REMEDIAL ACTION CONSTRUCTION AND COMPLETION REPORT

for the

Lockheed West Seattle Superfund Site

Seattle, Washington
(U.S. Region 10, CERCLA Docket No. 10-2015-0079)

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FINAL REMEDIAL ACTION CONSTRUCTION AND COMPLETION REPORT

LOCKHEED WEST SEATTLE SUPERFUND SITE REMEDIAL ACTION SEATTLE, WASHINGTON

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FINAL REMEDIAL ACTION CONSTRUCTION AND COMPLETION REPORT LOCKHEED WEST SEATTLE SUPERFUND SITE CERTIFICATION STATEMENT

To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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ACRONYMS AND ABBREVIATIONS

µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
AHA	activity hazards analysis
AIS	automatic identification system
ARAR	applicable or relevant and appropriate requirement
AWQC	ambient water quality criteria
CDF	controlled density fill
cm	centimeter(s)
COC	contaminant of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CQAP	*Construction Quality Assurance Plan*
CS1	construction season 1
CS2	construction season 2
CSL	Cleanup Screening Level
CUL	cleanup level
cy	cubic yard(s)
DO	dissolved oxygen
DMMU	dredged material management unit
DU	decision unit
EDD	electronic data deliverable
ENR	enhanced natural recovery
ESD	*Explanation of Significant Differences, 2013 Record of Decision Cleanup Levels: Lockheed West Seattle Superfund Site* (USEPA, 2015b)
Final Design	*Revised Final (100 Percent) Design* (Amec Foster Wheeler et al., 2018a)
HPAH	total high molecular weight polycyclic aromatic hydrocarbon
Lockheed Martin	Lockheed Martin Corporation
m^2	square meter(s)
mg/kg	milligram(s) per kilogram

mm	millimeter(s)
MHHW	mean higher high water
MLLW	mean lower low water
NTU	nephelometric turbidity unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
Port	Port of Seattle
PSR	Pacific Sound Resources
QC	quality control
RACCR	*Remedial Action Construction and Completion Report*
RAL	remedial action level
RAO	remedial action objective
RI/FS	remedial investigation and feasibility study
RML	residual management layer
RNA	regulated navigation area
ROD	Record of Decision
Site	Lockheed West Seattle Superfund Site
SMS	sediment management standards
SQS	sediment quality standards
SWAC	surface-weighted average concentration
TBT	tributyltin
TEQ	toxicity equivalent quotient
Tribes	Muckleshoot Indian Tribe and Squamish Tribe
UAO	Unilateral Administrative Order
USEPA	United States Environmental Protection Agency
Wood	Wood Environment & Infrastructure Solutions, Inc.

SECTION 1
INTRODUCTION

The Lockheed Martin Corporation ("Lockheed Martin") implemented a remedial action at the Lockheed West Seattle Superfund Site ("the Site"; Figure 1) pursuant to the *Unilateral Administrative Order for Remedial Design and Remedial Action: Lockheed West Seattle Superfund Site* (United States Environmental Protection Agency [USEPA] Docket No. 10-2015-0079/ Comprehensive Environmental Response, Compensation, and Liability Act) (UAO; USEPA, 2015a).

The USEPA issued a Record of Decision (ROD) for the Lockheed West Seattle Superfund Site ("Site"; USEPA, 2013a) and an associated Explanation of Significant Differences, 2013 Record of Decision Cleanup Levels: Lockheed West Seattle Superfund Site (ESD; USEPA, 2015b). The selected remedy presented in the ROD include the following elements:

- Dredge the former shipway area (westernmost portion of the Site) to remove sediments with contaminants of concern (COC) concentrations above the sediment quality standards (SQS), which are the lower of the two sediment comparison criteria under the Washington State sediment management standards (SMS). A thin layer (6 to 9 inches) of clean material will then be placed to cover dredge residuals and promote enhanced natural recovery (ENR).

- Dredge the Navigation Channel in the West Waterway to remove sediments with COC concentrations that exceed the SQS, and place a thin layer of clean material to cover dredge residuals and promote ENR.

- Dredge the former Dry Docks 1 through 3 area and other localized areas throughout the Site to remove sediments with COC concentrations above the cleanup screening levels (CSLs), which are the higher of the two SMS comparison values. A thin layer of clean material will then be placed to cover dredge residuals and promote ENR.

- Place a thin layer of clean material to promote ENR over the remainder of the subtidal area.

- Dredge the shoreline bank and intertidal zone (defined as areas extending from mean high higher water at plus [+] 11.3 feet mean lower low water (MLLW) to minus [-] 10 feet MLLW) to remove sediments with COCs at levels above the SQS, as structurally practicable, and backfill with clean material to grade.

- Remove debris, riprap, failing wooden bulkheads, and pilings as necessary or directed by the USEPA, and dispose of them off site.

- Dispose of dredged sediments and other related remediation materials by truck or rail transport to an appropriate offsite upland facility permitted to accept these materials.

- Place institutional controls (ICs) in the form of a proprietary control that runs with the property and that requires coordination with the USEPA and management of any residual contamination (above Cleanup Levels) that is disturbed or encountered in the event of future excavation or dredging within the boundaries of the Site. In addition, the current fish advisory for Recreational Marine Area 10 (Elliott Bay) under the Puget Sound Fish Consumption Advisory, established by the Washington State Department of Health, to reduce human exposure from ingestion of contaminated seafood will continue to be posted at the Site. The USEPA can revise the fish advisory as warranted.

- Conduct postremedial confirmation sampling of sediment and surface water.

- Conduct long-term monitoring at the Site. The monitoring interval and other criteria will be defined in the *Long-Term Monitoring and Maintenance Plan*. Additional monitoring, following identified triggering weather and seismic events, also will be defined in the *Long-Term Monitoring and Maintenance Plan*. If such events occur, bathymetric monitoring will be implemented to determine whether one or more components of the Selected Remedy are affected.

- Conduct five-year reviews, which will include sediment sampling for risk-driver COCs, bathymetric surveys to ensure that the thin cover/ENR layer remains in place, file reviews, and interviews with the landowner(s) pertaining to any development that has occurred at the Site since remediation was completed. Surface water and fish tissue samples will not be collected as part of five-year reviews.

The ROD also included a technical impracticability (TI) waiver. A TI waiver of the Federal ambient water quality criteria (AWQC) for arsenic was part of the Selected Remedy. As described in the TI waiver rationale memorandum (USEPA, 2013b), it was technically impracticable for remediation of contaminated sediments at this small, 40-acre Site to measurably improve the overall water quality for arsenic within the larger Elliott Bay, and there are no treatment technologies capable of surface water treatment for arsenic at the scale of Elliott Bay (approximately 5.42×10^{11} gallons, assuming no replenishment from Puget Sound). It was expected that arsenic concentrations in Elliott Bay would remain the same after Site cleanup. All Site-related arsenic sources are or were to be controlled after sediment remediation. The TI waiver applied only to AWQC exceedances at the Site and would not prevent the USEPA or other regulatory agencies from taking actions related to AWQC exceedances.

This *Remedial Action Construction and Completion Report* (RACCR) follows the requirements specified in the UAO and documents the cleanup action that was conducted at the Site over two construction seasons (August 2018 through March 2019 and September 2019 through March 2020) required to complete the work. All work was conducted under the oversight of USEPA in conjunction with the Port of Seattle and the Muckleshoot Indian Tribe and Suquamish Tribe (collectively "the Tribes"). In addition, the Washington State Department of Ecology provided oversight of the sediment transloading facility.

Sections 2 through 5 present summaries to allow the reader to understand the overall project without needing to read the details provided later in the document. Section 2 summarizes the remedial design, as detailed in the USEPA approved *Revised Final (100 Percent) Design* ("*Final Design*"; Amec Foster Wheeler et al., 2018a) and associated appendices that make up the Remedial Action Work Plan. Section 3 summarizes the construction, and Section 4 summarizes monitoring conducted during implementation of the remedy. Section 5 summarizes how the remedial action met the cleanup goals of the project.

Sections 6 through 10 provide details of the construction and monitoring. Section 11 discusses the health and safety procedures and protocols used during implementation of the project, and Section 12 provides information on the measures taken to reduce the impact of the remediation on the environment. Section 13 describes the decontamination protocol for construction equipment that was conducted after each of the field seasons. Section 14 discusses the prefinal and final construction inspection. Section 15 describes the institutional controls at the site in the *Institutional Control Implementation and Assurance Plan*. Section 16 provides the *Long-Term Monitoring and Maintenance Plan*, and Section 17 provides a summary of the lessons learned while constructing the project and how these lessons may impact future sediment remedial actions. Section 18 documents the costs incurred in complying with the UAO, and Section 19 presents a list of references cited in the text of the report.

Attached to the report is a DVD that contains the appendices to this report.

Appendix A – design drawings from the *Revised Final (100 Percent) Design* (Amec Foster Wheeler et al., 2018a) as well as design changes that were required where deeper dredging due to elevated concentrations of contaminants was required.

Appendix B – daily construction reports.

Appendix C – significant memos and includes the work window extension approvals, a memo on the addition of polyaromatic hydrocarbons (PAHs) to the suite of analyses that were required for certain portions of the site, and the Clean Water Act §404 ARAR Memoranda for the two construction seasons. Appendix D contains the minutes of the weekly construction meeting that were held during the project. Appendix E and Appendix F present the quality assurance inspection and testing reports and backfill material testing and approval, respectively.

Appendix G contains the dredged material management unit approvals, and Appendix H provides the core logs for the postdredging/prebackfill sampling. Appendix I provides the geospatial interpolations for each of the decision units. The as-built drawing for the site excluding the former shipway are provided in Appendix J, and the sediment data validation reports are presented in Appendix K.

The former shipway sheet pile wall deformation monitoring, shipway rock buttress and fill drawings, shipway concrete slab backfill memo, and shipway fill as-builts are presented in Appendix M, Appendix N, Appendix O, and Appendix P, respectively. Appendix Q contains the sediment and debris disposal records, Appendix R provides the weekly water quality monitoring reposts, and Appendix S provides the health and safety records. The *Pre-Final and Final Construction Inspections* report is provided in Appendix T. Provided in Appendix U is the *Institutional Control Implementation and Assurance Plan* and Appendix V is the *Long-Term Monitoring and Maintenance Plan* that was approved by USEPA as part of the design documents.

SECTION 2
SUMMARY OF REMEDIAL DESIGN

Lockheed Martin conducted the remedial action as a design-build project, with the contractor working with Lockheed Martin under a single contract to provide both final design and construction. The benefit of a design-build approach was the development of an integrated project design and implementation plan.

2.1 SITE REGULATORY BACKGROUND

The Site represents the aquatic portions of what formerly was known as Lockheed Shipyard No. 2, located near where the West Waterway enters Elliott Bay (Figure 1). The former shipyard uplands are currently owned by the Port of Seattle ("Port"). The Site was placed on the National Priorities List on March 7, 2007. Prior to this date, the Site was listed as a sediment cleanup priority project under State of Washington authority through the requirements of the Model Toxics Control Act. Lockheed Martin submitted the *Final Remedial Investigation/Feasibility Study, Lockheed West Seattle Superfund Site* to USEPA Region 10 in May 2012 (RI/FS; Tetra Tech, 2012). The RI/FS concluded that sediments within the Site contained elevated levels of several hazardous contaminants. Analytical data from surface and subsurface sediment samples indicate that metals, polychlorinated biphenyls (PCBs), tributyltin (TBT), and polycyclic aromatic hydrocarbons (PAHs) were the most frequently detected compounds in the study area. Dioxins and furans also were identified as contaminants of concern (COCs) based on their assumed presence at the Site.

Ship construction, dry dock ship repairs, vessel sandblasting, and painting resulted in contamination of underlying sediments in Elliott Bay. Sediments adjacent to the former shipyard could have been contaminated in several ways, including the following general mechanisms:

- Direct discharges from historical shipyard operations into the receiving water (e.g., loss of wastes from floating dry docks)
- Transport and discharge of historic and current storm water outfalls from adjoining upland areas

- Transport and discharge of contaminated groundwater from adjoining upland areas
- Atmospheric deposition from the shipyard
- Transport via sediment, water, or air from other sites or activities in the Site vicinity

Of these mechanisms, historical overwater operations at the former shipyard appear to have been the most significant historical source of sediment contamination. Soils contaminated by historical spills and other environmental releases have a potential pathway to the adjacent aquatic sediments from direct discharge, transfer through storm drain systems, or groundwater transport.

On August 28, 2013, USEPA issued the ROD for the Site based on the area identified in the RI/FS that warranted remedial action. The ROD presented a selected remedy (Figure 2) to address unacceptable human health risks associated with seafood consumption, net fishing, clamming, and beach play, as well as ecological risks posed to benthic invertebrates, fish, and birds. The USEPA selected remedy is described in detail in Section 2.3. The cleanup under the ROD represented the final remedial action for the Site.

In February 2015, USEPA issued an ESD to correct errors in Table 12 and Table 23 of the ROD that set forth cleanup levels for the Site. The ESD replaced these tables and described the differences between the ROD and the final details for cleanup levels of COCs at the Site[1].

On March 5, 2015, USEPA signed the UAO, documenting Lockheed Martin's responsibility for cleanup of the Site. A Statement of Work attached as Appendix B to the UAO defined the work to be accomplished in the remedial design and remedial action. The final plans and specifications, general provisions, and special requirements necessary to implement the ROD were developed during the remedial design. The remedial action was to be conducted based on the approved remedial design. At the time of the issuance of the UAO, Lockheed Martin did not own, lease, or otherwise control any of the Site, as documented in the 1992 agreement with the Port (when the property was purchased by the Port from Lockheed Martin), but was responsible to perform the work described in the UAO.

[1] In May 2014, the USEPA recognized that Tables 12 and 23 contained several errors, which necessitated preparation of this ESD. These errors included: 1) The units for certain COCs (PCBs, phthalates, and PAHs) were inadvertently listed as micrograms per kilogram organic carbon (μg/kg – OC) instead of milligrams per kilogram organic carbon mg/kg – OC). 2) The references for the Cleanup Levels for certain COCs were not cited correctly. 3) The spatial scale of exposure, or compliance basis, was mistakenly listed as "Sitewide" should have been listed as "Subtidal."

To support the design for the USEPA selected remedy, Lockheed Martin performed a predesign field investigation of surface and subsurface sediment, a geotechnical investigation in upland and offshore areas, structural evaluations, and additional bathymetric and debris surveys in November 2015 and January 2016. The complete report of these investigations can be found in the *Pre-Remedial Design Field Sampling Data Report* (Tetra Tech, 2016). The results of the predesign investigation were used to refine the selected remedy.

2.2 LOCKHEED WEST SEATTLE SITE DESCRIPTION

The Site is located near the confluence of the West Waterway and Elliott Bay, in Seattle, Washington (Figure 1). The Site is bordered by Elliott Bay on the north, the Harbor Island West Waterway Operable Unit on the east, Pacific Sound Resources (PSR) Marine Sediment Unit on the west, and the Port's Terminal 5 to the south. The Site includes the in-water marine sediments where the former Lockheed Shipyard No. 2 was located (the shipway and dry docks were located in the water over the sediments). The Site also includes a narrow shoreline intertidal bank (exposed during low tides) defined for this site as areas extending from plus [+]11.3 feet mean higher high water (MHHW) to minus [-]10 feet mean lower low water (MLLW) along the northern and eastern shorelines, as well as subtidal sediments (never exposed during low tides) that extend to -40 to -50 feet MLLW in historically dredged areas. The Site is impacted by tides, with additional influence from the Lower Duwamish Waterway, which flows into the West Waterway. In addition, at the time of remedial construction, numerous pilings remained within the footprint of the former shipway, and pier structures remained along the northern shoreline and in the northwestern portion of the Site within aquatic tidelands owned by the Port of Seattle.

The Site encompasses 40 acres of aquatic lands, including approximately 26 acres of state-owned aquatic lands managed by the Washington State Department of Natural Resources and 14 acres of aquatic tidelands owned or managed by the Port. The Site and adjacent aquatic areas are designated as Tribal Usual and Accustomed Fishing Areas. Designation as a Usual and Accustomed Fishing Area required Lockheed Martin to coordinate construction activities with the Tribes to reduce the impact to Tribal fishers. The bank and intertidal portions of the Site are accessible from the water. Access via land is currently restricted due to security fencing around Terminal 5.

The Site is located in a historically industrialized and commercial area of Seattle. Several former and current environmental sediment cleanup sites are located in the vicinity (Figure 1). These sites include the Pacific Sound Resources Marine Sediment Unit, the West Waterway Operable Unit, the Todd Shipyard Sediment Operable Unit, and the Lockheed Shipyard Sediment Operable Unit. The primary land uses near the Site have been industrial and maritime for over a century. The adjoining area of the West Waterway includes a federally maintained navigation channel and numerous privately maintained berthing areas.

Historical shipyard operations at the Site were discontinued in 1987, and no current ongoing sources of contamination remain from present uses of the Site. However, upland and upstream sources of contamination are present in the vicinity of the Site. These off-site sources represent potential future sources of contamination to the Site.

Surface water and sediment conditions at the Site are influenced by the natural counterclockwise flow of water and tidal influences in Elliott Bay. Elliott Bay is affected by nearby urbanization, and overall concentrations of certain contaminants in bay sediments are higher than concentrations identified as being protective of human consumption of seafood (USEPA, 2013a). Thus, contaminated sediment could migrate to the Site after completion of remediation as a result of sediment transport from adjacent off-site areas.

2.3 DESCRIPTION OF REMEDIAL ACTION DESIGN

In the Lockheed West ROD, USEPA selected a remedy comprising four key elements to address contaminated sediments at the Site (Figure 2):

1. Removal and disposal of identified debris along the shoreline and pilings in the former shipway (details in Appendix A)
2. Sediment remedial action, including sediment removal and disposal in selected areas; intertidal backfill placement; residuals management; and placement of an enhanced natural recovery (ENR) layer in undredged areas (details in Appendix A)
3. Institutional controls
4. Long-term monitoring and maintenance

Source control activities were completed previously by others under a separate order with the Washington State Department of Ecology and are not part of the USEPA selected remedy. The expected outcome of the selected remedy was dredging and removal of the most highly contaminated sediments at the Site and placement of ENR in areas with lower levels of sediment contamination. Following implementation of the remedy, the Site would be suitable for its current and anticipated future use, which includes a navigation channel. However, due to the ongoing presence of other contaminant sources in the area, the Site will not be suitable for unrestricted consumption of fish. (USEPA, 2013a).

2.3.1 Remedial Action Objectives

The ROD defined the following remedial action objectives (RAOs) to address the risks posed to human health and the environment:

- Human health risks:
  - RAO 1: Reduce human health risks associated with the consumption of resident seafood by adults and children with the highest potential exposure.
  - RAO 2: Prevent human health risks from direct exposure (skin contact and incidental ingestion) to contaminated sediments during net fishing, clamming, and beach play.
- Ecological risks:
  - RAO 3: Prevent risks to benthic invertebrates from exposure to contaminated sediments.
  - RAO 4: Prevent risks to crabs, fish, and birds from exposure to contaminated sediments.

The ROD and associated ESD set cleanup levels (CULs) for the Site COCs. These CULs represent Site-specific concentration limits to be achieved at the sediment surface (i.e., upper 10 centimeters [cm] in the subtidal zone, upper 45 cm in the intertidal zone) after dredging and placement of the dredge residual management/ENR layers or intertidal backfill and provide the basis for meeting the RAOs. The CULs for demonstrating compliance are listed in Table 1. Table 1 specifies four separate sets of CULs based on the potential exposure pathway and applicable RAO. Only a small portion of the Site, primarily at the head of the former shipway, is within the intertidal zone; therefore, CULs to be achieved are most generally the subtidal surface (upper 10 cm) concentration limits.

2.3.2 Construction Performance Standards

In addition to meeting the CULs in the top 10 to 45 cm, construction performance standards for the Site cleanup included the following:

- Remedial action levels (RALs; Table 2)—Contaminant concentrations that, when exceeded, triggered removal (dredging) of sediment. Dredging was determined to be complete at the bottom of the dredge prism when contaminant concentrations met the RAL rules detailed in Section 2.3.5. The dredge residual management layer (RML) was placed after this determination was made.

- Construction activity limits—Defined limits on environmental impacts related to construction activities, including the Federal ambient water quality criteria (AWQC) and other applicable or relevant and appropriate requirements (ARARs).

2.3.3 Remedial Action Area

Figure 3 shows an overview of the selected remedy. The remedial action area consisted of areas to be dredged followed by RML placement and areas to be remediated by placement of ENR. In order to manage the work effectively, the dredge areas were arranged into dredged material management units (DMMUs), and the ENR areas were arranged into work areas (Figure 3). A DMMU is a dredging area measuring roughly 50 feet by 200 feet (10,000 square feet), which generally corresponds to the practical operational limits of the dredge and dredge barge when the barge position is fixed. The DMMUs and ENR work areas were labelled with identifiers consisting of a number followed by a letter. Note that the DMMU numbering system is separate from and does not match the numbering used for the ENR work areas. But for both, the numbers indicate locations increasing from west to east, and the letters indicate positions ranging north/south, with the letters increasing from south to north for the DMMUs and from north to south for the ENR work areas (Figure 3).

To determine if dredging met the design requirements, the DMMUs were arranged into 16 decision units (DUs). During construction season 1 (CS1), USEPA approved the modification to the boundaries of the DUs defined in the final design documents. The boundary changes consisted of two modifications:

- The boundaries of the DUs on the western edge of the Site in the vicinity of the federal navigation channel were revised to address the two different sets of RALs (SQS and Cleanup Screening Levels [CSLs]) that apply in these areas (Table 2). To the east of the navigation channel (see Figure 2) the SQS criteria applied and to the west of the channel the CSL criteria applied.

- Steep-slope shoreline areas were removed from consideration for additional dredging once the initial design dredge depth was achieved regardless of chemical contamination criteria. This change was done because additional dredging beyond the design depth could over-steepen the shoreline bank, leading to potential instability and possibly affecting Port infrastructure. The design calculations for slope stability are provided in Appendix H of the *Revised Final (100 Percent) Design* (Amec Foster Wheeler et al., 2018a).

The revised DU layout is shown on Figure 3.

2.3.4 Remedial Action Activities

The remedial action comprised the following elements:

- Removal and disposal of shoreline debris
- removal of creosote-treated timber pilings
- dredging to remove contaminated sediment over approximately 15 acres
- within the dredge area placement of:
  - a minimum 6-inch-thick RML consisting of sand over approximately 11.5 acres of the dredged subtidal area
  - gravel beach mix with fish mix over approximately 1.3 acres of intertidal area
  - sand over 0.2 acre in the subtidal area of the former shipway
  - riprap over approximately 2.1 acres in areas where shoreline debris was removed or in areas of the dry dock dredge slopes
  - gravel beach mix, fish mix, and sand placed to presconstruction grade in the shipway
- a minimum 6-inch-thick ENR layer consisting of sand over approximately 24.9 acres of undredged subtidal area

The USEPA-approved design drawings for the remedy are provided in Appendix A.

After dredging was completed in each DMMU, a confirmation hydrographic survey was conducted to determine if the dredging met the design prism criteria. The dredging design prism criteria for the project were:

- No material more than 0.5 foot above the design elevation could be left in place.
- At least 90% of the DMMU needed to be at or below the design elevation.
- No more than 500 contiguous square feet of area above the design elevation could be left in place.

If the confirmation survey showed that the DMMU did not meet the design criteria, then additional dredging was conducted, and a new confirmation hydrographic survey of the redredged area was completed. See Section 6.6.4 for discussion of meeting these criteria.

2.3.5 Dredging Chemical Criteria

When it was determined that the DMMU met the design depth criteria, then confirmatory sediment sampling was conducted to assess conformance with sediment chemical criteria, per the *Field Sampling Plan* (Appendix P of the *Final Design* [Amec Foster Wheeler et al., 2018b]).

When all the samples were collected and analyzed within a DU, a geospatial interpolation was conducted following the methods detailed in the *Field Sampling Plan* (Appendix P of the *Final Design*; Amec Foster Wheeler et al., 2018b). The geospatial interpolation was used to determine a surface-weighted average concentration (SWAC) for each of the COCs. The following rules were used to determine if the dredging objectives were met and the RML or backfill could be placed without additional dredging:

- The SWAC was less than the applicable RAL shown in Table 2.
- No more than 20% of a given DU area could be over 2 times the RAL.
- No point or area could be greater than 3 times the RAL.

If all three chemical criteria were met within a DU, then the RML backfill material could be placed within the boundaries of the DU. If the chemistry results failed any of the above rules, the dredging was extended to the area(s) that led to the exceedance using the geospatial interpolation conducted to calculate the SWAC. Areas that failed the chemical criteria were redredged and then reevaluated to determine if the dredging met the revised design depth criteria discussed above. The depth of additional dredging was determined based on analysis of the archived samples: dredging extended to the shallowest interval that, when incorporated into the SWAC calculation, met all the RALs (see Section 6.6.5).

2.3.6 Post-ENR and RML Placement Chemical Criteria

After placement of the ENR or RML, the surface material was sampled to determine if the postconstruction surface met the CULs identified in Table 1. If the postconstruction sediment concentrations were less than the RAO-specific CULs, the RAOs would be met for the site.

SECTION 3
SUMMARY OF CONSTRUCTION

The remedial construction work was completed over two construction seasons, 2018 to 2019 and 2019 to 2020. The in-water work windows have been established for the protection of migrating salmon. In-water work was confined to August or September, depending on the construction activity, to mid-February during each construction season although as described below the mid-February end date was extended for both construction seasons due to the need to complete additional work.

The approval of the extensions of the work window from the National Marine Fisheries Service and the United States Fish and Wildlife Service was facilitated by USEPA. The approval of the extension of the work window from the Washington Department of Fish and Wildlife was requested directly by Lockheed Martin.

The remedial work was conducted in accordance with the USEPA-approved *Revised Final (100 Percent) Design* ("*Final Design"*; Amec Foster Wheeler et al., 2018a) documents and the remedial action work plans, which are appendices to the *Final Design*. Daily construction reports are included in Appendix B. Material quantities removed or placed during the two-season project are listed below.

- 1,200 tons of debris (in-water and shoreline) were removed
- 790 pilings (930 tons) were removed
- 182,600 tons (134,300 cubic yards [cy]) of dredge material were removed
- 136,800 tons (100,600 cy) of backfill and shoreline protection materials were placed, which consisted of:
  - 80,300 tons (59,500 cy) of enhanced natural recovery (ENR)/residual management layer (RML) material
  - 10,200 tons (7,900 cy) of gravel beach mix

- 3,200 tons (2,500 cy) of fish mix
- 9,800 tons (7,000 cy) of filter rock
- 33,200 tons (23,800 cy) of riprap

3.1 CONSTRUCTION SEASON 1

Figure 4 summarizes the work completed during construction season 1 (CS1). During CS1, approximately:

- 1,200 tons of debris (in-water and shoreline) were removed
- 790 pilings (930 tons) were removed
- 114,100 tons of dredge material were removed (approximately 86,000 cy)
- 63,300 tons (46,600 cy) of backfill and shoreline protection materials were placed, consisting of:
  - 39,200 tons (29,000 cy) of ENR/RML material
  - 4,900 tons (3,800 cy) of gravel beach mix
  - 1,700 tons (1,300 cy) of fish mix
  - 3,900 tons (2,800 cy) of filter rock
  - 13,500 tons (9,700 cy) of riprap

Construction work began on August 13, 2018, with pile removal in the former shipway and shoreline debris removal. On August 21, 2018, work was halted due a regional crane operator's labor strike that impacted multiple work sites in Washington State; work resumed on September 10, 2018. CS1 work was completed on March 28, 2019, after USEPA and the natural resource agencies approved an extension of the construction work window. The extension approval is provided in Appendix C. The extension from February 16 to March 31, 2019, allowed for placement of clean backfill (ENR, RML, gravel beach mix, fish mix, or riprap). During the extension, no dredging was performed.

Dredging was conducted during CS1 in DUs 3, 4, 6–8, and 11–16. At the end of CS1, dredging was completed, the chemical contaminant compliance rules were met, and RML had been placed in decision units (DUs) 11, 12, 13, and 14 (Figure 4). In DUs 3, 4, 6, 7, and 15, dredging to the design elevations was completed, but each of these DUs failed to meet the chemical contaminant compliance rules. Additional dredging was conducted in these DUs during construction season 2 (CS2). A more detailed discussion of the DU dredging is provided in Section 6.6.

In DU 8, dredging was completed, and the chemical contaminant compliance rules were met; however, RML was placed over only a portion of the dredged material management units (DMMUs) that comprised DU 8. RML was placed over only a portion of DU 8 because of the proximity of the adjacent DU 7, which required additional dredging.

The dredge design elevations in the former shipway (DU 16) were generally met except for a small area adjacent to the sheet pile wall on the west side of the shipway. In this area, the sheet pile wall deformed during dredging, which precluded dredging to the design elevation. Due to the deformity of the sheet pile wall, additional engineering was required for stabilization of the wall. This issue is discussed further in Section 6.7. As described above, several DUs were dredged to the original design elevations but did not meet the chemical contaminant compliance rules; these areas were redredged during CS2. In the DUs that did not meet the chemical criteria, a 3-inch layer of sacrificial temporary RML material was placed at the end of CS1 in DMMUs where concentrations of contaminants exceeded the RALs and were greater than the preconstruction concentrations.

ENR material was placed over about 58% of the ENR areas (approximately 13.3 acres of 22.9 acres) during CS1. ENR material was not placed adjacent to DUs that required dredging during CS2 to reduce the potential for dredge residuals to be deposited on the ENR layer (see Figure 4).

3.2 CONSTRUCTION SEASON 2

During CS2, dredging was completed in DUs where dredging was begun in CS1 and not completed (DUs 3, 4, 6, 7, 8, and 15). In addition, dredging was completed in DUs 1, 2, 5, 9, and 10. All the remaining ENR, RML, and slope protection material (filter rock and riprap) was placed during CS2.

During CS2 approximately:

- 68,500 tons of dredge material were removed (approximately 48,300 cy)

- 73,500 tons (54,000 cy) of backfill and shoreline protection materials were placed, consisting of:
  - 41,100 tons (30,400 cy) of ENR/RML material
  - 5,300 tons (4,100 cy) of gravel beach mix
  - 1,500 tons (1,200 cy) of fish mix
  - 5,800 tons (4,200 cy) of filter rock
  - 19,700 tons (14,100 cy) of riprap

Construction work began on September 3, 2019. On January 31, 2020, Lockheed Martin received an extension of the in-water work window from the Washington Department of Fish and Wildlife to allow construction to continue until March 31, 2020 (Appendix C). The in-water work window extension was required to allow additional dredging and backfilling in DU 5. It was determined that it was necessary to remove elevated concentrations of mercury in sediment at the toe of the newly constructed riprap slope adjacent to the federal navigation channel (see Sections 6.6.4 and 6.6.5 for additional detail). This work was conducted in March 2020. All in-water work was completed on March 25, 2020.

SECTION 4
SUMMARY OF REMEDY IMPLEMENTATION MONITORING

Monitoring required during implementation of the remedy was performed as described in the *Field Sampling Plan* (Appendix P of the *Revised Final (100 Percent) Design* [“*Final Design”*; Amec Foster Wheeler et al., 2018b]), the *Water Quality Monitoring Plan* (Appendix M of the *Final Design* [Amec Foster Wheeler et al., 2018c]), and the *Updated Final Memorandum, Clean Water Act §404 ARAR Memo: Substantive Water Quality Requirements for the Lockheed West Seattle Superfund Remedial Action* (“Clean Water Act §404 ARAR Memo; USEPA, 2018, 2019).

The monitoring program was implemented to determine if the following goals were met for the project:

- Backfill used at the Site met the cleanup levels (CULs) for the metals and organic contaminants of concern (COCs) (Table 1). See Section 6.3 for results of this monitoring.
- The postdredge surface within each of the decision units (DUs) shown on Figure 3 met the remedial action levels (RALs; Table 2). See Section 6.6.5 for postdredge surface sampling information and analytical results.
- In-water construction activities would not adversely affect water quality. The water quality monitoring results are presented in Section 8.
- The postconstruction surface sediments met the CULs (Table 1) on a surface-weighted average concentration (SWAC) basis or on a point-by-point basis as appropriate for the remedial action objective (RAO). Meeting the CULs for the COCs would protect human health and benthic organisms after placement of the enhanced natural recovery (ENR) and residual management layer (RML). Postconstruction sediment sampling is discussed in Section 9.
- Dredging, backfill placement, and other construction activities with the potential to cause resuspension and transport of contaminated sediments off site did not contribute to off-site spread of contamination. The results of the pre- and postconstruction perimeter monitoring are presented in Section 10.

4.1 QUARRY SAMPLING FOR CHEMISTRY AND PHYSICAL PROPERTIES

Samples of fine-grained material (i.e., sand) were collected and analyzed for COCs to determine if the source of proposed fill materials met the required specifications and if the levels of COCs were either undetected or below concentrations that would be deleterious to human health or marine life when placed in the marine environment. Riprap, filter rock, and gravel materials (fish mix and gravel beach mix) were not chemically analyzed; however, a visual inspection of the quarry was conducted to determine that the source material was from an undisturbed source (native rock). All fine-grained material placed at the site had COC concentrations that were less than the CULs (Table 1). See Section 6.3 for additional detail.

4.2 POSTDREDGING SEDIMENT CHEMISTRY MONITORING

As described in Section 2.3, once dredging was completed within a dredged material management unit (DMMU; met design prism criteria; see Section 6.6.4), sediment core samples were collected at 0.5-foot intervals within each of the DMMUs shown on Figure 3. When all the samples were collected and analyzed within a DU, a geospatial interpolation was conducted to determine if the interpolated chemical concentrations met the dredging chemical criteria specified in Section 2.3.5.

Analytes that were used in the geospatial interpolation were the risk-driver COCs with corresponding RALs in Table 2 (i.e., arsenic, coper, lead, mercury, and PCBs). Based on a request by USEPA, polycyclic aromatic hydrocarbons (PAHs) were added as target analytes for confirmation samples in selected locations within the project area (shipway and DU 6) and benzo(a)pyrene was used as an indicator compound for cPAHs in the geospatial interpolation.

If all three chemical criteria were met within a DU (Section 2.3.5), then the RML backfill material was placed within the boundaries of the DU. If the chemistry results failed any of the above rules, the dredging was extended to the area(s) that led to the exceedance using the geospatial interpolation conducted to calculate the SWAC. Areas that failed the criteria were redredged and then reevaluated to determine if the dredging met the design prism criteria discussed in Sections 2.3 and 6.6.4. The depth of additional redredging was determined based on analysis of the archived samples: dredging extended to the shallowest interval that, when incorporated into the SWAC calculation, met all the RALs.

DUs or portions of DUs that were in sloped areas along the shoreline (portions of DUs 5, 7, and 8; Figure 3) were not evaluated against the decision rules because potential slope stability issues precluded additional dredging in these areas. These areas were dredged to the design depths and samples were collected in these areas for informational purposes only. Also, in DU 16 (the shipway), the instability of a sheet pile wall precluded additional dredging near the wall (see Section 6.7).

Chemical compliance monitoring was conducted at 129 unique sample locations over the 14.8-acre dredging footprint, representing about 1 sample per 0.1 acre. Based on the results of the geospatial interpolations, 11 of the 15 DUs (not including the former shipway) did not meet all three chemical compliance rules and required additional dredging. Results of the chemical compliance analyses are described further in Section 6.6.5.

4.3 WATER QUALITY MONITORING DURING IN-WATER WORK

Water quality monitoring was conducted to ensure that in-water construction activities complied with the Clean Water Act §404 ARAR Memoranda (USEPA, 2018, 2019; Appendix C). The monitoring followed the requirements detailed in the *Water Quality Monitoring Plan* (Appendix M of the *Final Design* [Amec Foster Wheeler et al., 2018c]) and the Clean Water Act §404 ARAR Memoranda.

Conventional water quality parameters (i.e., temperature, dissolved oxygen, turbidity and pH) were measured in the field using a direct read multiparameter data sonde. Chemical compliance monitoring for copper, lead, mercury, zinc and total PCBs was also conducted. Samples were collected using a water sampling bottle and sent to an analytical laboratory for analysis. Activities that were monitored included dredging, barge dewatering, placement of backfill materials (ENR, RML, filter rock, gravel beach mix, and fish mix), in-water debris and pile removal, and shoreline debris removal.

The objectives of the water quality monitoring and management activities were to:

- Ensure that the water quality performance criteria prescribed by the Clean Water Act §404 ARAR Memoranda (USEPA, 2018, 2019; Appendix C) were met during implementation of the remedial action.

- Monitor for the presence of oil sheens and document their extent and persistence.

- Establish contingency measures and corrective action if unacceptable conditions were detected.

During the 100 days of monitoring during construction season 1 (CS1), 217 rounds of monitoring were conducted, with turbidity exceeding the water quality compliance criterion during 31 rounds. Most of the turbidity exceedances during CS1 occurred during backfill placement. Also, during CS1, dissolved oxygen concentrations were below the water quality criterion during 16 monitoring rounds. The low dissolved oxygen concentrations were due to an area-wide phenomenon and not related to construction activities (see Section 8.1.1).

During CS1, water samples collected as described in the *Water Quality Monitoring Plan* (Appendix M of the *Final Design* [Amec Foster Wheeler et al., 2018c]) and the Clean Water Act §404 ARAR Memoranda (USEPA, 2018, 2019) and were analyzed for copper, mercury, lead, zinc, and polychlorinated biphenyls (PCBs). Based on the analytical results, no exceedances of the chronic water criteria occurred during CS1. See Sections 8.1.1 and 8.2.1 for additional details on monitoring results during CS1.

During the 62 days of monitoring during construction season 2 (CS2), 153 rounds of monitoring were conducted, with turbidity exceeding the water quality compliance criterion during four rounds. Three of the turbidity criterion exceedances occurred during backfill placement, and one occurred during dredging. During CS2, four water samples were analyzed for copper, mercury, lead, zinc, and PCBs; all analytical results were below the chronic water quality criteria. The results of water quality monitoring during CS2 are detailed in Sections 8.1.2 and 8.2.2.

4.4 BACKFILL THICKNESS MONITORING

The entire 40-acre Site was covered with ENR or RML material, riprap, or gravel material (Figure 2). An average 6-inch layer of ENR or RML material was placed across most of the 40-acre Site. Riprap was placed along the shoreline slopes across portions of DUs 5, 7, and 8; a portion of the western side of the shipway; and DU 14. Gravel material (fish mix and gravel beach mix) was placed along the shoreward portions of DU 16 (shipway), DU 1, and DU 15.

To verify that placement of the ENR and RML material met the design specifications (i.e., average of at least 6 inches; with a minimum of 4 inches except on slope areas where the minimum was 3 inches), weighted buckets ("rain gauges") were used to measure the thickness of the placed material. See Sections 4.1.5.2 and 4.1.5.3 of the *Construction Quality Assurance Plan* (Amec Foster Wheeler et al., 2018g).

There were 184 rain gauges within the approximately 23 acres of ENR placement (approximately 8 rain gauges/acre) and 138 rain gauges within the approximately 13.3 acres (about 10 rain gauges/acre) of dredge area to measure thickness of the placed ENR or RML material. RML and ENR placement is further described in Sections 6.6.7 and 6.8, respectively.

In areas where ENR or RML material was placed, sampling was conducted to confirm that the COC concentrations at the postplacement sediment surface (upper 0 to 10 cm) were below the CULs (see Table 1). The results of sampling were used to calculate a SWAC using the geospatial methods described in the *Field Sampling Plan* (Appendix P of the *Final Design* [Amec Foster Wheeler et al., 2018b]). Areas covered with riprap or coarser gravel (fish mix and gravel beach mix) materials that could not be effectively sampled were excluded from the SWAC calculations. The results of the geospatial interpolation show that for all contaminants, the SWAC was less than the SWAC CUL and all concentrations were below applicable point CUL. (See Section 9 for additional detail.)

4.5 PERIMETER SEDIMENT CHEMISTRY MONITORING

Pre- and postconstruction sampling was conducted outside of the project area boundary adjacent to areas where active remediation (i.e., dredging) occurred. The objective of this pre- and postconstruction perimeter monitoring was to determine if increases in concentrations of COCs with corresponding RALs (Table 2) occurred in postconstruction perimeter surface sampling areas outside the project area boundary relative to their preremediation concentrations. The results for the pre- and postconstruction perimeter monitoring are fully described in Section 10 and show that postconstruction concentrations of contaminants adjacent to the construction area were about the same as the preconstruction concentrations; therefore, the remedial action did not have an effect on the area outside of the remedy footprint.

SECTION 5
PROVIDING A FINAL REMEDY BY MEETING RALs AND CULs

The purpose of this remedial action was to provide an environmentally protective final remedy through dredging of contaminated sediment and placement of clean cover material. This section presents summaries of pre-, during-, and postconstruction data that demonstrate the effectiveness of the remedy and confirm that the cleanup criteria established in the Record of Decision (ROD) were met. Details of the work execution are presented in Sections 6 through 12.

Protectiveness of the remedy is demonstrated by the attainment of remedial action levels (RALs; Table 2) at the postdredge sediment surface and the attainment of cleanup levels (CULs; Table 1) at the final sediment surface following placement of residual management layer (RML) and enhanced natural recovery (ENR) materials. Note that as indicated in Table 1, some of the CULs are measured as point concentrations while others are based on surface-weighted average concentrations (SWACs) for the surface of the entire project site.

5.1 REMEDIAL ACTION OBJECTIVES

The Remedial Action Objectives (RAOs) identified in Section 2.3.1 were met by achieving the CULs specified in Table 1 in the following ways:

- Human health risks:
  - RAO 1 was met when Site-wide average concentrations of contaminants of concern (COCs) in the upper 45 cm of intertidal sediment and in the upper 10 cm of subtidal sediment did not exceed CULs that are based on human consumption of seafood caught or gathered at the Site.
  - RAO 2 was met when Site-wide average concentrations of COCs in the upper 45 cm of intertidal sediment and in the upper 10 cm of subtidal sediment did not exceed the CULs that are based on direct contact with sediment during net fishing, Tribal clamming, or beach play.

- Ecological risks:
  - RAO 3 was met when point-by-point concentrations of COCs in the upper 10 cm of intertidal and subtidal sediments did not exceed CULs based on protection of benthic invertebrates (Sediment Quality Standards [SQS][2] values).
  - RAO 4 was met when Site-wide average concentrations of COCs in the upper 10 cm of intertidal and subtidal sediments did not exceed CULs that are based on protection of crabs, fish, and birds.

5.2 RISK-DRIVER CONTAMINANTS OF CONCERN

Risk-driver COCs were selected during the Remedial Investigation/Feasibility Study (Tetra Tech, 2012) recognizing that removal of these compounds addresses the majority, if not all, of the contaminant-exposure risk. Risk-driver COCs consisted of those contaminants that individually or in combination with other contaminants posed elevated risks for a given human-health exposure scenario or ecological receptor. Eight contaminants were identified as risk-driver COCs (arsenic, copper, carcinogenic PAHs [CPAHs], dioxins/furans, lead, mercury, total polychlorinated biphenyls [PCBs], and tributyltin [TBT]; Table 2); however, three of the COCs (TBT, cPAHs, and dioxins/furans), do not have regulatory-based criteria for protection of benthic organisms so no RAL values are listed for these COCs in Table 2.

5.3 CLEANUP EFFECTIVENESS

The cleanup approach was developed based largely on the distribution of the five risk-driver COCs with established RALs: arsenic, copper, lead, mercury, and PCBs. Dredging was conducting in areas where the existing surface sediment concentrations were above the RALs. A layer of clean material (RML) was then placed over the dredged surface to manage any residuals that may been generated during dredging. A layer of clean material (ENR) was also placed over the remainder of the Site which had lower concentrations of the risk-driver COCs.

5.3.1 Attainment of Remedial Action Levels at Dredge Leave Surface

Interpolated surface sediment concentrations of the five risk-driver COCs were calculated within the large contiguous dredge area consisting of decision units (DUs) 3, 4, 5, 6, 7, 8, and 9 (Figure 3)

2. Applicable or relevant and appropriate requirements (ARARs) were frozen at the time the ROD was signed (August 2013). Therefore, the revised (2014) Washington State Sediment Management Standards terminology was not used at this Site because these standards were not an ARAR at the time the ROD was signed. The cleanup screening levels and SQS terminology was used for all work related to the Site.

both (1) prior to the remedial action and (2) after dredging but prior to backfill placement. As described in Section 2.3.5, there were three rules that had to be met after dredging prior to placement of the RML.

- The SWAC was less than the applicable RAL.
- No more than 20% of a given DU area could be over 2 times the RAL.
- No point or area could be greater than 3 times the RAL.

The results are presented in Chart 1, which shows the before and after dredging SWAC, maximum contaminant concentration at any sample location, where the maximum concentration was located, and the percentage the dredge area that exceeded 2 times the RAL. The values are compared to the RALs, which apply to the postdredge surface.

Chart 1

Concentrations of Risk-Driver Contaminants of Concern within Dredge Area Prior To and After Dredging

	Risk-Driver COC	RAL	Surface-Weighted Average Concentration[1]	Maximum Point Concentration[1]	Area of Maximum Concentration[3]	Percent of Area Exceeding 2 Times the RAL
Predredge Surface	Arsenic	57/93 [2]	56.3	367	CSL	16.3%
	Copper	390	419.2	2170	NA	12.1%
	Lead	530	182.4	889	NA	0.0%
	Mercury	0.41/0.59 [2]	1.2	12.6	SQS	43.6%
	Total PCBs	180/960	737.2	4420	CSL	34.8%
Postdredge Surface	Arsenic	57/93	13.3	226	CSL	0.6%
	Copper	390	82.8	959	NA	0.4%
	Lead	530	37.8	352	NA	0%
	Mercury	0.41/0.59	0.25	1.9	CSL	13.3%
	Total PCBs	180/960	137.2	2004	CSL	15.0%

1. Concentrations of arsenic, copper, lead, and mercury are in milligrams per kilogram (mg/kg), and the concentration of total PCBs is in micrograms per kilogram (µg/kg).
2. Arsenic, mercury, and total PCBs have two remedial action levels, which correspond to the Sediment Quality Standard (SQS) or the Cleanup Screening Level (CSL), depending on location. East of the navigation channel boundary the SQS applies (lower of the two values), and west of the boundary the CSL applies.
3. Location of maximum point concentration. If SQS or CSL noted in the column, the maximum concentration is located as indicated in Note 2 (east or west of the navigation channel boundary. If the column has a NA, there is a single SQS/CSL value for the RAL and the location is not relevant.

SWAC >RAL

SWAC <RAL

When compared to the predredge condition, the postdredge concentrations of risk-driver COCs were substantially reduced by the dredging component of the remedy. For example, arsenic had a predredge SWAC of 56.3 milligrams per kilogram (mg/kg) and after dredging the SWAC was 13.3 mg/kg. The maximum point concentration of arsenic prior to dredging was 367 mg/kg and after dredging the maximum concentration 226 mg/kg; because the 226 mg/kg was located within the Cleanup Screening Level (CSL) area, the concentration was less than 3 times the RAL. Prior to dredging, 16.3% of the dredge area had concentrations of arsenic that were greater than 2 times the RAL; after dredging the percentage of the area that was greater than 2 times the RAL was only 0.6%.

After dredging was completed, the SWAC for each risk-driver COC was below the respective RAL, as was required in the ROD. For copper and mercury, the SWACs in the dredged area met the RAL, and the more protective CULs (Table 1). The postdredge SWAC for copper was 83 mg/kg, which was below the required RAL of 390 mg/kg and the CUL of 114 mg/kg. The postdredge SWAC for mercury was 0.25 mg/kg, which was below the required RAL of 0.41 or 0.59 mg/kg and the CUL of 0.41 mg/kg.

The maximum point concentrations for each of the risk-driver COCs were less than 3 times the RAL except for a single mercury sample in the riprapped slope area where additional dredging could not be conducted (see Sections 2.3.3 and 4.2). The percentage of the area that exceeded 2 times the RAL after dredging was less than 20% for all the risk-driver contaminants. Except for the single mercury sample in the shoreline slope area that exceeded 3 times the RAL, the rules were met at all dredged areas.

5.3.2 Attainment of Cleanup Levels at Site Surface

Interpolated surface sediment concentrations of the five risk-driver COCs were calculated for the entire Site both (1) prior to the remedial action and (2) after dredging and placement of ENR and RML material. Chart 2 presents the pre- and postremedial action SWACs and maximum point concentrations for the five risk-driver COCs across the surface of the entire Site and shows that there was a substantial reduction in the postremedial action surface sediment concentrations as compared to the preremedial action concentrations. In addition, the postremedial action sediment surface met the CULs. Also shown in Chart 2, the SWACs for the five risk-driver COCs showed at least 95% reduction in concentration as compared to the preconstruction Site conditions.

Chart 2

Concentrations of Risk-Driver Contaminants of Concern Across the Site Prior To and After ENR/RML Placement

	Risk-Driver COC	SWAC-Based Comparison		Point-Based Comparison			Percent Reduction in SWAC (Preremedial Action vs Postremedial Action)
		CUL	Calculated Site SWAC	CUL	Maximum Point Concentration Across Site	Percent of Sample Locations Exceeding CUL	
Preremedial Action Surface Sediment	Arsenic	7	37.3	57	338	22%	
	Copper	114	221.5	390	2170	22%	
	Lead	11	109.8	NA	1420	NA	
	Mercury	0.41	0.53	0.41	12.6	50%	
	Total PCBs	2	356	180	2240	66%	
Postremedial Action Surface Sediment	Arsenic	7	1.8	57	5.59	0%	95.2%
	Copper	114	11.7	390	43.8	0%	94.7%
	Lead	11	1.6	NA	24.5	0%	98.5%
	Mercury	0.41	0.01	0.41	0.055	0%	98.1%
	Total PCBs	2	1.6	180	8.9	0%	99.6%

Concentrations of arsenic, copper, lead, and mercury are in mg/kg and the concentration of total PCBs is in micrograms per kilogram (µg/kg).

NA = No point CUL

SWAC or Point > CUL (yellow)

SWAC or Point < CUL (blue)

The data presented in Chart 1 and Chart 2 demonstrate that the remedial action met the RAOs for the project.

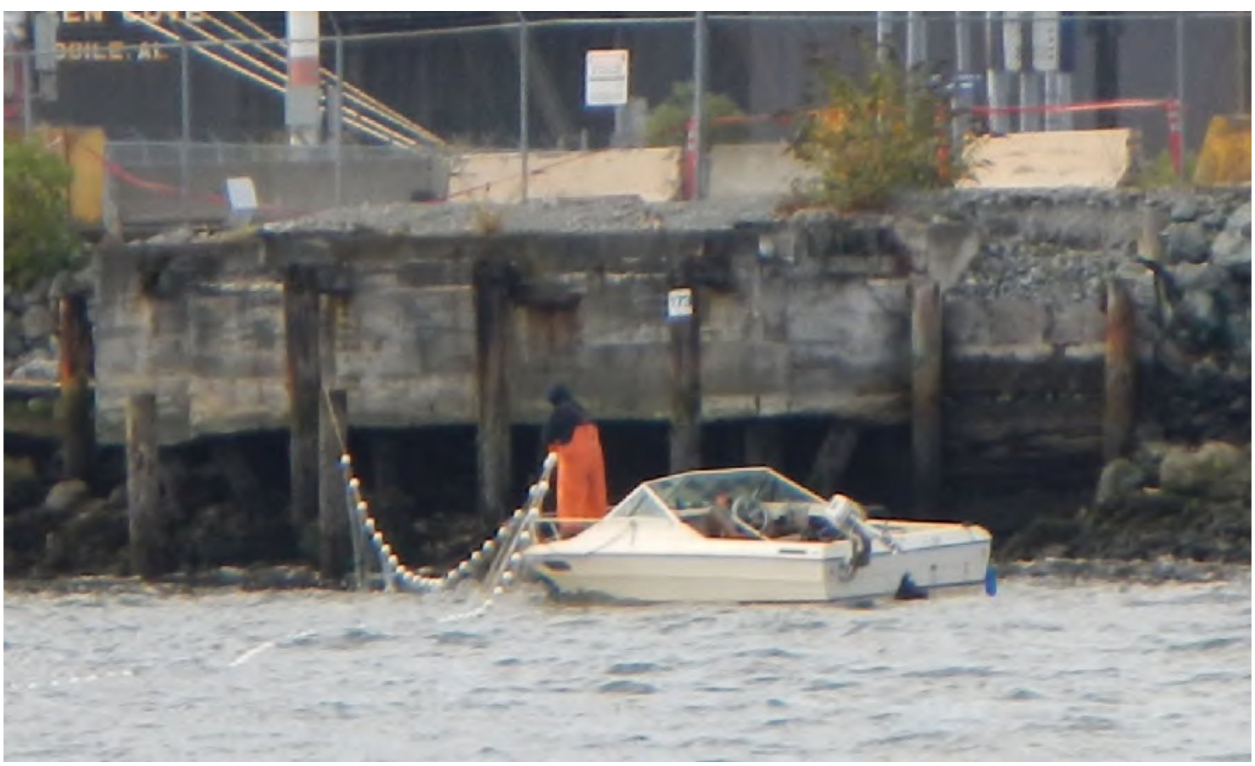
SECTION 6
CONSTRUCTION AND SUPPORTING ACTIVITIES

This section presents a summary of activities that were conducted to facilitate remedial construction and a description of the construction work. The section also describes significant revisions to the approved design documents that were required as the work progressed during the two construction seasons.

6.1 TRIBAL COORDINATION

Construction during the two construction seasons overlapped fishery openings by the Muckleshoot Indian Tribe and Suquamish Tribe ("Tribes") for salmon and steelhead fishing within Elliott Bay and the Duwamish Waterway (Photo 1).

Photo 1 Tribal Fisher Deploying Gillnet at Lockheed West Seattle Superfund Site During Remedial Construction



During construction season 1 (CS1), construction overlapped tribal fisheries from late summer 2018 into January 2019. During construction season 2 (CS2), construction overlapped the tribal fisheries from late summer 2019 into November 2019. During CS2, the Tribes experienced very low returns for all salmon species fished. As a result, a very noticeable decline in participation by tribal fishermen occurred during CS2 compared to CS1. These fisheries did not have predetermined opening and closing dates but instead were driven by the actual arrival of the target species, as determined by test fisheries conducted by the Tribes. For example, the Tribes expect from historical data a salmon run will arrive approximately in early September, but the fishery opening date was determined based on the result of a test fishery. This variance in the exact date of a specific fishery opening along with the large number of tribal fishermen typically working on the waterways (again, decreased during CS2 compared to CS1) necessitated ongoing coordination between the Tribes and the project team.

Regardless of the length of the fishery or participation by the fishermen, coordination between the Tribes and the project team was required while each fishery was open. During the timeframe of the different fisheries, coordination between designated points of contact for the project team and the Tribes fisheries services was achieved through the following procedures.

- Compensation was given to the Tribes for site access and displacing fishing.
- One designated point of contact was identified for each of the Tribes and one for the Lockheed Martin project team.
- Tribes were updated by the project with a summary of scheduled activities to take place on site and the location on site where these activities were to occur.
- The Muckleshoot Indian Tribe's Net Fishery Hotline was monitored, which is a weekly notification to Tribal fishermen and users of the waterway as to which river-miles of the Duwamish Waterway or locations within Elliott Bay were open to fishing and the dates/times these areas would be opened and closed to tribal fishing.
- The designated Tribal fisheries service coordinators were notified of all upcoming traffic of barges that would either be arriving on site or transiting between the dredge and transload site in Slip 4 in the Lower Duwamish Waterway. Information contained in these notifications included but were not necessarily limited to:
  - name of barge being moved
  - estimated time of departure and location of departure point

   - estimated time of arrival and location of destination
   - name of tugboat(s) to be used during barge traffic

- Once received by the Tribal fisheries service coordinators, information in the above notifications was disseminated to the Tribes' fisheries coordination personnel in the field, where they could determine and notify which tribal fishermen might be affected by the upcoming barge traffic and check in the field if a net move was warranted.

- If a net move was required, the above information was used to file the appropriate paperwork so that the tribal fisherman was compensated for lost fishing time or to identify that the net move was not caused by the project but instead another user of the waterway that was not affiliated with the project. During CS1, tribal nets were required to be moved on 17 occasions to facilitate transit of barges in the Duwamish Waterway. During CS2, there were six net moves to facilitate transit of barges and two net displacements of 5 days duration each when the nets were located within a dredge area.

Due to the importance of the Chinook salmon fishery to the Tribes, Lockheed Martin halted in-water work in CS1 during the time of the Chinook salmon fishery (August 15 and 16, 2018) to eliminate any impacts to Tribal fishers.

This coordination between the project team and the Tribes resulted in no Tribal fishery conflicts during construction.

6.2 SUMMARY OF DAILY AND WEEKLY CONSTRUCTION ACTIVITIES

As described in Section 3.1, CS1 in-water construction work began on August 13, 2018, and on August 21, 2018, work was halted due a crane operator's labor strike. After the labor strike was settled, work resumed on September 10, 2018. CS1 work was completed on March 28, 2019, after the United States Environmental Protection Agency (USEPA) and the natural resource agencies approved an extension of the construction work window from February 16 to March 31, 2019.

As described in Section 3.2, CS2 work began on September 4, 2019, and was completed on March 25, 2020, after Lockheed Martin received an extension of the in-water work window through March 31, 2020, from the Washington Department of Fish and Wildlife on January 31, 2020.

Appendix B contains the daily construction reports. Appendix D contains the minutes of the weekly construction meetings attended by Lockheed Martin, the construction team, USEPA, and stakeholders.

Appendix E presents the quality assurance inspection and testing reports. These appendices provide the details of the daily work that was conducted and document issues that arose during the conduct of the work. The weekly meeting minutes produced during CS1 were not reviewed by either USEPA or the Port of Seattle ("the Port"); however, the CS2 weekly meeting minutes were reviewed and approved by USEPA.

6.3 BACKFILL MATERIAL QUALITY AND APPROVAL

All backfill material used at the Site had to meet both chemical and physical criteria. Preconstruction quarry sampling was conducted to determine if levels of contaminants of concern (COCs) in the source of proposed fill material were either undetected or below the cleanup levels (CULs; Table 1). Preconstruction quarry sampling was conducted in accordance with the *Field Sampling Plan* (Appendix P of the *Revised Final (100 Percent) Design* ["*Final Design*"; Amec Foster Wheeler et al., 2018b]). Based on chemical analysis and visual inspections (Photo 2 and Photo 3), materials from CalPortland's Dupont, Enumclaw, and Snoqualmie facilities and Washington Rock's Orting facility were determined suitable for use and were used as fill for the project (see Appendix F for results of quarry sampling and analysis). Chemical testing of material from the Manke Shelton pit showed that material from this pit was not suitable for use as fill on the project due to concentrations of cobalt, selenium, vanadium, and polychlorinated biphenyls (PCBs) that exceeded applicable CULs. Backfill material types, sources, and tonnages delivered to the Site by date are provided in Table 3.

Potential sources of backfill materials had to meet gradation requirements in the design specifications (Section 2.1 of Specification 35 42 00 of the *Specifications*; Appendix R of the *Final Design* [Amec Foster Wheeler et al., 2018e]). Gradation of the proposed materials to be used was submitted prior to delivery to the Site by vendors to confirm that the materials met the gradation specifications. In addition, the gradation was confirmed for the material delivered to the Site. Some materials delivered to the Site did not meet the gradation requirements; these were rejected and replaced with compliant material.

Photo 2 Backfill Material Being Measured to Determine if Material Meets Specifications

Riprap and filter rock were placed at selected areas of the Site shoreline to provide protection. Gravel beach mix and fish mix were placed at selected shallow-water locations for scour protection. The enhanced natural recovery (ENR) / residual management layer (RML) material that was placed in the subtidal portions of the Site was double washed to reduce potential turbidity impacts.

During CS1, approximately 63,300 tons of backfill and shoreline protection materials were placed, consisting of:

- 39,200 tons (29,000 cubic yards [cy]) of ENR/RML material
- 4,900 tons (3,800 cy) of gravel beach mix
- 1,700 tons (1,300 cy) of fish mix
- 3,900 tons (2,800 cy) of filter rock

- 13,500 tons (9,700 cy) of riprap

During CS2 approximately 73,500 tons of backfill and shoreline protection materials were placed, consisting of:

- 41,100 tons (30,400 cy) of ENR/RML material
- 5,300 tons (4,100 cy) of gravel beach mix
- 1,500 tons (1,200 cy) of fish mix
- 5,800 tons (4,200 cy) of filter rock
- 19,700 tons (14,100 cy) of riprap

Photo 3 Visual Inspection of Riprap at Quarry

During CS1, project quality assurance staff collected samples of delivered materials. The minimum frequency for the collection of quality assurance samples was 20% of barge or truck loads delivered to the Site. Excluding riprap, materials were submitted to an independent, third-party laboratory to verify and document that delivered materials met project specifications. Results of these analyses are documented in Appendix F. Visual inspection of riprap used during CS1 is detailed in Inspection and Testing Report 036 (Appendix F).

During CS1, Materials Testing and Consulting, Inc. (an independent third-party laboratory), performed gradation analysis at their materials lab of materials used for ENR/RML placement (Appendix F, Inspection and Testing Reports 001, 035, and 054), filter layer rock (Appendix F, Inspection and Testing Reports 016, 017, 028, and 030), gravel beach fill (Appendix F, Inspection and Testing Report 050), and fish mix (Appendix F, Inspection and Testing Report 051). During CS1, all visual and gradation tests demonstrated that material used met the required specifications.

During CS2, 20% of all delivered materials were sampled by project quality assurance staff for gradation analysis by an independent, third-party laboratory to verify and document that delivered material met project specifications. For riprap, which had a median diameter (D50) of 2.22 feet, a visual inspection of 20% of delivered material was required and performed. Visual inspection of riprap is detailed in Inspection and Testing Reports 061 and 109 (Appendix F). During CS2, Materials Testing and Consulting, Inc., performed gradation analysis at their materials lab of materials used for ENR/RML (Appendix F, Inspection and Testing Reports 063 and 087), filter layer rock (Appendix F, Inspection and Testing Report 060), gravel beach fill (Appendix F, Inspection and Testing Report 086), and fish mix (Appendix F, Inspection and Testing Report 095). Results of these analyses are documented in the respective Inspection and Testing Reports in Appendix F. All visual or gradation tests demonstrated that delivered material met required specifications during CS2.

6.4 EXTENSION OF IN-WATER CONSTRUCTION WORK WINDOWS

As described above, USEPA and the National Oceanic and Atmospheric Administration National Marine Fisheries Service approved an extension of the CS1 construction work window from February 16 to March 31, 2019. The National Marine Fisheries Service approved the extension on March 14, 2019, and the Washington Department of Fish and Wildlife approved the extension on January 24 and March 5, 2019. Due in part to a labor strike, issues encountered during construction in the former shipway, and the need for placement of a temporary RML layer in selected dredged material management units (DMMUs), an extension was required to help protect aquatic organisms from exposure to contaminant concentrations that were greater than preconstruction concentrations between CS1 and CS2. The extension from February 16 to March 31, 2019, allowed for placement of backfill (ENR, RML, sacrificial RML, gravel beach mix, fish mix, and riprap). During the CS1 extension, no dredging was performed.

An extension of the construction work window for CS2 was needed to complete the remedial work. The National Marine Fisheries Service did not require an official approval of the construction work window extension since no "new" work would be conducted in the extended timeframe. On January 31, 2020, Lockheed Martin received an extension of the in-water construction work window from the Washington Department of Fish and Wildlife to allow construction to continue until March 31, 2020 (Appendix C). The in-water construction work window extension was required to allow additional dredging and backfilling in DU 5. All in-water work was completed on March 25, 2020.

6.5 INTERTIDAL SHORELINE DEBRIS REMOVAL

Targeted debris removal was conducted in the intertidal areas of the Site over 7 days during CS1. A majority of debris removal was conducted in the "dry" during low tide (Photo 4).

The debris removed from the shoreline included wood piles, steel pipes, metal debris, slag, concrete debris, and other anthropogenic material larger than about 12 inches. The debris was removed using a clamshell bucket operated from a derrick barge. Debris was also removed by hand by personnel using hand tools. Debris that was removed from the shoreline was identified in the USEPA-approved design drawings (Appendix A). Diagrams of where debris was removed from the shoreline are provided in the Daily Construction Reports (Appendix B). Based on visual surveys of the shoreline, all debris identified in the design drawings was removed.

A total of 387 tons of debris was removed using equipment working completely in the dry. An additional 851 tons of debris was removed in a combination of dry and wet excavation. A total of 9 tons of metal was recycled by Seattle Iron & Metals Corp. The shoreline debris was hauled to the Waste Management 8th Avenue facility via barge for processing and separation of recyclable material. The nonhazardous waste was loaded on train gondolas and hauled to an approved disposal site. Visual monitoring for readily apparent turbidity plumes was conducted during shoreline debris removal work. A DVD of the pre- and postcleanup video surveys of the shoreline is available on request.

Photo 4 Removal of Shoreline Debris Using Dredge Bucket

6.6 OPEN-WATER DEBRIS REMOVAL, DREDGING, AND RESIDUAL MANAGEMENT LAYER PLACEMENT

This section discusses dredging work conducted outside of the former shipway. Construction in the former shipway is discussed in Section 6.7.

6.6.1 Construction Equipment

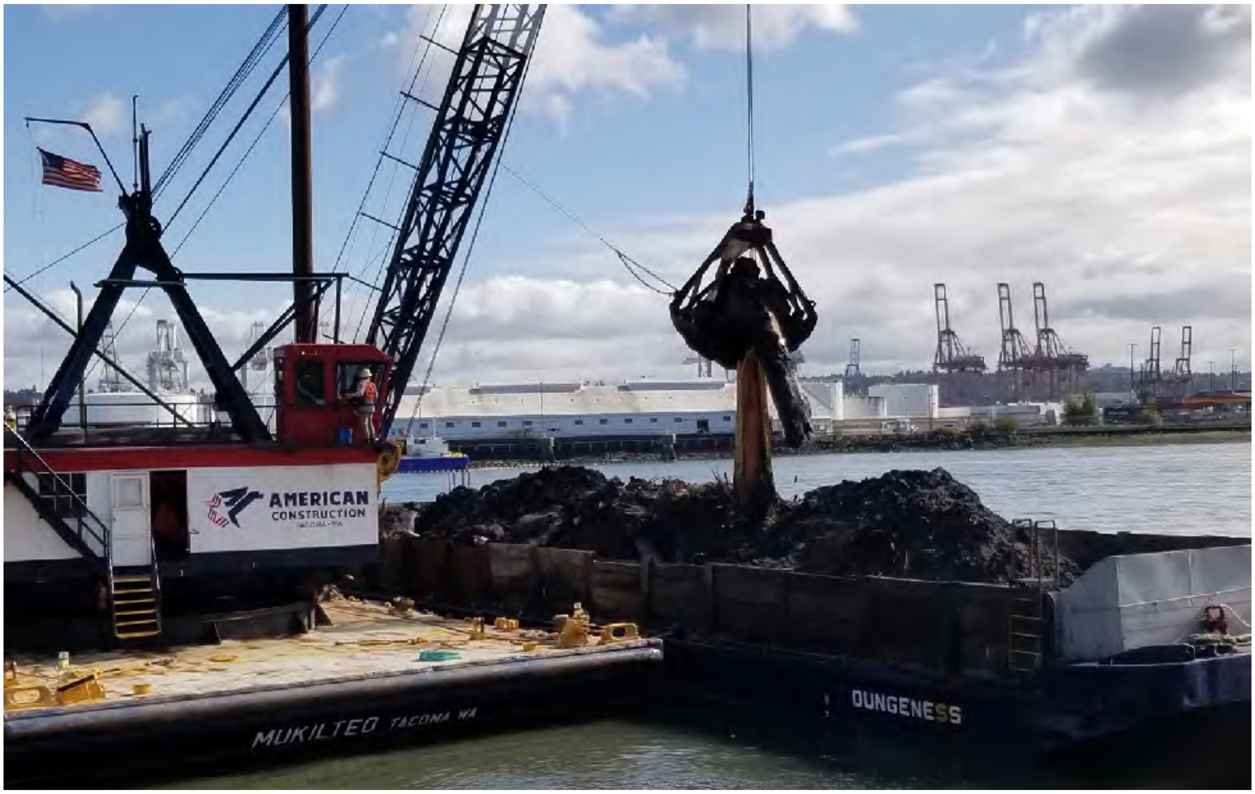
Dredging operations were performed by two derrick barges (American Construction's Palouse and Mukilteo). Production dredging used an environmental dredging bucket (Photo 5); however, some of the site debris prevented the bucket from closing properly and resulted in leakage and loss of sediments. The loss of dredged material frequently resulted in a visible turbidity plume. Following an exceedance of the conventional water quality parameters for turbidity during water quality monitoring of dredging during CS1, the decision was made to switch to a standard digging bucket (Photo 6) for dredging the shallow surface sediments in areas containing large amounts of debris.

Photo 5 Environmental Dredge Bucket Used During Dredging

The standard digging bucket was also used to dredge denser sediments that the environmental bucket had problems penetrating. Final dredging and cleanup passes were conducted using the environmental bucket (where practicable).

Material placement (ENR/RML material, gravel beach mix, fish mix, filter rock, and riprap) was conducted using three derrick barges (American Construction's Palouse, Mukilteo, and Patriot) during the two construction seasons. In addition to placement using a derrick barge, some ENR material was placed using a telebelt under Piers 23, 24, 25, and at the concrete dock on the eastern shoreline (Figure 2).

Photo 6 Standard Digging Dredge Bucket Used in Areas of Significant Debris or Dense Sediment



6.6.2 Debris Removal

Prior to dredging, a targeted debris sweep using a clamshell digging bucket was conducted in the open-water area over a 3-day period during CS1 to remove debris that had been identified on the design drawings. Approximately 1,237 tons of shoreline and in-water debris were removed and disposed of. Additional debris was encountered during production dredging along the shoreline. In locations with a high concentration of debris, the debris was removed with a standard digging bucket as discussed above. During CS2, riprap was removed from the interface area between DUs 5 and 7 to facilitate dredging in DU 5. The riprap removal occurred over a 4-day period.

6.6.3 Barge Dewatering

Sediment barges were equipped with watertight steel interior bin walls and a timber fence on the exterior of the sediment bin. The timber fence was an artifact of the original barge construction before installation of the interior steel walls. As a result of the watertight bin walls, removal of free-standing water from within the sediment bin was accomplished using a pneumatic diaphragm pump. The pump transferred the water into a monofilament geotextile sediment bag. Once in the bag, the sediments would remain, and the filtered water would drain back into the work area (Photo 7).

The *Dewatering Plan* (Appendix N of the *Final Design* [Amec Foster Wheeler et al., 2018f]) required the sediment bag fabric to have an apparent opening size of a No. 40 U.S. sieve (0.4 millimeter [mm]) or smaller. The bags used on the project had an apparent opening size of a No. 70 U.S. sieve or 0.21 mm.

Barge dewatering took place only within the Site work area as specified in the *Dewatering Plan*. Prior to barge transit between the dredge area and the offload site at Slip 4 on the Duwamish Waterway, dewatering was ceased, water within the bag was allowed to drain, and the sediment bag was placed within the sediment bin on the barge for disposal along with the dredged material at the approved disposal site.

Photo 7 Geotextile Filter Bag Used Prior to Discharge of Dredge Return Water

6.6.4 Open-Water Dredging

Dredging was conducted in the open-water dredge areas outside of the former shipway. Open-water areas (DUs 3, 4, 6, 7, 8, 11, 12, 13, 14, and 15) were dredged on approximately 88 days during CS1 (excluding days when dredging was conducted only in the shipway) and 57 days during CS2. Determining if dredging met the dredge design based on elevation criteria was made independently for each DMMU. Once the contractor believed that a DMMU met the dredge design elevation, a bathymetric survey was submitted to the quality control (QC) officer for approval. The DMMU dredge elevation was approved if:

- no point within the dredge footprint was more than 0.5 foot above the design elevation,
- 90% of the dredge area was at or below the design elevation, and
- the largest contiguous area within each DMMU over the design elevation was less than 500 square feet.

If the DMMU dredge elevation did not meet the three acceptance criteria, then the DMMU was not approved, and additional dredging was required. The process of dredging, surveying, and QC review/approval was repeated until the DMMU met the dredge elevation acceptance criteria. The DMMU dredge elevation approvals are presented in Appendix G. During CS1, 61 DMMUs (excluding the former shipway DMMUs) were dredged to design elevation. Among these, 51 DMMUs were approved as meeting the design elevation in the first QC submittal, 11 were approved on the second submittal, and 2 were approved on the third submittal; no DMMUs required a fourth submittal.

During CS2, 53 DMMUs were dredged to design elevation, 49 of which were approved as meeting design elevation on the first QC submittal. Four DMMUs were not approved in the first submittal and required additional dredging; all of these were approved on the second submittal. Table 4 lists the DMMUs and the associated approval dates.

As described above, there was an allowance of 20% of the dredge area could be up to 0.5 foot above the design elevation and still meet the dredging requirements. The design dredge elevation was compared to the as-built dredge elevations for all the dredge areas outside of the shipway to determine the actual area that was above the design elevation when the work was complete. Based on this comparison, approximately 3.9% of the dredge area was above the design elevation with an average of 0.14 foot above the design elevation. This percent of area above the design elevation is well below the dredge elevation allowance of 20%.

Along the shoreline slope area, additional dredging was not conducted in areas that did not meet the remedial action level (RAL) criteria due to the potential instability of the slope. However, there was one small area along the toe of the riprapped slope in DU 5 where additional dredging was conducted as described below.

In DU 5, the original design for the slope areas was to cut the slope prior to placement of riprap to no steeper than 2 horizontal:1 vertical (2:1). Based on concern of the USEPA and the US Army Corps of Engineers that the elevated concentrations of mercury in undredged sediment along the slope could affect the deepening of the adjacent navigation channel to a deeper authorized depth, Lockheed Martin evaluated options for removing the small area with elevated concentrations of mercury. Based on this evaluation, Lockheed Martin developed a plan to remove the contaminated material without undermining the riprapped slope. An area approximately 400 feet long and an average of 25 feet wide was redredged to remove elevated concentrations of mercury from the area. More information about mercury concentrations in this area is provided in Section 6.6.5.

6.6.5 Decision Unit Bottom Sampling for Evaluation of Attainment of RALs

Once a DMMU met design prism criteria, decision unit sampling was conducted in DMMUs that had sampling locations within the DMMU (Photo 8). Sampling was conducted as described in the *Field Sampling Plan* (Appendix P of the *Final Design* [Amec Foster Wheeler et al., 2018b]).

The objective of the chemical sampling at the bottom of the dredge cut was to ensure that the leave surface in each of the dredge areas met the RALs. There were 81 DMMUs within the approximately 648,000 square foot dredge area. The DMMUs were grouped into 16 larger decision units (DUs) that were used to determine if the objectives of the dredging had been met. Within the DUs, sample locations were allocated to have at least a 95% of detecting a 10,000-square-foot hot spot with a 5% false negative error rate. The sample spacing fits a systematic rectangular grid spacing equal to 116 feet x 39 feet. A total of 129 samples was collected in the DUs. DUs with less than approximately 10,000 square feet were allocated one sample near the centroid of the DU polygon. A point-by point comparison was not used to determine if the leave surface in the DU met the RAL; in DUs that had three or more samples collected, a geospatial interpolation was used to determine if the average concentration in the DU at the bottom of the dredge cut was less than the RAL. The dredging chemical criteria (see Section 2.3.5) limited how much above the RAL a single point could be and the size of the area within a DU that could exceed that RAL.

The proposed and actual sediment sampling coordinates are listed in Table 5, and the locations are shown on Figure 5. Table 5 and Figure 5 show differences between the planned and actual sampling locations. These changes were necessary due to waves and currents that affected the sampling vessel. In addition, sample locations may have been moved slightly from the planned locations due to the lack of adequate recovery in the core during sampling.

Photo 8 Sampling Vessel Collecting Core Sample

6.6.5.1 Sediment Sample Collection, Processing, and Chemical Analysis

At each sample location, a sediment core was collected at the bottom of the dredge cut. Each core was logged, and samples were collected *in situ* at 0.5-foot intervals (Photo 9). See Appendix H for the core summary logs for all samples collected. The sample intervals were chemically analyzed using a top-down approach to a depth judged to be appropriate to the known and suspected conditions. For example, a 4-foot core yielded eight 0.5-foot samples. If the physical properties of the sediment samples suggested that pre-anthropogenic sediment was encountered at a depth of 2 feet, then the top five sample intervals were analyzed while the remaining samples were archived. At some locations, analytical results from the deepest sample analyzed exceeded the RALs; at these locations, additional cores were collected to provide deeper sample intervals than were originally collected. Two cores were required at locations, SD-CONF058, SD-CONF070, SD-CONF083, and SD-CONF101 to obtain deeper samples that were below the RALs. At SD-CONF070, four core samples were required to provide deep enough samples.

Photo 9 Core Sample that was Collected for Decision Unit Bottom Sampling

Samples were analyzed for metals (arsenic, copper, lead, and mercury) and PCBs as specified in the approved *Field Sampling Plan* (Amec Foster Wheeler et al., 2018b). At the request of the USEPA, analysis of polycyclic aromatic hydrocarbons (PAHs) was added for DU 6 that was in the vicinity of the former Dry Dock 1.

Initially, the 0- to 0.5-foot and 0.5- to 1.0-foot samples were analyzed for the four metals (arsenic, copper, lead, and mercury), PCBs, and PAHs. As detailed in the *Field Sampling Plan* (Amec Foster Wheeler et al., 2018b), a defined residual layer (soft unconsolidated surface layer at the top of the core) was excluded from any sample submitted for laboratory analysis. Not including the shipway there were 26 of 120 sample locations that had a defined residual layer that was excluded from analysis. At 16 of the sample locations that had a defined residual layer, additional dredging was conducted which likely removed the residual layer.

The results of chemical analyses in each DU are presented in Table 6A through Table 6R.

6.6.5.2 Geospatial Analysis of Sampling Results to Determine Additional Dredging

As described in the *Field Sampling Plan* (Amec Foster Wheeler et al., 2018b), a geospatial interpolation of the 0- to 0.5-foot samples was conducted for each DU where more than two samples were located. The geospatial interpolation was conducted for each of the analyzed COCs and was used to determine if the postdredge sediment surface met the chemical contaminant compliance rules provided in Section 2.3.5. The geospatial analysis was not conducted for each PAH compound where PAHs were COCs (DU 6). Instead, benzo(a)pyrene was used as an indicator for PAHs as a group.

In small DUs where only one or two samples were collected, no geospatial analysis was conducted (DUs 2, 10, 11, 12, 13, 14, and 15). For these DUs, the SWAC was calculated as the concentration of the sample for DUs with a single sample (DUs 2, 10, 11, 12, 13, and 15) or as the arithmetic average of the concentration of the two samples (DU 14). The geospatial interpolations are provided in Appendix I.

Results of these analyses showed that several DUs failed to meet the chemical contaminant compliance rules after the initial dredging to the design elevation (DUs 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, and 15). For these DUs, a revised dredge plan was prepared to define the depth of dredging within each DMMU that required additional dredging within the DU. In some cases, contiguous DMMUs that required additional dredging were combined into a single DMMU; these combined DMMUs were identified with an "R" prefix (Redredge; e.g., R-DMMU20 A/B which was a dredge area that was comprised of a portion of DMMU 20A and DMMU 20B). There were 17 areas where DMMUs were combined for redredging and on average they were approximately the same size or smaller as the original average DMMU size of approximately 10,000 square feet (200 feet x 50 feet). The additional dredging in the redesigned DMMUs or R-DMMUs was subsequently approved by the QC officer and USEPA after the dredge design compliance rules were met. The DMMU approvals are presented in Appendix G, and the open-water dredging as-built drawings are provided in Appendix J.

6.6.5.3 Prescreening Electronic Data Deliverables to Expedite Decisions Regarding Additional Dredging

Due to the short turnaround time required to make decisions about additional dredging, data "prescreens" were conducted on the electronic data deliverables (EDDs) provided by the laboratory; full validation of the analytical data was not conducted until the end of the project.

The EDDs provided by the laboratory were screened by the data validator using database queries to verify that no quality control issues affected the preliminary data. These "prescreens" verified that QC samples associated with the results were in control and would not lead to rejected results, and dilutions, if performed, did not result in reporting limits that were greater than the RALs or CULs. The data prescreens allowed confidence in the analytical data used to determine whether additional analyses were required or if the bottom of the DU met chemical requirements. As a result of using preliminary data in the geospatial interpolations some values may have changed between the prescreened unvalidated data and the final validated data due to the resubmittal of laboratory reports. These changes were relatively minor and did not materially affect the geospatial interpolation and the design of additional dredging. Data may have been also qualified as estimated during the data validation process; however, this had no effect on the geospatial interpolation or decisions about additional dredging because estimated values were treated as detected values in the decision process.

Data used to demonstrate that the bottom of the DU met chemical requirements were validated following the requirements outlined in the *Quality Assurance Project Plan* (Attachment B of

Appendix P of the *Final Design* [Amec Foster Wheeler et al., 2018b). The data validation reports are provided in Appendix K.

6.6.5.4 Evaluation of the Environmental Protectiveness of the Dredging

To evaluate the overall success of the dredging and protectiveness of the remedy, an interpolation of the chemical concentrations in the postdredge sediment surface was conducted. The interpolated concentrations of arsenic, copper, lead, mercury, and total PCBs for sediments that were left in place after dredging (prior to placement of RML) were compared to the project RALs.

This approach was conducted for the combined, contiguous areas of DUs 3, 4, 5, 6, 7, 8, and 9; the smaller dredge areas could not be incorporated into the interpolation. The data used in the interpolation in many cases were estimated because all of the sediment associated with analytical sampling results was removed during redredging in some locations (Table 6C through Table 6J indicate which samples were removed during redredging). In addition, not all analytes were analyzed in all sample intervals, and these missing data were estimated based on results from shallower sampling intervals. Table 7 shows examples of how the data were selected to create the dataset used in the geospatial interpolation. As shown for the example data in Table 7, all analytes except mercury were estimated for shallow sample intervals at sample locations SD-CONF045 and SD-CONF032. At SD-CONF045, arsenic, copper, lead, and total PCBs were estimated for a sample at least 0.5 foot above the bottom of the dredge cut. At location SD-CONF032, arsenic, copper, lead, and total PCBs concentrations were estimated from a sample interval that was at least 2 feet above the bottom of the dredge cut. The same process for data selection was applied to all the core samples collected in DUs 3, 4, 5, 6, 7, 8, and 9. The complete dataset used in the geospatial interpolations is provided in Appendix L.

The interpolations were performed using 106 sample locations. Sample analyte concentrations were estimated from shallower samples in approximately 13% of the arsenic sample locations, 14% of the copper and lead locations, 10% of the total PCB locations, and 1% of the mercury locations. Based on the postconstruction core samples, in general, the concentration of contaminants decreased with depth below the mudline as described below.

Of the 106 sample locations, 51 were in areas that required redredging. Of the 51 sampling locations where additional dredging was required, dredging at 37 of these locations extended below the deepest sample analyzed. It is reasonable to assume that chemical concentrations decrease with depth based on the conceptual site model of contaminated sediment being deposited on uncontaminated native material. Appendix L provides the data used in the interpolations and includes sample intervals used, notations for each sample whether the deepest sample was removed by dredging, if the values were estimated from shallower sample intervals, and an assessment whether the concentrations of contaminants decreased with depth. An assessment of whether a contaminant concentration decreased with depth was not performed for samples where dredging did not extend below the deepest sample analyzed. Data in the appendix shows that 56 of 530 contaminant values were estimated from shallower intervals. There were 185 out of 530 contaminant values (37 sample locations) removed by dredging (i.e., there were no sample intervals analyzed below the dredge cut).

Of the 42 sample locations that were removed by dredging or where concentrations were estimated from shallower samples, 38 showed a clear trend of decreasing contamination concentration with depth. One of these locations (SD-CONF112 in DU 9) showed a trend of decreasing concentration for arsenic, copper, lead, and mercury; however, total PCBs at this location did not show a trend of decreasing concentration with depth. There were five sample locations (including SD-CONF112 in DU 9 for PCBs) out of 42 sample locations that were removed by dredging or where concentrations were estimated from shallower samples that did not show a clear trend of decreasing concentration with depth. Although there were five sample locations that did not show decreasing concentration with depth, the overall trend of decreasing concentration with depth for a majority of the locations suggests that the chemical concentrations used in the interpolation were likely overestimated by some unknown amount.

The results of the evaluation are presented in the lower portion of Chart 1 in Section 5.3.1. The chart shows that, for the five contaminants evaluated in this analysis, after dredging the SWAC sediment concentrations were considerably lower than the applicable RAL and clearly show that the remedial objectives for sediment concentrations left in place after dredging were met.

As described in Section 6.6.4, additional dredging at the toe of the riprap slope in DU 5 was conducted to remove elevated concentrations of mercury. Sample locations SD-CONF032, SD-CONF033, SD-CONF034, and SD-CONF035 were within the footprint of the additional dredging. The concentrations of mercury left in place after the additional dredging are provided in Table 6E.

The maximum concentration of mercury left in place after the additional dredging was 0.218 mg/kg.

The design allowed for up to 20% of the area in each DU that could be greater than 2 times the RAL, equivalent to requiring that a minimum of 80% of the area had to be less than 2 times the RAL. Note that areas in steep slope areas were excluded because no further dredging could be conducted due to potential slope instability. Within the large contiguous area of DUs 3, 4, 5, 6, 7, 8, and 9 the percent of the area that was less than 2 times the RAL was 99.4%, 99.6%, 100%, 85.7%, and 85.0% for arsenic, copper, lead, mercury, and total PCBs, respectively. These numbers are well above the required 80%.

Another design dredging criterion was that there were to be no areas of the postdredging surface in which the contaminant concentration exceeded 3 times the RAL. This criterion was met for all areas outside of the steep slope area. There was one small area in the steep slope area where the mercury concentration was greater than 3 times the RAL. To provide environmental protection over 6 feet of cover materials were placed in this area.

In addition to evaluating cleanup success by a reduction in concentrations of COCs, the contaminant mass that was removed was calculated. The mass reduction was estimated by identifying subsets of the dredging quantities in which contaminant concentrations were known. For example, if a DMMU was known to have had 600 tons of dredge spoils removed with a concentration of lead of 110 mg/kg, then the total mass of lead removed can be calculated. In this example, the mass of lead removed is 600 tons times 110 (concentration of lead) divided by 1 million (lead concentration unit of parts per million [mg/kg]) which equals 0.066 tons, or 132 pounds. By using the total dredge tonnage from the site and the average concentration of the risk-driver contaminants, the mass of contaminants removed by dredging was:

- Arsenic: 9,832 pounds (4,461 kg)
- Copper: 75,870 pounds (34,424 kg)
- Lead: 30,012 pounds (13,617 kg)
- Mercury: 253 pounds (115 kg)
- Total PCBs: 320 pounds (145 kg)

In summary, the dredging phase of the remedial action was very effective at reducing sediment COC concentrations. The remedial action was designed to remove sediments with chemical concentrations greater than the RALs; however, by targeting the removal of sediment exceeding the RALs, the average chemical concentrations in sediments left in place were significantly lower than the RALs; moreover, for copper and mercury, the average concentrations were below the CUL SWAC.

6.6.6 Shoreline Slope Stabilization

The shoreline slopes adjacent to DUs 7 and 8 were dredged according to the approved plans (see DMMUs 9A, 10A, 11A, 12A, and 13A in Appendix G). Due to a delay in placing the shoreline armor material, the toe anchor trench needed to be redredged prior to placement of the armor rock. The delay was caused by difficulty in obtaining shoreline stabilization materials that met the required specifications.

The subtidal slopes in the vicinity of the former drydocks were stabilized with a layer of riprap over a filter rock layer base following the dredging and postdredging sampling of the DMMUs. Approximately 3,000 tons (2,000 cy) of filter rock and 11,800 tons (7,900 cy) of riprap were placed along the shoreline in this area during CS1. Placement of the filter rock and riprap was conducted over approximately 24 days with incremental bathymetric surveys to confirm placement thickness. Twelve incremental surveys were conducted to verify the thickness of the filter rock, and seven surveys were conducted to verify the placement thickness of the riprap.

The shoreline slopes adjacent to DU 5 were dredged according to the approved plans (see DMMUs 14B, 14C, 15B, 15C, 15D1, 16A, and 16C1 in Appendix G). A portion of the area was redredged in March of 2020 as directed by the USEPA (see R-DMMUs 16AB-B, 16B-A, and 16A-C in Appendix G).

The subtidal slopes were stabilized in DU 5 following dredging, postdredge sampling, and redredging with a layer of riprap over a filter rock layer base. Approximately 4,000 tons (2,700 cy) of filter rock and 9,000 tons (6,000 cy) of riprap were placed along the shoreline in this area during initial DU 5 work in CS2. Placement of the filter rock was conducted over 14 days; placement of riprap was conducted over 9 days. An additional approximately 2,200 tons (1,600 cy) of riprap was placed along the shoreline after redredging of sediment with elevated mercury concentrations at the toe of the original riprap slope was completed in DU 5. Placement of riprap subsequent to the redredging was conducted over 5 days. Incremental bathymetric surveys were conducted to confirm placement thickness. Fifteen incremental surveys were conducted to verify the thickness of the filter rock, and nine surveys were conducted to verify the placement thickness of the riprap. The shoreline stabilization as-built drawings and QC approvals are provided in Appendix J.

6.6.7 Residual Management Layer Placement

An average 6-inch layer of sand (RML; average of at least 6 inches; with a minimum of 4 inches except on slope areas where the minimum was 3 inches (*Construction Quality Assurance Plan* [Amec Foster Wheeler et al., 2018g]) was placed in the open-water DMMUs that met the design depth requirements and where the postconstruction core sampling indicated that the DMMU met the chemical criteria.

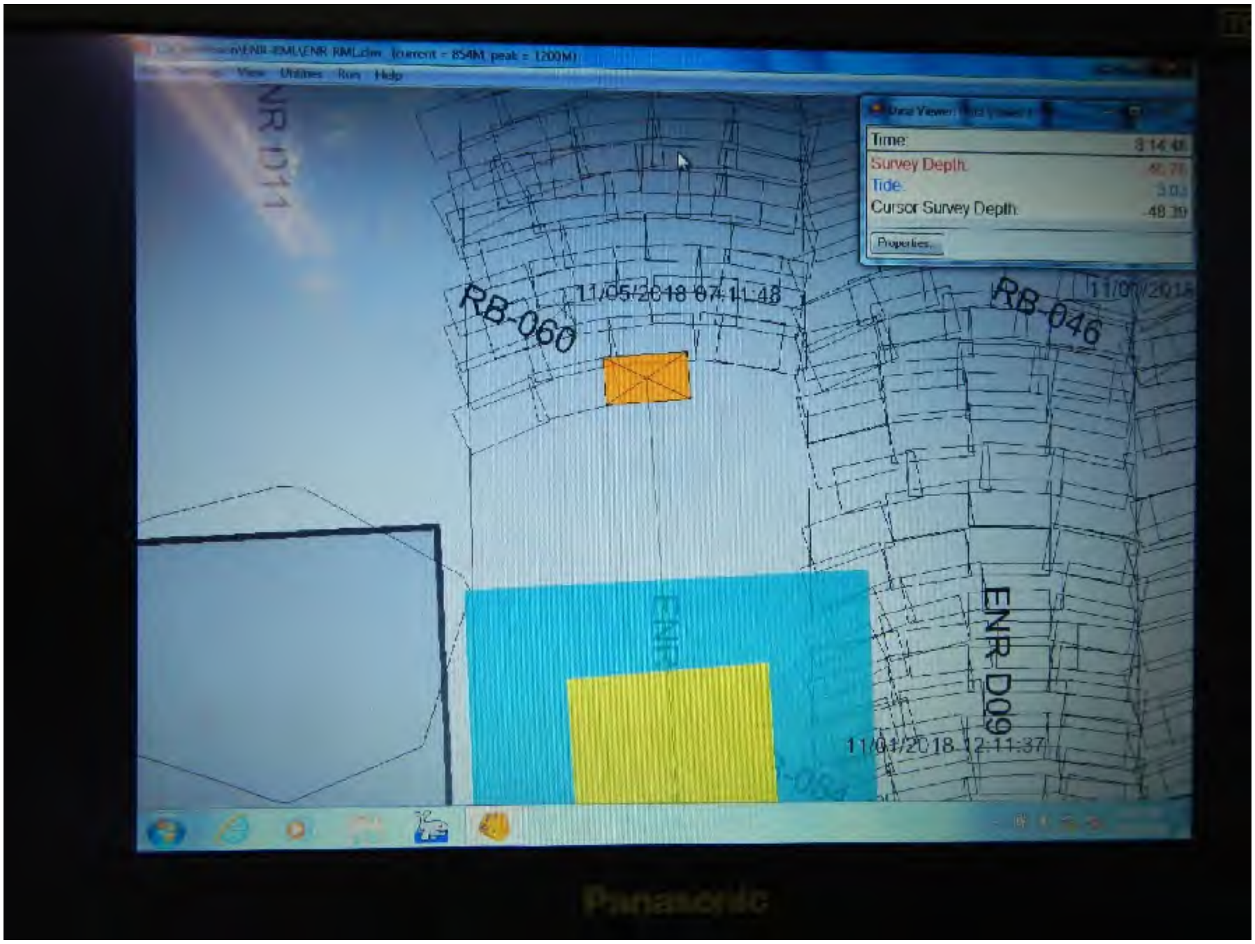
The RML material was placed by a derrick barge (floating crane) equipped with a 7-cy or 32-cy rehandling bucket (Photo 10). Rain gauge bucket locations at the required average density of approximately eight rain gauge buckets per acre were loaded into the derrick barge's electronic positioning system. As the derrick stepped back into a new placement set that required a rain gauge bucket, the operator would alert the two deck engineers onboard that he was spotting the location with the derrick's rehandling bucket using the derrick's positioning system. Once the location was spotted, the rain gauge bucket was lowered to the seabed by the two deck engineers working from the derrick's skiff.

Placement of RML was generally done in a single pass (or swing) of the rehandling bucket across a fixed radius from the crane's center-pin. Generally, placement of RML material was done with the opening of the rehandling bucket lowered just below the waterline during placement unless there was a danger of the bucket striking an obstruction, such as a pier, within the swing radius of the derrick's anchor wire or rain gauge bucket recovery buoy. As the operator returned the rehandling bucket back to the material barge (still at a fixed radius), the operator would mark placement progress by recording a series of bucket placement marks using the positioning system across the radius of the crane's swing (Photo 11). The practice of marking placement was done for each swing in which RML was placed, not just when a rain gauge bucket measurement was recorded. The marking of each placement swing radius served the purpose of documenting complete horizontal coverage within the placement area and was a requirement under the project's

Construction Quality Assurance Plan (Appendix D of the *Final Design* [Amec Foster Wheeler et al., 2018g]).

Photo 10 Placement of Residual Management Layer

Photo 11 On-board Navigation System Bucket Swing Marks



During placement of RML, a spreadsheet was updated with rain gauge bucket measurements collected by construction QA staff and a running average of ENR/RML thicknesses to date to monitor progress toward the minimum 6-inch average thickness requirement. Rain gauge buckets (approximately 10 buckets per acre) were used to monitor the thickness of RML placement (Photo 12), and overall placement quantities were based on a calculated tonnage of backfill per area. Rain buckets were positioned in locations to avoid dredged slopes greater than 3 horizontal to 1 vertical (H:V) to prevent tipping (as practicable). If the initial measurement of the thickness of RML material was less than the minimum required thickness (i.e., <4 inches [except on slope areas where the minimum was 3 inches] as specified in the *Construction Quality Assurance Plan* [Amec Foster Wheeler et al., 2018g]), then the rain gauge buckets were redeployed at the same locations and additional material was placed in radiuses leading up to and beyond the location of the rain gauge bucket. Additional RML material was placed, and a second (or potentially a third) round of measurements were made. In areas where the slope was greater than 3H:1V, the minimum required thickness of ENR was 3 inches. Upon satisfactory completion of the horizontal (recorded bucket placements on the derrick's positioning system) and vertical requirements (rain gauge bucket measurement if required within set), the derrick continued by stepping backwards into the next placement set.

Photo 12 Rain Gauge Bucket Retrieval

At the project completion, the minimum depth placements for RML and ENR were met at all locations. The approximate locations for RML rain gauge buckets are shown on Figure 6.

6.6.7.1 Construction Season 1

During CS1, RML material was placed in DU 11, DU 12, DU 13, and DU 14, and over a portion of DU 8. RML material was not placed in DMMUs that were adjacent to DU 7, which required additional dredging in CS2. The status of the work at the end of CS1 is shown on Figure 4.

The minimum final thickness at any of the 18 rain gauge bucket locations during CS1 was 4.5 inches, the maximum was 7.5 inches, and the average was 6 inches. RML placement occurred over a period of 10 days. The RML thickness measurements are provided in Table 8.

Several DUs were dredged during CS1 to the original design elevations but did not meet the chemical contaminant compliance rules and were redredged during CS2. In the DUs that did not meet the chemical criteria, a nominal 3-inch layer of sacrificial temporary RML material was placed in DMMUs that had concentrations of arsenic, copper, lead, mercury, or PCBs greater than the preconstruction concentrations of these contaminants. Placement of approximately 3,300 tons (2,400 cy) of the temporary RML layer was conducted over 4 days. The thickness of the temporary RML placement was determined based on tons of material per acre rather than through the use rain gauge buckets. The areas where temporary RML was placed are shown on Figure 4.

6.6.7.2 Construction Season 2

During CS2, RML was placed in DUs 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. During CS2, 120 rain gauge bucket locations were measured (Table 8). The minimum thickness in any rain gauge bucket in CS2 was 4.0 inches, and the maximum thickness was 11.0 inches. The average thickness was about 6 inches.

6.7 SHIPWAY PILE REMOVAL, DREDGING, AND BACKFILL

All work conducted in the former shipway was conducted during CS1.

6.7.1 Pile Removal

Pile removal within the shipway was conducted over 15 days between August 13 and September 22, 2018 (Photo 13). An estimated 514 wood piles were identified on the design drawings for removal within the shipway. An additional 262 piles were found and removed during subsequent days of production dredging within the shipway. The additional piles were either embedded piles that apparently had been broken off at or below mudline or were laying on the sediment surface. All piles were extracted and disposed of at the Roosevelt Regional Landfill according to the approved plans and relevant best management practices.

Photo 13 Vibratory Pile Extraction

6.7.2 Shipway Dredging

Dredging in the former shipway (DU 16) required approximately 18 days. The dredge design elevations in the former shipway were generally met except for an area adjacent to the sheet pile wall on the west side of the shipway (Figure 7). In this area, the sheet pile wall on the west side of the shipway deformed during dredging, which precluded dredging to the design elevation (see Section 6.7.4). In the area of the wall deformity, an approximately 0.2-acre dredging buffer area was established to not further compromise the stability of the sheet pile wall. In addition, in the remainder of the shipway, dredging was limited to the design elevation with no overdredge allowance (i.e., the dredging was continued to the design elevation but no deeper). This restriction was done to reduce the potential for further wall deformity. The change in the dredge elevations was approved by USEPA; however, due to concern that the material to be left in place may have contained elevated concentrations of PAHs, USEPA required that all former shipway samples be analyzed for PAHs (PAH Memo in Appendix C).

Dredging in the shipway was to be conducted using an environmental bucket; however, the presence of debris and buried piles required the use of a digging bucket for most of the shipway dredging. Approximately 6,700 cy of sediment was removed from the former shipway.

6.7.3 Shipway Postconstruction Core Sampling

After dredging was completed to the elevations that would not further compromise the stability of the sheet pile wall, core sampling was conducted at the locations provided in Table 9 and shown on Figure 8. Core sample intervals were analyzed for metals, PCBs, and PAHs. In addition to the 0.5-foot intervals that were collected from each core sample, composite samples at locations SD-CONF119 (0 to 6.5 feet), SD-CONF120 and field duplicate location SD-CONF2120 (0 to 2.5 feet), and SD-CONF127 (0 to 5.0 feet) were collected and analyzed. The composites represented material that was left in place above the original design elevation within the buffer area. Additionally, samples of the first two 0.5-foot intervals below the original design elevation were analyzed from each of the locations within the buffer area. The results of these analyses are presented in Table 6A through Table 6R.

The geospatial analysis of the shipway (Figure 9) shows that the 0- to 0.5-foot interval met the chemical contaminant compliance rules for all chemicals except for benzo(a)pyrene; the SWAC for benzo(a)pyrene was 1,540 micrograms per kilogram (µg/kg), and the RAL was 1,500 µg/kg. Concentrations of metals and PCBs in the composite samples (the material left in place above the original design elevation) were below the RALs. Concentrations in the composite sample from SD-CONF119 were elevated above the RAL for several PAHs (Table 6R). At SD-CONF120 and the duplicate sample location SD-CONF2120, only a single PAH exceeded the RAL in the composite sample. The composite sample from SD-CONF127 had no exceedance of the RALs for PAHs.

Due to the short turnaround time available to make decisions about additional dredging, full validation of the analytical data was not conducted until the end of the project. A prescreen of the data was conducted as described in Section 6.6.5.

6.7.4 Sheet Pile Wall Deformation and Stabilization

On October 16, 2018, American Construction Company observed movement of the shipway sheet pile wall and uplands slope while dredging in the former shipway. Geotechnical engineers from Wood Environment & Infrastructure Solutions, Inc., visited the site on October 16, 2018, to observe the slope movement and the condition of the sheet pile wall. The site visit documented an exposed head scarp on the slope and tension cracks behind the crest of the slope. The sheet pile wall had moved laterally and tilted outward toward the water. The top of the wall appeared to have moved up to 3 feet laterally (see Figure 10). The geotechnical engineers observed severe corrosion of the wall (red, brown, or orange in color). The wall exhibited evidence of disintegration and deterioration, and the wall walers and anchors were visibly no longer functioning.

In the area of the wall deformity and the dredging buffer area (Figure 7), surveys were conducted twice a week to monitor wall movement (Appendix M). Due to the deformity of the sheet pile wall, additional engineering was required to determine the appropriate method to stabilize the wall. Several engineering designs were considered to stabilize the wall, and the selected remedy approved by USEPA was to place a rock buttress along the wall. The rock buttress stabilized the wall. The as-built drawings and QC approvals for the filter rock and riprap placement along the sheet pile wall are provided in Appendix N. The Port has expressed concern about the stability of the decaying sheet pile wall; however, no further action is required or planned.

After placement of the rock buttress, periodic monitoring of the wall was conducted to assess the stability of the wall (Appendix M). Monitoring was conducted weekly until three consecutive surveys identified no observed movement followed by a subsequent monthly monitoring event indicating no observed movement. As of June 2019, no movement attributable to instability of the rock wall or buttress had been observed. Visual monitoring of the wall is the continuing responsibility of the Port of Seattle. Surveying may be reinitiated if a visual deformity of the wall is noted or in the event of a significant weather event, as determined by the Port in consultation with Lockheed Martin.

6.7.5 Shipway Ramp Stabilization

During dredging of the shipway, the pile-supported concrete slab at the head of the shipway became undermined when tidal action removed sand from underneath the slab. The observed undermined area of the slab was approximately 29 feet long parallel to the face of the slab, extending approximately 21 to 25 feet toward shore from the face. The vertical void space under the slab varied from a fraction of an inch inshore to approximately 25 inches at the face of the slab.

The Port requested that the void space beneath the slab be filled to help stabilize the slab. Lockheed Martin considered various engineering alternatives and decided with the Port's approval to fill the void space with controlled density fill (CDF). The slab was prepared for CDF placement by drilling six 8-inch holes through the slab for injection and observation of the CDF. The CDF was placed on February 12 and February 22, 2019. A total of approximately 38 cy of CDF was pumped into the void over two construction days. Appendix O details the placement of the CDF. After completion of the CDF placement, gravel beach mix was placed over the concrete slab to restore the preconstruction grade.

6.7.6 Shipway Fill Placement

Placement of backfill material within the shipway was conducted following completion of dredging. The approved design for the shipway fill required that fill be placed to restore the preconstruction grade. The shipway fill will isolate residual PAH contamination from the Pacific Sound Resources (PSR) found at depth in the shipway (see the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018a] for a discussion of the nature and extent of the PSR PAHs).

The fill (from bottom to top) was to consist of a sand layer of variable thickness, a 3-foot gravel beach fill layer, all overlain with a 0.5-foot layer of fish mix above an elevation of -10 feet mean lower low water (MLLW). Below elevation -10 feet MLLW, the fill was to consist of sand to restore the preconstruction grades. Above -10 feet MLLW, a minimum of 3.5 feet of backfill was placed (3 feet of gravel beach mix and 0.5 foot of fish mix). In areas where the difference in elevation between the pre- and postconstruction grades was less than 3.5 feet, the bottom elevation was raised above the preconstruction grade to accommodate the fill. The following approximate volumes of material were placed in the former shipway: 5,300 cy of sand, 580 cy of filter rock, 1,400 cy of riprap, 1,300 cy of fish mix, and 3,200 cy of gravel beach mix.

Each layer of material that was placed was approved through bathymetric surveys as meeting the design requirements prior to the next layer of material being placed. The as-built drawings and QC approvals for the gravel beach mix and sand fill materials are presented in Appendix N. The thickness of the final layer of fish mix was monitored with rain gauge buckets.

6.7.7 As-Built Drawings

The as-built drawings for the shipway are presented in Appendix P.

6.8 ENHANCED NATURAL RECOVERY LAYER PLACEMENT

ENR material was placed using the same methods as RML placement (Section 6.6.7). Rain gauge buckets (eight buckets per acre) were used to monitor the thickness of the placement; overall placement quantities were based on a calculated tonnage of ENR material placed by area. The approximate locations where the rain gauge buckets were deployed are shown on Figure 11.

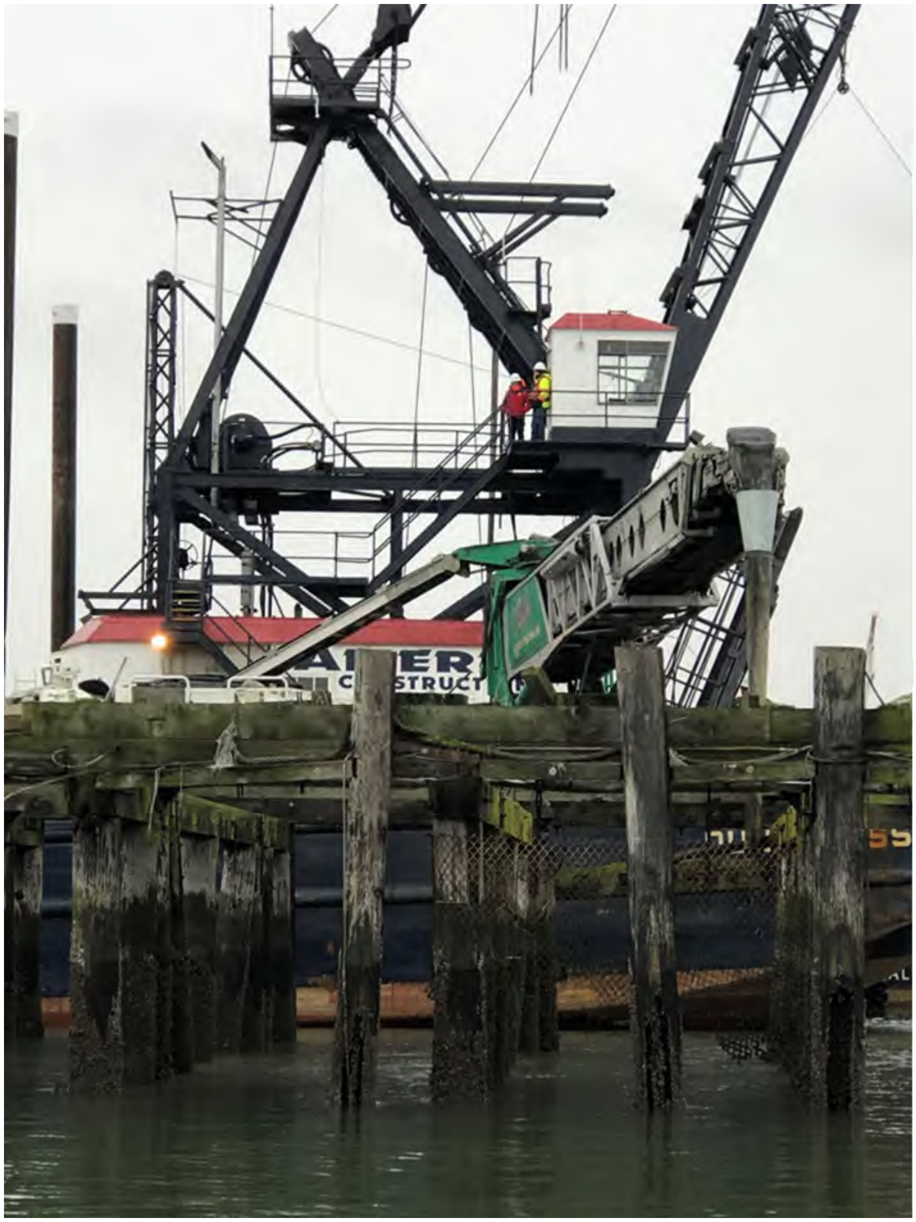
If the initial measurement of the thickness of ENR material was less than the minimum required thickness (i.e., <4 inches or on slope areas where the minimum was 3 inches) as specified in the *Construction Quality Assurance Plan* (Amec Foster Wheeler et al., 2018g), then the rain gauge buckets were redeployed at the same locations, additional ENR material was placed, and a second of measurements were made (and potentially a third round if the thickness requirements were not met after the second measurement). In areas where the slope was greater than 3H:1V, the minimum required thickness of ENR was 3 inches.

At Piers 23, 24, 25, and the concrete dock, a volumetric equivalent was placed using parts of the structures, such as pile rows, as a visual reference to assist in placement. For each bay between piling rows, a precalculated volume of ENR material measured by loader buckets was placed in the telebelt's hopper and distributed evenly by the telebelt (Photo 14). ENR placement by telebelt was overseen by project QC personnel.

Placement of ENR material was conducted on 40 construction days during both CS1 and CS2. Measurements were made at 118 rain gauge locations during CS1 and at 66 locations during CS2.

The required placement depths of ENR were met at all locations. The minimum final thickness at any rain gauge bucket location was 3.5 inches, the maximum was 13.25 inches, with an average of 6.5 inches. The minimum thickness was less than 4 inches at two locations; however, these locations were on slopes greater than 3H:1V and therefore met the thickness criterion. A summary of the rain gauge bucket results for the ENR placement is provided in Table 10.

Photo 14 Placement of Enhanced Natural Recovery Layer by Telebelt



SECTION 7
TRANSLOADING OF DREDGE SEDIMENTS AND DEBRIS

This section describes the project transloading facilities, operations, waste streams, waste quantities, and landfills used during the project. Approximately 1,237 tons of debris (in-water and shoreline), approximately 114,100 tons of dredged sediment, and approximately 790 pilings (930 tons) were disposed of during construction season 1 (CS1). A total of 1,739 rail carloads were used to transport material to the landfill during CS1. During construction season 2 (CS2), approximately 68,500 tons of dredged sediment was transported to the landfill on 1,522 rail cars. Appendix Q includes barge displacement survey reports, rail car bill of ladings, transload certificate of disposal forms, and gondola tracking records.

7.1 WASTE MANAGEMENT

All dredge material and nonpiling debris were transported from the Site to the Waste Management 8th Avenue Reload Facility located at 7400 8th Avenue South on Slip 4 in the Lower Duwamish Waterway in Seattle, Washington. The reload facility is approximately 4.5 miles from the project site and is situated just north of the Duwamish Waterway. Barges were offloaded at the facility's south dock. During CS1, the first debris load was received on September 12, 2018. The second and final barge load of debris was received on September 15, 2018. Dredge material was first received on September 18, 2018, and the last load for CS1 was received on January 16, 2019. During CS2, dredge material was first received on September 18, 2019, and the last load was received on March 18, 2020. Decontamination of barges occurred at the Waste Management 8th Avenue Reload Facility and is discussed in Section 13.

Dredge material offloading and transfer were performed using a Sennebogen 875E excavator (Photo 15).

Photo 15 Uploading of Dredge Material from Barge at Reload Facility

Shoreline debris, in-water debris, and dredge material were stockpiled in the facility within secondary containment that included a water control system regulated by the Washington State Department of Ecology. Debris piles were segregated from sediments; however, other sediments and uplands soils originating from other non-Lockheed Martin generator sites were mixed in the stockpile area with sediments from the Site. These waste streams were placed into gondola rail cars using a front-end loader before being released for shipment to the Subtitle D Columbia Ridge Landfill located in Arlington, Oregon.

During a site visit on September 27, 2018, a USEPA representative observed sediment on the sides of some of the rail gondolas being released from the 8th Avenue Reload Facility. The USEPA representative notified Lockheed Martin and its subcontractors of the observation and inquired about the cleaning protocols that Waste Management has in place prior to releasing rail gondolas. Lockheed Martin discussed these observations with Waste Management's district operations manager and project manager after the observation was reported. Waste Management explained that, although the 8th Avenue Reload Facility does not pressure wash the sides of gondolas, they do use a wire brush, broom, or similar cleaning device to brush off excess sediment and/or soils from the edges and tops of the rail cars prior to release. The protocol was explained and documented to the USEPA in the form of email communication on October 5, 2018.

7.2 AMERICAN CONSTRUCTION COMPANY

Pilings removed from the Site were transported on material barges to American Construction Company's yard located at 1501 Taylor Way, Tacoma, Washington. American Construction Company's property lies just south of the Hylebos Waterway, where material barges dock during the offloading process. These pilings were placed in containers using a small excavator (Photo 16), and the containers were picked from the material barges with an onshore crane. The first barge load of pilings was received at American Construction Company's yard on September 26, 2018, and the last load was received on October 4, 2018. Piling materials were transferred at American Construction Company's yard to containers, which were trucked to the Alaska Street Transfer Station in Seattle for rail shipment to the landfill. Pilings were transported on rail cars to the Roosevelt Regional Landfill located in Roosevelt, Washington. The first rail cars of pilings were received at the landfill on September 28, 2018, and the last rail car was received was on October 12, 2018.

Photo 16 Excavator Used to Place Pilings in Containers

SECTION 8
RESULTS OF WATER QUALITY MONITORING

Water quality monitoring was conducted in accordance with the *Water Quality Monitoring Plan* (Appendix M of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018c]), which was approved by the United States Environmental Protection Agency (USEPA), and the *Updated Final Memorandum, Clean Water Act §404 ARAR Memo: Substantive Water Quality Requirements for the Lockheed West Seattle Superfund Remedial Action* ("the Clean Water Act §404 ARAR Memo"; USEPA 2018, 2019; Appendix C).

Weekly water quality monitoring reports submitted to USEPA and additional stakeholders are provided in Appendix R.

Water quality monitoring was performed in construction season 1 (CS1) during the following construction activities:

- pile removal
- submerged debris removal
- dredging
- barge dewatering
- enhanced natural recovery (ENR)/residual management layer (RML) material placement
- shoreline slope armoring:
  - placement of filter rock
  - placement of riprap
- material placement in shipway:
  - filter rock
  - riprap

- gravel beach mix
- fish mix
- sand

Water quality monitoring was performed in construction season 2 (CS2) during the following construction activities:

- dredging
- barge dewatering
- ENR/RML material placement
- shoreline slope armoring:
  - placement of filter rock
  - placement of riprap

Water quality monitoring generally consisted of field measurements of conventional water quality parameters (turbidity, dissolved oxygen, pH, and temperature) in accordance with the *Water Quality Monitoring Plan* (Amec Foster Wheeler et al., 2018c). Water quality monitoring was conducted using a small vessel (Photo 17). In addition, water samples were collected during the first 5 days of intensive monitoring during construction activities that had the potential to suspend contaminated sediments into the water column. These activities included the dredging and dewatering of sediments. Collection of water samples continued during subsequent weeks of dredge monitoring when turbidity measured during monitoring at any compliance station exceeded the water quality performance criteria specified in the Clean Water Act §404 ARAR Memo (USEPA, 2018, 2019; Appendix C).

8.1 MONITORING OF CONVENTIONAL WATER QUALITY PARAMETERS

This section documents water quality monitoring performed for conventional parameters during the remedial action and summarizes the results of the monitoring.

8.1.1 Construction Season 1

During CS1, in-water construction activities were conducted on 160 days of the total 226-day construction season (August 13, 2018, to March 28, 2019). Of the 160 days of in-water construction, water quality monitoring of the conventional parameters was conducted on 100 of the construction days. The 160 days did not include visual monitoring for turbidity conducted during shoreline debris removal and during placement of shoreline protection material. During CS1, 217 rounds of water quality monitoring were performed, with exceedances of the turbidity criterion recorded during 31 rounds (exceedance ranged from 5 to 81.1 nephelometric turbidity units [NTU] above ambient levels; Table 11).

Photo 17 Vessel Used for Water Quality Monitoring

Table 12 summarizes the water quality monitoring activities conducted during CS1 by activity. The discussion below focuses on turbidity, since turbidity exceedances represented the majority of cases of noncompliance with conventional water quality criteria (turbidity at a compliance station no greater than 5 NTU more than the value measured at a corresponding ambient station or no more than 10% above ambient if ambient turbidity was greater than 50 NTU). The remaining instances of noncompliance were for dissolved oxygen (DO). Low DO values (DO <6 milligrams per liter) were measured during some of the rounds of monitoring at the deeper compliance stations. The low DO values resulted in several apparent or confirmed instances of noncompliance with the DO criterion; however, low DO levels were also found at the corresponding ambient stations in a number of cases (i.e., deeper water at the mouth of the West Waterway or north of the project site in Elliott Bay). The low DO values appeared to be an area-wide phenomenon, unrelated to the Lockheed Martin construction activities. Fourteen of the 16 apparent or confirmed noncompliance events involving low DO occurred during the week of October 22–28, 2018. Low DO levels were measured at the corresponding ambient locations during 12 of the 16 apparent or confirmed low DO monitoring events.

Table 12 provides a further breakdown of the tidal conditions and the general water depth during which turbidity exceedances were observed. Sampling or observational information summarized in Table 12 may have been potentially biased or inconclusive due to limited number of sampling events, limited duration, or lack of variability in the sampling conditions (e.g., same tidal stage).

Figure 12 shows a histogram for the range of differences between the maximum turbidity (in NTU) at compliance stations versus the corresponding ambient station (representing the background). The differences in turbidity were grouped into the following ranges differences between the compliance station and the ambient station: <5 NTU; 5 NTU to <10 NTU; 10 NTU to <20 NTU; 20 NTU to <40 NTU; 40 NTU to <60 NTU; and ≥60 NTU. The number of rounds of water quality monitoring within each range were also broken down by general construction activity. No confirmed exceedances of turbidity were observed during monitoring of pile or submerged debris removal, barge dewatering (conducted separate from dredging), or shoreline slope armoring. These activities were not expected to result in significant amounts of turbidity or other water quality impacts, and monitoring was scheduled for the first 2 days of an activity to confirm that significant impacts were not occurring.

Exceedances of the turbidity criterion were observed for about 7% of the monitoring rounds (7 of 97 rounds of monitoring) during dredging (including dredging in the shipway). The largest exceedance (difference between the compliance station and the ambient [background]) was approximately 38 NTU over background. The remaining six turbidity exceedances during dredging were on average about 11 NTU over background. As shown in Table 12, exceedances during dredging do not appear to be related to tidal cycle or whether work was being conducted in either deep (offshore or open areas) or shallow (nearshore areas) water.

Exceedance of the turbidity criterion during ENR/RML placement was observed for 14% of the monitoring rounds (9 of 63 monitoring rounds). The largest observed exceedance was about 14 NTU over background, and the remaining exceedances averaged about 7 NTU over background. Exceedances did not appear to be related to the tidal cycle. Exceedances did not appear to be related to where work was being conducted (deep or shallow water); however, this observation may be an artifact of the limited rounds of monitoring conducted during shallow-water ENR/RML placement. The RML placement in shallow water was limited to placement in dredged material management unit (DMMU) 4A and did not include placement of clean backfill materials in the shipway.

During material placement in the shipway, exceedances of the turbidity criterion were observed for about 37% of the monitoring rounds (15 of 41 monitoring rounds). Of the 15 exceedances, 12 occurred during sand backfill placement (using the same material used for ENR and RML). The largest exceedances were about 81 and 56 NTU over background; the average of the remaining exceedances was about 17 NTU over background. It is believed that the exceedances during sand placement resulted from several factors, including the fill material type, placement in shallow nearshore waters, and the configuration of the shipway.

During placement of sand material (ENR/RML or backfill) in shallow water, turbidity associated with the fine clays that adhered to sand were confined to a shallow lens of water. The lens of water frequently moved in a narrow band along the adjacent shoreline, driven by current induced by wind or waves. The currents and current-driven dispersion of turbid water within the shipway was further reduced due to the adjacent “L” shaped shoreline to the west and the presence of a pile-supported pier structure to the east that limits current flow, effectively creating a “U” shaped confined area. Once a turbidity plume had been generated, dispersion of the plume was limited to the surface currents because the settling time for the finer clay-size particles is on the order of hours.

The sand placed was the cleanest material (lowest percentage fines) that could be purchased in bulk (i.e., thousands of tons). This material contained up to about 1% fines (particle size

<75 micrometers). This material was double-washed at the quarry to remove a majority of the fines; however, the wash water used is recycled on site at the quarry due to operational permit requirements. The recycled wash water contained fine material (clays) that had long settling times; therefore, the sand material contained some of the clays suspended in the wash water. When this double-washed material was placed, the remaining clays were suspended in the water column and remain suspended until transported off site by currents. The sand that was used at the Site is the same double-washed material that has been used at other sites in the Lower Duwamish Waterway (i.e., Boeing Plant 2 and the Lower Duwamish Waterway Group Carbon Pilot Study). This material has the lowest turbidity-generating component of any commercially viable material.

Placement of the sand with the bucket above the surface of the water resulted in a surface turbidity plume. The height above the water surface that the material was released from influenced the area over which the finer clay particles could potentially drift in the air prior to contacting the water. Within the shipway, which had shallow water depths and reduced water movement, the difference in the area impacted by the sand placement with the bucket just above the water (2 to 3 feet) versus 10 feet or more above the water could not be determined; however, the additional time required to maneuver the bucket to just above the water surface after clearing obstacles, such as the pier, resulted in an increase in the cycle time for the crane and slower placement of material. Within the shipway this made release from approximately 10 feet above the water more efficient without any apparent additional water quality impacts.

8.1.2 Construction Season 2

During CS2, in-water construction activities were conducted on 118 days of the total 204-day construction season (September 3, 2019, to March 25, 2020). Of the 118 days of in-water construction, water quality monitoring for conventional parameters was conducted on 62 of the construction days. The 62 days does not include visual monitoring for turbidity conducted during placement of shoreline protection material. During CS2, 153 rounds of water quality monitoring were performed, during which exceedances of the turbidity criterion were observed for 4 rounds (exceedances ranged from 7.9 NTU to 24.5 NTU above ambient; Table 13). Table 14 presents a summary of water quality monitoring conducted during CS2 by activity.

Figure 13 shows a histogram for the range of differences between the maximum turbidity (in NTU) at compliance stations versus the corresponding ambient station (representing the background).

The difference in turbidity was grouped into the same ranges presented in Section 8.1.1. The number of rounds of water quality monitoring within each range were also broken down by general construction activity. No confirmed exceedances of the turbidity criterion were observed during dredging (conducted separate from dredging with dewatering), dewatering (conducted separate from dredging), filter rock placement, gravel beach mix placement, riprap placement, or telebelt placement. These activities were not expected to result in significant amounts of turbidity or other water quality impacts, and monitoring was scheduled for the first 2 days of an activity to confirm that significant impacts were not occurring.

During dredging (including simultaneous dredging and dewatering), exceedances of the turbidity criterion were observed during about 1% of the monitoring rounds (1 of 70 rounds of monitoring). The observed exceedance (difference between the compliance station and the ambient [background]) was 8.4 NTU. The exceedance occurred during dredging in DMMU 19E in deep water during a flood tide.

During rock placement (including fish mix, gravel beach mix, filter rock, and riprap materials), exceedances of the turbidity criterion were observed during about 2% of the monitoring rounds (1 of 49 rounds of monitoring). The observed exceedance was 24.5 NTU over background and occurred during placement of fish mix material. The exceedance occurred in shallow water, during a flood tide, near the shoreline in DMMU 3A.

During ENR/RML placement (including sand placement with the telebelt), exceedance of the turbidity criterion occurred during approximately 6% of the monitoring rounds (2 of 32 monitoring rounds). The largest observed exceedance was 12.5 NTU over background; the remaining exceedances observed during the two rounds had an average of 7.9 NTU over background (six total turbidity exceedances in two rounds). Exceedances did not appear to be correlated to the depth of the water in which work was being conducted. Exceedances may have been related to the proximity to the shoreline in combination with the tidal cycle, whereby incoming tides may have helped generate turbidity along the shoreline. The observed exceedances occurred in DMMU 10A, near the shore, and during a flood tide and tide change. No exceedances were observed during ENR placement with the telebelt.

8.1.3 Comparison of Water Quality Monitoring Results to Nearby Site

Figure 14 shows a histogram of turbidity monitoring results for the 3 years of construction monitoring at the Boeing Plant 2 site, located upriver from the Site on the Lower Duwamish Waterway. Figure 14 shows the frequency for the range of differences between the maximum turbidity at compliance stations versus the corresponding ambient station. The values are grouped into similar ranges, and the construction activities are broken down into similar categories, as presented above for CS 1 and CS 2 at the Site.

During dredging (including dredging in Slip 4, an off-channel area), exceedances of the turbidity criterion were observed during 18.5% of the monitoring rounds (23 of 124 rounds of monitoring). The largest exceedance (difference between the compliance station and the ambient [background]) was approximately 19 NTU over background. The remaining 22 turbidity exceedances during dredging were on average about 10 NTU over background.

During placement of final backfill at Boeing Plant 2, 51 rounds of water quality monitoring were conducted, during which exceedances of the turbidity criterion were observed in 27 rounds (53%). The largest exceedances of the turbidity criterion were about 90, 80, and 53 NTU over background. The remaining exceedances averaged about 22 NTU over background. It is notable that the backfill material was placed at the Boeing Plant 2 site using a precision excavator with a small hydraulically closed bucket. The material was released from the submerged bucket approximately 2 feet above the bottom, which would presumably reduce material suspension into the water column. Even though the material during the Boeing Plant 2 project was placed using equipment believed to be the least environmentally disturbing, turbidity exceedances were about the same, if not greater than, the exceedances observed while placing material in the shipway at the Lockheed West Seattle site using a cable bucket.

These data indicate that placement of commercially viable sand, particularly in shallow water, generates turbidity that exceeds the turbidity water quality criterion and is unavoidable.

8.2 COMPARISON TO THE CHEMICAL WATER QUALITY CRITERIA

This section documents results of water quality sampling conducted during the remedial action and presents a comparison of results against the chemical water quality criteria.

8.2.1 Construction Season 1

More than 300 water samples were tested during 31 days of intensive monitoring for conventional water quality parameters during the first portion of CS1 at the Site. During CS1, a total of 26 samples (Table 15) were submitted to the laboratory for analysis for one or more analytes (selected metals [copper, mercury, lead, and zinc] and/or polychlorinated biphenyls [PCBs]). These results were compared to the Marine Acute and Chronic Water Quality Criteria for the protection of aquatic life, found within the State of Washington's Water Quality Standards and listed in the Clean Water Act §404 ARAR Memo (Appendix C).

No water quality chemistry exceedances occurred during CS1; an apparent exceedance of copper was determined to have been an anomaly from the chemical analytical method, as described below.

Water samples were collected for chemical analysis during the first 5 days of dredging and barge dewatering, and water sample collection for chemical analysis continued during the initial weeks of intensive dredge monitoring (Table 12 and Table 15). Samples with the highest turbidity on Day 1 and Day 3 of the first week of intensive dredge monitoring were analyzed for the selected metals and PCBs (Table 15). Water samples were also collected during a single round of monitoring during barge dewatering (conducted as a separate activity from the combined dredging and barge dewatering). The sample with the highest turbidity for the round of barge dewatering was analyzed for the selected metals and PCBs (Table 15).

Additional samples were analyzed during subsequent days of intensive dredge monitoring from compliance stations with turbidity exceedances. On each day when there was a confirmed turbidity exceedance, the sample collected at the compliance station with the highest turbidity was analyzed for the selected metals and PCBs. The remaining samples were archived pending the results of the initial sample analysis. If compliance with the Marine Acute and Chronic Water Quality Criteria could not be confirmed following the analysis of the initial sample (from the compliance station with the turbidity exceedance), then additional samples were analyzed following the guidelines in the *Water Quality Monitoring Plan* (Appendix M of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018c]) to demonstrate compliance with the Marine Water Quality Criteria.

The samples collected and analyzed at the compliance stations (and at the ambient station) during the first 5 days of monitoring had reporting limits for copper that were well above the reporting limits specified in the *Water Quality Monitoring Quality Assurance Project Plan* (Attachment A in the *Water Quality Monitoring Plan* (Appendix M of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018c]). Two compliance station samples with levels of turbidity below the water quality turbidity criterion had reported levels of dissolved copper that were above the chronic water quality criterion. Field duplicate samples were collected at the ambient station as part of the quality control (QC) requirements in the *Water Quality Monitoring Quality Assurance Project Plan* (Appendix M of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018c]). There were detected concentrations of zinc and copper at the ambient station. In addition, a filter blank, collected as part of the QC requirements, was analyzed for the dissolved metals. The sample had detected concentrations of dissolved copper and dissolved zinc. Total mercury and PCBs were undetected in a rinsate blank collected to meet QC requirements.

Wood was able to determine that the analysis method used by the first laboratory (Method 6020) appeared to provide results that were biased high for some of the dissolved metals. The analytical results for dissolved copper provided by the first laboratory were problematic. The chronic water quality criterion for dissolved copper was close to the reporting limit provided by the laboratory for the selected analysis method. Some of the results were potentially biased high and the analysis of additional samples were required to demonstrate compliance with the water quality chemical criteria.

Selected samples were resubmitted to a second analytical laboratory (Frontier Global Sciences in Bothell, Washington) and analyzed using different analytical methods. Analytical method 200.8 demonstrated a lower reporting limit and lower overall concentrations for dissolved copper in the submitted samples. After consultation and with the approval of USEPA, all the subsequent samples submitted for dissolved metals analysis used the more sensitive Method 200.8 for dissolved copper, dissolved lead, and dissolved zinc.

The chemical results for all samples submitted and analyzed are provided in Table 15. In Table 15 samples analyzed for metals on or before September 28, 2018 were analyzed using Method 6020; sample analyzed for metals after September 28, 2018 were analyzed using Method 200.8. Samples LMCWQ-100, LMCWQ-208, LMCWQ-271, LMCWQ-276, and LMCWQ-299 were analyzed for dissolved copper, dissolved lead, and dissolved zinc using Method 200.8. All the dissolved metal results were below the chronic criteria in the five samples. The field filtered samples were not analyzed for dissolved mercury because there was insufficient sample volume to analyze the sample for dissolved mercury (by Method 7470A) and for dissolved copper, dissolved lead, and dissolved zinc using Method 200.8.

The water samples submitted for the Method 200.8 analysis were also analyzed for total mercury for comparison against the marine chronic water quality criterion. The results for total mercury in these samples were well below the acute criteria for mercury, which is based on the dissolved fraction. The dissolved mercury fraction is a component of the total mercury fraction and is expected to be lower than the total mercury concentration. Based on the analytical results there were no exceedances of the chemical contaminant compliance criteria for the water quality monitoring conducted during CS1.

In addition to the samples from the compliance stations analyzed in response to a turbidity exceedance (discussed above) a total of 11 samples were collected at two locations used to represent ambient conditions during the water quality monitoring (Table 16). The two ambient stations were located to the east of the project site at the mouth of the West Waterway and to the north of the project site in Elliott Bay. The ambient locations are well outside the area possibly impacted by the construction activities at the Lockheed West site. Samples were collected near surface (2 feet below the surface) and deeper in the water column (40 feet or 46 feet below the surface) on 2 consecutive days and targeted both ebb and flood tides to cover ambient different conditions. The samples were field-filtered and preserved and analyzed for dissolved copper, dissolved lead, and dissolved zinc using the 200.8 analytical method. All sample results were well below the chronic criteria; however, there were detected values of copper found in the samples from the ambient stations. The copper concentrations range from 0.52 micrograms per liter (µg/L) to 1.88 µg/L (versus 3.1 µg/L chronic criterion). Copper concentrations were slightly higher on samples collected on the ebb tide versus the flood tide. Lead and zinc were undetected at reporting limits well below the chronic criteria. A pair of filter blanks submitted with the ambient samples had detected levels of dissolved copper, dissolved lead, and dissolved zinc, but all the results were well below the respective water quality chronic chemical criteria.

8.2.2 Construction Season 2

During CS2, a total of four samples (Table 13 and Table 17) were analyzed for one or more analytes (selected metals [copper, mercury, lead, and zinc] and/or PCBs) for comparison to the Marine Acute and Chronic Water Quality Criteria for the protection of aquatic life, found within the State of Washington's Water Quality Standards and listed in the Clean Water Act §404 ARAR Memo (see Appendix C). As shown in Table 13, sample LMCWQ-372 was inadvertently analyzed for mercury and PCBs; however, the results are reported. Based on the analytical results for the samples submitted, there were no exceedances of the chemical contaminant compliance criteria for the water quality monitoring conducted during CS2.

Water samples were collected during the first 5 days of dredging and barge dewatering (Table 13). Samples with the highest turbidity on Day 1, 2, 3, and 4 of intensive dredge monitoring were analyzed for the selected metals and PCBs (Table 13 and Table 17). The chemical results for all samples submitted and analyzed are provided in Table 17. Samples LMCWQ-351, LMCWQ-383, and LMCWQ-397 were analyzed for dissolved copper, dissolved lead, and dissolved zinc using Method = 200.8. All the dissolved metal results were below the chronic criteria in the three samples. The water samples submitted for the Method 200.8 analysis were also analyzed for total and dissolved mercury for comparison against the marine chronic water quality criterion. The results for dissolved mercury in these samples were well below the acute criterion. Sample LMCWQ-372 was analyzed for total and dissolved mercury and PCBs; all results were below reporting limits and therefore below acute and chronic criteria.

SECTION 9
POSTCONSTRUCTION ENHANCED NATURAL RECOVERY LAYER AND RESIDUAL MANAGEMENT LAYER PLACEMENT SAMPLING

Sampling was conducted after placement of the enhanced natural recovery (ENR) and residual management layer (RML), as specified in the *Field Sampling Plan* (Appendix P of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018b]). The objective of sampling was to confirm that contaminant of concern (COC) concentrations at the postplacement sediment surface (upper 0 to 10 centimeters [cm]) were below cleanup level (CUL) subtidal surface-weighted average concentration (SWAC) and were no higher than the CUL surface sediment concentrations (point). The intertidal areas in the project site were armored with riprap or covered with coarser gravel (fish mix) materials that could be effectively sampled; therefore, the intertidal areas were not sampled or included in the SWAC calculation.

Samples were collected within a few days after placement of ENR or RML material. The samples were collected with a 0.1-square-meter van Veen grab sampler; the sediment represented the top 10 cm of the postbackfill surface (Photo 18). Samples were collected at 25 locations, with duplicate samples collected at three of these locations. The sampling coordinates are provided in Table 18, and the locations are shown on Figure 15.

The analytical results are provided in Table 19. Analytical results showed COC concentrations less than the applicable CUL surface sediment point criteria for the following COCs with assigned point CULs:

- antimony
- arsenic
- chromium
- cobalt
- mercury
- nickel
- selenium
- vanadium
- acenaphthene
- benzo(a)anthracene
- benzo(a)pyrene
- benzo(g,h,i)perylene

- copper
- chrysene
- dibenzo(a,h)anthracene
- fluoranthene
- zinc
- indeno(1,2,3-cd)pyrene
- phenanthrene
- total high molecular weight polycyclic aromatic hydrocarbons (HPAHs)
- total benzofluoranthenes
- bis(2-ethylhexyl) phthalate
- pentachlorophenol
- total polychlorinated biphenyls (PCBs)

Photo 18 Collection of Sediment Samples after Placement of Enhanced Natural Recovery and Residual Management Layer Material

A geospatial interpolation was conducted for all COCs with assigned subtidal SWAC CULs:

- arsenic
- cadmium
- copper
- mercury
- benzo[g,h,i]perylene
- pentachlorophenol
- tributyltin
- total PCBs
- total dioxins/furans (TEQ)

- lead
- cPAHs (micrograms per kilogram dry weight, expressed as toxicity equivalent concentration [TEQ])

The subtidal SWAC was calculated using the geospatial methods presented in Exhibit 1 of the *Field Sampling Plan* (Amec Foster Wheeler et al., 2018b) to derive the SWAC for each chemical. The SWAC was compared to the CULs for the risk-driver COCs listed in Table 1. The results of the geospatial interpolation are provided in Table 19. The results show that for all contaminants with an assigned SWAC criterion, all SWACs were less than the criterion. In addition, there was no contaminant in the postconstruction samples that exceeded the applicable point CULs. These data demonstrate that the cleanup goals were met for the project.

SECTION 10
PRE- AND POSTCONSTRUCTION PERIMETER MONITORING

Pre- and postconstruction perimeter samples were collected at 10 sample locations (with one field duplicate; see Table 20 and Figure 15). Preconstruction samples were collected by a 0.2-square-meter (m^2) pneumatically operated grab sampler; the sediment represented the top 10 centimeters of the surface sediments. All of the preconstruction samples were collected on August 20, 2018, prior to the start of construction season 1 construction work. The postconstruction samples were collected at the same 10 locations where preconstruction samples were collected. Postconstruction samples were collected using a 0.1-m^2 van Veen grab sampler on March 26, 2020, at the end of construction season 2.

The results of the pre- and postconstruction samples were analyzed for the Site contaminants of concern (COCs), and the results are presented in Table 21.

The comparison of pre- and postdredging contaminant concentrations shows the concentrations were generally less than the sediment quality standards (SQS) prior to and after the remedial action. There were two sample locations that exceeded the SQS after the remedial action that did not before construction (a few polycyclic aromatic hydrocarbons [PAHs] at SD-PER20-001 and mercury at SD-PER20-010). There were two locations where mercury was greater than the SQS both before and after construction (SD-PERXX-006 and SD-PERXX-206 [field duplicate of SD-PERXX-006]) and there was one sample location where polychlorinated biphenyls (PCBs) were greater than the SQS before and after construction (SD-PERXX-010). Based on these data, few changes in COC concentrations were observed between the pre- and postconstruction sampling events. Any differences likely represent small-scale sediment heterogeneity.

SECTION 11
HEALTH & SAFETY

Three health and safety plans guided construction of the project, one from each of the following companies: Wood Environment & Infrastructure Solutions, Inc. (Wood), American Construction Company, and Dalton, Olmsted & Fuglevand. The health and safety plans for the Site were implemented with oversight provided by staff from Wood. Signature pages for the health and safety plan, daily tailgate meeting forms, boat safety checklists, and weekly safety surveys are presented in Appendix S.

Based on personnel involvement, workers received an induction training with one or multiple health and safety plans. A weekly safety walk was conducted by the safety officers from Wood and American Construction Company. The safety walk included an inspection of all on-site construction equipment, noting any safety deficiencies. If any deficiencies were identified during these safety walks, then corrective actions would take place immediately.

Throughout the project, the inventory of activity hazards analyses (AHAs) were updated to reflect the work that was being conducted. The crew was trained immediately when a revision or a new AHA was developed during the daily tailgate meetings. The safety of the crew and field staff was kept as the top priority for the project team.

The overall assessment of the health and safety performance was positive, with no lost-time incidents or major injuries. The project documented 40 near-miss incidents that were followed with short-term and long-term preventive actions. The incidents and near-miss reports are included in Table 22 and Appendix S.

One incident was reported during construction season 1. A worker was injured during a repair operation on the dredge barge. The worker self-treated using first aid and completed the shift. After the shift, the worker received stitches at a hospital. The incident was recorded, and an incident review PowerPoint was presented to the project team.

No incidents were recorded during construction season 2.

SECTION 12
GREEN REMEDIATION

The remedial work was conducted in accordance with the United States Environmental Protection Agency Region 10 "Clean and Green Policy." The project team was committed to designing and conducting the Lockheed West Seattle remedial action in a manner that conserves and protects natural resources. To reduce the project's contribution to greenhouse gas emissions, the project used railcars instead of trucks to transport the dredged sediments from Seattle, Washington, to the designated landfill in Arlington, Oregon. It is estimated that by using rail instead of trucking, over 200,000 gallons of fuel were saved, and carbon dioxide emissions were reduced by over 2,240 tons throughout construction season 1 (CS1) and construction season 2 (CS2). The on-site diesel equipment operated by American Construction Company was powered with a cleaner, ultra-low-sulfur diesel fuel. The equipment on site was partially supplied by rental companies. The CAT 966 front-end wheel loader was supplied by Evergreen Equipment and met Tier 3 standards. The APE 200 vibratory pile extractor met Tier 3 standards.

In the accordance with the principles of green remediation, the contractor followed the practices to the extent practicable. The dredged material that contained recyclable material was sorted at the waste management facilities upon delivery. During shoreline debris removal and in-water debris removal, approximately 70 tons of steel was recovered and recycled. Scrap metal, aluminum, paper, and plastics used during sampling and construction oversite activities were recycled. Approximately 1,000 pounds of other material was recycled during CS1 and CS2. The waste produced on site was reduced by employing an environmental management system that used electronic transmittal of project documents, and waste reduction and recycling programs were implemented at the work site. When practicable, reports were generated and transmitted electronically to reduce paper use and to eliminate fuel use for mail or courier delivery.

SECTION 13
END OF CONSTRUCTION SEASON DECONTAMINATION

Dredging during construction season 1 (CS1) was supported using three barges to hold and transport dredged material. These barges were the Dungeness, Skagit, and ITB-249. During the construction season 2 (CS2) only the Dungeness and Skagit barges were used. The Dungeness and Skagit barges were of similar design: 156-foot-long by 48-foot-wide flat-deck barges with steel, watertight bin walls with capacities of 1,925 tons each. The ITB-249 barge was a 250-foot-long by 50-foot-wide hopper barge, with total capacity of approximately 5,000 tons. Prior to a sediment barge being either demobilized from the site or used for transporting cargo other than dredged material, decontamination of that piece of equipment was required as specified in the *Equipment Decontamination Plan* (Appendix W of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018h]). The project requirement for successful decontamination was the removal of all visible sediment from the decks and bin (or hopper) walls of the barge (Photo 19). After a sediment barge was offloaded of dredged material at the transload site for the last time for the season, it went through the following decontamination sequence during CS1:

- The two flat deck barges (Skagit and Dungeness) had a skid steer loader placed onboard at the transload site for bulk removal of sediment. The skid steer was assisted by laborers using hand tools to remove the sediment from the corners of the bin walls and deck. Sediment removed during this step was offloaded and disposed of with the rest of the dredged material by Waste Management at their Slip 4 facility.
- Once bulk removal was complete, the remaining residual sediment was slurried and then consolidated into the ITB-249 barge's hoppers. Slurried material was disposed of with dredged material from the project.
- When the dredging contractor believed decontamination of a barge was complete, project oversight personnel performed a visual inspection of the barge for the presence of sediment on the deck and bin walls of the barge. If this inspection revealed the presence of sediment, decontamination continued until the requirement of no visible sediment was met.

- Bulk sediment onboard the ITB-249 barge from within the barge's hoppers was removed through the use of hand tools and vacuum trucks to remove the sediment at the transload site. Collected sediment was disposed of with dredged material from the project.

- Upon completion of bulk sediment removal, remaining visible residual sediment was then slurried using pressure washers and removed from the barge by vacuum truck. Slurried material was disposed of with dredged material from the project.

- As with the two flat deck barges, project oversight staff visually inspected the ITB-249 barge to confirm that the project requirement that no visible sediment remained on the barge was met. Only after this condition was met was the barge released from the project.

Photo 19 Decontamination of Barge Prior to Demobilization

During CS2 after a sediment barge was offloaded of dredged material at the transload site for the final load of the season, the following decontamination sequence was used:

- Prior to leaving the dredge area for the transload site, sediment outside of the sediment bin was placed back into the sediment bin by shovel.

- Once bulk material was placed into the sediment bin, the crew used water to remove any residual material from the outer deck of the barge prior to leaving the dredge area.

- Bulk sediment within the Dungeness' sediment bin was removed through the use of hand tools and vacuum trucks to remove the sediment from within the barge's hoppers at the transload site. Collected sediment was disposed of with dredged material from the project.

- Upon completion of bulk sediment removal, remaining visible residual sediment was then slurried using pressure washers and removed from the barge by vacuum truck. Slurried material was also disposed of with dredged material from the project.

- Prior to being released from the Site, quality control personnel performed visual inspection of the barge for the presence of residual sediment.

SECTION 14
PREFINAL AND FINAL CONSTRUCTION INSPECTIONS

As a requirement of the Unilateral Administrative Order, at the conclusion of construction a prefinal and final construction inspection must be conducted. Due to the Covid-19 pandemic, no in person prefinal or final construction inspections were conducted. However, a *Pre-Final and Final Construction Inspections* document was prepared to document the work that was conducted that would have required an in-person inspection (see Appendix T).

SECTION 15
INSTITUTIONAL CONTROL IMPLEMENTATION AND ASSURANCE

Existing institutional controls are in place for the Site. These include a regulated navigation area (RNA) over a portion of the site that restricts anchoring (Figure 16), and a fish consumption advisory for Washington State Marine Area 10 (Elliott Bay) and the Duwamish Waterway that is part of the Puget Sound Fish Consumption Advisory determined by the Washington Department of Health.

The RNA over a portion of the Site was implemented during the Pacific Sound Resources (PSR) remedial action as a result of contamination from the adjacent PSR site, where wood-treating compounds were removed from surface sediment and covered with a cap. This Lockheed West Seattle Superfund Site cleanup has removed contamination attributable to shipyard activities from the Lockheed West site to protective levels; therefore, no additional institutional controls are required beyond the existing RNA. It is the responsibility of the PSR site to maintain the RNA.

The fish consumption advisory in place for Elliott Bay and the Duwamish Waterway that recommends no or limited consumption of certain shellfish, flatfish, and rockfish. Although there was a significant reduction in the amount of contamination to which fish would be exposed at the Site, the Site represents only a small portion of the home range of the fish and shellfish that have consumption advisories. The current fish advisory for Recreational Marine Area 10 (Elliott Bay) under the Puget Sound Fish Consumption Advisory established by the Washington State Department of Health, to reduce human exposure from ingestion of contaminated seafood will continue to be posted at the Site.

In addition to the existing institutional controls, USEPA requires additional institutional controls (ICs) in the form of a proprietary control that runs with the property and that requires coordination with the USEPA and management of any residual contamination (above Cleanup Levels) that is disturbed or encountered in the event of future excavation or dredging within the boundaries of the Site. The *Institutional Control Implementation and Assurance Plan* that was approved by USEPA as part of the *Final (100 Percent) Design* is provided in Appendix U.

SECTION 16
LONG-TERM MONITORING AND MAINTENANCE

The long-term monitoring and maintenance program is described in Appendix V. The long-term monitoring program will be conducted to determine the following:

- the subtidal postconstruction sediment surface is at or above postremediation elevations, and
- differentiate postconstruction recontamination from off-site sources from remedy failure.

The postconstruction monitoring at the Site will include the following monitoring activities:

- bathymetric survey of the subtidal portions of the Site to confirm postdredge slope and backfill stability after construction completion, and
- sediment sampling (top 10 centimeters [cm]) to monitor sediment quality after completion of construction.

It is not anticipated that long-term maintenance of the project will be conducted unless there is significant erosion which will be discussed with USEPA. Stability of the subtidal portions of the Site will be assessed using a multibeam bathymetric survey conducted by a certified hydrographer in Year 4. The bathymetric survey will compare the Year 4 surface against the postconstruction "as-built" surface. The bathymetric survey will provide information about the stability and persistence of the additional enhanced natural recovery (ENR) and residual management layer (RML) material placed at the Site. It should be noted that the resolution of multibeam survey equipment may not detect small changes in elevations less than approximately 0.5 foot. In addition to performing a bathymetric survey in Year 4, a site-walk will be conducted during low tide to determine that the shoreline area has not significantly shifted or eroded.

Grab samples will be collected in the ENR area and in the dredged areas where RML material was placed. The grab sampling locations are the same locations sampled during the postbackfill sampling that was conducted following construction as described in Section 9.

At each grab sample location, the thickness of the ENR/RML material and any depositional layer will be measured if it can be determined. A sample of the top 10 cm of material will be collected from the center of the grab for analysis. If there is a discrete depositional material layer that can be sampled, a sample of this material will be collected and analyzed. If there is a discrete depositional layer, the following samples will be analyzed:

- discrete depositional layer,
- top 10-cm sample, and
- sample of underlying ENR or RML material.

If no discrete depositional layer is present, then the top 10 cm will be analyzed.

SECTION 17
LESSONS LEARNED

The remedial action work plans developed and approved in 2018 were largely based on the use of conventional and established methods for dredging and handling dredge spoils in Puget Sound. Nonetheless, small differences in conditions and lessons learned about the appropriateness and success of the methods inevitably arise. This section describes the more significant lessons learned from implementation of the remedial action.

17.1 DREDGE BUCKET TYPE

Two types of dredge buckets were used during dredging: a digging (or standard clamshell bucket) and a level-cut environmental bucket. One of the best management practices prescribed in the *Best Management Practices* (Appendix J of the *Revised Final (100 Percent) Design* [Amec Foster Wheeler et al., 2018i]) was to use an environmental bucket to the extent practicable. While this type of bucket allowed more precise level cuts through sediments, it was not found to reduce suspension of contaminated sediments while dredging through sediments with high debris content. The debris would often become lodged in the environmental bucket's flat edges, preventing closure of the bucket and allowing more sediment to escape the bucket. The digging bucket was much more successful in retaining sediments and debris due to its interlocking teeth.

17.2 TURBIDITY

The dispersal of contaminated sediment during dredging was very limited. Turbidity exceedances occurred during 8 of the 167 rounds of monitoring (approximately 5%) conducted during dredging or dredging and dewatering (see Section 8.1, Table 11, and Table 13), and no water quality chemical exceedances were observed in samples collected from turbidity exceedances during dredging (see Section 8.2). Placement of clean fill material caused more turbidity exceedances than dredging. During the monitoring of enhanced natural recovery (ENR) and residual management layer (RML) placement in the deeper offshore areas, turbidity at one or more of the compliance stations was 5 nephelometric turbidity units (NTU) or more above the corresponding ambient station during 11 out of 91 rounds of monitoring (12%).

The construction contractor initially started placing the ENR backfill material with the bucket well above the surface of the water and then sweeping the bucket in an arc to evenly disperse the material. This placement seemed to result in a large surface plume of visible turbidity. Following a turbidity exceedance during water quality monitoring, modifications were made to the placement methods. The placement methods included completely submerging the entire bucket before dispersing and partially submerging the bucket while dispersing. Placement of the ENR material with the bucket completely submerged appeared to result in uneven distribution and possible mounding of the material on the sediment surface, based on the rain gauge bucket data. Placement with the bucket partially submerged in deeper water appeared to provide lower turbidity while still achieving a suitable distribution. This last method was used when possible when placing ENR/RML material in the deeper offshore areas.

More exceedances occurred when placing clean fill in the shallow nearshore areas (i.e., shipway) compared to placement in deeper water. During monitoring of placement of clean backfill materials in the shallow inshore shipway, turbidity at one or more of the compliance stations was 5 NTU or more above the corresponding ambient station during 15 of 41 rounds of monitoring (37%). A majority of the turbidity exceedances (12 of 15) occurred during placement of sand backfill material (see Section 8.1.1).

Placement of backfill materials in the shipway was complicated by limited access and restricted clearances. The adjacent pier and uplands required placement of backfill materials with extra care by the crane operator to avoid contact with structures and to prevent placing material on the adjacent structures or uplands. Placement and dispersion of materials was initially conducted well above the surface of the water or on the shoreline (in the dry) to provide the crane operator with a clear line of sight. Turbidity became an issue when backfill was placed in the water in the shipway. The United States Environmental Protection Agency (USEPA) directed that placement of all materials in the water be done with materials released and dispersed when the bucket is no more than 2 to 3 feet above the water surface; however, it did not appear that the release within 2 to 3 feet of the water surface improved turbidity over release heights greater than 2 to 3 feet.

Placement of clean sand (ENR/RML and backfill) caused the most turbidity exceedances during construction, and the placement method in shallower water did not appear to significantly affect the overall turbidity within the water column. If the sand was placed above the water, a near-surface plume resulted. If the sand was placed just below the water surface, surface turbidity was less noticeable, but turbidity was still noted below the surface and in deeper water. Note that import material contained less than 1% fines (measured as passing a #200 sieve). Washington regulations require that all quarries use recycled wash water, which limits the amount of fines that can be removed from fill materials.

As described in Section 8.1.3, other projects in the Lower Duwamish Waterway have experienced elevated turbidities when placing sand backfill material, particularly in shallow water. However, importantly, the material being placed has been shown to be free of chemical concentrations of any concern so the turbidity did not nor will not increase contaminant loading. Based on the above information, it is expected that future remedial actions that require placement of fine-grained material will experience exceedances of the turbidity water quality criterion, especially if the placement is in shallow water. Given that turbidity exceedances have occurred during multiple other projects, it may be appropriate for the USEPA to consider some short-term water quality variance for placement of fine-grained material in the future.

17.3 TRANSLOADING

Past Lower Duwamish Waterway projects were limited by the absence of a dedicated sediment transloading facility. With Waste Management completing its permitting of a transloading facility at 7400 8th Avenue South in Seattle (approximately river mile 2.8), the Lockheed West Seattle Superfund Site project benefited from the availability of this facility. Past sediment removal projects were restricted in part by the inability to remove and transport dredge spoils, which slowed dredging. Approximately 182,600 tons of sediment were unloaded and transported by Waste Management by rail to its Subtitle D Columbia Ridge Landfill located in Arlington, Oregon.

Discharge and filtration of excess water from dredged sediments on the material barges was found to not be needed. Initially, sediment loaded onto barges was dewatered by allowing gravity drainage to one corner of the barge, pumping the water with a diaphragm pump through a 210-micrometer filter-fabric bag, and then discharging the water directly to Elliott Bay. The process was technically sound, but the relatively small amount of water that was recovered did not justify the effort because the process slowed dredging production. Moreover, the Waste Management 8th Avenue Reload Facility on river mile 2.8 was effective in removing and handling the moist sediment by allowing the sediments to dry within secondary containment. The on-barge dewatering process was therefore discontinued.

17.4 CONFIRMATION SAMPLING

Following dredging, collection of sediment confirmation samples was occasionally delayed allowing for more samples to be collected in a single day. However, collecting several samples during a single day created an issue of overwhelming the analytical laboratories with samples such that they could not meet desired turnaround times. Data results were delayed, which affected reporting and analysis for geospatial modeling, which in turn affected follow-up dredging. During construction season 2 (CS2), fewer samples were submitted to the analytical laboratory on a daily basis to reduce the backlog of samples to be analyzed for the project. This resulted in a quicker turnaround time for CS2 samples as compared to construction season 1 (CS1).

17.5 WATER QUALITY MONITORING

Early in CS1, two unexpected water sampling results were reported. The first was an apparent high concentration of dissolved copper. At the concentrations measured, a fish kill would have been expected, which did not in fact occur. We were able to determine that the analytical method used produced falsely high concentrations due to chemical interferences. Analytical method 6020 was used for this apparently elevated copper result. In response, the analytical method was switched to USEPA Method 200.8 for dissolved metals, which provides lower reporting limits and less bias in copper results. The second unexpected result was the detection of dissolved oxygen at concentrations less than 6.0 milligrams per liter in the vicinity of dredging in late October 2018. Based on monitoring that was conducted, the low dissolved oxygen concentrations were occurring throughout the Lower Duwamish Waterway and were not related to construction activities.

To support efficient dredging, concurrent water quality sampling is necessary. On a few occasions, the water quality data sonde malfunctioned temporarily and dredging had to be suspended. During CS2, a back-up water quality instrument was made available on site, and no failures of the water quality instrument occurred during CS2. However, the backup instrument would have allowed no delay in dredging should a failure have occurred.

During CS1, a small vessel was used for water quality monitoring and there were times that water quality monitoring could not be conducted due to inclement weather. In addition, water quality monitoring at night could not be safely conducted.

To reduce the potential that inclement weather could affect the ability to safely conduct water monitoring, a larger vessel was used during CS2. The larger vessel could work safely in any weather that construction activities could be conducted and also allowed for the ability to safely conduct water quality monitoring at night.

17.6 ENHANCED NATURAL RECOVERY AND RESIDUAL MANAGEMENT LAYER MATERIAL PLACEMENT

The placement of ENR/RML sand proved to be effective in avoiding possible dispersal of fine sediment residue (the "residuals layer"). Early in the project, there was concern that placement of sand near the water surface might disturb or disperse fine sediment, which is common as the uppermost layer of the postdredge sediment surface. Among other measures to test for possible dispersal of the residuals layer, postremediation sediment samples (after ENR or RML placement) were collected to determine if the Site met the cleanup levels. Chemical analyses of these samples showed that there was undetected or very low concentrations of organic contaminats present in the postconstruction samples confirming that there was little if any resuspension of dredge residuals. Moreover, cleanup levels were met for all contaminants of concern following ENR/RML placement. There was concern that the ENR/RML placement would disturb a fine residuals layer, which could then settle back down on the clean fill. Chemical testing demonstrated that this did not occur at the Site.

At the end of CS1, in DUs that did not meet the chemical criteria, a nominal 3-inch layer of sacrificial temporary RML material was placed in dredged material management units (DMMUs) that had concentrations of arsenic, copper, lead, mercury, or PCBs that were greater than the preconstruction concentrations of these contaminants. This was neccessitated by partially dredging a portion of the site that could not be completed during the first costruction season. The placement of the sacrifical RML potentially could have been avoided by reducing the size of the areas that were partially dredged.

Placement of ENR sand between the pilings of the remaining Port of Seattle piers (Piers 23, 24, and 25) represented a modest challenge. This challenge was addressed through the use of a telebelt. The hopper-fed conveyor was used to place sand between the pilings. The telescoping arm of the conveyor allowed for even distribution of sand on the sediment surface.

17.7 NOTIFICATIONS

The U.S. Coast Guard required that the derrick barges performing dredging within the federal navigation channel be equipped with an automatic identification system (AIS). When the contractor dredge equipment was mobilized during CS2, it had not yet been equipped with an AIS. Following notification by the U.S. Coast Guard of the need for the AIS, an AIS was installed on the vessel, briefly delaying work in the navigation channel. This resulting delay did not impact the work schedule; however, the requirement for an AIS system to be installed should have been identified prior to the start of the work.

SECTION 18
COSTS INCURRED BY COMPLYING WITH THE UNILATERAL ADMINISTRATIVE ORDER

The effective date of the Unilateral Administrative Order (UAO) was April 13, 2015. Total costs incurred by Lockheed Martin to comply with the UAO from the effective date through the issuance of this report are $54,965,695. The total cost includes such tasks as remedial design, dredging, sampling, backfilling, project management, financial assurance fees, access fees, and reporting.

SECTION 19
REFERENCES

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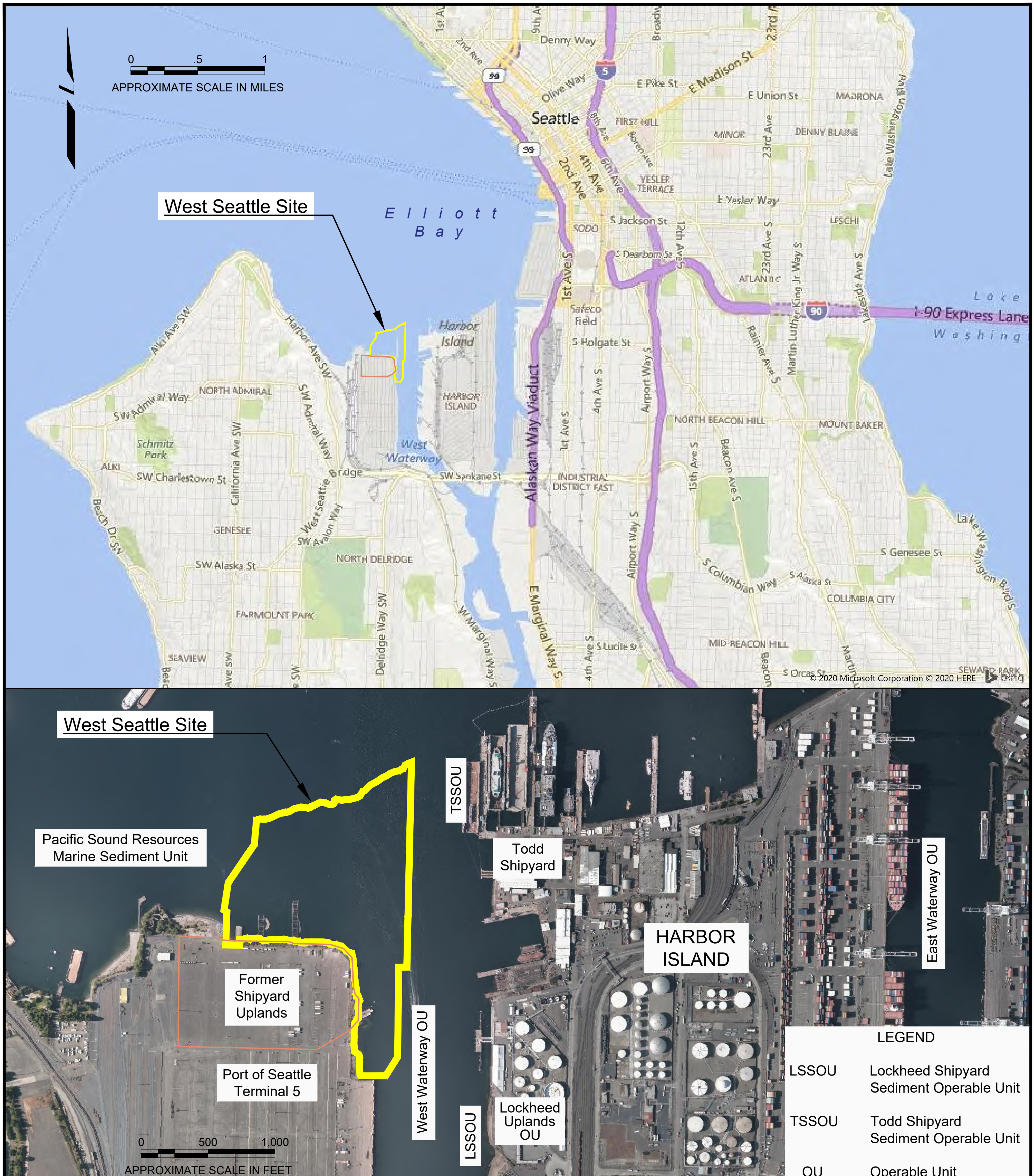
______, 2019. *Updated Final Memorandum, Clean Water Act §404 ARAR Memo: Substantive Water Quality Requirements for the Lockheed West Seattle Superfund Remedial Action*: USEPA Region 10.

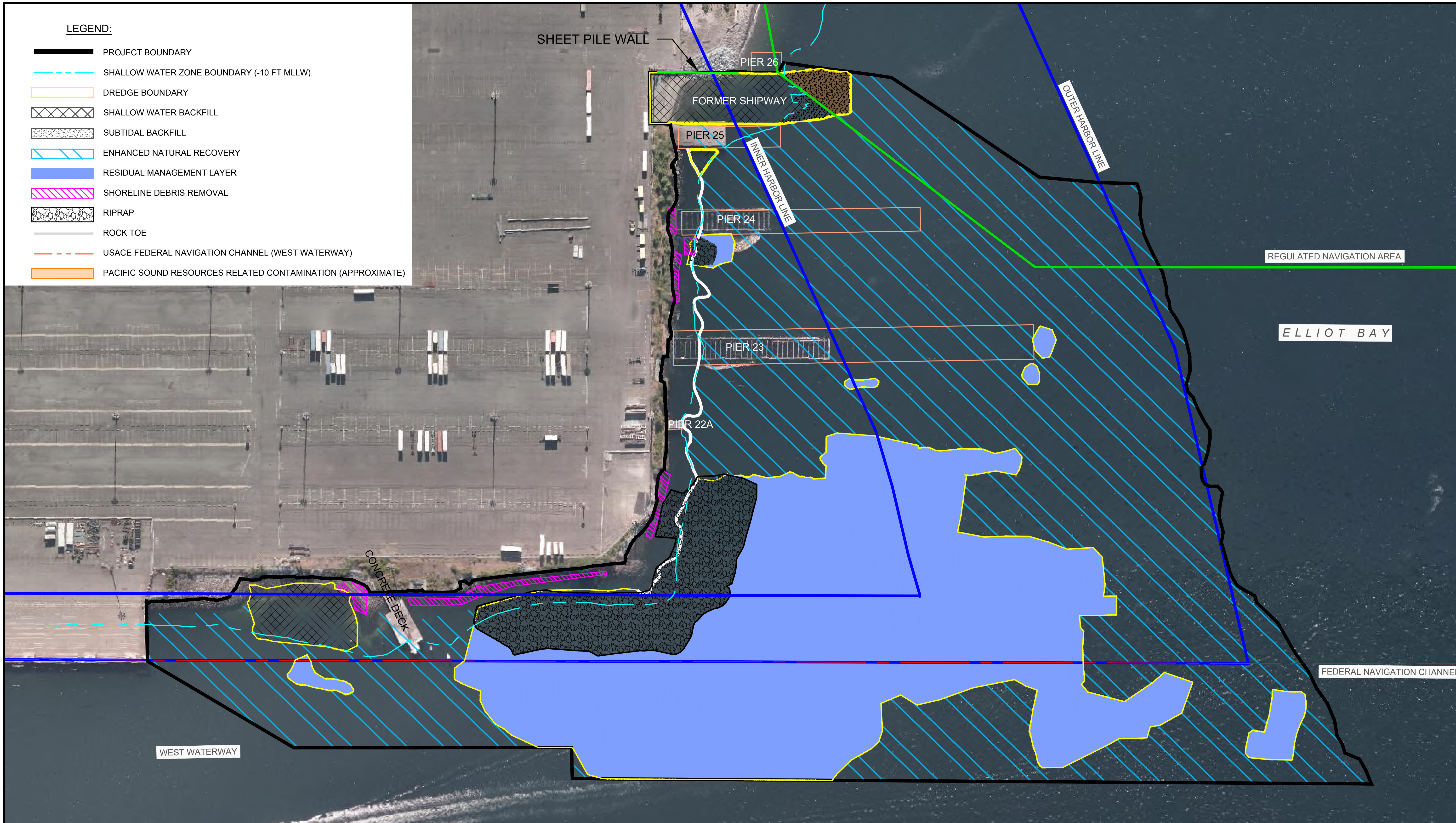
FIGURES



LOCKHEED MARTIN	wood.	LOCKHEED WEST SEATTLE SUPERFUND SITE	DATE JUNE 2020 SCALE AS SHOWN
Wood Environment & Infrastructure Solutions, Inc. 600 University Street, Suite 600 Seattle, Washington 98101		SITE VICINITY	PROJECT NO. 651917003 FIGURE 1

DRAWN BY: GSM CHECKED BY: CJW

C:\Users\adam.stenberg\Documents\LMC\LMC Site Vicinity.dwg - Vicinity Map with notes - Jun. 16, 2020 4:06pm - adam.stenberg



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LOCKHEED WEST SEATTLE SUPERFUND SITE

SELECTED REMEDY

DATE	JUNE 2020
SCALE	AS SHOWN
PROJECT NO.	6519170003.08.02
FIGURE	2

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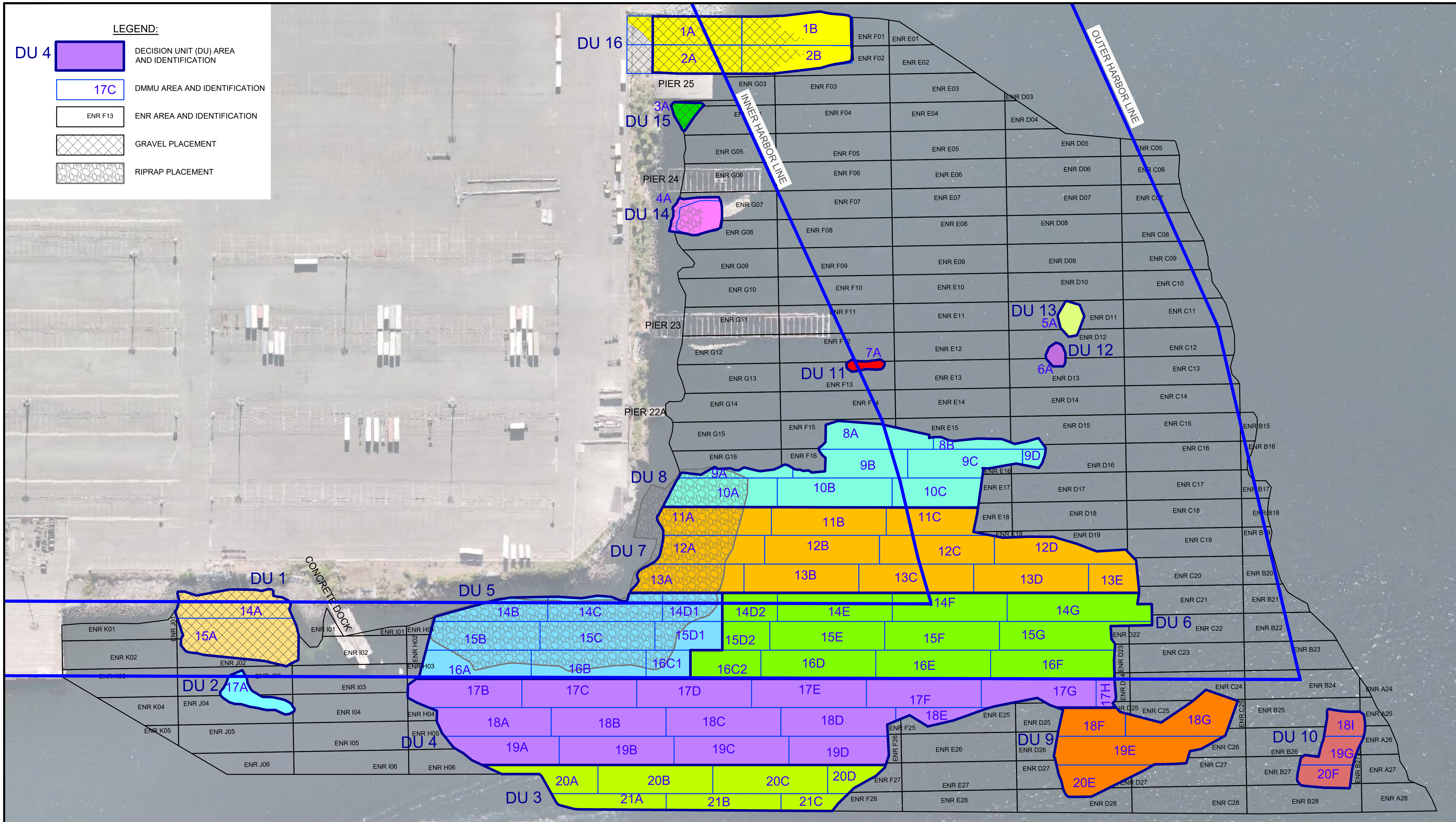

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Seattle, Washington 98101

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LOCKHEED WEST SEATTLE SUPERFUND SITE

LAYOUT OF DECISION UNITS (DUs) AND DREDGED MATERIAL MANAGEMENT UNITS (DMMUs)

DATE JUNE 2020

SCALE AS SHOWN

PROJECT NO. 6519170003.08.02

FIGURE 3

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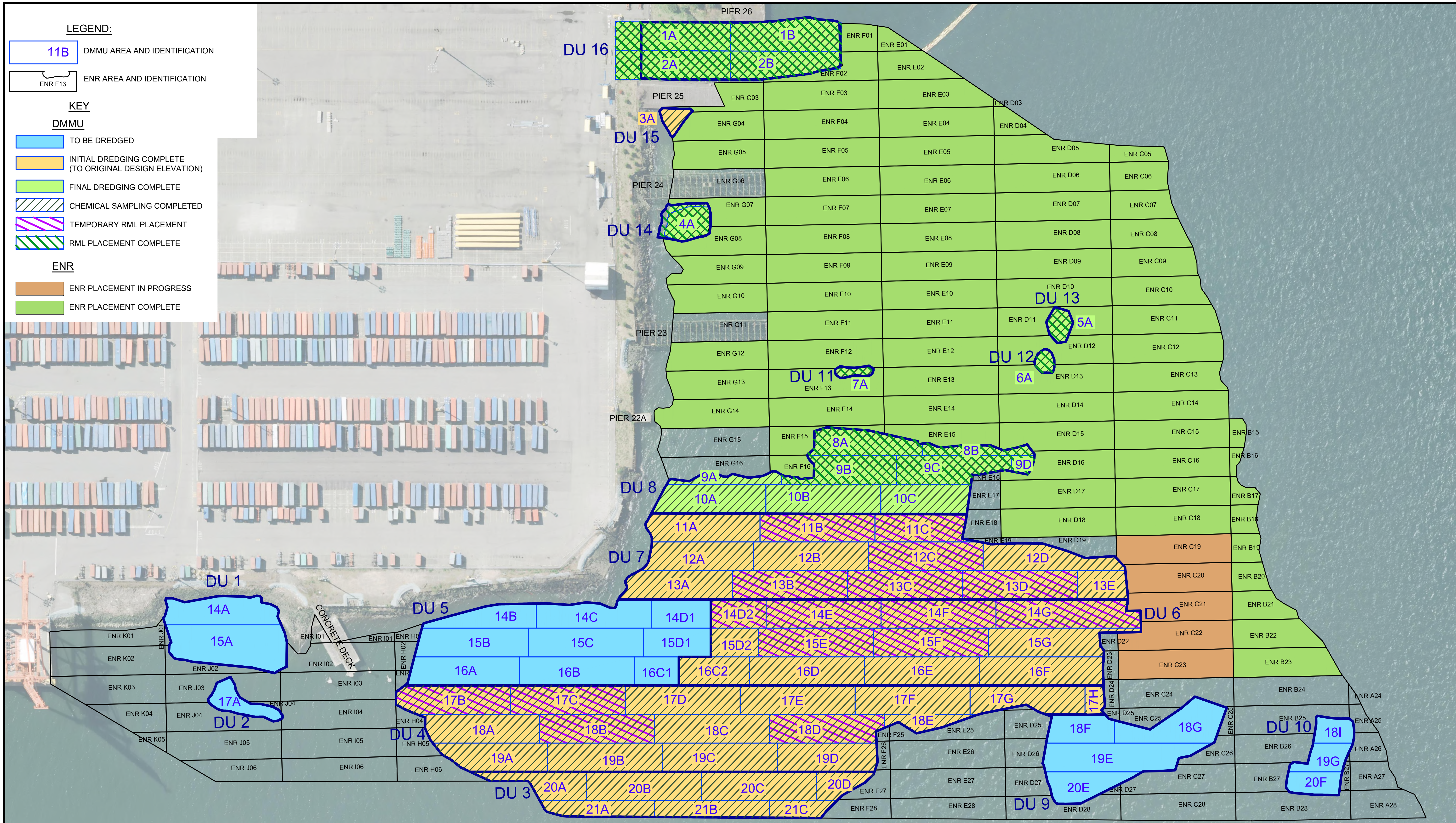

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LOCKHEED WEST SEATTLE SUPERFUND SITE

STATUS OF WORK AT END OF CONSTRUCTION SEASON 1

DATE: JUNE 2020
SCALE: AS SHOWN
PROJECT NO. 6519170003.01.03
FIGURE 4

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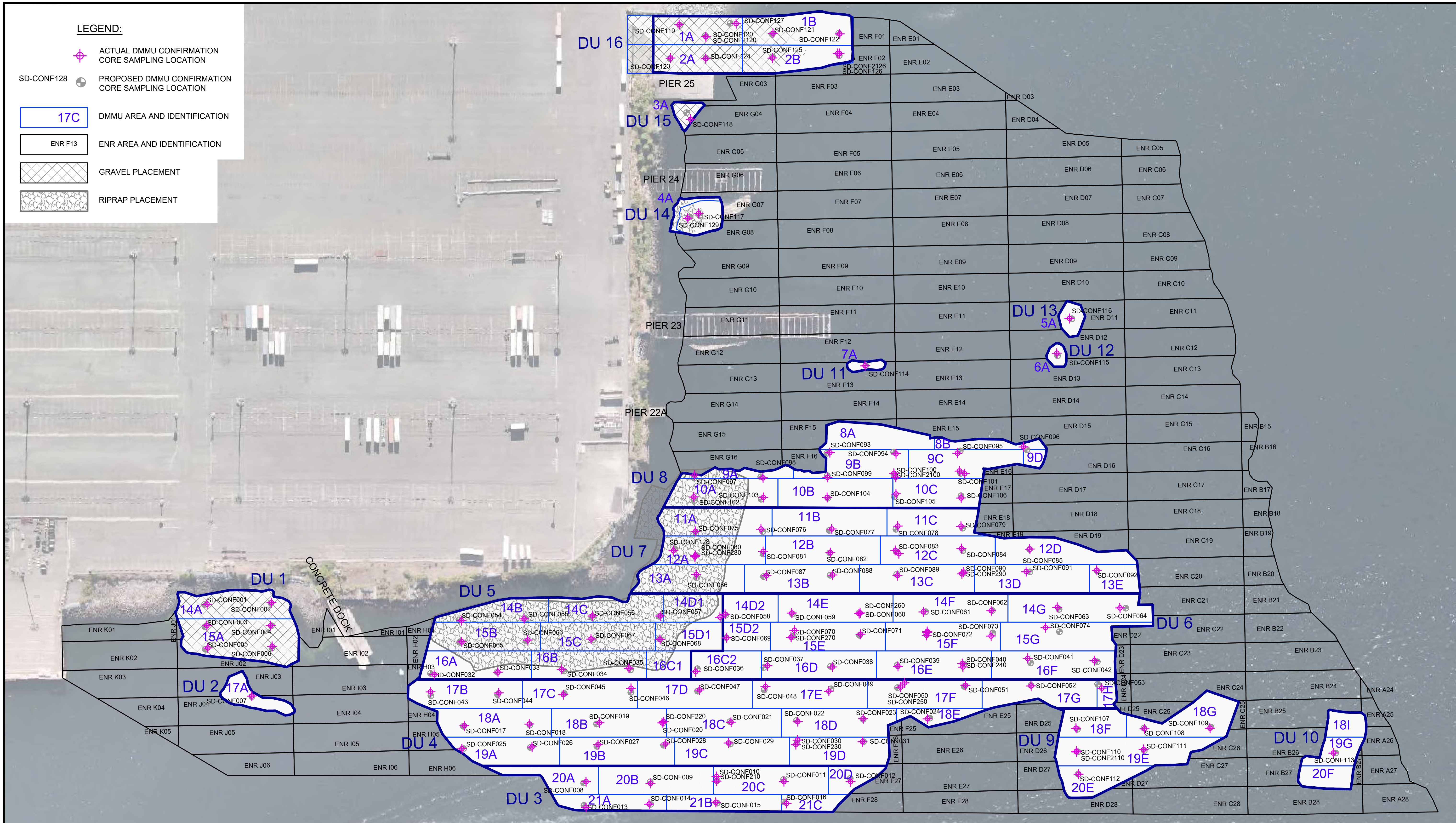

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LOCKHEED WEST SEATTLE SUPERFUND SITE

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS

DATE JUNE 2020

SCALE AS SHOWN

PROJECT NO. 6519170003.08.02

FIGURE 5

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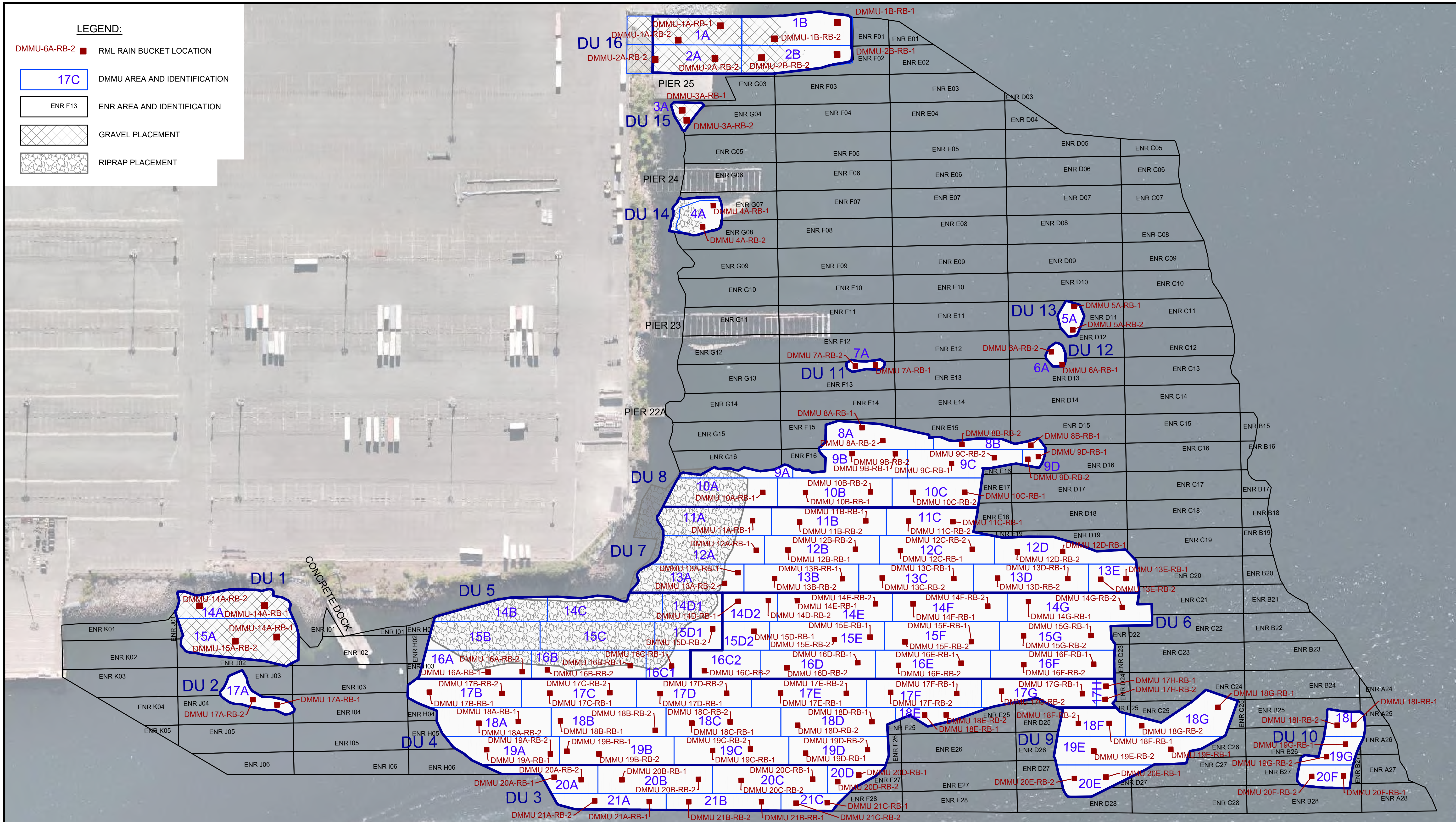

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LOCKHEED WEST SEATTLE SUPERFUND SITE

APPROXIMATE LOCATIONS FOR RAIN GAUGE BUCKETS TO MEASURE RESIDUAL MANAGEMENT LAYER MATERIAL PLACEMENT THICKNESS

DATE JUNE 2020

SCALE AS SHOWN

PROJECT NO. 6519170003.08.02

FIGURE 6

DRAWN BY: GSM CHECKED BY: CJW

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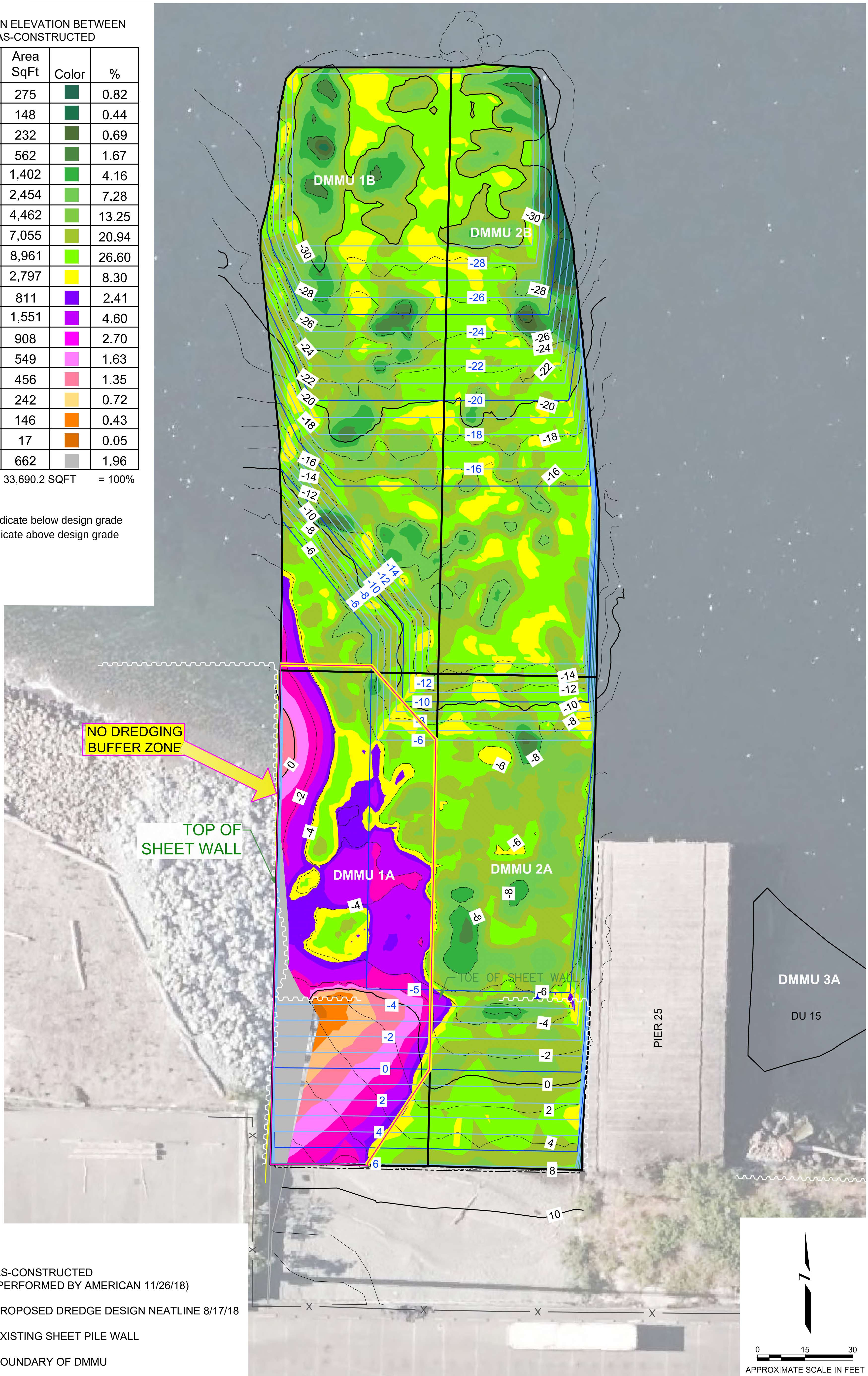
DIFFERENCE IN ELEVATION BETWEEN DESIGN AND AS-CONSTRUCTED

MIN. FT	MAX. FT	Area SqFt	Color	%
-8.9	-4.0	275		0.82
-4.0	-3.5	148		0.44
-3.5	-3.0	232		0.69
-3.0	-2.5	562		1.67
-2.5	-2.0	1,402		4.16
-2.0	-1.5	2,454		7.28
-1.5	-1.0	4,462		13.25
-1.0	-0.5	7,055		20.94
-0.5	0.0	8,961		26.60
0.0	0.5	2,797		8.30
0.5	1.0	811		2.41
1.0	2.0	1,551		4.60
2.0	3.0	908		2.70
3.0	4.0	549		1.63
4.0	5.0	456		1.35
5.0	6.0	242		0.72
6.0	7.0	146		0.43
7.0	8.8	17		0.05
x	x	662		1.96

TOTAL AREA = 33,690.2 SQFT = 100%

Note(s)
Negative values indicate below design grade
Positive values indicate above design grade



LEGEND

AS-CONSTRUCTED (PERFORMED BY AMERICAN 11/26/18)
PROPOSED DREDGE DESIGN NEATLINE 8/17/18
EXISTING SHEET PILE WALL
BOUNDARY OF DMMU

CLIENT LOCKHEED MARTIN	wood.	PROJECT LOCKHEED WEST SEATTLE SUPERFUND SITE	DATE JUNE 2020 SCALE AS SHOWN
Wood Environment & Infrastructure Solutions, Inc. 600 University Street, Suite 600 Seattle, Washington 98101		TITLE ISOPACH OF DESIGN VERSUS AS-CONSTRUCTED ELEVATIONS AND NO-ADDITIONAL DREDGING BUFFER ZONE IN SHIPWAY	PROJECT NO. 6519170003.01.03 FIGURE 7

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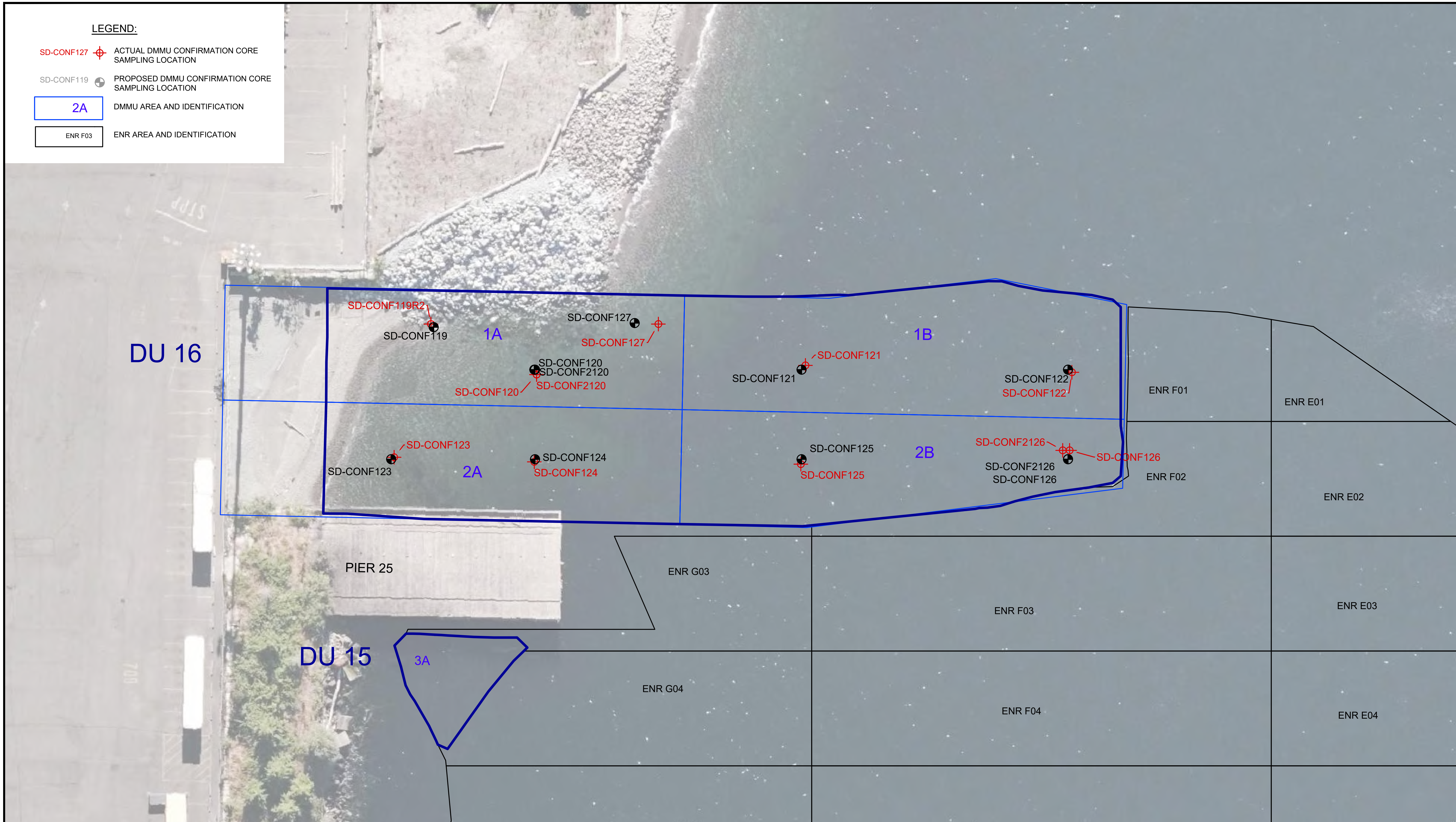

0 20 40
APPROXIMATE SCALE IN FEET

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LOCKHEED WEST SEATTLE SUPERFUND SITE

SHIPWAY CONFIRMATION CORE SAMPLING LOCATIONS

DATE	MAY 2020
SCALE	AS SHOWN
PROJECT NO.	6519170003.01.03
FIGURE	8

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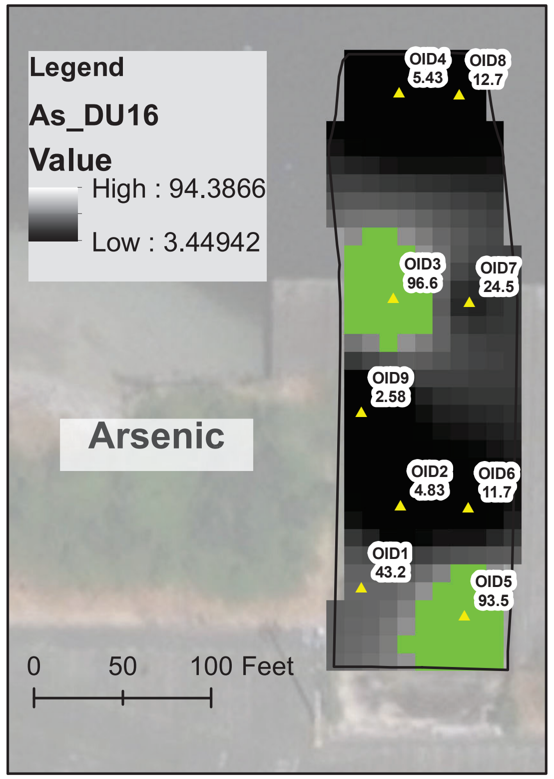
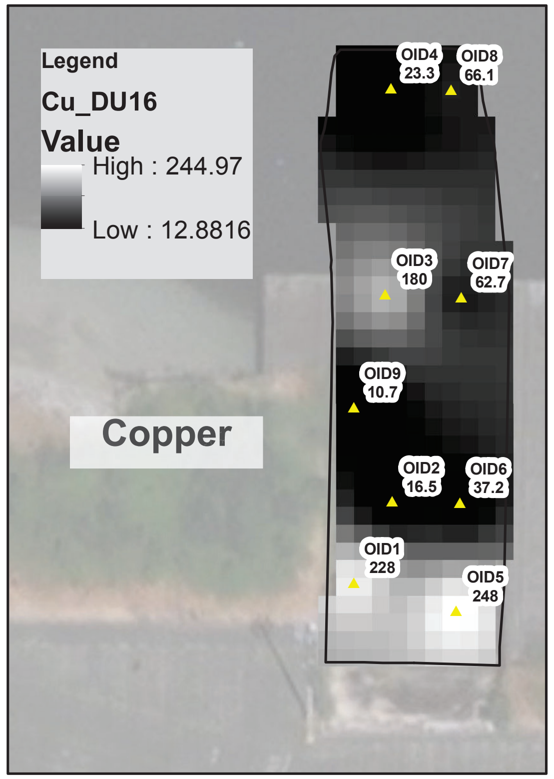
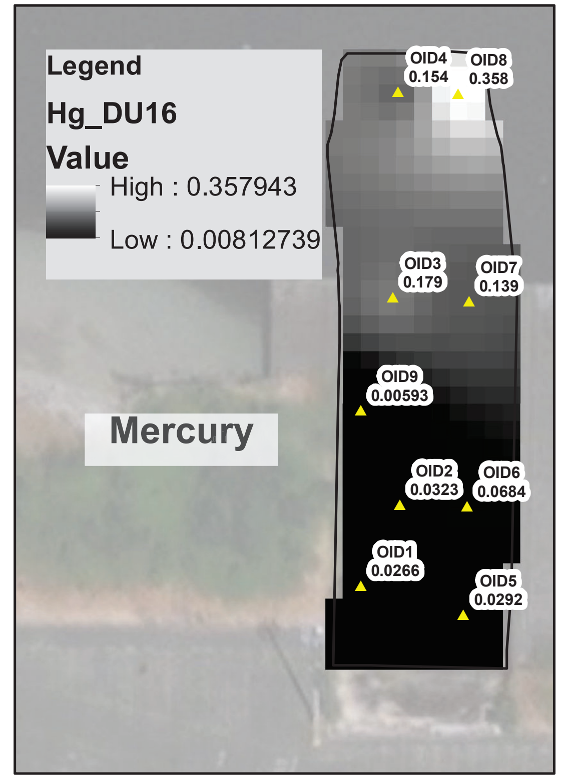
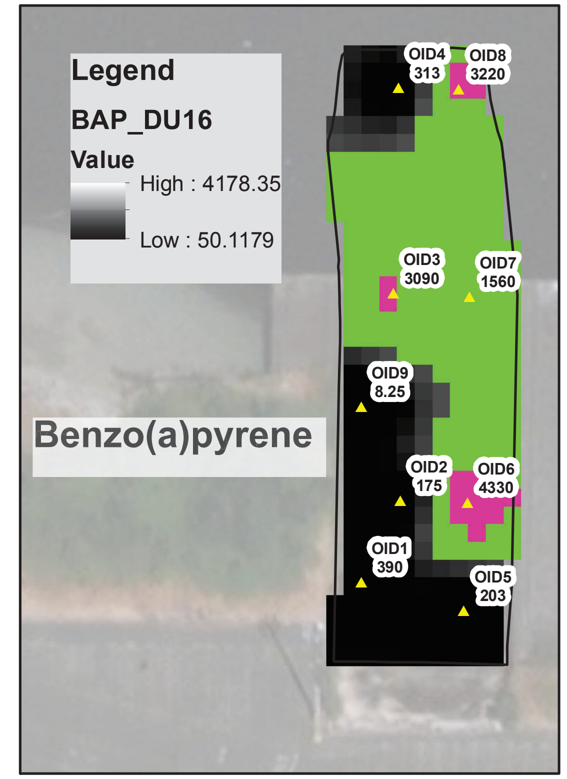




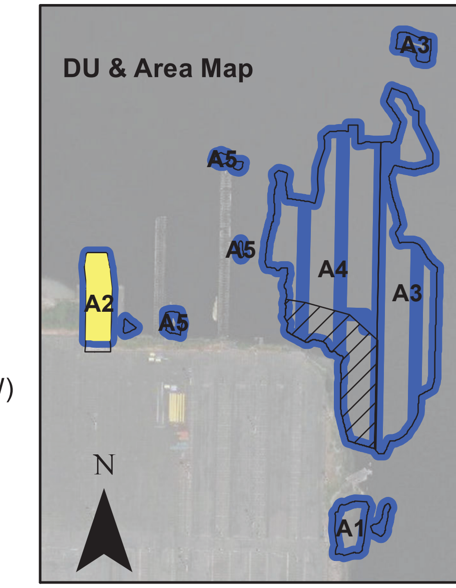


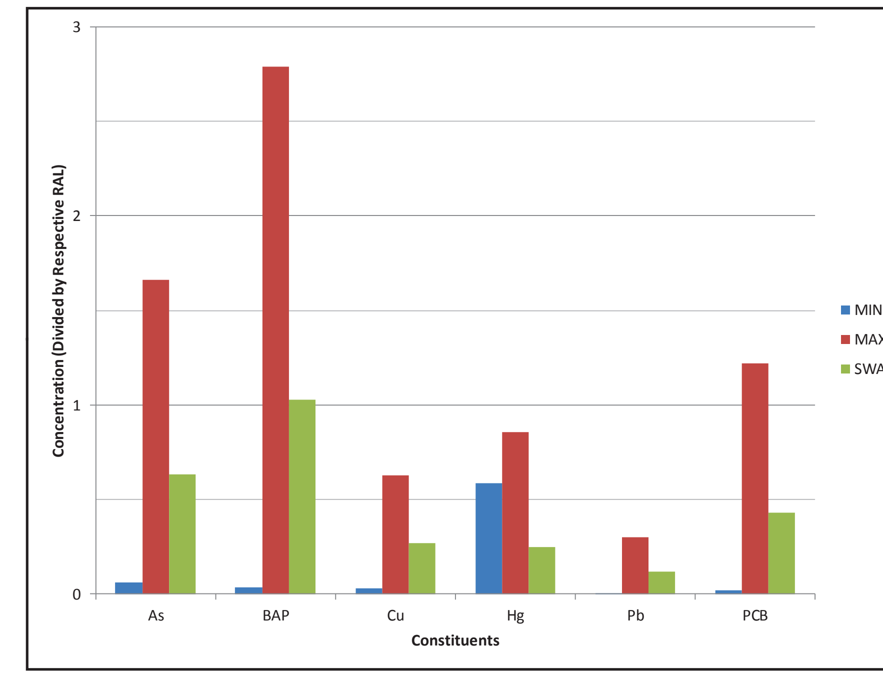


Legend for Decision Rule Failures

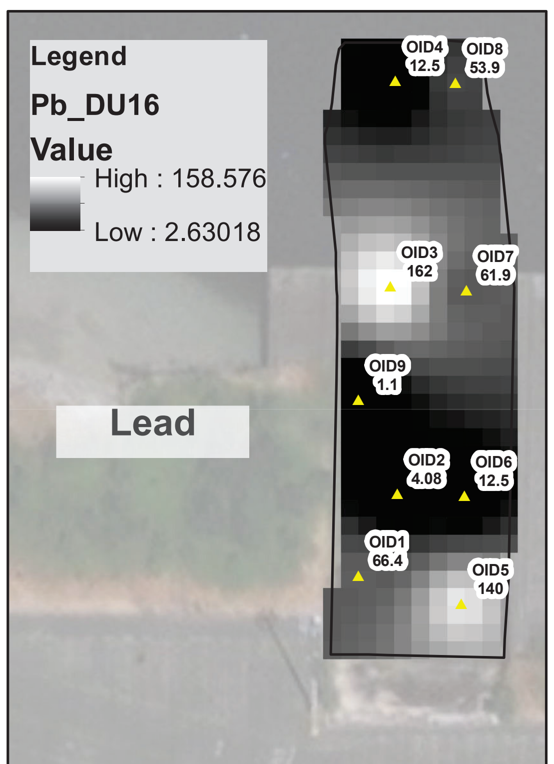
- Exceeds RAL
- Exceeds 2x RAL
- Exceeds 3x RAL

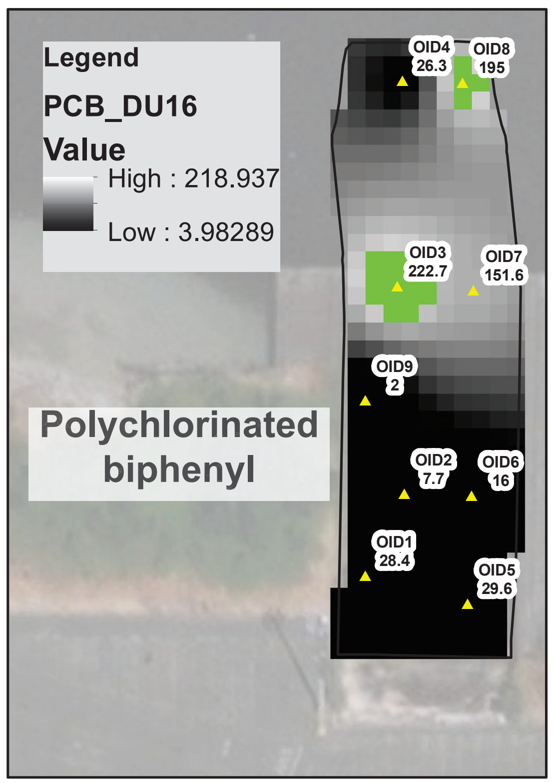
All data are interpolated using Inverse Distance Weighting (IDW) spatial estimation.

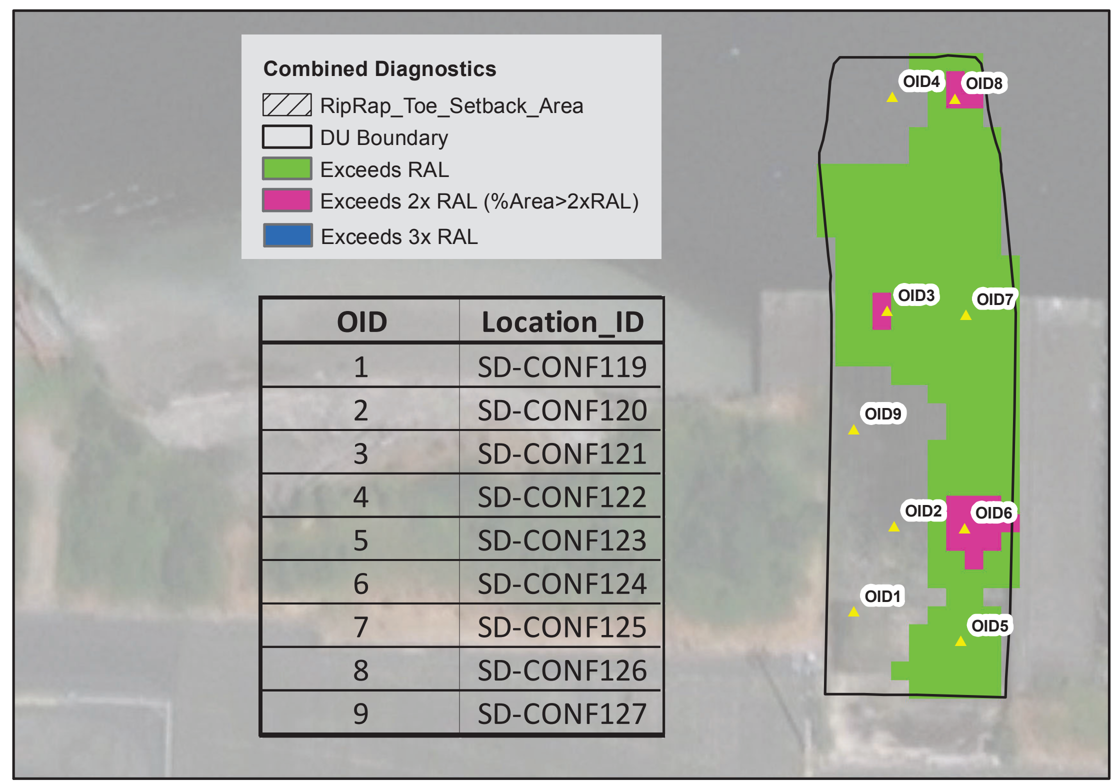




Concentrations are divided by the respective RAL value. Therefore, a SWAC value exceeding a value of 2, for example, indicates that the SWAC is higher than 2x the respective RAL.







OID	Location_ID
1	SD-CONF119
2	SD-CONF120
3	SD-CONF121
4	SD-CONF122
5	SD-CONF123
6	SD-CONF124
7	SD-CONF125
8	SD-CONF126
9	SD-CONF127

Decision Rule Failure: BAP

Interpolation Statistics

	NAME	Units (dry wt)	MIN	MAX	SWAC	RAL_Limit	2X_RAL_Limit	3X_RAL_Limit	SWAC>RAL	%Area>2XRAL	MAX>3XRAL
As	DU16	mg/kg	3.45	94.4	34.1	57	114	171	No	---	No
BAP	DU16	mg/kg	50.1	4180	1540	1500	3000	4500	Yes	4.72% (PASS)	No
Cu	DU16	mg/kg	12.9	245	95.8	390	780	1170	No	---	No
Hg	DU16	mg/kg	0.0081	0.358	0.114	0.41	0.82	1.23	No	---	No
Pb	DU16	mg/kg	2.63	159	60.1	530	1060	1590	No	---	No
PCB	DU16	µg/kg	3.98	219	83.1	180	360	540	No	---	No

Notes: None.

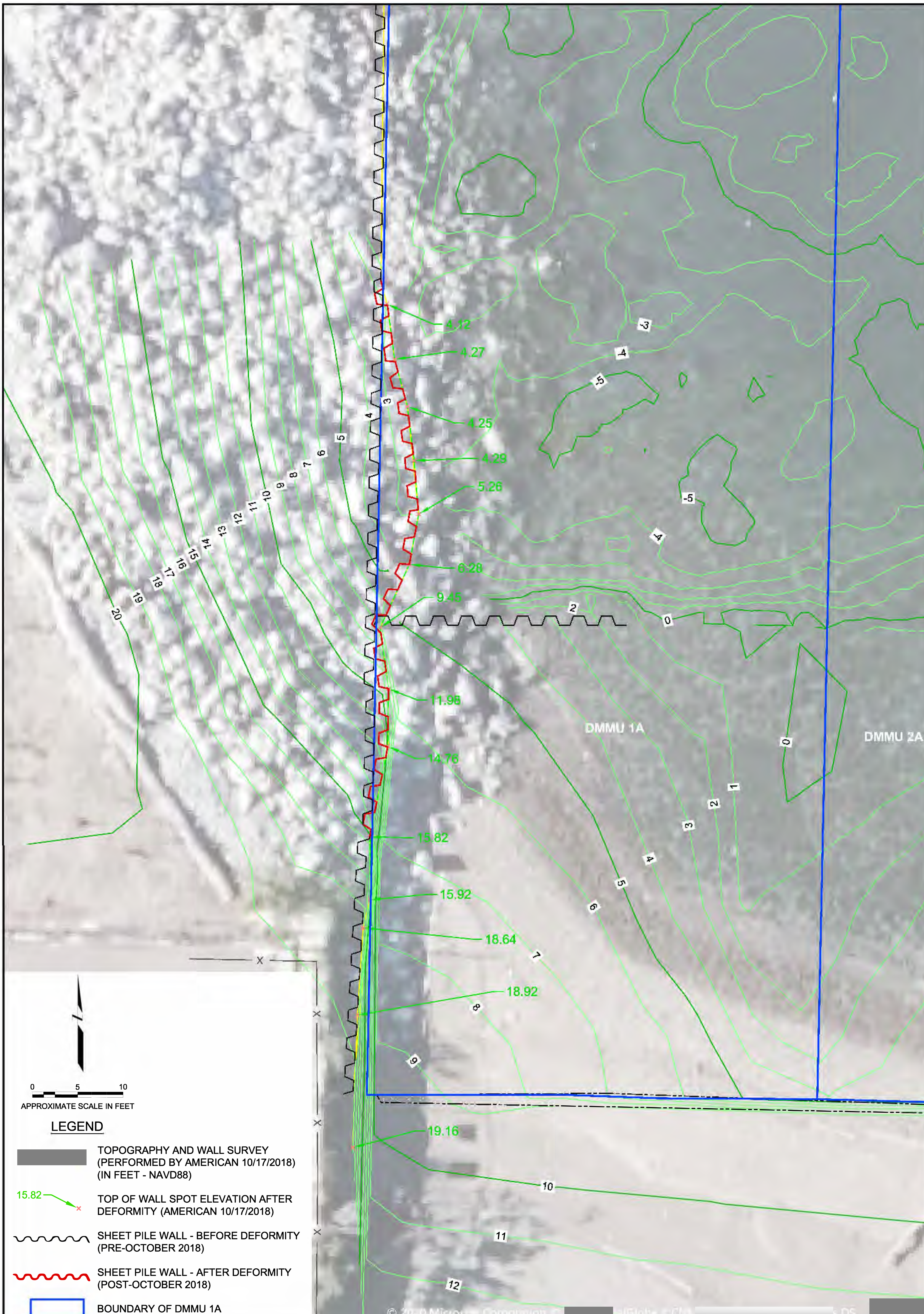
LOCKHEED WEST SEATTLE SUPERFUND SITE
LOCKHEED MARTIN

DECISION UNIT 16 GEOSPATIAL ANALYSIS FOR 0- to 0.5-FOOT INTERVAL

Prepared by/Date: CJL - 2/21/2019
Checked by/Date: DCM - 2/21/2019
Project Number: 6519170003

wood.

Figure: 9



CLIENT		PROJECT	DATE
LOCKHEED MARTIN	wood.	LOCKHEED WEST SEATTLE SUPERFUND SITE	JUNE 2020
			SCALE AS SHOWN
Wood Environment & Infrastructure Solutions, Inc. 600 University Street, Suite 600 Seattle, Washington 98101		TITLE SHIPWAY SHEET PILE WALL DEFORMITY	PROJECT NO. 6519170003.01.03
			FIGURE 10

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LOCKHEED MARTIN

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Seattle, Washington 98101

wood.

LOCKHEED WEST SEATTLE SUPERFUND SITE

RAIN BUCKET LOCATIONS IN ENHANCED NATURAL RECOVERY AREAS

DATE: JUNE 2020
SCALE: AS SHOWN
PROJECT NO. 6519170003.08.02
FIGURE 11

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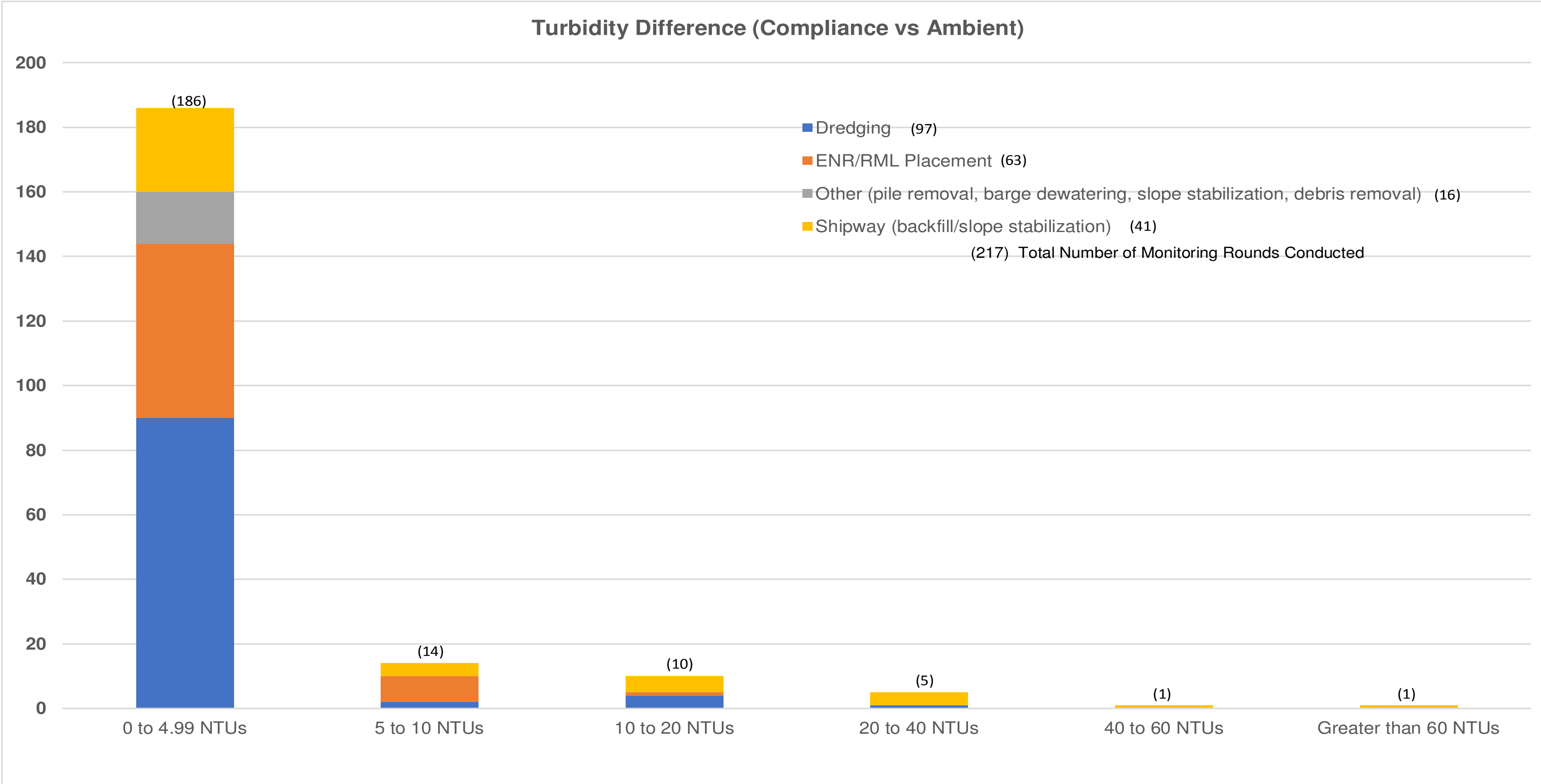


Table 1 Revised Cumulative_Table 2 WQ Summary_Figure 1 Histogram.xlsx

HISTOGRAM OF RESULTS OF WATER QUALITY MONITORING BY ACTIVITY DURING CONSTRUCTION SEASON 1 Lockheed West Seattle Superfund Site Lockheed Martin		
wood.	By: RHG Project: 6519170003 Phase No.: 08.02 Date: 05/27/20	Figure 12

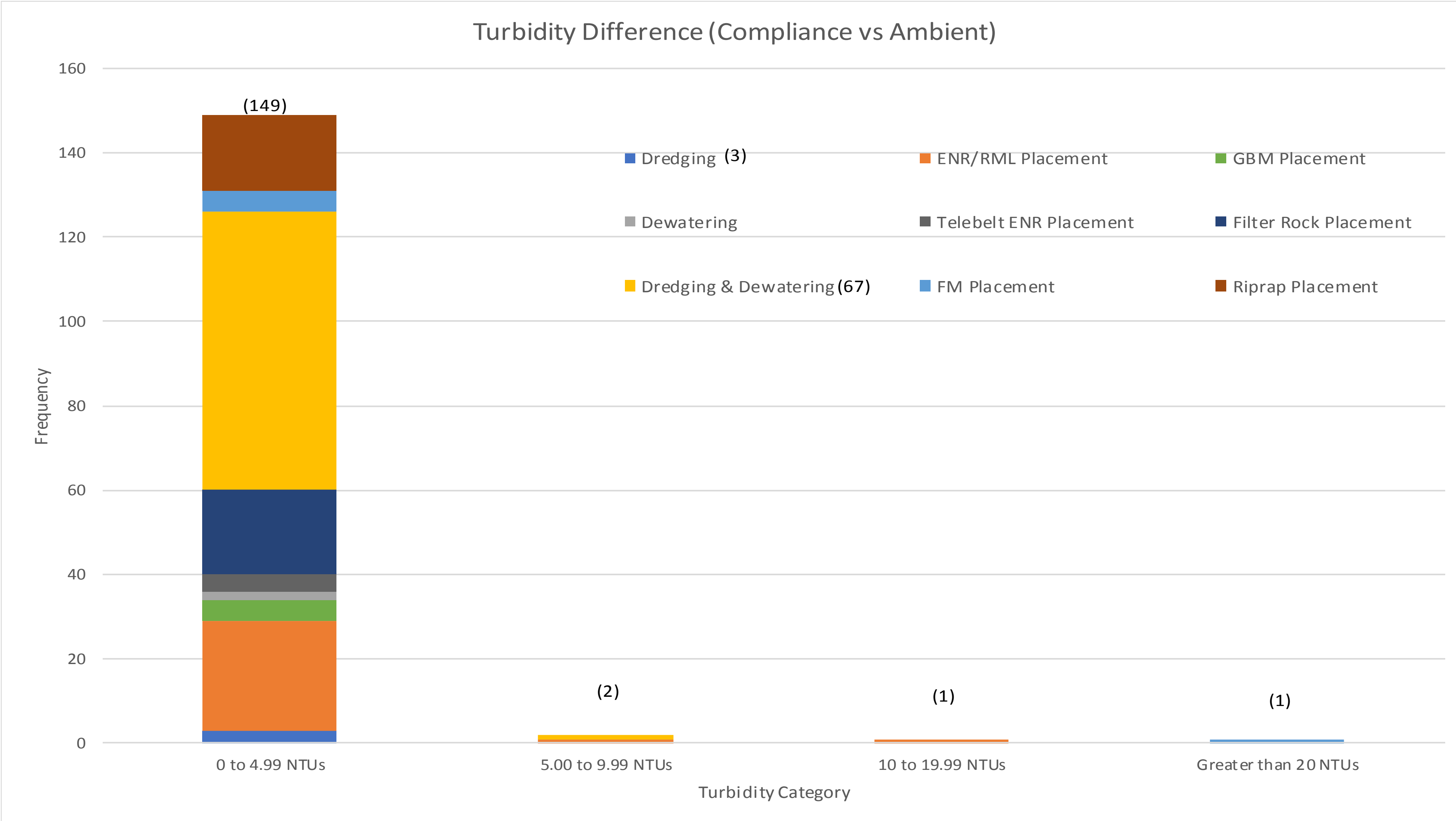


Table 1 Revised Cumulative _Table 2 WQ Summary_Figure 1 Histogram.xlsx

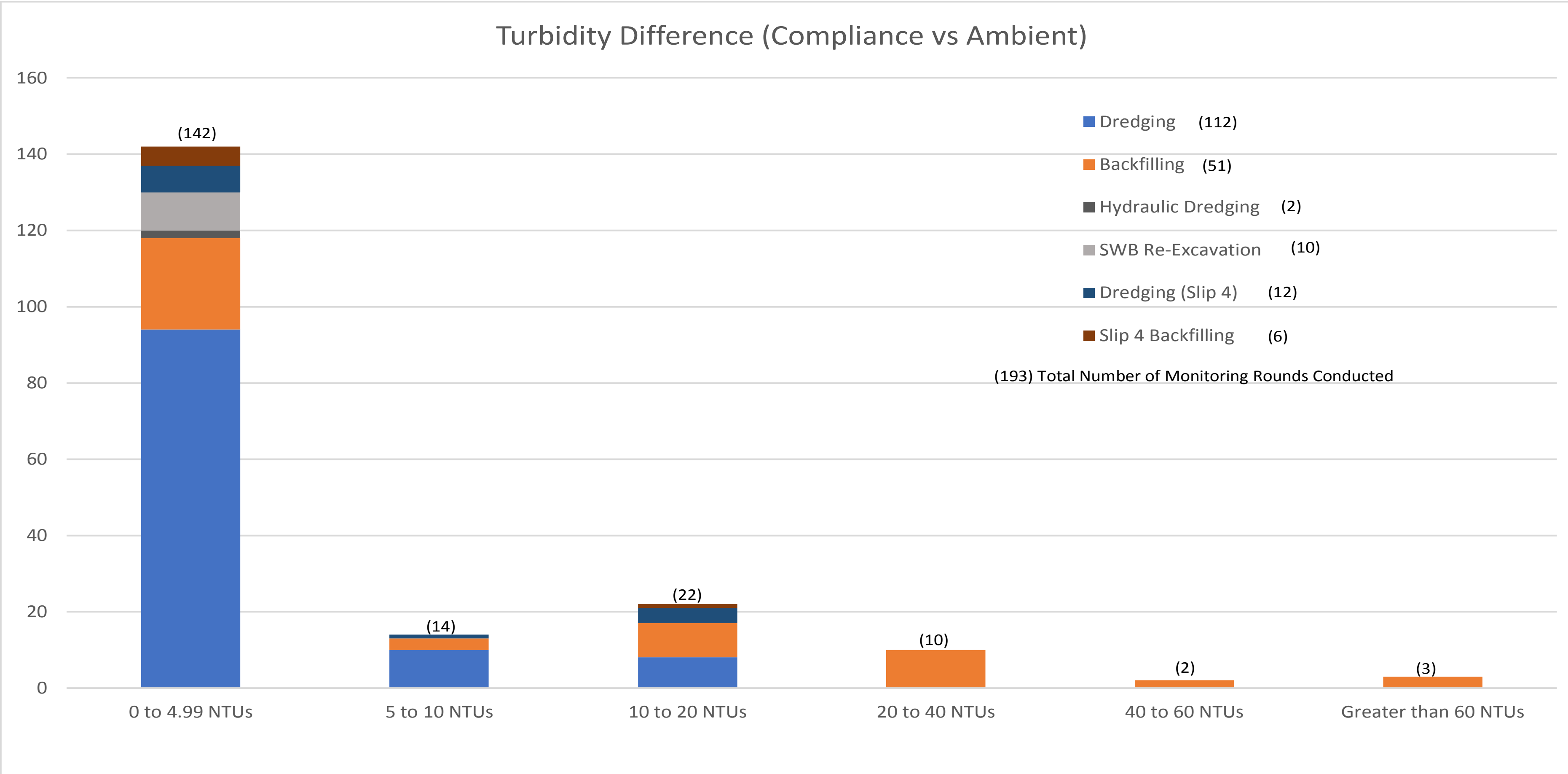
HISTOGRAM OF RESULTS OF WATER QUALITY MONITORING BY ACTIVITY DURING CONSTRUCTION SEASON 2

Lockheed West Seattle Superfund Site
Lockheed Martin

wood.

By: CJW
Project: 6519170003
Phase No.: 08.02
Date: 05/27/20

Figure 13



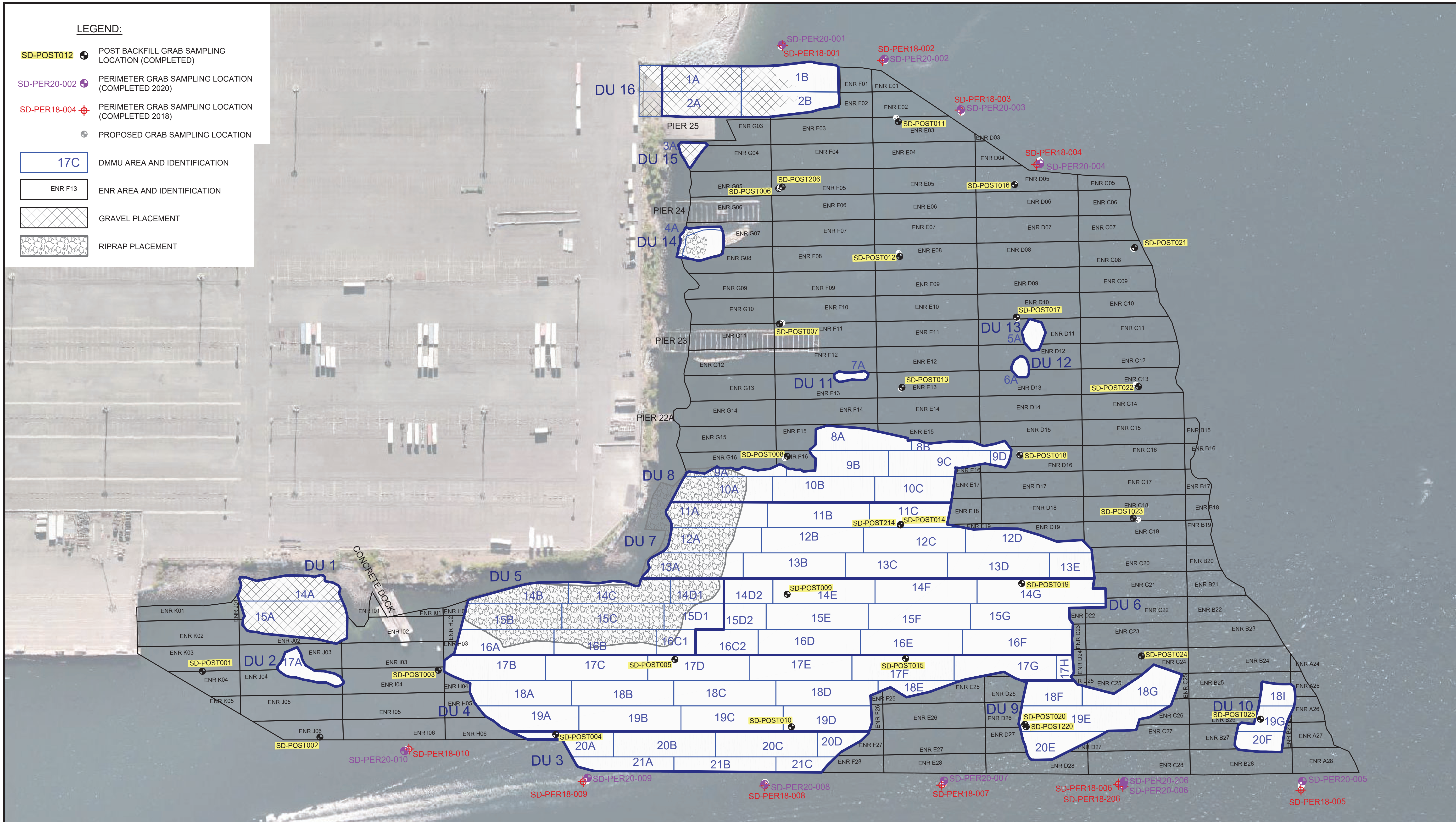
HISTOGRAM OF RESULTS OF WATER QUALITY MONITORING BY ACTIVITY DURING BOEING PLANT 2 REMEDIATION

Lockheed West Seattle Superfund Site
Lockheed Martin

wood.

By: RHG	Figure 14
Project: 6519170003	
Phase No.: 08.02	
Date: 05/27/20	

Figure 2 Boeing WQ Monitoring Comparison.xlsx



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LOCKHEED WEST SEATTLE SUPERFUND SITE

POSTBACKFILL AND PRE- AND POSTCONSTRUCTION PERIMETER SAMPLING LOCATIONS

DATE	JUNE 2020
SCALE	AS SHOWN
PROJECT NO.	6519170003.08.02
FIGURE	15

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0 150 300
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LOCKHEED WEST SEATTLE
SUPERFUND SITE

INSTITUTIONAL CONTROLS AND
PROPERTY OWNERSHIP

DATE	JUNE 2020
SCALE	AS SHOWN
PROJECT NO.	6519170003.08.02
FIGURE	16

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TABLES

TABLE 1

SUMMARY OF CLEANUP LEVELS FOR CONTAMINANTS OF CONCERN IN SEDIMENT

COC	Risk Driver?	Units[1]	Spatial Scale of Exposure[2]	RAO 1 Human Seafood Consumption[3] (0 to 10 cm)	RAO 2 Human Direct Contact[3] (0 to 45 cm)	RAO 3 Benthic Organisms[4] (0 to 10 cm)	RAO 4 Ecological[5] (0 to 10 cm)
Total PCBs	Yes	µg/kg dw	Subtidal	2 (nat. bkgd)	n/a	n/a	100 (RBTC – fish)
			Intertidal	2 (nat. bkgd)	n/a	n/a	n/a
			Point	n/a	n/a	12 mg/kg-OC/180 (SQS)	n/a
cPAHs	Yes	µg TEQ/kg dw	Subtidal	9 (nat. bkgd)	550 (RBTC)[6]	n/a	n/a
			Intertidal	9 (nat. bkgd)	15 (RBTC)[7]	n/a	n/a
			Point	n/a	n/a	n/a	n/a
Arsenic	Yes	mg/kg dw	Subtidal	7 (nat. bkgd)	7 (nat. bkgd)	n/a	n/a
			Intertidal	7 (nat. bkgd)	7 (nat. bkgd)	n/a	n/a
			Point	n/a	n/a	57 (SQS)	n/a
Lead	Yes	mg/kg dw	Subtidal	11 (nat. bkgd)	n/a	n/a	n/a
			Intertidal	11 (nat. bkgd)	n/a	n/a	50 (RBTC – sandpiper)
			Point	n/a	n/a	n/a	n/a
Tributyltin	Yes	µg/kg dw	Subtidal	430 (RBTC – child)	n/a	n/a	150
			Intertidal	2,000 (RBTC – child)[8]	n/a	n/a	n/a
			Point	n/a	n/a	n/a	n/a
Copper	Yes	mg/kg dw	Subtidal	400 (RBTC – child)	n/a	n/a	114 (RBTC – fish)
			Intertidal	400 (RBTC – child)[8]	n/a	n/a	420 (RBTC – sandpiper)
			Point	n/a	n/a	390 (SQS/CSL)	n/a
Mercury	Yes	mg/kg dw	Subtidal	0.41 (RBTC – child)	n/a	n/a	n/a
			Intertidal	0.17 (RBTC – child)	n/a	n/a	n/a
			Point	n/a	n/a	0.41 (SQS)	n/a
Dioxins/ Furans	Yes	ng TEQ/kg dw	Subtidal	2 (nat. bkgd)	37 (RBTC)[8]	n/a	n/a
			Intertidal	2 (nat. bkgd)	13 (RBTC)[8]	n/a	n/a
			Point	n/a	n/a	n/a	n/a
Antimony	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	150 (LAET/SL)	n/a
Cadmium	No	mg/kg dw	Subtidal	0.398 (nat. bkgd)	n/a	n/a	n/a
			Intertidal	0.398 (nat. bkgd)	n/a	n/a	n/a
			Point	n/a	n/a	n/a	n/a

TABLE 1

SUMMARY OF CLEANUP LEVELS FOR CONTAMINANTS OF CONCERN IN SEDIMENT

COC	Risk Driver?	Units[1]	Spatial Scale of Exposure[2]	RAO 1 Human Seafood Consumption[3] (0 to 10 cm)	RAO 2 Human Direct Contact[3] (0 to 45 cm)	RAO 3 Benthic Organisms[4] (0 to 10 cm)	RAO 4 Ecological[5] (0 to 10 cm)
Chromium	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	260 (SQS)	n/a
Cobalt	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	10 (LAET/SL)	n/a
Nickel	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	140 (LAET/SL)	n/a
Selenium	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	1 (LAET/SL)	n/a
Vanadium	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	57 (LAET/SL)	n/a
Zinc	No	mg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	410 (SQS)	n/a
Pentachloro-phenol	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	360 (SQS)	n/a
Bis(2-ethylhexyl) phthalate	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	47 mg/kg-OC/710 (SQS)	n/a
Acenaphthene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	16 mg/kg-OC/ 240 (SQS)	n/a
Benzo(a)-anthracene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	110 mg/kg-OC/ 1,700	n/a

TABLE 1

SUMMARY OF CLEANUP LEVELS FOR CONTAMINANTS OF CONCERN IN SEDIMENT

COC	Risk Driver?	Units[1]	Spatial Scale of Exposure[2]	RAO 1 Human Seafood Consumption[3] (0 to 10 cm)	RAO 2 Human Direct Contact[3] (0 to 45 cm)	RAO 3 Benthic Organisms[4] (0 to 10 cm)	RAO 4 Ecological[5] (0 to 10 cm)
Benzo(a)pyrene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	99 mg/kg-OC/ 1,500 (SQS)	n/a
Benzo(g,h,i)-perylene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	31 mg/kg-OC/ 470 (SQS)	n/a
Total Benzofluor-anthenes	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	230 mg/kg-OC/ 1,800	n/a
Chrysene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	110 mg/kg-OC/ 1,700	n/a
Dibenz(a,h)-anthracene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	12 mg/kg-OC/ 180 (SQS)	n/a
Fluor-anthene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	160 mg/kg-OC/ 2,400	n/a
Indeno(1,2,3-cd)pyrene	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	34 mg/kg-OC/ 510 (SQS)	n/a
Phenan-threne	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	100 mg/kg-OC/ 1,500	n/a
Total HPAH	No	µg/kg dw	Subtidal	n/a	n/a	n/a	n/a
			Intertidal	n/a	n/a	n/a	n/a
			Point	n/a	n/a	960 mg/kg-OC/ 14,400	n/a

TABLE 1

SUMMARY OF CLEANUP LEVELS FOR CONTAMINANTS OF CONCERN IN SEDIMENT

COC	Risk Driver?	Units[1]	Spatial Scale of Exposure[2]	RAO 1 Human Seafood Consumption[3] (0 to 10 cm)	RAO 2 Human Direct Contact[3] (0 to 45 cm)	RAO 3 Benthic Organisms[4] (0 to 10 cm)	RAO 4 Ecological[5] (0 to 10 cm)

Note(s)

1. Unless noted differently in RAO-specific values.
2. The spatial scale of exposure is measured as subtidal SWAC, intertidal sediments SWAC, and point measurements at single locations throughout the site (i.e., all subtidal and intertidal sediment locations) or at single locations in intertidal sediment only. The spatial scale is RAO-specific, with site-wide exposures applicable to human seafood consumption, human direct contact, and exposures of fish and crab. Intertidal-only exposures are applicable to human consumption of clams from intertidal areas and exposures of sandpiper. Point exposures are applicable to benthic organisms, which are evaluated at single station locations. The statistical metric for site-wide and intertidal evaluation of alternatives and compliance monitoring is the upper confidence limit on the mean, whereas point exposures are evaluated with concentration data at single locations.
3. Cleanup levels are based on 10^{-6} cancer risk for carcinogens (e.g., PCBs, cPAHs, arsenic) or on a child exposure hazard quotient of 1 for noncarcinogens (lead, tributyltin, copper). Where cleanup levels are based on carcinogenic risks below background, the background concentration is selected; where no background values are available (chlordanes and DDT), the method detection limit (MDL) is selected.
4. Applicable on a point exposure only. Two values for PCBs and PAHs (except total benzofluoranthenes). The first is the organic carbon-normalized SQS value (mg/kg-OC). The second is the dry-weight equivalent based on an average sediment total organic carbon content of 1.5%. For all other compounds, values are dry weight. Under the SMS, sediment cleanup standards are established on a site-specific basis within an allowable range. The SQS and CSL define this range. For chemicals without SMS, LAET, and 2LAET values or the SL and ML of the DMMP define this range.
5. Cleanup levels for site-wide exposure are the lowest for either fish or crab; cleanup levels for intertidal exposure are for sandpiper.
6. The cleanup level for site-wide direct contact is based on netfishing.
7. The cleanup level for intertidal direct contact is based on the lowest for either Tribal clamming or child beach play exposures.
8. The cleanup level for intertidal seafood consumption is based on consumption of clams from the intertidal sediment.

Abbreviation(s)

COC = contaminant of concern
cm = centimeter(s)
cPAH = carcinogenic polycyclic aromatic hydrocarbon
CSL = cleanup screening level
DMMP = Dredged Material Management Program
dw = dry weight
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LAET = lowest-apparent-effect threshold
2LAET = second-lowest-apparent-affect threshold
ML = maximum level
mg/kg dw = milligram(s) per kilogram dry weight
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
n/a = compounds do not present a risk for the RAO scenario
Nat. Bkgd = natural background
ng TEQ/kg dw = nanograms toxicity equivalents per kilogram dry weight
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RAO = remedial action objective
RBTC = risk-based threshold concentrations
SL = screening level
SMS = Sediment Management Standards
SQS = Washington State Sediment Quality Standards
SWAC = surface-weighted average concentration
µg/kg dw = microgram(s) per kilogram dry weight
µg TEQ/kg dw = microgram(s) toxicity equivalents per kilogram dry weight

TABLE 2

REMEDIAL ACTION LEVELS TO BE ACHIEVED AT SEDIMENT SURFACE FOLLOWING EXCAVATION AND DREDGING

COC	Risk Driver?	Compliance Zone[1]	RAL	Units	Source
Remedial Action Levels for Decision Units 2, 3, 4, 9, and 10					
Total PCBs	Yes	0 to 10 cm	12	mg/kg-OC	SQS
			180	µg/kg dw	
cPAHs	Yes	Not applicable			
Arsenic	Yes	0 to 10 cm	57	mg/kg dw	SQS
Lead	Yes	0 to 10 cm	530	mg/kg dw	CSL
Tributyltin	Yes	Not applicable			
Copper	Yes	0 to 10 cm	390	mg/kg dw	SQS and CSL
Mercury	Yes	0 to 10 cm	0.41	mg/kg dw	SQS
Dioxins/Furans	Yes	Not applicable			
Chromium	No	0 to 10 cm	260	mg/kg dw	SQS
Cobalt	No	0 to 10 cm	10	mg/kg dw	LAET/SL
Nickel	No	0 to 10 cm	140	mg/kg dw	LAET/SL
Selenium	No	0 to 10 cm	1	mg/kg dw	LAET/SL
Vanadium	No	0 to 10 cm	57	mg/kg dw	LAET/SL
Zinc	No	0 to 10 cm	410	mg/kg dw	SQS
Pentachlorophenol	No	0 to 10 cm	360	mg/kg dw	SQS
Bis(2-ethylhexyl) phthalate	No	0 to 10 cm	47	mg/kg-OC	SQS
			710	µg/kg dw	
Acenaphthene	No	0 to 10 cm	16	mg/kg-OC	SQS
			240	µg/kg dw	
Benzo(a)anthracene	No	0 to 10 cm	110	mg/kg-OC	SQS
			1,700	µg/kg dw	
Benzo(a)pyrene	No	0 to 10 cm	99	mg/kg-OC	SQS
			1,500	µg/kg dw	
Benzo(g,h,i)perylene	No	0 to 10 cm	31	mg/kg-OC	SQS
			470	µg/kg dw	
Total Benzofluoranthenes	No	0 to 10 cm	230	mg/kg-OC	SQS
			1,800	µg/kg dw	

TABLE 2

REMEDIAL ACTION LEVELS TO BE ACHIEVED AT SEDIMENT SURFACE FOLLOWING EXCAVATION AND DREDGING

COC	Risk Driver?	Compliance Zone[1]	RAL	Units	Source
Chrysene	No	0 to 10 cm	110	mg/kg-OC	SQS
			1,700	µg/kg dw	
Dibenz(a,h)anthracene	No	0 to 10 cm	12	mg/kg-OC	SQS
			180	µg/kg dw	
Fluoranthene	No	0 to 10 cm	160	mg/kg-OC	SQS
			2,400	µg/kg dw	
Indeno(1,2,3-cd)pyrene	No	0 to 10 cm	34	mg/kg-OC	SQS
			510	µg/kg dw	
Phenanthrene	No	0 to 10 cm	100	mg/kg-OC	SQS
			1,500	µg/kg dw	
Total HPAH	No	0 to 10 cm	960	mg/kg-OC	SQS
			14,000	µg/kg dw	
Remedial Action Levels for Decision Units 1, 5, 6, 7, 8, 11, 12, 13, 14, 15, and 16					
Total PCBs	Yes	0 to 10 cm	65	mg/kg-OC	CSL
			960	µg/kg dw	
cPAHs	Yes	Not applicable			
Arsenic	Yes	0 to 10 cm	93	mg/kg dw	CSL
Lead	Yes	0 to 10 cm	530	mg/kg dw	CSL
Tributyltin	Yes	Not applicable			
Copper	Yes	0 to 10 cm	390	mg/kg dw	SQS and CSL
Mercury	Yes	0 to 10 cm	0.59	mg/kg dw	CSL
Dioxins/Furans	Yes	Not applicable			
Chromium	No	0 to 10 cm	270	mg/kg dw	CSL
Cobalt	No	0 to 10 cm	n/a	mg/kg dw	
Nickel	No	0 to 10 cm	n/a	mg/kg dw	
Selenium	No	0 to 10 cm	n/a	mg/kg dw	
Vanadium	No	0 to 10 cm	n/a	mg/kg dw	
Zinc	No	0 to 10 cm	960	mg/kg dw	CSL
Pentachlorophenol	No	0 to 10 cm	690	mg/kg dw	CSL
Bis(2-ethylhexyl) phthalate	No	0 to 10 cm	78	mg/kg-OC	CSL
			1,200	µg/kg dw	

TABLE 2

REMEDIAL ACTION LEVELS TO BE ACHIEVED AT SEDIMENT SURFACE FOLLOWING EXCAVATION AND DREDGING

COC	Risk Driver?	Compliance Zone[1]	RAL	Units	Source
Acenaphthene	No	0 to 10 cm	57	mg/kg-OC	CSL
			860	µg/kg dw	
Benzo(a)anthracene	No	0 to 10 cm	270	mg/kg-OC	CSL
			4,100	µg/kg dw	
Benzo(a)pyrene	No	0 to 10 cm	210	mg/kg-OC	CSL
			3,200	µg/kg dw	
Benzo(g,h,i)perylene	No	0 to 10 cm	78	mg/kg-OC	CSL
			1,200	µg/kg dw	
Total Benzofluoranthenes	No	0 to 10 cm	450	mg/kg-OC	CSL
			6,800	µg/kg dw	
Chrysene	No	0 to 10 cm	460	mg/kg-OC	CSL
			6,900	µg/kg dw	
Dibenz(a,h)anthracene	No	0 to 10 cm	33	mg/kg-OC	CSL
			500	µg/kg dw	
Fluoranthene	No	0 to 10 cm	1,200	mg/kg-OC	CSL
			18,000	µg/kg dw	
incleno(1,2,3-cd)pyrene	No	0 to 10 cm	88	mg/kg-OC	CSL
			1,300	µg/kg dw	
Phenanthrene	No	0 to 10 cm	480	mg/kg-OC	CSL
			7,200	µg/kg dw	
Total HPAH	No	0 to 10 cm	5,300	mg/kg-OC	CSL
			79,500	µg/kg dw	

Note(s)

1. The Compliance Basis is Subtidal Surface Sediment (point), and is the same for all COCs.

Abbreviation(s)

COC = contaminant of concern
cm = centimeter(s)
cPAH = carcinogenic polycyclic aromatic hydrocarbon
CSL = cleanup screening level
dw = dry weight
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LAET = lowest-apparent-affect threshold
mg/kg dw = milligrams per kilogram dry weight
n/a = compounds do not present a risk for the RAO scenario
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
PCB = polychlorinated biphenyl
RAL = remedial action level
SL = screening level
SQS = Washington State Sediment Quality Standards
µg/kg dw = microgram(s) per kilogram dry weight

TABLE 3

BACKFILL MATERIALS QUANTITY SUMMARY

Date	Material	Source	Tons
10/18/2018	ENR-RML	CalPortland	4,070
10/28/2018	ENR-RML	CalPortland	5,039
12/18/2018	ENR-RML	CalPortland	5,039
1/8/2019	ENR-RML	CalPortland	4,984
1/15/2019	ENR-RML	CalPortland	5,031
1/17/2019	Filter Rock	Washington Rock	1,200
1/17/2019	Riprap	Washington Rock	3,841
1/21/2019	ENR-RML	CalPortland	5,010
1/30/2019	Riprap	Washington Rock	3,388
1/30/2019	Filter Rock	Washington Rock	1,548
2/1/2019	ENR-RML	CalPortland	4,007
2/1/2019	Gravel Beach Mix	CalPortland	504
2/1/2019	Fish Mix	CalPortland	513
2/11/2019	Riprap	Washington Rock	4,395
2/11/2019	Filter Rock	Washington Rock	582
2/16/2019	Gravel Beach Mix	CalPortland	999
2/16/2019	ENR-RML	CalPortland	4,011
2/28/2019	Riprap	Washington Rock	1,354
2/28/2019	Filter Rock	Washington Rock	598
3/15/2019	Riprap	Washington Rock	526
3/17/2019	Gravel Beach Mix	CalPortland	3,227
3/17/2019	Fish Mix	CalPortland	532
3/23/2019	ENR-RML	CalPortland	2,007
3/23/2019	Fish Mix	CalPortland	681
3/23/2019	Gravel Beach Mix	CalPortland	212
10/21/2019	Filter Rock	Washington Rock	3,991
10/21/2019	Riprap	Washington Rock	1,026
11/15/2019	Riprap	Washington Rock	4,722
11/25/2019	Riprap	Washington Rock	4,213
11/25/2019	Filter Rock	Washington Rock	790
12/5/2019	ENR-RML	CalPortland	4,545
12/13/2019	ENR-RML	CalPortland	4,517
12/13/2019	Riprap	Washington Rock	4,504
12/13/2019	Filter Rock	Washington Rock	554
12/20/2019	ENR-RML	CalPortland	4,491
12/28/2019	ENR-RML	CalPortland	4,516
1/4/2020	ENR-RML	CalPortland	4,515
1/6/2020	Riprap	Washington Rock	2,911
1/6/2020	Filter Rock	Washington Rock	505
1/10/2020	ENR-RML	CalPortland	4,528
1/10/2020	Gravel Beach Mix	Washington Rock	5,302
1/15/2020	ENR-RML	CalPortland	5,511
1/20/2020	Fish Mix	CalPortland	1,515

TABLE 3

BACKFILL MATERIALS QUANTITY SUMMARY

Date	Material	Source	Tons
1/20/2020	ENR-RML	CalPortland	4,048
1/28/2020	ENR-RML	CalPortland	3,418
3/13/2020	Riprap	Washington Rock	2,342
3/24/2020	ENR-RML	CalPortland	1,029
Totals		Gravel Beach Mix	10,244
		Filter Rock	9,768
		Riprap	33,221
		Fish Mix	3,241
		ENR-RML	80,316
Totals		CalPortland	88,499
		Washington Rock	48,291

Abbreviation(s)
ENR = enhanced natural recovery
RML = residual management layer

TABLE 4

DREDGED MATERIAL MANAGEMENT UNIT APPROVAL DATES

Construction Season	DU	DMMU	Approval Date
Construction Season 1			
CS1	DU 11	DMMU7A	12/6/2018
CS1	DU 12	DMMU6A	10/29/2018
CS1	DU 13	DMMU5A	10/18/2018
CS1	DU 14	DMMU4A	12/6/2018
CS1	DU 15	DMMU3A	1/16/2019
CS1	DU 16	DMMU1A	Shipway - No Approval
CS1	DU 16	DMMU1B	
CS1	DU 16	DMMU2A	
CS1	DU 16	DMMU2B	
CS1	DU 3	DMMU20A	1/12/2019
CS1	DU 3	DMMU20B	1/4/2019
CS1	DU 3	DMMU20C	1/4/2019
CS1	DU 3	DMMU20D	1/12/2019
CS1	DU 3	DMMU21A	1/4/2019
CS1	DU 3	DMMU21B	1/10/2019
CS1	DU 3	DMMU21C	1/4/2019
CS1	DU 4	DMMU17B	1/11/2019
CS1	DU 4	DMMU17C	1/11/2019
CS1	DU 4	DMMU17D	1/16/2019
CS1	DU 4	DMMU17E	1/11/2019
CS1	DU 4	DMMU17F	12/29/2018
CS1	DU 4	DMMU17G	12/29/2018
CS1	DU 4	DMMU17H	12/29/2018
CS1	DU 4	DMMU18A	1/10/2019
CS1	DU 4	DMMU18B	1/11/2019
CS1	DU 4	DMMU18C	1/11/2019
CS1	DU 4	DMMU18D	1/4/2019
CS1	DU 4	DMMU18E	1/4/2019
CS1	DU 4	DMMU19A	1/12/2019
CS1	DU 4	DMMU19B	1/12/2019
CS1	DU 4	DMMU19C	1/11/2019
CS1	DU 4	DMMU19D	1/10/2019
CS1	DU 6	DMMU14D2	1/4/2019
CS1	DU 6	DMMU14E	12/13/2018
CS1	DU 6	DMMU14F	12/18/2018
CS1	DU 6	DMMU14G	12/13/2018
CS1	DU 6	DMMU15D2	1/11/2019
CS1	DU 6	DMMU15E	12/29/2018
CS1	DU 6	DMMU15F	12/18/2018
CS1	DU 6	DMMU15G	12/19/2018
CS1	DU 6	DMMU16C2	1/12/2019
CS1	DU 6	DMMU16D	12/29/2018
CS1	DU 6	DMMU16E	12/29/2018
CS1	DU 6	DMMU16F	12/29/2018

TABLE 4

DREDGED MATERIAL MANAGEMENT UNIT APPROVAL DATES

Construction Season	DU	DMMU	Approval Date
CS1	DU 7	DMMU11A	11/2/2018
CS1	DU 7	DMMU11B	10/31/2018
CS1	DU 7	DMMU11C	10/29/2018
CS1	DU 7	DMMU12A	11/3/2018
CS1	DU 7	DMMU12B	11/29/2018
CS1	DU 7	DMMU12C	11/2/2018
CS1	DU 7	DMMU12D	11/2/2018
CS1	DU 7	DMMU13A	11/7/2018
CS1	DU 7	DMMU13B	11/29/2018
CS1	DU 7	DMMU13C	11/29/2018
CS1	DU 7	DMMU13D	11/29/2018
CS1	DU 7	DMMU13E	11/2/2018
CS1	DU 8	Additional Dredge	1/4/2019
CS1	DU 8	DMMU10A	11/3/2018
CS1	DU 8	DMMU10B	10/29/2018
CS1	DU 8	DMMU10C	10/18/2018
CS1	DU 8	DMMU8A	10/31/2018
CS1	DU 8	DMMU8B	10/29/2018
CS1	DU 8	DMMU9A	11/3/2018
CS1	DU 8	DMMU9B	10/29/2018
CS1	DU 8	DMMU9C	10/18/2018
CS1	DU 8	DMMU9D	10/18/2018
Construction Season 2			
CS2	DU 1	DMMU14A	10/2/2019
CS2	DU 1	DMMU15A	10/3/2019
CS2	DU 10	DMMU18I	9/17/2019
CS2	DU 10	DMMU19G	9/17/2019
CS2	DU 10	DMMU20F	9/17/2019
CS2	DU 10 Redredge	RDMMMU 20F	11/24/2019
CS2	DU 10 Redredge	RDMMMU18I	11/22/2019
CS2	DU 10 Redredge	RDMMMU19G	11/22/2019
CS2	DU 15	RDMMU3A	10/2/2019
CS2	DU 2	DMMU17A	9/23/2019
CS2	DU 2 Redredge	RDMMMU17A	11/25/2019
CS2	DU 3 Redredge	RDMMU20A/B	9/30/2019
CS2	DU 4 Redredge	RDMMU17B	11/1/2019
CS2	DU 4 Redredge	RDMMU17C	11/1/2019
CS2	DU 4 Redredge	RDMMU17D/E	10/31/2019
CS2	DU 4 Redredge	RDMMU17G/H	11/4/2019
CS2	DU 4 Redredge	RDMMU18A	10/31/2019
CS2	DU 4 Redredge	RDMMU18B	10/31/2019
CS2	DU 4 Redredge	RDMMU18C/D	10/31/2019
CS2	DU 4 Redredge	RDMMU19A	11/1/2019
CS2	DU 4 Redredge	RDMMU19B	11/1/2019
CS2	DU 4 Redredge	RDMMU19C/D	11/1/2019

TABLE 4

DREDGED MATERIAL MANAGEMENT UNIT APPROVAL DATES

Construction Season	DU	DMMU	Approval Date
CS2	DU 5	DMMU14B	10/24/2019
CS2	DU 5	DMMU14C	10/17/2019
CS2	DU 5	DMMU14D1	10/17/2019
CS2	DU 5	DMMU15B	10/28/2019
CS2	DU 5	DMMU15C	10/24/2019
CS2	DU 5	DMMU15D1	10/24/2019
CS2	DU 5	DMMU16A	10/28/2019
CS2	DU 5	DMMU16B	10/25/2019
CS2	DU 5	DMMU16C1	10/25/2019
CS2	DU 5 Redredge	RDMMU16AB-B	3/18/2020
CS2	DU 5 Redredge	RDMMU16B-A	3/12/2020
CS2	DU 5 Redredge	RDMMU16A-C	3/16/2020
CS2	DU 6 Redredge	RDMMU14D2/E	11/19/2019
CS2	DU 6 Redredge	RDMMU14F	11/12/2019
CS2	DU 6 Redredge	RDMMU14G	11/11/2019
CS2	DU 6 Redredge	RDMMU15D2E	11/12/2019
CS2	DU 6 Redredge	RDMMU15F	10/8/2019
CS2	DU 6 Redredge	RDMMU15G	11/11/2019
CS2	DU 6 Redredge	RDMMU16C2D	11/12/2019
CS2	DU 6 Redredge	RDMMU16E/F	11/12/2019
CS2	DU 7 Redredge	RDMMU11A/B	11/22/2019
CS2	DU 7 Redredge	RDMMU11C	11/21/2019
CS2	DU 7 Redredge	RDMMU12A/B	11/19/2019
CS2	DU 7 Redredge	RDMMU12C	11/21/2019
CS2	DU 7 Redredge	RDMMU12D	11/21/2019
CS2	DU 7 Redredge	RDMMU13 A/B	11/21/2019
CS2	DU 7 Redredge	RDMMU13C	11/21/2019
CS2	DU 7 Redredge	RDMMU13D	11/21/2019
CS2	DU 9	DMMU18F	9/13/2019
CS2	DU 9	DMMU18G	9/13/2019
CS2	DU 9	DMMU19E	9/13/2019
CS2	DU 9	DMMU20E	9/13/2019
CS2	DU 9 Redredge	RDMMMU19E/20E	11/22/2019

Abbreviation(s)
CS1 = Construction Season 1
CS2 = Construction Season 2
DMMU = dredged material management unit
DU = decision unit

TABLE 5

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS IN OPEN WATER AREAS

	Planned			Actual		
Decision Unit	Location ID [1]	Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2]		Location ID	Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet)	
		Easting	Northing		Easting	Northing
DU 1	SD-CONF001	1263182	216142	SD-CONF001	1263182	216146
DU 1	SD-CONF002	1263182	216258	SD-CONF002	1263181	216258
DU 1	SD-CONF003	1263221	216142	SD-CONF003	1263219	216145
DU 1	SD-CONF004	1263221	216258	SD-CONF004	1263221	216256
DU 1	SD-CONF005	1263260	216142	SD-CONF005	1263258	216146
DU 1	SD-CONF006	1263260	216258	SD-CONF006	1263257	216258
DU 2	SD-CONF007	1263344	216221	SD-CONF007	1263343	216221
DU 3	SD-CONF008	1263504	216796	SD-CONF008	1263502	216800
DU 3	SD-CONF009	1263504	216912	SD-CONF009	1263507	216912
DU 3	SD-CONF010	1263504	217028	SD-CONF010	1263505	217027
DU 3	SD-CONF011	1263504	217144	SD-CONF011	1263508	217144
DU 3	SD-CONF012	1263504	217260	SD-CONF012	1263510	217260
DU 3	SD-CONF013	1263543	216796	SD-CONF013	1263547	216799
DU 3	SD-CONF014	1263543	216912	SD-CONF014	1263543	216909
DU 3	SD-CONF015	1263543	217028	SD-CONF015	1263542	217025
DU 3	SD-CONF016	1263543	217144	SD-CONF016	1263546	217148
DU 4	SD-CONF017	1263402	216588	SD-CONF017	1263401	216590
DU 4	SD-CONF018	1263402	216704	SD-CONF018	1263400	216703
DU 4	SD-CONF019	1263402	216820	SD-CONF019	1263400	216825
DU 4	SD-CONF020	1263402	216936	SD-CONF020	1263402	216934
DU 4	SD-CONF021	1263402	217052	SD-CONF021	1263403	217054
DU 4	SD-CONF022	1263402	217168	SD-CONF022	1263404	217170
DU 4	SD-CONF023	1263402	217284	SD-CONF023	1263401	217284
DU 4	SD-CONF024	1263402	217400	SD-CONF024	1263403	217396
DU 4	SD-CONF025	1263441	216588	SD-CONF025	1263441	216585
DU 4	SD-CONF026	1263441	216704	SD-CONF026	1263440	216707
DU 4	SD-CONF027	1263441	216820	SD-CONF027	1263438	216822
DU 4	SD-CONF028	1263441	216936	SD-CONF028	1263439	216939
DU 4	SD-CONF029	1263441	217052	SD-CONF029	1263439	217049
DU 4	SD-CONF030	1263441	217168	SD-CONF030	1263444	217166
DU 4	SD-CONF031	1263441	217284	SD-CONF031	1263441	217282
DU 5	SD-CONF032	1263309	216533	SD-CONF032	1263311	216539
DU 5	SD-CONF033	1263309	216649	SD-CONF033	1263309	216650
DU 5	SD-CONF034	1263309	216765	SD-CONF034	1263306	216761
DU 5	SD-CONF035	1263309	216881	SD-CONF035	1263306	216878
DU 6	SD-CONF036	1263309	216997	SD-CONF036	1263314	216994
DU 6	SD-CONF037	1263309	217113	SD-CONF037	1263306	217119
DU 6	SD-CONF038	1263309	217229	SD-CONF038	1263310	217232
DU 6	SD-CONF039	1263309	217345	SD-CONF039	1263311	217346
DU 6	SD-CONF040	1263309	217461	SD-CONF040	1263314	217459

TABLE 5

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS IN OPEN WATER AREAS

	Planned			Actual		
Decision Unit	Location ID [1]	Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2] Easting	Northing	Location ID	Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet) Easting	Northing
DU 6	SD-CONF041	1263309	217577	SD-CONF041	1263301	217572
DU 6	SD-CONF042	1263309	217693	SD-CONF042	1263307	217688
DU 4	SD-CONF043	1263348	216533	SD-CONF043	1263341	216532
DU 4	SD-CONF044	1263348	216649	SD-CONF044	1263345	216651
DU 4	SD-CONF045	1263348	216765	SD-CONF045	1263350	216763
DU 4	SD-CONF046	1263348	216881	SD-CONF046	1263341	216881
DU 4	SD-CONF047	1263348	216997	SD-CONF047	1263346	217000
DU 4	SD-CONF048	1263348	217113	SD-CONF048	1263342	217115
DU 4	SD-CONF049	1263348	217229	SD-CONF049	1263352	217225
DU 4	SD-CONF050	1263348	217345	SD-CONF050	1263340	217357
DU 4	SD-CONF051	1263348	217461	SD-CONF051	1263346	217463
DU 4	SD-CONF052	1263348	217577	SD-CONF052	1263349	217577
DU 4	SD-CONF053	1263348	217693	SD-CONF053	1263355	217700
DU 5	SD-CONF054	1263217	216584	SD-CONF054	1263218	216588
DU 5	SD-CONF055	1263217	216700	SD-CONF055	1263217	216697
DU 5	SD-CONF056	1263217	216816	SD-CONF056	1263214	216816
DU 5	SD-CONF057	1263217	216932	SD-CONF057	1263216	216934
DU 6	SD-CONF058	1263217	217048	SD-CONF058	1263215	217047
				SD-CONF058R2	1263220	217038
DU 6	SD-CONF059	1263217	217164	SD-CONF059	1263215	217163
DU 6	SD-CONF060	1263217	217280	SD-CONF060	1263218	217280
DU 6	SD-CONF061	1263217	217396	SD-CONF061	1263217	217392
DU 6	SD-CONF062	1263217	217512	SD-CONF062	1263217	217510
DU 6	SD-CONF063	1263217	217628	SD-CONF063	1263213	217625
DU 6	SD-CONF064	1263217	217744	SD-CONF064	1263216	217734
DU 5	SD-CONF065	1263256	216584	SD-CONF065	1263255	216588
DU 5	SD-CONF066	1263256	216700	SD-CONF066	1263259	216703
DU 5	SD-CONF067	1263256	216816	SD-CONF067	1263254	216813
DU 5	SD-CONF068	1263256	216932	SD-CONF068	1263257	216933
DU 6	SD-CONF069	1263256	217048	SD-CONF069	1263256	217049
DU 6	SD-CONF070	1263256	217164	SD-CONF070	1263257	217161
				SD-CONF070R2	1263245	217167
DU 6	SD-CONF071	1263256	217280	SD-CONF071	1263254	217282
DU 6	SD-CONF072	1263256	217396	SD-CONF072	1263251	217398
				SD-CONF072R2	1263258	217397
				SD-CONF072R4	1263250	217404
				SD-CONF072R5	1263253	217395
DU 6	SD-CONF073	1263256	217512	SD-CONF073	1263261	217509
DU 6	SD-CONF074	1263256	217628	SD-CONF074	1263248	217604

TABLE 5

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS IN OPEN WATER AREAS

	Planned			Actual		
		Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2]			Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet)	
Decision Unit	Location ID [1]	Easting	Northing	Location ID	Easting	Northing
DU 7	SD-CONF075	1263073	216999	SD-CONF075	1263070	216998
DU 7	SD-CONF076	1263073	217115	SD-CONF076	1263068	217112
DU 7	SD-CONF077	1263073	217231	SD-CONF077	1263070	217235
DU 7	SD-CONF078	1263073	217347	SD-CONF078	1263067	217350
DU 7	SD-CONF079	1263073	217463	SD-CONF079	1263069	217460
DU 7	SD-CONF080	1263112	216999	SD-CONF080	1263112	216997
DU 7	SD-CONF081	1263112	217115	SD-CONF081	1263107	217115
DU 7	SD-CONF082	1263112	217231	SD-CONF082	1263111	217232
DU 7	SD-CONF083	1263112	217347	SD-CONF083	1263115	217351
				SD-CONF083R2	1263109	217345
DU 7	SD-CONF084	1263112	217463	SD-CONF084	1263108	217460
DU 7	SD-CONF085	1263112	217579	SD-CONF085	1263111	217579
DU 7	SD-CONF086	1263151	216999	SD-CONF086	1263145	216998
DU 7	SD-CONF087	1263151	217115	SD-CONF087	1263149	217120
DU 7	SD-CONF088	1263151	217231	SD-CONF088	1263150	217235
DU 7	SD-CONF089	1263151	217347	SD-CONF089	1263153	217348
DU 7	SD-CONF090	1263151	217463	SD-CONF090	1263149	217463
DU 7	SD-CONF091	1263151	217579	SD-CONF091	1263150	217572
DU 7	SD-CONF092	1262523	216997	SD-CONF092	1263150	217695
DU 8	SD-CONF093	1262938	217229	SD-CONF093	1262937	217234
DU 8	SD-CONF094	1262938	217345	SD-CONF094	1262941	217349
DU 8	SD-CONF095	1262938	217461	SD-CONF095	1262942	217456
DU 8	SD-CONF096	1262938	217577	SD-CONF096	1262933	217571
DU 8	SD-CONF097	1262977	216997	SD-CONF097	1262972	216998
DU 8	SD-CONF098	1262977	217113	SD-CONF098	1262979	217117
DU 8	SD-CONF099	1262977	217229	SD-CONF099	1262980	217229
DU 8	SD-CONF100	1262977	217345	SD-CONF100	1262975	217345
DU 8	SD-CONF101	1262977	217461	SD-CONF101	1262978	217468
				SD-CONF101R2	1262973	217459
DU 8	SD-CONF102	1263016	216997	SD-CONF102	1263010	216996
DU 8	SD-CONF103	1263016	217113	SD-CONF103	1263013	217117
DU 8	SD-CONF104	1263016	217229	SD-CONF104	1263015	217228
DU 8	SD-CONF105	1263016	217345	SD-CONF105	1263011	217348
DU 8	SD-CONF106	1263016	217461	SD-CONF106	1263020	217461
DU 9	SD-CONF107	1263426	217656	SD-CONF107	1263424	217654
DU 9	SD-CONF108	1263426	217772	SD-CONF108	1263427	217773
DU 9	SD-CONF109	1263426	217888	SD-CONF109	1263428	217887
DU 9	SD-CONF110	1263465	217656	SD-CONF110	1263465	217654
DU 9	SD-CONF111	1263465	217772	SD-CONF111	1263463	217771
DU 9	SD-CONF112	1263504	217656	SD-CONF112	1263504	217657

TABLE 5

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS IN OPEN WATER AREAS

	Planned			Actual		
Decision Unit	Location ID [1]	Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2] Easting	Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2] Northing	Location ID	Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet) Easting	Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet) Northing
DU 10	SD-CONF113	1263475	218105	SD-CONF113	1263477	218101
DU 11	SD-CONF114	1262787	217299	SD-CONF114	1262787	217298
DU 12	SD-CONF115	1262776	217633	SD-CONF115	1262771	217632
DU 13	SD-CONF116	1262712	217659	SD-CONF116	1262711	217655
DU 14	SD-CONF117	1262521	217015	SD-CONF117	1262517	217013
DU 15	SD-CONF118	1262342	216995	SD-CONF118	1262353	217002
				SD-CONF118R2	1262340	216999
DU 7	SD-CONF128	1263100	216962	SD-CONF128	1263103	216959
DU 14	SD-CONF129	1262523	216997	SD-CONF129	1262525	216994
DU 3	SD-CONF210	1263504	217028	SD-CONF210	1263497	217027
DU 8	SD-CONF2100	1262977	217345	SD-CONF2100	1262982	217348
DU 9	SD-CONF2110	1263465	217656	SD-CONF2110	1263464	217654
DU 4	SD-CONF220	1263402	216936	SD-CONF220	1263400	216937
DU 4	SD-CONF230	1263441	217168	SD-CONF230	1263436	217169
DU 6	SD-CONF240	1263309	217461	SD-CONF240	1263308	217458
DU 4	SD-CONF250	1263348	217345	SD-CONF250	1263347	217350
DU 6	SD-CONF260	1263217	217280	SD-CONF260	1263217	217282
DU 6	SD-CONF270	1263256	217164	SD-CONF270	1263257	217161
DU 7	SD-CONF280	1263112	216999	SD-CONF280	1263114	216996
DU 7	SD-CONF290	1263151	217463	SD-CONF290	1263152	217460

Note(s)

1. Field-duplicate sample collected at selected locations. Duplicate sample ID identified by a 200 series location ID (e.g., SD-CONF226 for duplicate core collected at location SD-CONF026).
2. Proposed sample locations were approximate and may have been adjusted based on bathymetry to avoid areas with steeper slopes or debris.

Abbreviation(s)

DU = decision unit
NAD = North American Datum
WA SPC = Washington State Plane Coordinates

TABLE 6A

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	1				1				1				1				1				1			
	DMMU	14A				14A				15A				15A				15A				15A			
	Sample Location	SD-CONF001				SD-CONF002				SD-CONF003				SD-CONF004				SD-CONF005				SD-CONF006			
	Sample Date	10/9/2019				10/9/2019				10/9/2019				10/9/2019				10/9/2019				10/9/2019			
	Sample ID	SD-CONF001-A		SD-CONF001-B		SD-CONF002-A		SD-CONF002-B		SD-CONF003-A		SD-CONF003-B		SD-CONF004-A		SD-CONF004-B		SD-CONF005-A		SD-CONF005-B		SD-CONF006-A		SD-CONF006-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																									
TOC (percent)	NA	0.41	J	2.21		1.58	J	2.49		0.12	J	0.08		0.05	J	0.05		0.63	J	0.36		0.08	J	0.10	
Metals (mg/kg)																									
Arsenic	57	10.9		7.65		13.2		7.06		1.65		1.25		1.90		2.00		2.61		3.05		1.93		1.38	
Copper	390	18.1		26.2		25.2		33.2		7.87		7.20		7.01		7.04		15.3		13.9		8.44		7.87	
Lead	530	25.5		7.88		19.6		5.95		22.1		15.8		2.54		2.17		32.8		47.3		10.8		14.5	
Mercury	0.41	0.0223	J	0.131		0.0508		0.0818		0.0162	J	0.00584	J	0.0256	U	0.0297	U	0.108		0.113		0.0161	J	0.0220	J
PCBs (µg/kg)																									
Aroclor 1016	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1248	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	0.9	J	1.1	J	2.0	U	2.0	U
Aroclor 1254	NA	2.3		1.0	J	1.4	J	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.0	J	1.7	J	1.0	J	2.0	U
Aroclor 1260	NA	3.5		2.2		1.9	J	2.0	U	2.0	U	2.0	U	0.6	J	2.0	U	2.1		2.9		1.9	J	1.6	J
Aroclor 1262	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Total PCBs[3]	180	5.8		3.2	J	3.3	J	2.0	U	2.0	U	2.0	U	0.6	J	2.0	U	4.0	J	5.7	J	2.9	J	1.6	J
Total PCBs (mg/kg-OC)	12	nc		nc		nc		nc		nc		nc		nc		nc		nc		nc		nc		nc	

Note(s)
1. Sample ID **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6B

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	2																			
	DMMU	17A																			
	Sample Location	SD-CONF007																			
	Sample Date	10/9/2019																			
	Sample ID	SD-CONF007-A		SD-CONF007-B		SD-CONF007-C		SD-CONF007-D		SD-CONF007-E		SD-CONF007-F		SD-CONF007-G		SD-CONF007-H		SD-CONF007-I		SD-CONF007-J	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	1.73		1.76		1.78		1.32		1.41		0.67		0.12	J	na		na		na	
Metals (mg/kg)																					
Arsenic	57	19.3		21.0		na		na		na		na		0.98		na		na		na	
Copper	390	173		199		na		na		na		na		6.40		na		na		na	
Lead	530	159		133		na		na		na		na		5.12		na		na		na	
Mercury	0.41	1.72		2.77		3.43		1.62		1.19		0.822		0.0270	U	0.0279	U	0.0128		0.208	
PCBs (µg/kg)																					
Aroclor 1016	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	UJ	na		na		na	
Aroclor 1221	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	U	na		na		na	
Aroclor 1232	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	U	na		na		na	
Aroclor 1242	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	U	na		na		na	
Aroclor 1248	NA	373		999	U	87.5		59.3		32.6		10.0	U	4.0	U	na		na		na	
Aroclor 1254	NA	455		15400		231		162		65.8		10.3		4.0	U	na		na		na	
Aroclor 1260	NA	395		3310		155		112		69.4		35.1		28.1		na		na		na	
Aroclor 1262	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	U	na		na		na	
Aroclor 1268	NA	20.0	U	999	U	10.0	U	10.0	U	10.0	U	10.0	U	4.0	U	na		na		na	
Total PCBs[3]	180	1223		18710		474		333		168		45.4		28.1		na		na		na	
Total PCBs (mg/kg-OC)	12	70.7		1063.1		26.6		25.3		11.9		6.8		nc		na		na		na	

Note(s)
1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
na = not analyzed
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6C

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	3				3				3				3				3			
	DMMU	20A				20B				20C				20C				20C			
	Sample Location	SD-CONF008				SD-CONF009				SD-CONF010				SD-CONF210 (field duplicate of SD-CONF010)				SD-CONF011			
	Sample Date	1/17/2019				1/10/2019				1/9/2019				1/9/2019				1/9/2019			
	Sample ID	SD-CONF008-A		SD-CONF008-B		SD-CONF009-A		SD-CONF009-B		SD-CONF010-A		SD-CONF010-B		SD-CONF210-A		SD-CONF210-B		SD-CONF011-A		SD-CONF011-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	1.04		1.34	J	0.58		0.54		0.15	J	0.62		0.48		0.46		0.35	J	0.69	
Metals (mg/kg)																					
Arsenic	57	50.1		7.90		8.34	J	4.39		3.30		3.52		10.5		4.03		6.46		3.37	
Copper	390	305		69.5	J	44.3	J	17.7		19.3		24.0		60.5		34.9		33.3		18.4	
Lead	530	246		30.9	J	18.5	J	4.91		8.87	J	12.3		28.6		16.7		31.8	J	3.14	
Mercury	0.41	1.79		0.758	J	0.146	J	0.127		0.131	J	0.737		0.384		0.459		0.117	J	0.0862	
PCBs (µg/kg)																					
Aroclor 1016	NA	23.3	U	9.9	U	8.0	U	1.6	UJ	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Aroclor 1221	NA	23.3	U	9.9	U	8.0	U	1.6	U	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Aroclor 1232	NA	23.3	U	9.9	U	8.0	U	1.6	U	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Aroclor 1242	NA	23.3	U	9.9	U	8.0	U	1.6	U	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Aroclor 1248	NA	23.3	U	9.9	U	8.0	U	1.9		17.3	J	19.2	U	41.0		22.5		64.5	J	4.7	
Aroclor 1254	NA	851		171	J	228		2.2		28.2		31.7		117		39.6		113		7.9	
Aroclor 1260	NA	173		41.4		40.9	J	0.8	J	10.6	J	17.0	J	38.9		16.4	J	27.0		4.2	
Aroclor 1262	NA	23.3	U	9.9	U	8.0	U	1.6	U	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Aroclor 1268	NA	23.3	U	9.9	U	8.0	U	1.6	U	19.2	U	19.2	U	19.4	U	19.4	U	19.1	U	2.0	U
Total PCBs[3]	180	1024		212	J	269	J	4.9		56.1	J	48.7	J	196.9		78.5	J	204.5	J	16.8	
Total PCBs (mg/kg-OC)	12	98.5		15.9	J	46.4	J	0.9		nc		7.9		nc		nc		nc		2.4	

TABLE 6C

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	3				3				3				3				3			
	DMMU	20D				21A				21A				21B				21C			
	Sample Location	SD-CONF012				SD-CONF013				SD-CONF014				SD-CONF015				SD-CONF016			
	Sample Date	1/16/2019				1/14/2019				1/14/2019				1/14/2019				1/10/2019			
	Sample ID	SD-CONF012-A		SD-CONF012-B		SD-CONF013-A		SD-CONF013-B		SD-CONF014-A		SD-CONF014-B		SD-CONF015-A		SD-CONF015-B		SD-CONF016-A		SD-CONF016-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	0.47	J	0.40		0.93	J	1.97		3.46	J	1.00		0.90	J	1.52		0.12	J	0.07	
Metals (mg/kg)																					
Arsenic	57	2.65		4.70		5.38	J	2.84		5.07	J	3.64		5.78	J	5.05		1.90	J	1.92	
Copper	390	14.1		30.5		33.1		18.5		21.3		17.0		40.1		30.1		7.82	J	7.38	
Lead	530	4.60		23.3		17.3		12.4		3.28		3.26		20.2		16.2		2.23	J	1.07	
Mercury	0.41	0.0476		0.222		0.6	J	0.512		0.0786	J	0.0835		0.537	J	0.599		0.0212	J	0.0266	U
PCBs (µg/kg)																					
Aroclor 1016	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Aroclor 1221	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Aroclor 1232	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Aroclor 1242	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Aroclor 1248	NA	7.9	U	1.6	U	16.7		1.9		2.8		1.9	U	41.5		33.0		1.6	U	1.5	U
Aroclor 1254	NA	61.8		17.2		34.1	J	3.6		4.9		1.9	U	87.8		67.4		1.8		1.5	U
Aroclor 1260	NA	265		7.9		4.8		1.6	J	1.3	J	1.9	U	26.3		16.9		0.8	J	1.5	U
Aroclor 1262	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Aroclor 1268	NA	7.9	U	1.6	U	1.8	U	1.7	U	1.9	U	1.9	U	8.1	U	8.2	U	1.6	U	1.5	U
Total PCBs[3]	180	326.8		25.1	J	55.6	J	7.1	J	9.0	J	1.9	U	155.6		117.3		2.6	J	1.5	U
Total PCBs (mg/kg-OC)	12	nc		nc		6.0	J	0.4		nc		0.2		17.3	J	7.7		nc		nc	

Note(s)
1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4				4				4										4									
	DMMU	18A				18A				18B										18B									
	Sample Location	SD-CONF017				SD-CONF018				SD-CONF019										SD-CONF020									
	Sample Date	1/10/2019				1/8/2019				1/14/2019										1/16/2019									
	Sample ID	SD-CONF017-A		SD-CONF017-B		SD-CONF018-A		SD-CONF018-B		SD-CONF019-A		SD-CONF019-B		SD-CONF019-C		SD-CONF019-D		SD-CONF019-E		SD-CONF020-A		SD-CONF020-B		SD-CONF020-C		SD-CONF020-D		SD-CONF020-E	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																													
TOC (percent)	NA	0.88		1.15	J	0.78	J	0.50		2.47		1.54		0.80		0.95	J	1.09		1.33		0.75		0.86		2.51		0.89	J
Metals (mg/kg)																													
Arsenic	57	22.5		7.80		7.76		2.49		46.3		53.5		na		6.05		na		158		38		4.89		4.31		2.51	J
Copper	390	186		33.5		33.4		11.3		310		827		na		27.9		na		1260		415		52.0		27.0		15.0	J
Lead	530	117		20.7	J	11.6	J	1.57		113		305		na		9.29		na		690		114		14.7		22.1		3.13	J
Mercury	0.41	1.19		0.305	J	0.0622	J	0.0237	J	2.17		3.52		0.504		1.37	J	0.136		7.18		3.81		0.896		0.456		0.117	J
PCBs (µg/kg)																													
Aroclor 1016	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1221	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1232	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1242	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1248	NA	154		47.8		11.3		2.0	U	181		446		140		2.0	U	1.9	U	1280		34.3	U	9.4		7.5		1.0	J
Aroclor 1254	NA	311		75.7	J	24.6		2.0	U	372		624		321		2.0	U	1.9	U	2920		1310		19.0		14.6		1.7	
Aroclor 1260	NA	75.8		25.7	J	5.2	J	2.0	U	83.9		244		83.3		1.1	J	1.9	U	601		97.3		8.2		4.5		1.1	J
Aroclor 1262	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1268	NA	19.5	U	9.9	U	1.9	U	2.0	U	9.2	U	10.4	U	2.0	U	2.0	U	1.9	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Total PCBs[3]	180	541		149.2	J	41.1	J	2.0	U	637		1314		544		1.1	J	1.9	U	4801		1407		36.6		26.6		3.8	J
Total PCBs (mg/kg-OC)	12	61.5		13.0	J	5.3	J	0.40	U	nc		85.3		nc		0.12	J	0.17	U	361		188		4.3		nc		0.43	J

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4										4				4				4				4			
	DMMU	18B										18C				18D				18D				18E			
	Sample Location	SD-CONF220 (field duplicate of SD-CONF020)										SD-CONF021				SD-CONF022				SD-CONF023				SD-CONF024			
	Sample Date	1/16/2019										1/16/2019				1/8/2019				1/8/2019				1/9/2019			
	Sample ID	SD-CONF220-A		SD-CONF220-B		SD-CONF220-C		SD-CONF220-D		SD-CONF220-E		SD-CONF021-A		SD-CONF021-B		SD-CONF022-A		SD-CONF022-B		SD-CONF023-A		SD-CONF023-B		SD-CONF024-A		SD-CONF024-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																											
TOC (percent)	NA	2.16		1.36		2.61		2.56		1.71	J	1.04		1.18	J	1.90		0.72	J	0.86	J	0.40		1.12	J	0.05	
Metals (mg/kg)																											
Arsenic	57	56.2		20.8		11.8		8.00		7.57	J	21.4		8.39		48.2		4.47		2.24		2.10		11.5		1.96	
Copper	390	1070		550		296		101		75.2	J	151		38.0		346		22.5		16.7		9.86		75.9		6.96	
Lead	530	354		117		62.6		37.7		32.3	J	70.8		19.9		174		9.00		1.71		1.60		41.5	J	3.53	
Mercury	0.41	9.35		3.88		2.51		1.62		0.678	J	0.545		0.402		2.43		0.142	J	0.0952	J	0.0186		1.20	J	0.0222	
PCBs (µg/kg)																											
Aroclor 1016	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Aroclor 1221	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Aroclor 1232	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Aroclor 1242	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Aroclor 1248	NA	413		9.1	U	37.4	U	13.7		8.1		9.0	U	87.4		831		4.2		1.9	U	2.0	U	7.5		2.0	U
Aroclor 1254	NA	1050		182		1240		35.7		11.6		845		182	J	1440		7.9		1.9	U	2.0	U	11.5		2.0	U
Aroclor 1260	NA	179		33.6		37.4	U	14.1		8.7		151		23.2		377		8.4		1.9	U	2.0	U	8.4		2.0	U
Aroclor 1262	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Aroclor 1268	NA	78.0	U	9.1	U	37.4	U	1.9	U	1.8	U	9.0	U	1.8	U	28.9	U	2.0	U	1.9	U	2.0	U	2.0	U	2.0	U
Total PCBs[3]	180	1642		216		1240		63.5		28.4		996		293	J	2648		20.5		1.9	U	2.0	U	27.4		2.0	U
Total PCBs (mg/kg-OC)	12	nc		15.9		nc		nc		1.7	J	95.8		24.8	J	139		2.8	J	0.22	U	nc		2.4	J	nc	

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4				4				4			
	DMMU	19A				19A				19B			
	Sample Location	SD-CONF025				SD-CONF026				SD-CONF027			
	Sample Date	1/17/2019				1/17/2019				1/17/2019			
	Sample ID	SD-CONF025-A		SD-CONF025-B		SD-CONF026-A		SD-CONF026-B		SD-CONF027-A		SD-CONF027-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	**RAL (SQS)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals													
TOC (percent)	NA	0.78	J	0.60		1.04	J	0.41		0.21	J	0.10	
Metals (mg/kg)													
Arsenic	57	14.3		6.40		12.3		2.42		1.84		1.86	
Copper	390	91.4	J	30.3		126	J	9.72		8.50	J	7.78	
Lead	530	65.4	J	15.4		58.5	J	1.81		1.22	J	1.14	
Mercury	0.41	1.03	J	0.0828		1.09	J	0.0245		0.0218	J	0.0108	J
PCBs (µg/kg)													
Aroclor 1016	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Aroclor 1221	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Aroclor 1232	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Aroclor 1242	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Aroclor 1248	NA	160		13.2		113		1.9	U	2.0	U	1.9	U
Aroclor 1254	NA	246	J	9.4		202		28.6		9.7		1.9	U
Aroclor 1260	NA	54.5		2.4		43.1		2.7		2.0	U	1.9	U
Aroclor 1262	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Aroclor 1268	NA	9.7	U	1.9	U	19.4	U	1.9	U	2.0	U	1.9	U
Total PCBs[3]	180	461	J	25.0		358		31.3		9.7		1.9	U
Total PCBs (mg/kg-OC)	12	59.0	J	4.2		34.4	J	nc		nc		nc	

	DU	4				4				4				4			
	DMMU	19B				19C				19D				19D			
	Sample Location	SD-CONF028				SD-CONF029				SD-CONF030				SD-CONF230 (field duplicate of SD-CONF030)			
	Sample Date	1/17/2019				1/16/2019				1/11/2019				1/11/2019			
	Sample ID	SD-CONF028-A		SD-CONF028-B		SD-CONF029-A		SD-CONF029-B		SD-CONF030-A		SD-CONF030-B		SD-CONF230-A		SD-CONF230-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte		**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																	
TOC (percent)		0.12	J	0.37		2.15	J	5.06		0.18	J	0.10		0.75		0.06	
Metals (mg/kg)																	
Arsenic		1.86		1.72		2.86		8.12		1.77		1.59		6.56		2.34	
Copper		9.92	J	9.40		13.4		19.4		7.58		7.59		36.2		11.7	
Lead		1.17	J	1.09		2.45		2.94		1.88	J	4.29		27.9		4.22	
Mercury		0.0143	J	0.0245	J	0.0372		0.0580		0.0264	J	0.0140	J	0.811		0.151	
PCBs (µg/kg)																	
Aroclor 1016		2.0	U	1.9	U	1.8	U	2.1	U	2.0	J	2.0	U	9.7	U	1.9	U
Aroclor 1221		2.0	U	1.9	U	1.8	U	2.1	U	2.0	U	2.0	U	9.7	U	1.9	U
Aroclor 1232		2.0	U	1.9	U	1.8	U	2.1	U	2.0	U	2.0	U	9.7	U	1.9	U
Aroclor 1242		2.0	U	1.9	U	1.8	U	2.1	U	2.0	U	2.0	U	9.7	U	1.9	U
Aroclor 1248		2.0	U	1.9	U	3.1		3.9		3.1		2.0	U	32.9		4.7	
Aroclor 1254		2.0	U	1.9	U	5.7		7.6		4.0		1.8	J	74.5		8.2	
Aroclor 1260		2.0	U	1.9	U	1.7	J	1.4	J	0.9	J	2.0	U	24.0		1.6	J
Aroclor 1262		2.0	U	1.9	U	1.8	U	2.1	U	2.0	U	2.0	U	9.7	U	1.9	U
Aroclor 1268		2.0	U	1.9	U	1.8	U	2.1	U	2.0	U	2.0	U	9.7	U	1.9	U
Total PCBs[3]		2.0	U	1.9	U	10.5		12.9		8.0	J	1.8	J	131.4		14.5	
Total PCBs (mg/kg-OC)		nc		nc		nc		nc		nc		nc		17.5		nc	

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4				4				4									
	DMMU	19D				17B				17B									
	Sample Location	SD-CONF031				SD-CONF043				SD-CONF044									
	Sample Date	1/11/2019				1/14/2019				1/14/2019									
	Sample ID	SD-CONF031-A		SD-CONF031-B		SD-CONF043-A		SD-CONF043-B		SD-CONF044-A		SD-CONF044-B		SD-CONF044-C		SD-CONF044-D		SD-CONF044-E	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	**RAL (SQS)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																			
TOC (percent)	NA	1.11	J	0.94		1.79	J	1.38		1.76		1.23		na		0.71	J	na	
Metals (mg/kg)																			
Arsenic	57	7.08		7.57		5.99	J	3.93		63.4		12.5		na		3.22		na	
Copper	390	50.9		36.8		57.2		29.9		838		671		na		15.4		na	
Lead	530	24.5	J	8.06		50.4		47.1		362		372		na		7.91		na	
Mercury	0.41	0.757	J	0.122		0.519	J	0.572		8.47		1.26		1.96		0.114	J	0.112	
PCBs (µg/kg)																			
Aroclor 1016	NA	9.9	UJ	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Aroclor 1221	NA	9.9	U	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Aroclor 1232	NA	9.9	U	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Aroclor 1242	NA	9.9	U	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Aroclor 1248	NA	38.3		3.9		35.7		5.9		194		177		75.0		1.7	U	1.6	U
Aroclor 1254	NA	85.3	J	6.2		79.8		13.2		470		396		74.5		1.7	U	1.6	U
Aroclor 1260	NA	19.2	J	1.5	J	34.6		21.3		90.7		41.1	J	17.9		3.9	J	2.2	
Aroclor 1262	NA	9.9	U	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Aroclor 1268	NA	9.9	U	2.0	U	9.3	U	1.8	U	19.2	U	45.2	U	1.7	U	1.7	U	1.6	U
Total PCBs[3]	180	142.8	J	11.6	J	150.1		40.4		755		614	J	167.4		3.9	J	2.2	
Total PCBs (mg/kg-OC)	12	12.9	J	1.2		8.4	J	2.9		42.9		49.9		nc		0.55	J	nc	

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4														4				4				4			
	DMMU	17C														17C				17D				17E			
	Sample Location	SD-CONF045														SD-CONF046				SD-CONF047				SD-CONF048			
	Sample Date	1/15/2019														1/15/2019				1/17/2019				1/15/2019			
	Sample ID	SD-CONF045-A		SD-CONF045-B		SD-CONF045-C		SD-CONF045-D		SD-CONF045-E		SD-CONF045-F		SD-CONF045-G		SD-CONF046-A		SD-CONF046-B		SD-CONF047-A		SD-CONF047-B		SD-CONF048-A		SD-CONF048-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																											
TOC (percent)	NA	1.19		1.00		na		na		na		1.03	J	na		0.69	J	10.3		0.52	J	0.66		0.85	J	0.22	
Metals (mg/kg)																											
Arsenic	57	60.5		120		na		na		na		4.53		na		4.28		2.95		10.1		2.06		4.79		2.00	
Copper	390	1070		2320		42.1		30.4		883		24.4		na		57.3		13.0		51.8	J	10.7		16.9		10.1	
Lead	530	618		428		na		na		na		9.27		na		18.9		2.10		6.31	J	1.96		7.25		2.79	
Mercury	0.41	11.1		7.76		11.7		0.285		10.3		0.117		0.174		0.0323	J	0.0365		0.174	J	0.0370		0.0843	J	0.0224	J
PCBs (µg/kg)																											
Aroclor 1016	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Aroclor 1221	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Aroclor 1232	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Aroclor 1242	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Aroclor 1248	NA	85.6	U	114		na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	2.2		1.6	U
Aroclor 1254	NA	745		183		na		na		na		3.4		na		61.9		1.7	U	80.4		1.2	J	3.5	J	0.9	J
Aroclor 1260	NA	190		51.5		na		na		na		4.7	J	na		16.1	U	1.7	U	8.7	J	0.8	J	1.7	J	0.9	J
Aroclor 1262	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Aroclor 1268	NA	85.6	U	8.6	U	na		na		na		2.0	U	na		16.1	U	1.7	U	9.9	U	1.9	U	1.7	U	1.6	U
Total PCBs[3]	180	935		349		na		na		na		8.1	J	na		61.9		1.7	U	89.1		2.0	J	7.4	J	1.8	J
Total PCBs (mg/kg-OC)	12	78.6		34.9		na		na		na		0.79	J	na		9.0	J	nc		17.1	J	0.3	J	0.9	J	nc	

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4				4				4				4									
	DMMU	17E				17F				17F				17F									
	Sample Location	SD-CONF049				SD-CONF050				SD-CONF250 (field duplicate of SD-CONF050)				SD-CONF051									
	Sample Date	1/16/2019				1/8/2019				1/8/2019				1/7/2019									
	Sample ID	SD-CONF049-A		SD-CONF049-B		SD-CONF050-A		SD-CONF050-B		SD-CONF250-A		SD-CONF250-B		SD-CONF051-A		SD-CONF051-B		SD-CONF051-C		SD-CONF051-D		SD-CONF051-E	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	0.70	J	0.06		0.05	J	0.05		0.20		0.05		0.96		3.69		na		1.76	J	5.52	
Metals (mg/kg)																							
Arsenic	57	103		10.6		1.18		1.16		1.83		1.06		5.31		8.78		na		5.71		3.56	
Copper	390	160		11.9		5.66		5.31		9.69		4.82		23.6		60.1		na		33.5		21.3	
Lead	530	122		20.0		1.82		1.95		3.64		1.68		16.5		56.3		na		17.4		9.82	
Mercury	0.41	0.912		0.00595	J	0.00750	J	0.00667	J	0.0441		0.00971	J	0.453		1.64		2.03		0.967	J	1.23	
PCBs (µg/kg)																							
Aroclor 1016	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Aroclor 1221	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Aroclor 1232	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Aroclor 1242	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Aroclor 1248	NA	98.9		2.5		1.9	U	1.9	U	1.9	U	1.9	U	8.5		7.1		na		2.0	U	1.9	U
Aroclor 1254	NA	216	J	4.6		1.9	U	1.9	U	1.9	U	1.9	U	18.0		20.7		na		2.0	U	1.9	U
Aroclor 1260	NA	29.9		0.7	J	1.9	U	1.9	U	1.9	U	1.9	U	12.3		54.9		na		2.0	U	1.9	U
Aroclor 1262	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Aroclor 1268	NA	1.6	U	1.5	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	na		2.0	U	1.9	U
Total PCBs[3]	180	344.8	J	7.8	J	1.9	U	1.9	U	1.9	U	1.9	U	38.8		82.7		na		2.0	U	1.9	U
Total PCBs (mg/kg-OC)	12	49.3	J	nc		nc		nc		nc		nc		4.04		nc		na		0.11	U	nc	

TABLE 6D

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	4										4					
	DMMU	17G										17H					
	Sample Location	SD-CONF052										SD-CONF053					
	Sample Date	1/7/2019										1/7/2019					
	Sample ID	SD-CONF052-A		SD-CONF052-B		SD-CONF052-C		SD-CONF052-D		SD-CONF052-E		SD-CONF053-A		SD-CONF053-B		SD-CONF053-C	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		1-1.5	
Analyte	RAL (SQS)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	1.91		1.39	J	1.54		1.78		2.52		1.51		1.77	J	na	
Metals (mg/kg)																	
Arsenic	57	8.96		7.53	J	4.91		5.69		10.0		73.0		10.4	J	na	
Copper	390	56.9		39.1	J	30.3		32.5		55.8		192		37.1	J	na	
Lead	530	58.0		31.3	J	17.6		5.41		9.04		175		8.58	J	na	
Mercury	0.41	1.44		1.02	J	1.10		0.182		0.186		1.76		0.198	J	0.0819	
PCBs (µg/kg)																	
Aroclor 1016	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Aroclor 1221	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Aroclor 1232	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Aroclor 1242	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Aroclor 1248	NA	21.7		2.5		1.9	U	1.9	U	2.0	U	130		5.1		na	
Aroclor 1254	NA	60.2		4.8		7.9		1.9	U	2.0	U	192		7.6		na	
Aroclor 1260	NA	83.6		6.5		2.3		1.9	U	2.0	U	122		5.9		na	
Aroclor 1262	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Aroclor 1268	NA	2.0	U	1.9	U	1.9	U	1.9	U	2.0	U	39.3	U	2.0	U	na	
Total PCBs[3]	180	165.5		13.8		10.2		1.9	U	2.0	U	444		18.6		na	
Total PCBs (mg/kg-OC)	12	8.7		0.99	J	0.66		0.11	U	nc		29.4		1.05	J	na	

Note(s)
1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
na = not analyzed
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6E

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	5		5		5		5		5		5		5		5	
	DMMU	14B		14B		14C		14C		15B		15B		15C		15D1	
	Sample Location	SD-CONF054		SD-CONF055		SD-CONF056		SD-CONF057		SD-CONF065		SD-CONF066		SD-CONF067		SD-CONF068	
	Sample Date	10/28/2019		10/28/2019		10/25/2019		10/25/2019		10/28/2019		10/29/2019		10/25/2019		10/25/2019	
	Sample ID	SD-CONF054-A		SD-CONF055-A		SD-CONF056-A		SD-CONF057-A		SD-CONF065-A		SD-CONF066-A		SD-CONF067-A		SD-CONF068-A	
	Depth Interval (ft)	0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5		0-0.5	
Analyte	**RAL (CSL)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																	
TOC (percent)	NA	0.35	J	0.66	J	1.26	J	0.25	J	0.91	J	1.17	J	0.53	J	0.14	J
Metals (mg/kg)																	
Arsenic	93	15.1	J	34.6	J	37.2		3.04		34.6	J	26.2	J	58		15.5	
Copper	390	356		310		479		13.9		310		275		800		132	
Lead	530	352	J	210	J	168		1.83		210	J	143	J	189		39	
Mercury	0.59	1.31	J	1.10	J	1.18	J	0.0254	J	1.33	J	1.85	J	0.814	J	0.291	J
PCBs (µg/kg)																	
Aroclor 1016	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Aroclor 1221	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Aroclor 1232	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Aroclor 1242	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Aroclor 1248	NA	416	D	100	J	474	D	2.0	U	79.9	J	160	J	239	D	32.9	J
Aroclor 1254	NA	918	D	194	J	901	D	1.6	J	134	J	296	J	363	D	83.5	J
Aroclor 1260	NA	223	J	90.9	J	199	D	2.0	U	119	J	159	J	118	J	39.6	J
Aroclor 1262	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Aroclor 1268	NA	9.9	U	9.7	U	10.0	U	2.0	U	9.9	U	10.0	U	2.0	U	2.0	U
Total PCBs[3]	960	1557	J	385	J	1574		1.6	J	333	J	615	J	720	J	156	J
Total PCBs (mg/kg OC)	65	nc		58.3	J	124.9	J	nc		36.6	J	52.6	J	135.8	J	nc	

TABLE 6E

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	5										5									
	DMMU	16A										16A									
	Sample Location	SD-CONF032										SD-CONF033									
	Sample Date	10/28/2019										10/28/2019									
	Sample ID	SD-CONF032-A		SD-CONF032-B		SD-CONF032-C		SD-CONF032-D		SD-CONF032-E		SD-CONF033-A		SD-CONF033-B		SD-CONF033-C		SD-CONF033-D		SD-CONF033-E	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	1.50	J									0.42	J								
Metals (mg/kg)																					
Arsenic	93	20.7	J									35.2	J								
Copper	390	138										225									
Lead	530	84.4	J									98.2	J								
Mercury	0.59	0.824	J	2.44	J	0.666	J	0.556	J	0.148	J	19.3	J	1.30	J	1.45	J	0.451	J	0.218	J
PCBs (µg/kg)																					
Aroclor 1016	NA	9.8	U									9.9	U								
Aroclor 1221	NA	9.8	U									9.9	U								
Aroclor 1232	NA	9.8	U									9.9	U								
Aroclor 1242	NA	9.8	U									9.9	U								
Aroclor 1248	NA	85.4										70.3									
Aroclor 1254	NA	174										136									
Aroclor 1260	NA	99.7	J									64.4									
Aroclor 1262	NA	9.8	U									9.9	U								
Aroclor 1268	NA	9.8	U									9.9	U								
Total PCBs[3]	960	359	J									271									
Total PCBs (mg/kg OC)	65	23.9	J									64.5	J								

TABLE 6E

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	5																			
	DMMU	16B																			
	Sample Location	SD-CONF034																			
	Sample Date	10/29/2019																			
	Sample ID	SD-CONF034-A		SD-CONF034-B		SD-CONF034-C		SD-CONF034-D		SD-CONF034-E		SD-CONF034-F		SD-CONF034-G		SD-CONF034-H		SD-CONF034-I		SD-CONF034-J	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	1.35	J																		
Metals (mg/kg)																					
Arsenic	93	46.9	J																		
Copper	390	495																			
Lead	530	222	J																		
Mercury	0.59	2.49	J	5.02	J	5.58	J	9.03	J	7.01	J	8.73	J	0.187	J	10.2	J	1.53	J	0.0606	J
PCBs (µg/kg)																					
Aroclor 1016	NA	20.0	U																		
Aroclor 1221	NA	20.0	U																		
Aroclor 1232	NA	20.0	U																		
Aroclor 1242	NA	20.0	U																		
Aroclor 1248	NA	271	J																		
Aroclor 1254	NA	462	J																		
Aroclor 1260	NA	187	J																		
Aroclor 1262	NA	20.0	U																		
Aroclor 1268	NA	20.0	U																		
Total PCBs[3]	960	920	J																		
Total PCBs (mg/kg OC)	65	68.1	J																		

TABLE 6E

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	5									
	DMMU	16B									
	Sample Location	SD-CONF035									
	Sample Date	10/29/2019									
	Sample ID	SD-CONF035-A		SD-CONF035-B		SD-CONF035-C		SD-CONF035-D		SD-CONF035-E	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals											
TOC (percent)	NA	0.39	J								
Metals (mg/kg)											
Arsenic	93	80.1									
Copper	390	656									
Lead	530	311	J								
Mercury	0.59	1.77	J	0.0154	J	0.00583	J	0.00893	J	0.0174	J
PCBs (µg/kg)											
Aroclor 1016	NA	10.0	U								
Aroclor 1221	NA	10.0	U								
Aroclor 1232	NA	10.0	U								
Aroclor 1242	NA	10.0	U								
Aroclor 1248	NA	293	J								
Aroclor 1254	NA	611	J								
Aroclor 1260	NA	230	J								
Aroclor 1262	NA	10.0	U								
Aroclor 1268	NA	10.0	U								
Total PCBs[3]	960	1134	J								
Total PCBs (mg/kg OC)	65	nc									

Note(s)

1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
   D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																	
	DMMU	14D2																	
	Sample Location	SD-CONF058																	
	Sample Date	1/10/2019																	
	Sample ID	SD-CONF058-A		SD-CONF058-B		SD-CONF058-C		SD-CONF058-D		SD-CONF058-E		SD-CONF058-F		SD-CONF058-G		SD-CONF058-H		SD-CONF058-I	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																			
TOC (percent)	NA	na		na		na		na		na		na		na		na		na	
Metals (mg/kg)																			
Arsenic	93	148.0		119		na		na		na		na		na		na		na	
Copper	390	1170		1070		2030		1930		2550		1790		1930		2030		922	
Lead	530	276		333.0		na		na		na		na		na		na		na	
Mercury	0.59	1.58		2.24		2.51		3.09		2.92		6.2		3.98		4.1		1.56	
PCBs (µg/kg)																			
Aroclor 1016	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Aroclor 1221	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Aroclor 1232	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Aroclor 1242	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Aroclor 1248	NA	2010		2400		1160		2220		3810		3260		2270		1920		1220	
Aroclor 1254	NA	1300		2120		1560		3820		5020		6100		4500		3640		2220	
Aroclor 1260	NA	218		255		185		281		330		589		717		524		336	
Aroclor 1262	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Aroclor 1268	NA	24.4	U	49.1	U	11.9	U	12.6	U	12.4	U	54.0	U	598	U	348	U	322	U
Total PCBs[3]	960	3528		4775		2905		6321		9160		9949		7487		6084		3776	
Total PCBs (mg/kg OC)	65.0	nc		nc		nc		nc		nc		nc		nc		nc		nc	
PAHs (µg/kg)																			
Acenaphthene	860	1210		585		na		na		na		na		na		na		na	
Benz[a]anthracene	4100	4670		5360		na		na		na		na		na		na		na	
Benzo[a]pyrene	3200	4970		4590		na		na		na		na		na		na		na	
Benzo(b)fluoranthene	—	4770		4530		na		na		na		na		na		na		na	
Benzo[g,h,i]perylene	470	3120		2640		na		na		na		na		na		na		na	
Benzo(k)fluoranthene	—	2790		2410		na		na		na		na		na		na		na	
Total benzofluoranthenes	6800	10100		9120		na		na		na		na		na		na		na	
Chrysene	6900	7400		5800		na		na		na		na		na		na		na	
Dibenzo[a,h]anthracene	180	970.0		818		na		na		na		na		na		na		na	
Fluoranthene	18000	16600		11300		na		na		na		na		na		na		na	
Indeno[1,2,3-c,d]pyrene	1300	3250		2860		na		na		na		na		na		na		na	
Phenanthrene	7200	17100		4160		na		na		na		na		na		na		na	
Pyrene	--	14500		9050		na		na		na		na		na		na		na	
Total HPAH	79500	65580		51538		na		na		na		na		na		na		na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6										6							
	DMMU	14D2										14E							
	Sample Location	SD-CONF058R2										SD-CONF059							
	Sample Date	2/27/2019										12/21/2018							
	Sample ID	SD-CONF058R2-J		SD-CONF058R2-K		SD-CONF058R2-L		SD-CONF058R2-M		SD-CONF058R2-N		SD-CONF059R2-A		SD-CONF059R2-B		SD-CONF059R2-C		SD-CONF059R2-D	
	Depth Interval (ft)	4.5-5		5-5.5		5.5-6		6-6.5		6.5-7		0-0.5		0.5-1		1-1.5		1.5-2	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																			
TOC (percent)	NA	0.69	J	na		na		na		na		0.45		0.95		0.49		0.43	J
Metals (mg/kg)																			
Arsenic	93	3.20		na		na		na		na		94.0		92.7		na		138	
Copper	390	16.5		na		na		na		na		842		1270		650		959	
Lead	530	2.20		na		na		na		na		118		214		na		199	
Mercury	0.59	0.0397	J	na		na		na		na		39.8		3.56		0.628		0.635	J
PCBs (µg/kg)																			
Aroclor 1016	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Aroclor 1221	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Aroclor 1232	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Aroclor 1242	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Aroclor 1248	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	523		1140		1780		692	J
Aroclor 1254	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	494		1770		2750		1020	J
Aroclor 1260	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	337		457		292	J
Aroclor 1262	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Aroclor 1268	NA	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	292	U	103	U	19.9	U	12.4	U
Total PCBs[3]	960	1.9	U	2.0	U	1.9	U	2.0	U	2.0	U	1017		3247		4987		2004	J
Total PCBs (mg/kg OC)	65.0	0.3	U	nc		nc		nc		nc		nc		341.8		nc		nc	
PAHs (µg/kg)																			
Acenaphthene	860	1.53	J	na		na		na		na		927		687		na		615	
Benz[a]anthracene	4100	1.85	J	na		na		na		na		2710		2100		na		2160	
Benzo[a]pyrene	3200	4.99	U	na		na		na		na		4650		2130		na		1370	
Benzo(b)fluoranthene	—	2.14	J	na		na		na		na		8670		1920		na		1220	
Benzo[g,h,i]perylene	470	4.99	U	na		na		na		na		2450		1400		na		746	
Benzo(k)fluoranthene	—	0.77	J	na		na		na		na		3050		1090		na		703	
Total benzofluoranthenes	6800	3.73	J	na		na		na		na		14900		4140		na		2570	
Chrysene	6900	4.34	J	na		na		na		na		5100		2860		na		2240	
Dibenzo[a,h]anthracene	180	4.99	U	na		na		na		na		1010		440		na		285	
Fluoranthene	18000	6.02		na		na		na		na		9840		7870		na		4520	
Indeno[1,2,3-c,d]pyrene	1300	4.99	U	na		na		na		na		2530		1410		na		732	
Phenanthrene	7200	7.08		na		na		na		na		8890		6020		na		3210	
Pyrene	--	11.4		na		na		na		na		10100		6670		na		4180	
Total HPAH	79500	27.34		na		na		na		na		53290		29020		na		18803	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6															
	DMMU	14E															
	Sample Location	SD-CONF060															
	Sample Date	12/21/2018															
	Sample ID	SD-CONF060-A		SD-CONF060-B		SD-CONF060-C		SD-CONF060-D		SD-CONF060-E		SD-CONF060-F		SD-CONF060-G		SD-CONF060-H	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	0.60		0.39		1.06		na		na		0.60	J	na		na	
Metals (mg/kg)																	
Arsenic	93	148		6.23		3.51		na		na		13.0	J	na		na	
Copper	390	1040		39.8		21.0		na		na		34.4	J	na		na	
Lead	530	499		7.93		3.92		na		na		12.7	J	na		na	
Mercury	0.59	6.97		0.108		0.105		0.172		9.72		0.498	J	0.0375		0.054	
PCBs (µg/kg)																	
Aroclor 1016	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Aroclor 1221	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Aroclor 1232	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Aroclor 1242	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Aroclor 1248	NA	1180		6.4		1.6	U	na		na		28.5	J	na		na	
Aroclor 1254	NA	2080		7.8		2.8		na		na		54.3	J	na		na	
Aroclor 1260	NA	482		3.1	J	1.4	J	na		na		1.9	U	na		na	
Aroclor 1262	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Aroclor 1268	NA	111	U	3.8	U	1.6	U	na		na		1.9	U	na		na	
Total PCBs[3]	960	3742		17.3		4.2	J	na		na		82.8	J	na		na	
Total PCBs (mg/kg OC)	65.0	623.7		nc		0.4		na		na		13.8	J	na		na	
PAHs (µg/kg)																	
Acenaphthene	860	409		83.1		63.9		na		na		172	J	na		na	
Benz[a]anthracene	4100	3880		31.1		10.6		na		na		48.9		na		na	
Benzo[a]pyrene	3200	2950		26.5		9.93		na		na		46.2	J	na		na	
Benzo(b)fluoranthene	—	2160		26.4		11.3		na		na		43.6	J	na		na	
Benzo[g,h,i]perylene	470	1630		18.2		8.24		na		na		32.6	J	na		na	
Benzo(k)fluoranthene	—	1310		14.1		5.23		na		na		17.7	J	na		na	
Total benzofluoranthenes	6800	4720		53.9		22.5		na		na		86.1		na		na	
Chrysene	6900	4090		36.5		13.7		na		na		63.1		na		na	
Dibenzo[a,h]anthracene	180	520		10.2		6.82		na		na		53.4		na		na	
Fluoranthene	18000	11500		97.7		44.3		na		na		202	J	na		na	
Indeno[1,2,3-c,d]pyrene	1300	1620		14.5		6.55		na		na		28.1		na		na	
Phenanthrene	7200	3180		109		59.6		na		na		516	J	na		na	
Pyrene	--	9230		128		64.5		na		na		221	J	na		na	
Total HPAH	79500	40140		417		187		na		na		781.4		na		na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6												6									
	DMMU	14E												14F									
	Sample Location	SD-CONF260												SD-CONF061									
	Sample Date	12/21/2018												12/21/2018									
	Sample ID	SD-CONF260-A		SD-CONF260-B		SD-CONF260-C		SD-CONF260-D		SD-CONF260-E		SD-CONF260-F		SD-CONF061-A		SD-CONF061-B		SD-CONF061-C		SD-CONF061-D		SD-CONF061-E	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	0.81		1.36		0.33		na		na		0.3	J	0.84		0.39		0.32	J	na		na	
Metals (mg/kg)																							
Arsenic	93	90.5		55.1		7.19		na		na		3.83	J	92.5		56.7		2.42		na		na	
Copper	390	698		661		46.2		na		na		21.4	J	1290		1070		14.1		na		na	
Lead	530	195		340		10.8		na		na		3.72	J	426		239		1.65		na		na	
Mercury	0.59	3.24		5.35		0.349		0.0811		0.0524		0.135	J	9.13		3.72		0.0221	U	0.00882	J	0.0184	J
PCBs (µg/kg)																							
Aroclor 1016	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Aroclor 1221	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Aroclor 1232	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Aroclor 1242	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Aroclor 1248	NA	767		449		25.3		na		na		3.2	J	964		443		1.5	U	na		na	
Aroclor 1254	NA	1590		782		31.7		na		na		6.1	J	1820		735		5.0		na		na	
Aroclor 1260	NA	463		219		13.7		na		na		1.3	J	593		264		1.0	J	na		na	
Aroclor 1262	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Aroclor 1268	NA	19.9	U	25.0	U	1.6	U	na		na		1.9	U	110	U	21.0	U	1.5	U	na		na	
Total PCBs[3]	960	2820		1450		70.7		na		na		10.6	J	3377		1442		6.0	J	na		na	
Total PCBs (mg/kg OC)	65.0	348.1		106.6		nc		na		na		nc		402.0		nc		nc		na		na	
PAHs (µg/kg)																							
Acenaphthene	860	956		1000		183		na		na		33.6	J	431		335		4.08		na		na	
Benz[a]anthracene	4100	5630		3280		69.3		na		na		7.76		2000		948		36.7		na		na	
Benzo[a]pyrene	3200	3020		2910		58.7		na		na		8.10	J	1540		604		66.4		na		na	
Benzo(b)fluoranthene	—	2970		2420		55.8		na		na		8.47	J	1160		535		67.0		na		na	
Benzo[g,h,i]perylene	470	1150		1730		39.3		na		na		8.47	J	898		395		33.9		na		na	
Benzo(k)fluoranthene	—	1510		1420		29.4		na		na		4.76		680		305		35.1		na		na	
Total benzofluoranthenes	6800	5550		5240		117		na		na		17.9		2530		1130		135		na		na	
Chrysene	6900	5170		3970		83.1		na		na		9.25		2640		1010		33.0		na		na	
Dibenzo[a,h]anthracene	180	402		428		24.1		na		na		6.81		275		171		13.7		na		na	
Fluoranthene	18000	11700		10000		209		na		na		22.0	J	6720		3030		49.6		na		na	
Indeno[1,2,3-c,d]pyrene	1300	1230		1740		37.4		na		na		5.54		829		363		33.5		na		na	
Phenanthrene	7200	3730		8870		414		na		na		32.4	J	1690		2620		23.3		na		na	
Pyrene	--	20000		9500		258		na		na		41.0	J	5820		2480		345		na		na	
Total HPAH	79500	53852		38798		808.3		na		na		127		23252		10131		747		na		na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																			
	DMMU	14F																			
	Sample Location	SD-CONF062																			
	Sample Date	12/21/2018																			
	Sample ID	SD-CONF062-A		SD-CONF062-B		SD-CONF062-C		SD-CONF062-D		SD-CONF062-E		SD-CONF062-F		SD-CONF062-G		SD-CONF062-H		SD-CONF062-I		SD-CONF062-J	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	0.99		0.86		0.47		0.54		0.76		0.58		0.54		0.25	J	0.13		na	
Metals (mg/kg)																					
Arsenic	93	130		122		na		na		na		na		na		44.9		1.96		na	
Copper	390	1020		1370		943		903		1140		na		na		179		8.19		na	
Lead	530	336		462		na		na		na		na		na		150		1.19		na	
Mercury	0.59	3.39		4.65		3.7		3.7		4.29		18.6		5.43		1.32		0.022		0.0166	
PCBs (µg/kg)																					
Aroclor 1016	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Aroclor 1221	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Aroclor 1232	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Aroclor 1242	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Aroclor 1248	NA	738		624		na		na		na		na		na		112		1.5	U	na	
Aroclor 1254	NA	1320		1130		na		na		na		na		na		234	J	1.5	U	na	
Aroclor 1260	NA	431		342		na		na		na		na		na		32.8		1.5	U	na	
Aroclor 1262	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Aroclor 1268	NA	37.0	U	26.8	U	na		na		na		na		na		5.7	U	1.5	U	na	
Total PCBs[3]	960	2489		2096		na		na		na		na		na		379	J	1.5	U	na	
Total PCBs (mg/kg OC)	65.0	251.4		243.7		na		na		na		na		na		nc		nc		na	
PAHs (µg/kg)																					
Acenaphthene	860	387		455		na		na		na		na		na		68.9	D	1.32	J	na	
Benz[a]anthracene	4100	2470		1980		na		na		na		na		na		5370	D	1.36	J	na	
Benzo[a]pyrene	3200	2210		1640		na		na		na		na		na		3810	D	1.29	J	na	
Benzo(b)fluoranthene	—	1860		1370		na		na		na		na		na		3030	D	1.11	J	na	
Benzo[g,h,i]perylene	470	1420		987		na		na		na		na		na		1390	D	1.01	J	na	
Benzo(k)fluoranthene	—	1050		797		na		na		na		na		na		1530	D	0.74	J	na	
Total benzofluoranthenes	6800	3960		2940		na		na		na		na		na		5400	D	2.95	J	na	
Chrysene	6900	2660		2120		na		na		na		na		na		4310	D	1.75	J	na	
Dibenzo[a,h]anthracene	180	475		354		na		na		na		na		na		523	D	3.61	U	na	
Fluoranthene	18000	6370		5480		na		na		na		na		na		13400	D	2.24	J	na	
Indeno[1,2,3-c,d]pyrene	1300	1380		967		na		na		na		na		na		1580	D	3.61	U	na	
Phenanthrene	7200	3200		3110		na		na		na		na		na		366	D	3.28	J	na	
Pyrene	--	6060		5320		na		na		na		na		na		12300	D	8.33		na	
Total HPAH	79500	27005		21788		na		na		na		na		na		48083		18.93	J	na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6										6				6			
	DMMU	14G										14G				15D2			
	Sample Location	SD-CONF063										SD-CONF064				SD-CONF069			
	Sample Date	12/21/2018										12/28/2018				1/14/2019			
	Sample ID	SD-CONF063-A		SD-CONF063-B		SD-CONF063-C		SD-CONF063-D		SD-CONF063-E		SD-CONF064-A		SD-CONF064-B		SD-CONF069-A		SD-CONF069-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Q	
Conventionals																			
TOC (percent)	NA	1.54		1.81		0.38		0.27	J	na		0.88	J	2.21		1.76	J	0.88	
Metals (mg/kg)																			
Arsenic	93	616		311		132		4.49		3.23		9.07	J	10.1		3.85	J	3.02	
Copper	390	1130		806		na		13.4		na		84.0	J	53.5		15.9		13.6	
Lead	530	1480		557		na		2.25		na		24.3	J	34.3		1.87		1.50	
Mercury	0.59	2.45		4.16		1.82		0.0114	J	0.011	J	0.154	J	0.717		0.0271	J	0.0124	J
PCBs (µg/kg)																			
Aroclor 1016	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Aroclor 1221	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Aroclor 1232	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Aroclor 1242	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Aroclor 1248	NA	878		49.3	U	1940		5.2		2.0	U	33.7		30.2		1.9	U	1.7	U
Aroclor 1254	NA	1860		2230		3130		7.8	J	2.0	U	72.9		65.9		1.9	U	1.7	U
Aroclor 1260	NA	592		1530		584		2.5		2.0	U	26.7		40.8		1.9	U	1.7	U
Aroclor 1262	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Aroclor 1268	NA	21.8	U	49.3	U	17.7	U	1.9	U	2.0	U	9.5	U	1.9	U	1.9	U	1.7	U
Total PCBs[3]	960	3330		3760		5654		15.5	J	2.0	U	133.3		136.9		1.9	U	1.7	U
Total PCBs (mg/kg OC)	65.0	216.2		207.7		nc		nc		nc		15.1	J	nc		0.1	U	0.2	U
PAHs (µg/kg)																			
Acenaphthene	860	1040		890		na		19.2		na		16.0		57.5		1.74	J	2.31	J
Benz[a]anthracene	4100	1700		1540		na		12.4		na		89.6		101		2.45	J	2.01	J
Benzo[a]pyrene	3200	1310		1180		na		13.6		na		114		242		4.92	U	1.35	J
Benzo(b)fluoranthene	—	1100		1010		na		14.3		na		99.8		234		1.70	J	1.90	J
Benzo[g,h,i]perylene	470	799		716		na		9.57		na		76.3		156		2.00	J	1.73	J
Benzo(k)fluoranthene	—	635		605		na		6.35		na		55.2		118		0.80	J	1.06	J
Total benzofluoranthenes	6800	2370		2200		na		27.7		na		209		465		3.49	J	4.24	J
Chrysene	6900	1810		1530		na		21.1		na		102		164		3.52	J	3.27	J
Dibenzo[a,h]anthracene	180	263		240		na		8.1		na		27.0		43.0		4.92	U	6.47	
Fluoranthene	18000	4780		4630		na		22.6		na		158		269		4.79	J	4.59	J
Indeno[1,2,3-c,d]pyrene	1300	790		719		na		4.05	J	na		72.1		139		4.92	U	1.37	J
Phenanthrene	7200	4620		3940		na		32.5		na		110		224		12.1		7.39	
Pyrene	--	3700		3480		na		142		na		184		446		5.64		4.60	J
Total HPAH	79500	17522		16235		na		261		na		1032		2025		21.89		29.63	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																			
	DMMU	15E																			
	Sample Location	SD-CONF070																			
	Sample Date	1/10/2019																			
	Sample ID	SD-CONF070-A		SD-CONF070-B		SD-CONF070-C		SD-CONF070-D		SD-CONF070-E		SD-CONF070-F		SD-CONF070-G		SD-CONF070-H		SD-CONF070-I		SD-CONF070-J	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	na		na		na		na		na		na		na		na		na		na	
Metals (mg/kg)																					
Arsenic	93	45.4		384		427		27		14.1		na		na		na		na		na	
Copper	390	802		841		941		248		390		na		na		na		na		na	
Lead	530	252		609.0		na		na		na		na		na		na		na		na	
Mercury	0.59	2.89		2.15		4.95		4.2		2.33		12.4		9.49		8.57		3.77		2.36	
PCBs (µg/kg)																					
Aroclor 1016	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Aroclor 1221	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Aroclor 1232	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Aroclor 1242	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Aroclor 1248	NA	1530		1190		799	U	746	U	392	U	777		825		115		38.5		19.2	
Aroclor 1254	NA	2940		2720		12200		9090		7780		1560		1630		181		86.4		55.1	
Aroclor 1260	NA	349		611		1770		656		435		463		303		70.3		35.9		28.5	
Aroclor 1262	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Aroclor 1268	NA	35.6	U	34.5	U	16	U	14.9	U	15.7	U	35.1	U	193	U	19.9	U	17.1	U	7.9	U
Total PCBs[3]	960	4819		4521		13970		9746		8215		2800		2758		366.3		160.8		102.8	
Total PCBs (mg/kg OC)	65.0	na		na		na		na		na		na		na		na		na		na	
PAHs (µg/kg)																					
Acenaphthene	860	949		231		na		na		na		na		na		na		na		na	
Benz[a]anthracene	4100	7610		2020		na		na		na		na		na		na		na		na	
Benzo[a]pyrene	3200	8710		2800		na		na		na		na		na		na		na		na	
Benzo(b)fluoranthene	—	7180		2860		na		na		na		na		na		na		na		na	
Benzo[g,h,i]perylene	470	5120		1570		na		na		na		na		na		na		na		na	
Benzo(k)fluoranthene	—	4130		1270		na		na		na		na		na		na		na		na	
Total benzofluoranthenes	6800	15200		5840		na		na		na		na		na		na		na		na	
Chrysene	6900	7540		2180		na		na		na		na		na		na		na		na	
Dibenzo[a,h]anthracene	180	1120.0		464		na		na		na		na		na		na		na		na	
Fluoranthene	18000	17600		4000		na		na		na		na		na		na		na		na	
Indeno[1,2,3-c,d]pyrene	1300	5230		1660		na		na		na		na		na		na		na		na	
Phenanthrene	7200	14200		2180		na		na		na		na		na		na		na		na	
Pyrene	--	19600		6940		na		na		na		na		na		na		na		na	
Total HPAH	79500	87730		27474		na		na		na		na		na		na		na		na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6													
	DMMU	15E													
	Sample Location	SD-CONF070R2													
	Sample Date	2/27/2019													
	Sample ID	SD-CONF070R2-K		SD-CONF070R2-L		SD-CONF070R2-M		SD-CONF070R2-N		SD-CONF070R2-O		SD-CONF070R2-P		SD-CONF070R2-Q	
	Depth Interval (ft)	5.5-6		6-6.5		6.5-7		7-7.5		7.5-8		8-.5		8.5-9	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals															
TOC (percent)	NA	na		0.05	J	na		na		na		na		na	
Metals (mg/kg)															
Arsenic	93	na		3.51		na		na		na		na		na	
Copper	390	na		21.9		na		na		na		na		na	
Lead	530	na		2.84		na		na		na		na		na	
Mercury	0.59	0.0209	J	0.0384		0.0222	J	0.0207	U	0.0211	U	0.0282	U	0.0263	
PCBs (µg/kg)															
Aroclor 1016	NA	na		39.7	U	na		na		na		na		na	
Aroclor 1221	NA	na		2.0	U	na		na		na		na		na	
Aroclor 1232	NA	na		149	U	na		na		na		na		na	
Aroclor 1242	NA	na		2.0	U	na		na		na		na		na	
Aroclor 1248	NA	na		2.0	U	na		na		na		na		na	
Aroclor 1254	NA	na		2.0	U	na		na		na		na		na	
Aroclor 1260	NA	na		2.0	UJ	na		na		na		na		na	
Aroclor 1262	NA	na		2.0	U	na		na		na		na		na	
Aroclor 1268	NA	na		2.0	U	na		na		na		na		na	
Total PCBs[3]	960	na		149	U	na		na		na		na		na	
Total PCBs (mg/kg OC)	65.0	na		nc		na		na		na		na		na	
PAHs (µg/kg)															
Acenaphthene	860	na		7.85		na		na		na		na		na	
Benz[a]anthracene	4100	na		2.35	J	na		na		na		na		na	
Benzo[a]pyrene	3200	na		1.50	J	na		na		na		na		na	
Benzo(b)fluoranthene	—	na		2.05	J	na		na		na		na		na	
Benzo[g,h,i]perylene	470	na		1.28	J	na		na		na		na		na	
Benzo(k)fluoranthene	—	na		0.84	J	na		na		na		na		na	
Total benzofluoranthenes	6800	na		4.22	J	na		na		na		na		na	
Chrysene	6900	na		3.59	J	na		na		na		na		na	
Dibenzo[a,h]anthracene	180	na		4.93	U	na		na		na		na		na	
Fluoranthene	18000	na		8.14		na		na		na		na		na	
Indeno[1,2,3-c,d]pyrene	1300	na		4.93	U	na		na		na		na		na	
Phenanthrene	7200	na		8.08		na		na		na		na		na	
Pyrene	--	na		16.8		na		na		na		na		na	
Total HPAH	79500	na		37.88		na		na		na		na		na	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																				6			
	DMMU	15E																				15E			
	Sample Location	SD-CONF270																				SD-CONF071			
	Sample Date	1/10/2019																				1/10/2019			
	Sample ID	SD-CONF270-A		SD-CONF270-B		SD-CONF270-C		SD-CONF270-D		SD-CONF270-E		SD-CONF270-F		SD-CONF270-G		SD-CONF270-H		SD-CONF270-I		SD-CONF270-J		SD-CONF071-A		SD-CONF071-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5		0-0.5		0.5-1	
Analyte	**RAL (CSL)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																									
TOC (percent)	NA	na		na		na		na		na		na		na		na		na		na		0.69	J	0.46	
Metals (mg/kg)																									
Arsenic	93	52.4		171		110		22.4		13.8		na		na		na		na		na		3.93	J	8.63	
Copper	390	731		329		826		516		285		na		na		na		na		na		29.8	J	30	
Lead	530	284.00		406		na		na		na		na		na		na		na		na		6.36	J	8.88	
Mercury	0.59	2.84		2.63		5.38		7.2		1.44		na		4		2.79		0.0129		0.0452		0.147	J	0.0927	
PCBs (µg/kg)																									
Aroclor 1016	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	UJ	1.6	U
Aroclor 1221	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	U	1.6	U
Aroclor 1232	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	U	1.6	U
Aroclor 1242	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	U	1.6	U
Aroclor 1248	NA	66.3	U	33.7	U	169	U	87.5		17.9		na		89.3		19.7	U	2.0	U	2.0	U	45.3		1.6	U
Aroclor 1254	NA	3820		2720		3290		187		44.9		na		75.5		477		5.0		2.4		81.3	J	50.6	
Aroclor 1260	NA	1020		496		297		65.7		13.2		na		55.6		19.7	U	1.0		0.6		10.5	J	5.6	
Aroclor 1262	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	U	1.6	U
Aroclor 1268	NA	66.3	U	33.7	U	16.9	U	8.4	U	8.6	U	na		16.8	U	19.7	U	2.0	U	2.0	U	8.6	U	1.6	U
Total PCBs[3]	960	4840		3216		3587		340		76		na		220.4		477		6.0		3.0		137.1	J	56.2	
Total PCBs (mg/kg OC)	65.0	nc		nc		nc		nc		nc		nc		nc		nc		nc		nc		19.9	J	nc	
PAHs (µg/kg)																									
Acenaphthene	860	376		61.5		na		na		na		na		na		na		na		na		625	D	62	
Benz[a]anthracene	4100	4380		717		na		na		na		na		na		na		na		na		721	D	55.4	
Benzo[a]pyrene	3200	3400		1540		na		na		na		na		na		na		na		na		620	D	56.8	
Benzo(b)fluoranthene	—	3020		1390		na		na		na		na		na		na		na		na		509	D	50.2	
Benzo[g,h,i]perylene	470	1820		746		na		na		na		na		na		na		na		na		384	D	34.7	
Benzo(k)fluoranthene	—	1730		689		na		na		na		na		na		na		na		na		302	D	28.9	
Total benzofluoranthenes	6800	6420		2600		na		na		na		na		na		na		na		na		1060	D	104	
Chrysene	6900	4150		801		na		na		na		na		na		na		na		na		681	D	53.3	
Dibenzo[a,h]anthracene	180	495		232		na		na		na		na		na		na		na		na		214	D	24.1	
Fluoranthene	18000	6450		1040		na		na		na		na		na		na		na		na		2040	D	146	
Indeno[1,2,3-c,d]pyrene	1300	1940		790		na		na		na		na		na		na		na		na		412	D	36.8	
Phenanthrene	7200	3810		636		na		na		na		na		na		na		na		na		2400	D	230	
Pyrene	--	10000		5530		na		na		na		na		na		na		na		na		1780	D	130	
Total HPAH	79500	34365		12085		na		na		na		na		na		na		na		na		7912		641	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																			
	DMMU	15F																			
	Sample Location	SD-CONF072																			
	Sample Date	12/27/2018																			
	Sample ID	SD-CONF072-A		SD-CONF072-B		SD-CONF072-C		SD-CONF072-D		SD-CONF072-E		SD-CONF072-F		SD-CONF072-G		SD-CONF072-H		SD-CONF072-I		SD-CONF072-J	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	0.98		1.39		1.25		0.57		1		1.04		1.12		1.51		0.26		0.22	
Metals (mg/kg)																					
Arsenic	93	45.9		205		na		na		na		na		na		na		na		16.9	
Copper	390	510		1210		1090		478		531		277		555		450		267		195	
Lead	530	153		488		na		na		na		na		na		na		na		104	
Mercury	0.59	1.33		7.14		5.38		1.65		3.65		3.13		5.67		6.31		3.28		0.941	
PCBs (µg/kg)																					
Aroclor 1016	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Aroclor 1221	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Aroclor 1232	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Aroclor 1242	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Aroclor 1248	NA	1460		1070		700		521		2050		989		482		810		7.2	U	23.2	
Aroclor 1254	NA	2720		2030		1240		855		3940		1680		775		1380		24.5		43.5	
Aroclor 1260	NA	548		545		418		415		1110		526		436		447		10.4		7.9	
Aroclor 1262	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Aroclor 1268	NA	348	U	85.1	U	20.7	U	12.0	U	64.4	U	76.4	U	33	U	37.4	U	7.2	U	7.1	U
Total PCBs[3]	960	4728		3645		2358		1791		7100		3195		1693		2637		34.9		74.6	
Total PCBs (mg/kg OC)	65.0	482.4		262.2		188.6		314.2		710.0		307.2		151.2		174.6		nc		nc	
PAHs (µg/kg)																					
Acenaphthene	860	1990		171		na		na		na		na		na		na		na		2050	
Benz[a]anthracene	4100	10900		1570		na		na		na		na		na		na		na		22500	
Benzo[a]pyrene	3200	6350		2580		na		na		na		na		na		na		na		20800	
Benzo(b)fluoranthene	—	5490		2230		na		na		na		na		na		na		na		15400	
Benzo[g,h,i]perylene	470	3080		1530		na		na		na		na		na		na		na		13300	
Benzo(k)fluoranthene	—	3350		1310		na		na		na		na		na		na		na		8860	
Total benzofluoranthenes	6800	12200		4800		na		na		na		na		na		na		na		32800	
Chrysene	6900	17700		1650		na		na		na		na		na		na		na		21800	
Dibenzo[a,h]anthracene	180	1500		375		na		na		na		na		na		na		na		2270	
Fluoranthene	18000	30200		2430		na		na		na		na		na		na		na		52700	
Indeno[1,2,3-c,d]pyrene	1300	3090		1500		na		na		na		na		na		na		na		12900	
Phenanthrene	7200	20800		1220		na		na		na		na		na		na		na		43000	
Pyrene	--	26400		7730		na		na		na		na		na		na		na		50300	
Total HPAH	79500	111420		24165		na		na		na		na		na		na		na		229370	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6									
	DMMU	15F									
	Sample Location	SD-CONF072R2									
	Sample Date	2/27/2019									
	Sample ID	SD-CONF072R2-K		SD-CONF072R2-L		SD-CONF072R2-M		SD-CONF072R2-N		SD-CONF072R2-O	
	Depth Interval (ft)	5.5-6		6-6.5		6.5-7		7-7.5		7.5-8	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals											
TOC (percent)	NA	na		na		na		na		1.73	
Metals (mg/kg)											
Arsenic	93	na		na		na		na		128	
Copper	390	na		na		na		na		1270	
Lead	530	na		na		na		na		773	
Mercury	0.59	na		na		na		na		5.83	
PCBs (µg/kg)											
Aroclor 1016	NA	na		na		na		na		208	U
Aroclor 1221	NA	na		na		na		na		208	U
Aroclor 1232	NA	na		na		na		na		208	U
Aroclor 1242	NA	na		na		na		na		208	U
Aroclor 1248	NA	na		na		na		na		9660	
Aroclor 1254	NA	na		na		na		na		30600	
Aroclor 1260	NA	na		na		na		na		7450	
Aroclor 1262	NA	na		na		na		na		208	U
Aroclor 1268	NA	na		na		na		na		208	U
Total PCBs[3]	960	na		na		na		na		47710	
Total PCBs (mg/kg OC)	65.0	na		na		na		na		2757.8	
PAHs (µg/kg)											
Acenaphthene	860	199		340		183		189		155	
Benz[a]anthracene	4100	3960		3700		2130		2080		2150	
Benzo[a]pyrene	3200	3880		4100		3000		3100		2540	
Benzo(b)fluoranthene	—	4520		4460		3310		3410		2800	
Benzo[g,h,i]perylene	470	2100		2200		1660		1760		1400	
Benzo(k)fluoranthene	—	2440		2380		1820		1840		1510	
Total benzofluoranthenes	6800	9150		9120		6870		7080		5760	
Chrysene	6900	4040		4270		2570		2390		2260	
Dibenzo[a,h]anthracene	180	560		598		447		283		423	
Fluoranthene	18000	5870		5980		3910		3400		2860	
Indeno[1,2,3-c,d]pyrene	1300	2110		2210		1530		1690		1350	
Phenanthrene	7200	1930		2760		1530		1460		1220	
Pyrene	--	11500		11200		9120		8980		8010	
Total HPAH	79500	43170		43378		31237		30763		26753	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																			
	DMMU	15F																			
	Sample Location	SD-CONF072R3																			
	Sample Date	5/22/2019																			
	Sample ID	SD-CONF072R3-P		SD-CONF072R3-Q		SD-CONF072R3-R		SD-CONF072R3-S		SD-CONF072R3-T		SD-CONF072R3-U		SD-CONF072R3-V		SD-CONF072R3-W		SD-CONF072R3-X		SD-CONF072R3-Y	
	Depth Interval (ft)	8-8.5		8.5-9		9-9.5		9.5-10		10-10.5		10.5-11		11-11.5		11.5-12		12-12.5		12.5-13	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	0.18		0.85		na		1.29		na		0.83		na		0.49		na		0.72	
Metals (mg/kg)																					
Arsenic	93	16.0		36.8		na		12.6		na		4.46		na		2.36		na		5.19	
Copper	390	263		272		813		287		36.5		27.3		810		44.9		na		325	
Lead	530	105		133		na		42.5		na		5.52		na		9.06		na		62.9	
Mercury	0.59	1.57		1.81		10.6		1.33		0.326		0.156		5.75		1.03		0.0581		2.32	
PCBs (µg/kg)																					
Aroclor 1016	NA	10	U	10	U	50	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Aroclor 1221	NA	10	U	10	U	10	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Aroclor 1232	NA	10	U	10	U	10	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Aroclor 1242	NA	10	U	10	U	10	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Aroclor 1248	NA	10	U	10	U	321		18		4.8		2.0	U	10	U	4.8		na		14.3	
Aroclor 1254	NA	29		29.1		832		49		12.7		7.8		267		6.7		na		29.7	
Aroclor 1260	NA	9.3		16.7		163		13		4.3		1.9		95.1		4		na		15	
Aroclor 1262	NA	10	U	10	U	10	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Aroclor 1268	NA	10	U	10	U	10	U	2.0	U	2.0	U	2.0	U	10	U	2.0	U	na		2.0	U
Total PCBs[3]	960	38.3		45.8		1316		80.1		21.8		9.7		362.1		15.5		na		59	
Total PCBs (mg/kg OC)	65.0	na		5.4		na		6.2		na		1.2		na		3.2		na		8.2	
PAHs (µg/kg)																					
Acenaphthene	860	112		1190		na		318		na		3060		na		8220		na		5200	
Benz[a]anthracene	4100	5730		14200		na		1200		na		37.3		na		1730		na		2000	
Benzo[a]pyrene	3200	6020		13800		na		498		na		30.1		na		403		na		1120	
Benzo(b)fluoranthene	—	6260		11900		na		610		na		36		na		568		na		1210	
Benzo[g,h,i]perylene	470	3010		6880		na		193		na		19		na		112		na		414	
Benzo(k)fluoranthene	—	3510		6810		na		330		na		17.2		na		269		na		661	
Total benzofluoranthenes	6800	13000		25900		na		1220		na		72.4		na		1070		na		2540	
Chrysene	6900	6650		15300		na		1450		na		45.7		na		1660		na		2160	
Dibenzo[a,h]anthracene	180	807		1960		na		60.1		na		5.27		na		41.8		na		128	
Fluoranthene	18000	10800		34600		na		1860		na		341		na		12800		na		5870	
Indeno[1,2,3-c,d]pyrene	1300	3020		6270		na		191		na		13.9		na		118		na		410	
Phenanthrene	7200	3290		24900		na		222		na		4150		na		28700		na		5260	
Pyrene	--	17900		42500		na		1200		na		269		na		7880		na		4380	
Total HPAH	79500	66937		161410		na		7872.1		na		833.67		na		25814.8		na		19022	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6																					
	DMMU	15F																					
	Sample Location	SD-CONF072R4																					
	Sample Date	7/26/2019																					
	Sample ID	SD-CONF072R4-A		SD-CONF072R4-B		SD-CONF072R4-C		SD-CONF072R4-D		SD-CONF072R4-E		SD-CONF072R4-F		SD-CONF072R4-G		SD-CONF072R4-H		SD-CONF072R4-I		SD-CONF072R4-J		SD-CONF072R4-K	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4		4-4.5		4.5-5		5-5.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	1.66		na		0.59		na		1.12		na		0.16		na		1.11		na		1.77	
Metals (mg/kg)																							
Arsenic	93	44.7		na		41.3		na		16.2		na		14.9		na		31.8		na		46.9	
Copper	390	752		na		338		na		441		na		184		na		298		na		422	
Lead	530	170		na		324		na		369		na		267		na		297		na		360	
Mercury	0.59	0.894		na		7.1		na		3.15		na		1.5		na		3.34		na		3.68	
PCBs (µg/kg)																							
Aroclor 1016	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Aroclor 1221	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Aroclor 1232	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Aroclor 1242	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Aroclor 1248	NA	409		na		515		na		215		na		17.3		na		114		na		40.5	
Aroclor 1254	NA	972		na		1400		na		511		na		49.4		na		299		na		89.9	
Aroclor 1260	NA	188		na		385		na		303		na		10.5		na		85.3		na		59.3	
Aroclor 1262	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Aroclor 1268	NA	20.0	U	na		50.0	U	na		20.0	U	na		2.0	U	na		20.0	U	na		2.0	U
Total PCBs[3]	960	1569		na		2300				1029				77.2				498				190	
Total PCBs (mg/kg OC)	65.0																						
PAHs (µg/kg)																							
Acenaphthene	860	650		na		84.3		na		110		na		88.9		na		961		na		801	
Benz[a]anthracene	4100	4950		na		1110		na		1130		na		4310		na		11900		na		6760	
Benzo[a]pyrene	3200	5810		na		1560		na		1250		na		3950		na		10400		na		2350	
Benzo(b)fluoranthene	—	6100		na		1690		na		1250		na		3800		na		8540		na		2620	
Benzo[g,h,i]perylene	470	3130		na		801		na		623		na		2070		na		5370		na		941	
Benzo(k)fluoranthene	—	3600		na		931		na		695		na		2270		na		4910		na		1340	
Total benzofluoranthenes	6800	12900		na		3490		na		2650		na		8190		na		19000		na		5730	
Chrysene	6900	6750		na		1500		na		1510		na		4400		na		12700		na		7060	
Dibenzo[a,h]anthracene	180	675		na		208		na		178		na		549		na		1230		na		214	
Fluoranthene	18000	12600		na		1620		na		3140		na		9370		na		29900		na		33200	
Indeno[1,2,3-c,d]pyrene	1300	3130		na		742		na		586		na		2030		na		5140		na		902	
Phenanthrene	7200	7930		na		735		na		775		na		2150		na		25700		na		1560	
Pyrene	--	19100		na		4760		na		8380		na		11500		na		38000		na		28500	
Total HPAH	79500	69045				15791				19447				46369				133640				85657	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6										6				6				6	
	DMMU	15F										15G				16C2				16D	
	Sample Location	SD-CONF073										SD-CONF074				SD-CONF036				SD-CONF037	
	Sample Date	12/27/2018										12/28/2018				1/17/2019				1/8/2019	
	Sample ID	SD-CONF073-A		SD-CONF073-B		SD-CONF073-C		SD-CONF073-D		SD-CONF073-E		SD-CONF074-A		SD-CONF074-B		SD-CONF036-A		SD-CONF036-B		SD-CONF037-A		SD-CONF037-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	1.04		0.65		1.19		1.38		0.18	J	1.53		0.92		0.40	J	0.41		1.69	J	1.23	
Metals (mg/kg)																							
Arsenic	93	106		76.4		na		na		41.4		45.8		30.1	J	2.33		2.33		21.8	J	7.05	
Copper	390	819		767		na		na		102		283		140	J	19	J	10.1		103	J	26.9	
Lead	530	334		225		na		na		127		160		86.0	J	2.27	J	1.75		112	J	10.9	
Mercury	0.59	1.85		0.699		na		na		0.29	J	2.2		0.798	J	0.0282	J	0.0278	J	0.512	J	0.167	
PCBs (µg/kg)																							
Aroclor 1016	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Aroclor 1221	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Aroclor 1232	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Aroclor 1242	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Aroclor 1248	NA	2180		1290		4020		1620		103	J	333		204	D	4.9		2.0	U	54.2	J	2.0	U
Aroclor 1254	NA	3560		2030		7620		2390		141		652		395	D	6.5	J	2.0	U	89.5	D	5.5	
Aroclor 1260	NA	458		363		1250		475		48.2		263		138	D	1.6	J	2.0	U	19.4	J, D	4.4	
Aroclor 1262	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Aroclor 1268	NA	365	U	107	U	81.4	U	57.1	U	7.9	U	48.7	U	9.6	U	1.9	U	2.0	U	19.9	U	2.0	U
Total PCBs[3]	960	6198		3683		12890		4485		292.2	J	1248		737		13.0	J	2.0	U	163.1	J	9.9	
Total PCBs (mg/kg OC)	65.0	596		566.6		1083.2		325.0		nc		81.6		80.1		nc		nc		9.7	J	0.8	
PAHs (µg/kg)																							
Acenaphthene	860	358		76.8		na		na		48.9		142		380	D	23.1		25.7		1810		20.7	
Benz[a]anthracene	4100	1830		776		na		na		2.4	J	544		1220	D	33.9		24.8		215		48.5	
Benzo[a]pyrene	3200	2420		672		na		na		1.96	J	667		1160	D	37.3		28.3		207		59.1	
Benzo(b)fluoranthene	—	2580		691		na		na		2.64	J	701		1120	D	35.2		27.6		186		59.0	
Benzo[g,h,i]perylene	470	1320		357		na		na		1.79	J	311		559	D	29.6		20.0		128		38.7	
Benzo(k)fluoranthene	—	1280		324		na		na		1.6	J	336		624	D	18.7		13.7		105		29.7	
Total benzofluoranthenes	6800	5160		1250		na		na		5.86	J	1310		2430	D	72.8		54.5		386		118	
Chrysene	6900	2410		682		na		na		3.86	J	690		1300	D	39.8		29.7		238		61.2	
Dibenzo[a,h]anthracene	180	357		112		na		na		4.93	U	106		475	D	11.3	U	9.61		38.2		14.9	
Fluoranthene	18000	4600		2390		na		na		7.04	J	1390		3420	D	105		93.4		847		124	
Indeno[1,2,3-c,d]pyrene	1300	1320		354		na		na		1.97	J	334		536	D	23.3		15.7		110		33.4	
Phenanthrene	7200	2080		353		na		na		74.3		680		2420	D	84.7		82.9		1420		89.8	
Pyrene	--	7600		2770		na		na		10.4	J	4650		7530	D	172		120		990		190	
Total HPAH	79500	27017		9363		na		na		35	J	10002		18630		514		396		3159		688	

TABLE 6F

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	6				6				6				6				6				6			
	DMMU	16D				16E				16E				16E				16F				16F			
	Sample Location	SD-CONF038				SD-CONF039				SD-CONF040				SD-CONF240				SD-CONF041				SD-CONF042			
	Sample Date	1/9/2019				1/9/2019				1/7/2019				1/7/2019				1/7/2019				1/7/2019			
	Sample ID	SD-CONF038-A		SD-CONF038-B		SD-CONF039-A		SD-CONF039-B		SD-CONF040-A		SD-CONF040-B		SD-CONF240-A		SD-CONF240-B		SD-CONF041-A		SD-CONF041-B		SD-CONF042-A		SD-CONF042-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																									
TOC (percent)	NA	0.89	J	0.70		2.30		2.29		3.27	J	0.16		1.62		na		0.52	J	0.07		0.78	J	0.88	
Metals (mg/kg)																									
Arsenic	93	8.83		14.0	J	8.35	J	4.89		45.4	J	16.6		13.8		4.13		12.2	J	12.5		43.8	J	13.1	
Copper	390	31.3		124	J	37.0	J	25.1		119	J	116		54.1		21.5		21.8	J	25.6		148	J	64.7	
Lead	530	15.6		71.3	J	16.6	J	4.33		202	J	401		47.4		3.42		17.3	J	14.3		102	J	26.3	
Mercury	0.59	0.104		0.352	J	0.227	J	0.0526		0.73		1.02		0.251		0.0362		0.0251	J	0.0562		0.138		0.269	
PCBs (µg/kg)																									
Aroclor 1016	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Aroclor 1221	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Aroclor 1232	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Aroclor 1242	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Aroclor 1248	NA	4.6		429		64.6	J	1.7	U	546	D	200		91.2		2.0	U	7.1		19.1		5.7	J	39.9	U
Aroclor 1254	NA	4.7		647		112	D	1.7	U	970	D	326		131.0		1.4	J	10.9		41.2		8.1		77.4	
Aroclor 1260	NA	1.6	J	154		40.8		1.7	U	242	D	117		28.3		2.0	U	2.7		10.9		3.1		18.8	
Aroclor 1262	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Aroclor 1268	NA	1.6	U	78.3	U	1.8	U	1.7	U	98.0	U	39.2	U	39.6	U	2.0	U	2.0	U	1.9	U	1.9	U	39.9	U
Total PCBs[3]	960	10.9	J	1230		217	J	1.7	U	1758		643		251		1.4	J	20.7		71.2		16.9	J	96.2	
Total PCBs (mg/kg OC)	65.0	1.2	J	175.7		nc		nc		53.8		nc		15.5		nc		4.0		nc		2.2		10.9	
PAHs (µg/kg)																									
Acenaphthene	860	31.4	J	57.9		288	J	44.4		87.3	D	101		398		14.1		89.8	D	7.44		14.7		24.8	U
Benz[a]anthracene	4100	75.2	D	275		665	J	119		505	D	433		356		13.7		539	D	50.5		56.5		86.9	D
Benzo[a]pyrene	3200	49.4	D	448		370	J	44.7		545	D	705		167		6.16		596	D	43.4		100		150	D
Benzo(b)fluoranthene	—	48.0	D	401		379	J	54.9		460	D	633		180		6.90		494	D	45.9		83.3		133	D
Benzo[g,h,i]perylene	470	32.9	D	250		238	J	25.8		334	D	405		95.6		4.12		345	D	29.4		71.8		94.7	D
Benzo(k)fluoranthene	—	24.7	D	219		197	J	27.9		260	D	348		91.5		3.63		278	D	25.5		46.4		72.5	D
Total benzofluoranthenes	6800	100	D	835		771	J	108		968	D	1310		364		14.6		1050	D	95.7		172		273	D
Chrysene	6900	62.8	D	291		664	J	98.5		636	D	462		321		11.7		680	D	74.4		65.0		102	D
Dibenzo[a,h]anthracene	180	22.2	D	80.0		134.0	J	22.4		108	D	134		32.3		6.79		116	D	13.9		34.6		44.3	D
Fluoranthene	18000	321	D	577		2260	J	305		1150	D	1040		1540		38.0		1180	D	133		106		205	D
Indeno[1,2,3-c,d]pyrene	1300	28.6	D	241		183		19.2		304	D	387		66.8		3.26		319	D	27.8		58.1		85.6	D
Phenanthrene	7200	122	D	271		896	J	139		623	D	540		846		72.4		648	D	84.8		79.3		148	D
Pyrene	--	372	D	2320		1950	J	339		1740	D	2940		1450		54.2		1830	D	156		145		241	D
Total HPAH	79500	1064		5317		7235		1082		6290		7816		4393		153		6655		624		809		1283	

Note(s)

1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   - U = analyte not detected at reporting limit presented.
   - J = result is estimated.
   - D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Indicates sample removed during re-dredging

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
na = not analyzed
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6G

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

Analyte	DU	R-DU 6			
	DMMU	R-DMMU 15F			
	Sample Location	SD-CONF072R5			
	Sample Date	10/10/2019			
	Sample ID	SD-CONF072R5-A		SD-CONF072R5-B	
	Depth Interval (ft)	0-0.5		0.5-1	
	RAL (CSL)	Result	Q	Result	Q
Conventionals					
TOC (percent)	NA	0.17		0.33	
Metals (mg/kg)					
Arsenic	93	12.1		2.84	
Copper	390	95.9		15.9	
Lead	530	38.1	J	4.28	
Mercury	0.59	0.117	J	0.0428	
PCBs (µg/kg)					
Aroclor 1016	NA	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U
Aroclor 1248	NA	6.4		2.1	
Aroclor 1254	NA	18.4		4.2	
Aroclor 1260	NA	4.9		1.1	J
Aroclor 1262	NA	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U
Total PCBs[3]	960	29.7		7.4	
Total PCBs (mg/kg-OC)	65	nc		nc	
PAHs (µg/kg)					
Acenaphthene	860	98.7	D	41.4	
Benz[a]anthracene	4100	789	D	17.5	
Benzo[a]pyrene	3200	734	D	21.2	
Benzo(b)fluoranthene	—	607	J	24.4	
Benzo[g,h,i]perylene	470	418	D	12.8	
Benzo(k)fluoranthene	—	438	J	12.2	
Total benzofluoranthenes	6800	1310	J	48.0	
Chrysene	6900	853	J	25.0	
Dibenzo[a,h]anthracene	180	120	J	5.00	U
Fluoranthene	18000	1880	J	50.0	
Indeno[1,2,3-c,d]pyrene	1300	403	D	10.3	
Phenanthrene	7200	1390	D	61.5	
Pyrene	--	2150	J	99.0	
Total HPAH	79500	8657		284	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
   D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	**7**				**7**						**7**											
	DMMU	**11A**				**11A**						**11B**											
	Sample Location	**SD-CONF075**				**SD-CONF076**						**SD-CONF077**											
	Sample Date	**11/5/2018**				**11/5/2018**						**11/5/2018**											
	Sample ID	**SD-CONF075-A**		**SD-CONF075-B**		**SD-CONF076-A**		**SD-CONF076-B**		**SD-CONF076-C**		**SD-CONF077-A**		**SD-CONF077-B**		**SD-CONF077-C**		**SD-CONF077-D**		**SD-CONF077-E**		**SD-CONF077-F**	
	Depth Interval (ft)	**0-0.5**		**0.5-1**		**0-0.5**		**0.5-1**		**1-1.5**		**0-0.5**		**0.5-1**		**1-1.5**		**1.5-2**		**2-2.5**		**2.5-3**	
Analyte	**RAL (CSL)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																							
TOC (percent)	NA	2.06		0.50		1.09		1.13		1.25		1.54		0.78		0.55		0.45		0.11	J	0.21	
Metals (mg/kg)																							
Arsenic	93	41.0		12.5		18.8	J	18.6		4.77		63.5		43.4		30.2		4.30		4.92		2.63	
Copper	390	280		68.9		230	J	280		109		646		1320		1340		253		85.2	J	15.4	
Lead	530	164		32.0		63.5		57.4		24.9		206		273		188		33.4		19.7	J	2.65	
Mercury	0.59	0.596		0.0995		1.51	J	0.867		1.60		3.14		7.79		17.2		3.20		0.0697	J	0.0467	
PCBs (µg/kg)																							
Aroclor 1016	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1248	NA	343	D	17.5		50.9		65.9		19.2		1020		118		38.8		19.5		3.6		2.0	
Aroclor 1254	NA	564	D	27.4		83.3		110		16.6		1650		186		77.7		29.7		4.2		1.7	J
Aroclor 1260	NA	121	J	6.8		20.5	J	22.5		5.3		97.9		37.3		27.6		14.7		1.1	J	0.7	J
Aroclor 1262	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	1.9	U	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Total PCBs[3]	960	1028	J	51.7		154.7	J	198.4		41.1		2768	J	341		144	J	63.9		8.9	J	4.4	J
Total PCBs (mg/kg OC)	65	49.9	J	10.3		14.2	J	17.6		3.3		179.7		43.8		26.2		nc		nc		nc	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7														7					
	DMMU	11C														11C					
	Sample Location	SD-CONF078														SD-CONF079					
	Sample Date	10/31/2018														10/30/2018					
	Sample ID	SD-CONF078-A		SD-CONF078-B		SD-CONF078-C		SD-CONF078-D		SD-CONF078-E		SD-CONF078-F		SD-CONF078-G		SD-CONF079-A		SD-CONF079-B		SD-CONF079-C	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		0-0.5		0.5-1		1-1.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																					
TOC (percent)	NA	1.70		1.66		1.36		1.41		1.26		0.75	J	2.03		0.33	J	1.68		0.95	
Metals (mg/kg)																					
Arsenic	93	132		80.5		76.9		50.5		17.7		7.93		14.2		3.53	J	3.23		8.49	
Copper	390	1100		903		988		844		584		36.6	J	17.6		23.1	J	21.7		337	
Lead	530	627		574		474		397		110		11.4	J	2.67		5.57		4.85		53.6	
Mercury	0.59	7.80		9.66		6.01		9.24		4.21		0.152	J	0.127		0.0414	J	0.156		1.37	
PCBs (µg/kg)																					
Aroclor 1016	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1221	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1232	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1242	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1248	NA	1990		5330		888		326		10.0	U	14.7		4.5		12.4		1.9	U	18.0	
Aroclor 1254	NA	3610		10300		2800		669		138		29.3		3.4		21.5		3.8		26.5	
Aroclor 1260	NA	1000		2460		919		228		30.2		8.5	J	2.1		5.7	J	1.5	J	15.3	
Aroclor 1262	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1268	NA	195	U	1960	U	96.4	U	40.9	U	10.0	U	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U
Total PCBs[3]	960	6600		18090		4607		1223		168		52.5	J	10.0		39.6	J	5.3	J	59.8	
Total PCBs (mg/kg OC)	65	388		1090		339		87		13		7.0	J	0.49		nc		0.32		6.29	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7				7				7						7			
	DMMU	12A				12A				12A						12A			
	Sample Location	SD-CONF080				SD-CONF280 (field duplicate of SD-CONF080)				SD-CONF081						SD-CONF128			
	Sample Date	11/7/2018				11/7/2018				11/8/2018						11/8/2018			
	Sample ID	SD-CONF080-A		SD-CONF080-B		SD-CONF280-A		SD-CONF280-B		SD-CONF081-A		SD-CONF081-B		SD-CONF081-C		SD-CONF128-A		SD-CONF128-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																			
TOC (percent)	NA	0.22		0.53		0.25		0.54		0.40		0.45	J	0.96		0.63	J	0.77	
Metals (mg/kg)																			
Arsenic	93	34.4		4.72		41.3		3.10		74.2		73.9	J	44.1		10.3	J	22.8	
Copper	390	165	J	27.9		147		21.0		383		530	J	125		109	J	276	
Lead	530	50.5		6.33		72.1		4.84		161		176	J	88.1		131	J	156	
Mercury	0.59	0.115	J	0.102		0.104		0.0536		4.75		1.28	J	0.316		0.401	J	0.752	
PCBs (µg/kg)																			
Aroclor 1016	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1221	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1232	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1242	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1248	NA	104	D	3.0		60.1		1.9	J	203		464	D	232	J	116		225	
Aroclor 1254	NA	167	D	3.5		122		2.4		368		828	D	492		199		372	
Aroclor 1260	NA	26	J	1.2	J	14.0		1.2	J	34.5		129	D	118	J	46.8		95.2	
Aroclor 1262	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1268	NA	1.9	U	1.9	U	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	1.9	U
Total PCBs[3]	960	297	J	7.7	J	196.1		5.5	J	606		1421		842		362		692.2	
Total PCBs (mg/kg OC)	65	nc		1.5		nc		1.0		nc		nc		87.7		57.4	J	89.9	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7						7											
	DMMU	12B						12C											
	Sample Location	SD-CONF082						SD-CONF083											
	Sample Date	12/3/2018						11/12/2018											
	Sample ID	SD-CONF082-A		SD-CONF082-B		SD-CONF082-C		SD-CONF083-A		SD-CONF083-B		SD-CONF083-C		SD-CONF083-D		SD-CONF083-E		SD-CONF083-F	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																			
TOC (percent)	NA	0.63		0.40		0.30	J	0.83		1.60		0.94		1.73		1.15		1.53	
Metals (mg/kg)																			
Arsenic	93	55.8		110		15.3	J	47.8		72.7		55.1		217		131		178	
Copper	390	537		898		102	J	1660		1370		1500		1180		1200		1540	
Lead	530	230		382		33.8	J	607		426		421		583		554		594	
Mercury	0.59	3.41		3.07		0.798	J	5.04		3.09		3.04		10.2		11.8		13.2	
PCBs (µg/kg)																			
Aroclor 1016	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Aroclor 1221	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Aroclor 1232	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Aroclor 1242	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Aroclor 1248	NA	494		654		64.7	D	5100		2900		195	U	1680	U	1780		1710	
Aroclor 1254	NA	961		1400		119	D	8460		5080		9340		18500		3490		3630	
Aroclor 1260	NA	284		235		43.9	J	1110		2190		1840		1790		545		800	
Aroclor 1262	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Aroclor 1268	NA	2.0	U	2.0	U	9.9	U	199	U	195	U	195	U	1680	U	239	U	129	U
Total PCBs[3]	960	1739		2289		227.6	J	14670		10170		11180		20290		5815		6140	
Total PCBs (mg/kg OC)	65	276.0		nc		nc		1767		636		1189		1173		506		401	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7								7					
	DMMU	12C								12C					
	Sample Location	SD-CONF083R2								SD-CONF084					
	Sample Date	1/15/2019								11/12/2018					
	Sample ID	SD-CONF083R2-G		SD-CONF083R2-H		SD-CONF083R2-I		SD-CONF083R2-J		SD-CONF084-A		SD-CONF084-B		SD-CONF084-C	
	Depth Interval (ft)	3-3.5		3.5-4		4-4.5		4.5-5		0-0.5		0.5-1		1-1.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals															
TOC (percent)	NA	0.20	J	0.71		0.43		1.42		1.25		0.59		0.15	J
Metals (mg/kg)															
Arsenic	93	2.50		1.77		2.05		2.46		104		76.1		8.59	J
Copper	390	7.45		9.91		10.7		10.1		949		1100		125	J
Lead	530	1.25		1.51		1.38		1.30		372		192		30.0	J
Mercury	0.59	0.00976	J	0.0770		0.0142	J	0.0116	J	5.64		2.00		0.170	J
PCBs (µg/kg)															
Aroclor 1016	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Aroclor 1221	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Aroclor 1232	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Aroclor 1242	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Aroclor 1248	NA	1.5	U	1.5	U	1.6	U	1.6	U	1190		658		187	D
Aroclor 1254	NA	2.4		1.6		1.6	U	1.6	U	1910		968		273	D
Aroclor 1260	NA	0.6	J	1.5	U	1.6	U	1.6	U	457		146		64.2	J
Aroclor 1262	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Aroclor 1268	NA	1.5	U	1.5	U	1.6	U	1.6	U	196	U	98.9	U	9.6	U
Total PCBs[3]	960	3.0	J	1.6		1.6	U	1.6	U	3557		1772		524.2	J
Total PCBs (mg/kg OC)	65	nc		0.23		nc		0.11	U	285		300		nc	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7				7				7											
	DMMU	12D				13A				13B											
	Sample Location	SD-CONF085				SD-CONF086				SD-CONF087											
	Sample Date	11/12/2018				11/8/2018				12/3/2018											
	Sample ID	SD-CONF085-A		SD-CONF085-B		SD-CONF086-A		SD-CONF086-B		SD-CONF087-A		SD-CONF087-B		SD-CONF087-C		SD-CONF087-D		SD-CONF087-E		SD-CONF087-F	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3	
Analyte	**RAL (CSL)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																					
TOC (percent)	NA	0.70		0.90	J	0.81		0.91	J	1.63		0.75		0.68		0.28	J	0.29		0.28	
Metals (mg/kg)																					
Arsenic	93	103		16.2	D	226		43.8	J	77.2		62.0		93.2		17.4		2.19		2.39	
Copper	390	886		86.0	D	796		163	J	774		597		506		74.8		12.9		14.7	
Lead	530	283		20.2	D	219		63.2	J	303		262		236		88.3		1.98		2.39	
Mercury	0.59	2.65		0.0489	J	1.90		0.342	J	5.04		2.80		3.33		0.283	J	0.0366		0.0506	
PCBs (μg/kg)																					
Aroclor 1016	NA	50.5	U	1.9	U	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Aroclor 1221	NA	50.5	U	1.9	U	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Aroclor 1232	NA	50.5	U	1.9	U	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Aroclor 1242	NA	50.5	U	1.9	U	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Aroclor 1248	NA	570		22.9		381		119		1520		671		469		46.5	D	4.2		3.8	
Aroclor 1254	NA	964		36.2		899		212		2310		1350		860		75.3	D	4.3		5.1	J
Aroclor 1260	NA	190		7.6	J	121		39.9	J	435		206		294		14.6	J, D	1.2	J	1.2	J
Aroclor 1262	NA	50.5	U	1.9	UJ	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Aroclor 1268	NA	50.5	U	1.9	UJ	2.0	U	2.0	U	19.9	U	19.1	U	19.9	U	19.5	U	2.0	U	2.0	U
Total PCBs[3]	960	1724		66.7	J	1401		370.9	J	4265		2227		1623		136.4	J	9.7		10.1	
Total PCBs (mg/kg OC)	65	246		7.4		173		40.8	J	261.7		296.9		238.7		nc		nc		nc	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7				7					
	DMMU	13B				13C					
	Sample Location	SD-CONF088				SD-CONF089					
	Sample Date	12/3/2018				12/5/2018					
	Sample ID	SD-CONF088-A		SD-CONF088-B		SD-CONF089-A		SD-CONF089-B		SD-CONF089-C	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		1-1.5	
Analyte	**RAL (CSL)**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals											
TOC (percent)	NA	1.27		1.02	J	0.59		0.76		0.23	J
Metals (mg/kg)											
Arsenic	93	39.4		24.9	J	87.9		53.6		2.91	J
Copper	390	442		61.9		1350		574		13.7	J
Lead	530	135		26.4		277		173		2.65	J
Mercury	0.59	3.69		0.110	J	3.60		2.31		0.0142	J
PCBs (µg/kg)											
Aroclor 1016	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Aroclor 1221	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Aroclor 1232	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Aroclor 1242	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Aroclor 1248	NA	461		14.9		1030		439		9.8	
Aroclor 1254	NA	914		19.0		1690		1670		11.3	
Aroclor 1260	NA	82.4		3.3		286		292		2.4	
Aroclor 1262	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Aroclor 1268	NA	2.0	U	1.9	U	98.9	U	19.7	U	1.9	U
Total PCBs[3]	960	1457		37.2		3006		2401		23.5	
Total PCBs (mg/kg OC)	65	114.8		3.6		509.5		315.9		nc	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7															
	DMMU	13C															
	Sample Location	SD-CONF090															
	Sample Date	12/5/2018															
	Sample ID	SD-CONF090-A		SD-CONF090-B		SD-CONF090-C		SD-CONF090-D		SD-CONF090-E		SD-CONF090-F		SD-CONF090-G		SD-CONF090-H	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	0.49		0.40		0.42	J	0.23		0.43		0.65		0.35		0.57	
Metals (mg/kg)																	
Arsenic	93	128		60.0		6.22	J	2.37		3.12		3.23		3.50		3.07	
Copper	390	1060		265		34.9	J	10.5		15.2		21.5		22.9		19.7	
Lead	530	354		157		11.0	J	1.49		1.82		2.69		3.24		2.89	
Mercury	0.59	2.73		1.91		0.0902	J	0.0285		0.0349		0.0433		0.0566		0.0427	
PCBs (µg/kg)																	
Aroclor 1016	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1221	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1232	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1242	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1248	NA	1040		131		10.6		2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1254	NA	1990		326		18.1		2.0	U	2.0	U	2.0	U	1.5	J	2.5	
Aroclor 1260	NA	314		113		9.5		2.0	U	2.0	U	2.0	U	0.7	J	0.8	J
Aroclor 1262	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Aroclor 1268	NA	49.3	U	9.6	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U
Total PCBs[3]	960	3344		570		38.2		2.0	U	2.0	U	2.0	U	2.2		3.3	
Total PCBs (mg/kg OC)	65	nc		nc		nc		nc		nc		0.31	U	nc		0.58	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	7															
	DMMU	13C															
	Sample Location	SD-CONF290 (field duplicate of SD-CONF090)															
	Sample Date	12/5/2018															
	Sample ID	SD-CONF290-A		SD-CONF290-B		SD-CONF290-C		SD-CONF290-D		SD-CONF290-E		SD-CONF290-F		SD-CONF290-G		SD-CONF290-H	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5		3.5-4	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	0.68		0.70		0.61		0.31		0.37		0.48		0.54		0.37	
Metals (mg/kg)																	
Arsenic	93	116		43.1		54.6		2.41		3.44		2.61		3.63		2.85	
Copper	390	913		605		393		12.4		20.2		18.2		21.2		15.2	
Lead	530	386		79.2		211		1.72		2.53		2.42		2.83		2.04	
Mercury	0.59	6.02		1.55		4.33		0.0247		0.0358		0.0365		0.0514		0.0416	
PCBs (µg/kg)																	
Aroclor 1016	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1221	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1232	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1242	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1248	NA	2270		88.9		96.4		1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1254	NA	1880		161		218		1.9	U	2.0	U	2.0	U	2.5		2.0	U
Aroclor 1260	NA	391		34.7	J	53.7		1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1262	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1268	NA	49.7	U	49.1	U	9.9	U	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U
Total PCBs[3]	960	4541		284.6		368.1		1.9	U	2.0	U	2.0	U	2.5		2.0	U
Total PCBs (mg/kg OC)	65	667.8		40.7		60.3		nc		nc		nc		0.5		nc	

TABLE 6H

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

Analyte																	
	DU	7												7			
	DMMU	13D												13E			
	Sample Location	SD-CONF091												SD-CONF092			
	Sample Date	12/5/2018												11/13/2018			
	Sample ID	SD-CONF091-A		SD-CONF091-B		SD-CONF091-C		SD-CONF091-D		SD-CONF091-E		SD-CONF091-F		SD-CONF092-A		SD-CONF092-B	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	0.48		0.31		0.65		0.37		0.33	J	1.17		2.43	J	1.80	
Metals (mg/kg)																	
Arsenic	93	163		176		154		122		6.95		2.80		9.99		8.46	
Copper	390	803		1460		1090		853		18.9		14.5		55.6	J	44.6	
Lead	530	427		466		594		191		14.7		1.84		8.70		6.66	
Mercury	0.59	2.55		8.91		2.53		2.54		0.0411	J	0.0266		0.122		0.0825	
PCBs (µg/kg)																	
Aroclor 1016	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1221	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1232	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1242	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1248	NA	917		2540		1230		367		11.5		2.0	U	1.9	U	2.0	U
Aroclor 1254	NA	1880		4660		2290		635		22.8		1.1	J	1.7	J	2.0	U
Aroclor 1260	NA	575		472		488		121		6.8		2.0	U	0.9	J	2.0	U
Aroclor 1262	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Aroclor 1268	NA	99.3	U	10	U	39.4	U	9.9	U	1.9	U	2.0	U	1.9	U	2.0	U
Total PCBs[3]	960	3372		7672		4008		1123		41.1		1.1	J	2.6	J	2.0	U
Total PCBs (mg/kg OC)	65	nc		nc		616.6		nc		nc		0.09	J	0.11		0.11	U

Note(s)

1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
   D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

(hatched box) Indicates sample removed during re-dredging

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6I

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	8				8				8				8				8		8			
	DMMU	8B				9A				9A				9B				9B		9B			
	Sample Location	SD-CONF096				SD-CONF097				SD-CONF098				SD-CONF093				SD-CONF094		SD-CONF099			
	Sample Date	10/31/2018				11/7/2018				11/7/2018				10/31/2018				10/29/2018		10/31/2018			
	Sample ID	SD-CONF096-A		SD-CONF096-B		SD-CONF097-A		SD-CONF097-B		SD-CONF098-A		SD-CONF098-B		SD-CONF093-A		SD-CONF093-B		SD-CONF094-A		SD-CONF099-A		SD-CONF099-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	0.18		0.30		0.17		0.29		0.23		0.23		1.48		0.15		1.47	J	1.08		0.43	
Metals (mg/kg)																							
Arsenic	93	1.84	J	2.37		14.1		9.27		12.6		2.85		7.84	J	2.07		8.71	J	20.4	J	13.7	
Copper	390	12.8	J	15.9		68.6	J	73.7		85.5	J	15.1		49.4	J	12.1		51.4		177	J	120	
Lead	530	2.86		3.45		107		65.3		39.3		4.91		16.1		1.79		82.5	J	67.6		42.9	
Mercury	0.59	0.0409	J	0.0526		0.117	J	0.0524		0.235	J	0.0254		0.238	J	0.0149		0.22	J	0.573	J	0.22	
PCBs (µg/kg)																							
Aroclor 1016	NA	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Aroclor 1221	NA	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Aroclor 1232	NA	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Aroclor 1242	NA	1.9	U	2.0	U	2.0	U	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Aroclor 1248	NA	1.9	U	2.0	U	13.1		14.0		75.8		6.2		13.9		2.0	U	102	J	81.7		88.1	
Aroclor 1254	NA	1.9		5.5		24.5		24.8		135		9.3		21.0		1.3		131	J	134		165	
Aroclor 1260	NA	0.7	J	2.4	J	7.9	J	12.7	J	27.6		2.8	J	7.9		1.5		35.1	J	53.7	J	44.1	
Aroclor 1262	NA	1.9	U	2.0	U	2.0	UJ	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Aroclor 1268	NA	1.9	U	2.0	U	2.0	UJ	2.0	U	2.0	U	1.9	U	2.0	U	2.0	U	10.0	UJ	10.3	U	9.8	U
Total PCBs[3]	960	2.6	J	7.9	J	45.5	J	51.5	J	238		18.3	J	42.8		2.8		268.1	J	269	J	297	
Total PCBs (mg/kg-OC)	65	nc		nc		nc		nc		nc		nc		2.9		nc		18.2	J	24.9	J	nc	

TABLE 6I

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	8				8				8				8							
	DMMU	9B				9B				9C				9C							
	Sample Location	SD-CONF100				SD-CONF2100 (field duplicate of SD-CONF100)				SD-CONF095				SD-CONF101		SD-CONF101R2					
	Sample Date	10/30/2018				10/30/2018				10/29/2018				10/29/2018		12/3/2018					
	Sample ID	SD-CONF100-A		SD-CONF100-B		SD-CONF2100-A		SD-CONF2100-B		SD-CONF095-A		SD-CONF095-B		SD-CONF101-A		SD-CONF101R2-B		SD-CONF101R2-C		SD-CONF101R2-D		SD-CONF101R2-E	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																							
TOC (percent)	NA	0.55	J	0.38		0.55		0.60		1.00	J	1.04		0.96		na		0.74	J	na		na	
Metals (mg/kg)																							
Arsenic	93	3.06	J	2.61		3.51		2.15		25.5	J	41.9		135		na		17.5		na		na	
Copper	390	21.7	J	19.3		124		17.2		287		669		639		na		58.1		na		na	
Lead	530	3.34		2.39		3.05		2.03		197	J	896		266		na		109		na		na	
Mercury	0.59	0.0654	J	0.0301		0.0298	J	0.0227	J	0.396	J	1.38		2.39		1.59		0.171	J	0.0567		0.0288	
PCBs (µg/kg)																							
Aroclor 1016	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Aroclor 1221	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Aroclor 1232	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Aroclor 1242	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Aroclor 1248	NA	2.0	U	2.0	U	2.0	U	2.0	U	77.8	J	387		833		na		133	J	na		na	
Aroclor 1254	NA	1.8	J	3.5		1.3	J	2.0	U	128	J	665		752		na		205	D	na		na	
Aroclor 1260	NA	0.5	J	1.8	J	2.0	U	2.0	U	56.6	J	314		133		na		53.6	D	na		na	
Aroclor 1262	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Aroclor 1268	NA	2.0	U	2.0	U	2.0	U	2.0	U	10.0	UJ	49.9	U	49.7	U	na		7.9	U	na		na	
Total PCBs[3]	960	2.3	J	5.3	J	1.3	J	2.0	U	262	J	1366		1718		na		392	J	na		na	
Total PCBs (mg/kg-OC)	65	0.42	J	nc		0.24		0.33		26.2	J	131		179		na		53	J	na		na	

TABLE 6I

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	8				8				8		8				8			
	DMMU	10A				10A				10B		10C				10C			
	Sample Location	SD-CONF102				SD-CONF103				SD-CONF104		SD-CONF105				SD-CONF106			
	Sample Date	11/7/2018				11/7/2018				10/31/2018		10/30/2018				10/29/2018			
	Sample ID	SD-CONF102-A		SD-CONF102-B		SD-CONF103-A		SD-CONF103-B		SD-CONF104-A		SD-CONF105-A		SD-CONF105-B		SD-CONF106-A		SD-CONF106-B	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		0-0.5		0-0.5		0.5-1		0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																			
TOC (percent)	NA	0.40		0.45		0.18		0.41		0.32		0.40	J	0.51		0.25		0.21	J
Metals (mg/kg)																			
Arsenic	93	3.17		3.24		12.5		16.4		13.1	J	11.6	J	2.62		49.3		2.48	J
Copper	390	11.3	J	12.6		71.1	J	99.7		102	J	78.6	J	16.2		216		10.1	
Lead	530	2.25		1.56		26.4		41.2		33.8		33.7		2.28		135		4.27	J
Mercury	0.59	0.0186	J	0.0163		0.12	J	0.0742		0.516	J	0.158	J	0.0234		0.844		0.0249	J
PCBs (µg/kg)																			
Aroclor 1016	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Aroclor 1221	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Aroclor 1232	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Aroclor 1242	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Aroclor 1248	NA	2.0	U	1.9	U	19.9		54.4		43.8		56.6	J	1.9	U	447		6.9	
Aroclor 1254	NA	0.9	J	1.0	J	30.4		111	J	73.7		91.9	J	0.90	J	788		8.3	
Aroclor 1260	NA	2.0	U	1.9	U	9.0	J	28.0	J	15.4	J	18.7	J	1.9	U	181		2.8	
Aroclor 1262	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Aroclor 1268	NA	2.0	U	1.9	U	2.0	U	1.9	U	2.0	U	9.6	UJ	1.9	U	47.9	U	1.9	U
Total PCBs[3]	960	0.9	J	1.0	J	59.3	J	193	J	133	J	167	J	0.90	J	1416		18	
Total PCBs (mg/kg-OC)	65	nc		nc		nc		nc		nc		nc		0.18	J	nc		nc	

Note(s)
1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
   D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Indicates sample removed during re-dredging

Abbreviation(s)
- CSL = cleanup screening level
- DU = decision unit
- DMMU = dredged material management unit
- ft = feet
- mg/kg = milligram(s) per kilogram
- mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
- NA = not applicable
- na = not analyzed
- nc = not calculated; TOC <0.5% or >2%
- PCB = polychlorinated biphenyl
- Q = qualifier
- RAL = remedial action level
- TOC = total organic carbon
- µg/kg = microgram(s) per kilogram

TABLE 6J

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	9		9		9		9		9		9		9			
	DMMU	18F		18G		18G		19E		19E		19E		20E			
	Sample Location	SD-CONF107		SD-CONF108		SD-CONF109		SD-CONF110		SD-CONF2110 (field duplicate of SD-CONF110)		SD-CONF111		SD-CONF112			
	Sample Date	9/17/2019		9/19/2019		9/19/2019		9/19/2019		9/19/2019		9/19/2019		9/19/2019			
	Sample ID	SD-CONF107-A	SD-CONF107-B	SD-CONF108-A	SD-CONF108-B	SD-CONF109-A	SD-CONF109-B	SD-CONF110-A	SD-CONF110-B	SD-CONF2110-A	SD-CONF2110-B	SD-CONF111-A	SD-CONF111-B	SD-CONF112-A	SD-CONF112-B	SD-CONF112-C	SD-CONF112-D
	Depth Interval (ft)	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	0-0.5	0.5-1	1-1.5	1.5-2
Analyte	RAL (SQS)																
Conventionals																	
TOC (percent)	NA	1.69 J	1.53	1.27 J	0.93	0.93 J	0.91	1.45	0.94 J	1.55	1.09 J	0.67 J	0.98	1.67	1.40	1.08 J	na
Metals (mg/kg)																	
Arsenic	57	8.99	8.01	7.53 J	5.82	5.35 J	4.01	7.81	4.81 J	10.9	6.1 J	3.25	4.73	8.61	9.65	7.48 J	na
Copper	390	36.4	41.1	40.9 J	31.3	31.1 J	23.1	38.2	27.3	55.9	30.1	17.7	12.9	55.8	76.4	42.4 J	na
Lead	530	8.31 J	7.94	19.8 J	10.5	10.4 J	3.64	11.4	8.54	38.5	9.21	2.60	1.53	50.1	47.1	17.3 J	na
Mercury	0.41	0.221 J	0.0916	0.398 J	0.224	0.207 J	0.0586	0.905	0.168 J	1.34	0.135 J	0.0364 J	0.0542	2.14	1.42	0.186 J	0.179
PCBs (µg/kg)																	
Aroclor 1016	NA	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	na
Aroclor 1221	NA	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	na
Aroclor 1232	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	na
Aroclor 1242	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 UJ	na
Aroclor 1248	NA	3.0	3.8	2.3	3.0	8.7	2.0 U	18.8	2.0 U	4.2	2.0 U	2.0 U	2.0 U	5.6	15.9	30.7 J	na
Aroclor 1254	NA	5.2	9.9	5.5 J	6.8	23.5	2.0 U	46.2	1.3 J	10.3	2.0 U	2.0 U	2.0 U	17.7	40.8	51.5 J	na
Aroclor 1260	NA	7.5 J	3.9	5.9	4.7	11.0	2.0 U	15.1	2.0 U	4.4	2.0 U	2.0 U	2.0 U	12.5	22.9	29.8 D	na
Aroclor 1262	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	na
Aroclor 1268	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U	na
Total PCBs[3]	180	15.7 J	17.6	13.7 J	14.5	43.2 J	2.0 U	80.1	1.3 J	18.9	2.0 U	2.0 U	2.0 U	35.8	79.6	112 J	nc
Total PCBs (mg/kg-OC)	12	0.9 J	1.2	1.1 J	1.6	4.6 J	0.2 U	5.5	0.1 J	1.2	0.2 U	0.3	0.2 U	2.1	5.7	10.4 J	nc

Note(s)

1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
   D = reported value if from a dilution.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)

DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
na = not analyzed
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6K

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

Analyte	DU	10			
	DMMU	19G			
	Sample Location	SD-CONF113			
	Sample Date	9/20/2019			
	Sample ID	SD-CONF113-A		SD-CONF113-B	
	Depth Interval (ft)	0-0.5		0.5-1	
	RAL (SQS)	Result	Q	Result	Q
Conventionals					
TOC (percent)	NA	0.63		0.45	J
Metals (mg/kg)					
Arsenic	57	3.40		3.67	
Copper	390	21.10		17.1	
Lead	530	7.50		7.99	
Mercury	0.41	0.411		0.112	J
PCBs (µg/kg)					
Aroclor 1016	NA	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U
Aroclor 1248	NA	8.9		2.3	
Aroclor 1254	NA	24.4		4.1	
Aroclor 1260	NA	8.2		6.2	
Aroclor 1262	NA	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U
Total PCBs[3]	180	41.5		12.6	
Total PCBs (mg/kg-OC)	12	6.6		nc	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

(hatched) Indicates sample removed during re-dredging

Abbreviation(s)

DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6L

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	11			
	DMMU	7A			
	Sample Location	SD-CONF114			
	Sample Date	10/23/2018			
	Sample ID	SD-CONF114-A		SD-CONF114-B	
	Depth Interval (ft)	0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q
Conventionals					
TOC (percent)	NA	2.17		1.46	J
Metals (mg/kg)					
Arsenic	93	110		12.5	
Copper	390	195		42.2	J
Lead	530	163		28.7	J
Mercury	0.59	0.535		0.173	
PCBs (µg/kg)					
Aroclor 1016	NA	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U
Aroclor 1248	NA	105		23.0	
Aroclor 1254	NA	172		35.9	
Aroclor 1260	NA	60.2		18.2	
Aroclor 1262	NA	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U
Total PCBs[3]	960	337		77.1	
Total PCBs (mg/kg-OC)	65	15.5		5.3	J

Note(s)
1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

(hatched) Indicates sample removed during re-dredging

Abbreviation(s)
CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6M

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	12			
	DMMU	6A			
	Sample Location	SD-CONF115			
	Sample Date	10/30/2018			
	Sample ID	SD-CONF115-A		SD-CONF115-B	
	Depth Interval (ft)	0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q
Conventionals					
TOC (percent)	NA	0.15	J	0.22	
Metals (mg/kg)					
Arsenic	93	31.5	J	3.14	
Copper	390	55	J	10.4	
Lead	530	57.8		2.55	
Mercury	0.59	0.0182	J	0.0579	
PCBs (µg/kg)					
Aroclor 1016	NA	1.9	U	2.0	U
Aroclor 1221	NA	1.9	U	2.0	U
Aroclor 1232	NA	1.9	U	2.0	U
Aroclor 1242	NA	1.9	U	2.0	U
Aroclor 1248	NA	7.1		1.1	J
Aroclor 1254	NA	11.7		1.2	J
Aroclor 1260	NA	3.2	J	0.5	J
Aroclor 1262	NA	1.9	U	2.0	U
Aroclor 1268	NA	1.9	U	2.0	U
Total PCBs[3]	960	22.0	J	2.8	J
Total PCBs (mg/kg OC)	65	nc		nc	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6N

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	13			
	DMMU	5A			
	Sample Location	SD-CONF116			
	Sample Date	10/23/2018			
	Sample ID	SD-CONF116-A		SD-CONF116-B	
	Depth Interval (ft)	0-0.5		0.5-1	
Analyte	RAL (CSL)	Result	Q	Result	Q
Conventionals					
TOC (percent)	NA	0.22	J	0.21	
Metals (mg/kg)					
Arsenic	93	14.2		5.9	
Copper	390	21.8	J	9.4	
Lead	530	17.7	J	7.9	
Mercury	0.59	0.0077	J	0.0285	U
PCBs (µg/kg)					
Aroclor 1016	NA	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U
Aroclor 1248	NA	2.0	U	2.0	U
Aroclor 1254	NA	1.9	J	1.2	J
Aroclor 1260	NA	1.5	J	1.1	J
Aroclor 1262	NA	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U
Total PCBs[3]	960	3.4	J	2.3	J
Total PCBs (mg/kg OC)	65	nc		nc	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6O

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

Analyte	DU	14									
	DMMU	4A									
	Sample Location	SD-CONF117				SD-CONF129					
	Sample Date	10/22/2018				10/23/2018					
	Sample ID	SD-CONF117-A		SD-CONF117-B		SD-CONF129-A		SD-CONF129-B		SD-CONF129-C	
	Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		1-1.5	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals											
TOC (percent)	NA	0.84		1.09	J	2.05	J	1.89		1.94	
Metals (mg/kg)											
Arsenic	93	214		84.4		54.6		62.1		63.6	
Copper	390	141		63.8	J	273	J	340		211	
Lead	530	346		124		136	J	243		142	
Mercury	0.59	0.197		0.0404		0.169		0.247		0.396	
PCBs (µg/kg)											
Aroclor 1016	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1221	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1232	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1242	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1248	NA	88.8		4.7		53.4	D	68.2		89.3	
Aroclor 1254	NA	164		7.6		90.5	D	123		129	
Aroclor 1260	NA	50.6		2.5		35.3	J	70.6		44.4	
Aroclor 1262	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Aroclor 1268	NA	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Total PCBs[3]	960	303		14.8		179	J	262		263	
Total PCBs (mg/kg OC)	65	36.1		1.4		8.7	J	13.9		13.5	

Note(s)
1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)
CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6P

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES [1, 2]

	DU	15							
	DMMU	3A							
	Sample Location	SD-CONF118							
	Sample Date	1/17/2019							
	Sample ID	SD-CONF118-A		SD-CONF118-B		SD-CONF118-C		SD-CONF118-D	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2	
Analyte	RAL (CSL)	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals									
TOC (percent)	NA	0.52		0.29		na		na	
Metals (mg/kg)									
Arsenic	93	102		94.0		110		130	
Copper	390	492		505		520		443	
Lead	530	181		113		na		na	
Mercury	0.59	0.111		0.0389		na		na	
PCBs (µg/kg)									
Aroclor 1016	NA	9.6	U	1.9	U	na		na	
Aroclor 1221	NA	9.6	U	1.9	U	na		na	
Aroclor 1232	NA	9.6	U	1.9	U	na		na	
Aroclor 1242	NA	9.6	U	1.9	U	na		na	
Aroclor 1248	NA	154		18.7		na		na	
Aroclor 1254	NA	105		30.2		na		na	
Aroclor 1260	NA	53.2		4.6		na		na	
Aroclor 1262	NA	9.6	U	1.9	U	na		na	
Aroclor 1268	NA	9.6	U	1.9	U	na		na	
Total PCBs[3]	960	312		53.5	J	na		na	
Total PCBs (mg/kg-OC)	65	60.0		nc		na		na	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

Abbreviation(s)

CSL = cleanup screening level
DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
na = not analyzed
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6Q

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

Analyte	DU	R-15									
	DMMU	R-3A									
	Sample Location	SD-CONF118R2									
	Sample Date	10/10/2019									
	Sample ID	SD-CONF118R2-A		SD-CONF11R2-B		SD-CONF118R2-C		SD-CONF118R2-D		SD-CONF118R2-E	
	Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
	RAL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals											
TOC (percent)	NA	0.04		na		na		na		na	
Metals (mg/kg)											
Arsenic	93	7.22		35.4		11.8		10.5		12.6	
Copper	390	25.3		141		42.2		109		112	
Lead	530	79.2	J	na		na		na		na	
Mercury	0.59	0.0207	UJ	na		na		na		na	
PCBs (µg/kg)											
Aroclor 1016	NA	2.0	U	na		na		na		na	
Aroclor 1221	NA	2.0	U	na		na		na		na	
Aroclor 1232	NA	2.0	U	na		na		na		na	
Aroclor 1242	NA	2.0	U	na		na		na		na	
Aroclor 1248	NA	3.9		na		na		na		na	
Aroclor 1254	NA	7.5		na		na		na		na	
Aroclor 1260	NA	2.5		na		na		na		na	
Aroclor 1262	NA	2.0	U	na		na		na		na	
Aroclor 1268	NA	2.0	U	na		na		na		na	
Total PCBs[3]	960	13.9		na		na		na		na	
Total PCBs (mg/kg-OC)	65	nc		na		na		na		nc	

Note(s)

1. Sample ID in colored font **SD-CONF001-A** indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = result is estimated.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)

DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
na = not analyzed
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PCB = polychlorinated biphenyl
Q = qualifier
RAL = remedial action level
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 6R

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	16								16							
	DMMU	1A								1A							
	Sample Location	SD-CONF119R2								SD-CONF120R2							
	Sample ID	SD-CONF119R2-A		SD-CONF119R2-N		SD-CONF119R2-O		SD-CONF119R2-COMP		SD-CONF120R2-A		SD-CONF120R2-F		SD-CONF120R2-G		SD-CONF120R2-COMP	
	Depth Interval (ft)	0-0.5		6.5-7		7-7.5		COMP		0-0.5		2.5-3		3-3.5		COMP	
	Sample Date	12/14/2018		12/14/2018				12/14/2018		12/20/2018		12/20/2018				12/20/2018	
Analyte	SQS	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals																	
TOC (percent)	NA	0.10	J	0.08		0.12		0.33		0.12	J	2.45		0.20		0.32	
Metals (mg/kg)																	
Arsenic	57	43.2	J	3.12		3.02		36.9		4.83	J	3.93		2.36		2.89	
Copper	390	228	J	8.16		9.12		149	J	16.5	J	21.0		8.58		16.1	
Lead	530	66.4	J	1.45		1.50		77.3		4.08	J	2.95		1.45		2.15	
Mercury	0.41	0.0266		0.00595	J	0.00981	J	0.0439		0.0323	UJ	0.0441		0.0274	J	0.0480	
PCBs (µg/kg)																	
Aroclor 1016	NA	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Aroclor 1221	NA	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Aroclor 1232	NA	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Aroclor 1242	NA	1.9	U	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Aroclor 1248	NA	12.5		2.0	U	2.0	U	23.0		4.3		1.9	U	1.9	U	1.9	U
Aroclor 1254	NA	22.7		2.0	U	2.0	U	22.6		2.6		1.9	U	1.9	U	1.9	U
Aroclor 1260	NA	5.7	J	2.0	U	2.0	U	8.3		0.8	J	1.9	U	1.9	U	1.9	U
Aroclor 1262	NA	1.9	UJ	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Aroclor 1268	NA	1.9	UJ	2.0	U	2.0	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
Total PCBs[3]	180	40.9	J	2.0	U	2.0	U	53.9		7.7	J	1.9	U	1.9	U	1.9	U
Total PCBs (mg/kg-OC)	12	nc		nc		nc		nc		nc		nc		nc		nc	
PAHs (µg/kg)																	
Acenaphthene	240	302	D	32.9		183		5360		376	J	267		471		431	
Benz[a]anthracene	1700	657	D	4.66	J	1.83	J	2720		512	J	14.4		293		31.2	
Benzo[a]pyrene	1500	390		1.86	J	4.89	U	1180		175	J	5.68		90.6		11.7	
Benzo(b)fluoranthene	—	470		2.99	J	4.89	U	1390		182	J	6.73		106		12.5	
Benzo[g,h,i]perylene	470	152	D	4.95	U	4.89	U	424		45	J	4.90	J	26.6		5.89	
Benzo(k)fluoranthene	—	218		1.34	J	4.89	U	610		102	J	3.40	J	57.2		6.91	
Total benzofluoranthenes	1800	910		5.76	J	9.78	U	2650		377	J	14.3		219		26.4	
Chrysene	1700	675	D	4.30	J	2.67	J	3090		577	J	16.9		376		39.5	
Dibenzo[a,h]anthracene	180	75.7	D	4.95	U	4.89	U	141		47.2	D	7.04		14.7		7.55	
Fluoranthene	2400	1960	D	16.8		9.17		11500		2100	J	70.3		1340		163	
Indeno[1,2,3-c,d]pyrene	510	168		1.36	J	4.89	U	468		52.9	D	4.40	J	28.8		5.96	
Phenanthrene	1500	1140	D	120		367		16100		1950	J	108		1830		278	
Pyrene	--	2010	D	21.3		93.9		9180		1400	J	50.1		920		104	
Total HPAH	14000	6998		56.0	J	107.6	J	31353		5286		188		3309		395	

TABLE 6R

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	16								16		16		16		16	
	DMMU	1A								1B		1B		2A		2A	
	Sample Location	SD-CONF2120R2 (field duplicate of SD-CONF120R2)								SD-CONF121		SD-CONF122R2		SD-CONF123R2		SD-CONF124R2	
	Sample ID	SD-CONF2120R2-A		SD-CONF2120R2-E		SD-CONF2120R2-F		SD-CONF2120R2-COMP		SD-CONF121-A		SD-CONF122R2-A		SD-CONF123R2-A		SD-CONF124R2-A	
	Depth Interval (ft)	0-0.5		2-2.5		2.5-3		COMP		0-0.5		0-0.5		0-0.5		0-0.5	
	Sample Date	12/20/2018		12/20/2018				12/20/2018		12/14/2018		12/17/2018		12/17/2018		12/14/2018	
Analyte	**SQS**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Conventionals																	
TOC (percent)	NA	0.38	J	0.84		1.57		0.43		19.0		1.18		0.21		1.19	
Metals (mg/kg)																	
Arsenic	57	11.9	J	5.30		5.68		3.05		96.6		5.43		93.5		11.7	
Copper	390	27.3	J	26.6		30.3		18.3		180		23.3		248		37.2	
Lead	530	8.07	J	3.76		4.33		3.00		162		12.5		140		12.5	
Mercury	0.41	0.0428	UJ	0.0815		0.107		0.0510		0.179		0.154		0.0292		0.0684	
PCBs (µg/kg)																	
Aroclor 1016	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1221	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1232	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1242	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1248	NA	2.0		2.0	U	2.0	U	1.6	J	76.2		9.5		8.9		1.9	U
Aroclor 1254	NA	1.4	J	2.0	U	2.0	U	2.0	U	109		10.4		12.0		12.4	
Aroclor 1260	NA	2.0	U	2.0	U	2.0	U	2.0	U	37.5		6.4		8.7		3.6	
Aroclor 1262	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Aroclor 1268	NA	2.0	U	2.0	U	2.0	U	2.0	U	9.9	U	2.0	U	2.0	U	1.9	U
Total PCBs[3]	180	3.4	J	2.0	U	2.0	U	1.6	J	223		26.3		29.6		16	
Total PCBs (mg/kg-OC)	12	nc		0.2	U	0.1	U	nc		nc		2.2		nc		1.3	
PAHs (µg/kg)																	
Acenaphthene	240	1060	J	666		324		263		8180		460		245		6390	
Benz[a]anthracene	1700	2.25	J	4.79		6.71		137		9550		725		350		11200	
Benzo[a]pyrene	1500	4.98	U	124		4.53	J	40.3		3090		313		203		4330	
Benzo(b)fluoranthene	—	4.98	U	3.44	J	4.86	J	47.4		3930		375		235		3740	
Benzo[g,h,i]perylene	470	4.98	U	3.88	J	4.54	J	11.0		840		102		97.3		1070	
Benzo(k)fluoranthene	—	0.77	J	1.44	J	2.23	J	24.2		2100		181		111		2530	
Total benzofluoranthenes	1800	9.96	U	3.49	J	9.53	J	94.9		7830		739		460		8600	
Chrysene	1700	1.49	J	2.75	J	6.86		181		10100		602		346		13000	
Dibenzo[a,h]anthracene	180	4.98	U	6.21		6.53		9.93		343		42.0		32.7		376	
Fluoranthene	2400	9.98	J	14.6		19.3		603		30800		2170		1420		12500	
Indeno[1,2,3-c,d]pyrene	510	4.98	U	1.09	J	3.17	J	11.4		1090		115		98.0		1380	
Phenanthrene	1500	292	J	23.3		22.6		836		14100		1180		893		13700	
Pyrene	--	6.84	J	13.6		18.9		400		20400		1720		1110		10300	
Total HPAH	14000	20.6		174.4		80.1		1489		84043		6528		4117		62756	

TABLE 6R

ANALYTICAL RESULTS FOR POSTDREDGE SEDIMENT SAMPLES[1, 2]

	DU	16		16		16		16							
	DMMU	2B		2B		2B		1A							
	Sample Location	SD-CONF125R2		SD-CONF126		SD-CONF2126 (field duplicate of SD-CONF126)		SD-CONF127R2							
	Sample ID	SD-CONF125R2-A		SD-CONF126-A		SD-CONF2126-A		SD-CONF127R2-A		SD-CONF127R2-D		SD-CONF127R2-E		SD-CONF127-COMP	
	Depth Interval (ft)	0-0.5		0-0.5		0-0.5		0-0.5		1.5-2		2-2.5		COMP	
	Sample Date	12/14/2018		11/30/2018		11/30/2018		12/14/2018		12/14/2018				12/14/2018	
Analyte	SQS	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals															
TOC (percent)	NA	28.1		2.58		2.5	J	0.07	J	0.12	J	1.44	J	0.08	J
Metals (mg/kg)															
Arsenic	57	24.5		12.7		8.94	J	2.58	J	1.79		5.64		2.34	J
Copper	390	62.7		66.1		46.6	J	10.7	J	8.37		18.9		6.12	J
Lead	530	61.9		53.9		40.6	J	1.10	J	2.07	J	5.26	J	1.37	J
Mercury	0.41	0.139		0.358		0.391		0.00593	J	0.0238	U	0.00621	J	0.0245	U
PCBs (µg/kg)															
Aroclor 1016	NA	2.7	U	2.0	U	1.9	H, U	2.0	U	2.0	U	1.9	U	2.0	U
Aroclor 1221	NA	2.7	U	2.0	U	1.9	H, U	2.0	U	2.0	U	1.9	U	2.0	U
Aroclor 1232	NA	2.7	U	2.0	U	1.9	H, U	2.0	U	2.0	U	1.9	U	2.0	U
Aroclor 1242	NA	2.7	U	2.0	U	1.9	H, U	2.0	U	2.0	U	1.9	U	2.0	U
Aroclor 1248	NA	52.0		64.8		63.3	H	2.0	U	2.0	U	1.9	U	2.0	U
Aroclor 1254	NA	73.8		83.2		67.4	H	2.0	U	1.3	J	2.0		1.5	J
Aroclor 1260	NA	25.8		46.5		39.7	J	2.0	UJ	2.0	U	0.8	J	2.0	U
Aroclor 1262	NA	2.7	U	2.0	U	1.9	UJ	2.0	UJ	2.0	U	1.9	UJ	2.0	U
Aroclor 1268	NA	2.7	U	2.0	U	1.9	UJ	2.0	UJ	2.0	U	1.9	UJ	2.0	U
Total PCBs[3]	180	152		195		170	J	2.0	U	1.3	J	2.8	J	1.5	J
Total PCBs (mg/kg-OC)	12	nc		nc		nc		nc		nc		0.2	J	nc	
PAHs (µg/kg)															
Acenaphthene	240	6450		28900		12000	J	6.99	U	15.1		134		7.66	U
Benz[a]anthracene	1700	3960		7410		3990	H, D	13.5		61.2		266		28.5	
Benzo[a]pyrene	1500	1560		3220		1730	H, D	8.25		33.3		118		16.9	
Benzo(b)fluoranthene	—	1910		3910		2060	J	9.85		39.3		140		20.3	
Benzo[g,h,i]perylene	470	448		1090		647	H, D	3.85	J	12.5		43.9		7.28	
Benzo(k)fluoranthene	—	961		1910		952	H, D	4.33	J	19.0		73.4		9.84	
Total benzofluoranthenes	1800	3820		7680		4160	J	19.5		77.8		286		40.7	
Chrysene	1700	3770		6960		3670	H, D	12.8		65.0		270		31.0	
Dibenzo[a,h]anthracene	180	183		288		840	H, D	6.44		9.18	U	20.8		7.96	
Fluoranthene	2400	15300		42000		24000	J	27.9		177		907		67.5	
Indeno[1,2,3-c,d]pyrene	510	533		1190		668	H, D	3.10	J	12.8		50.4		7.79	
Phenanthrene	1500	10100		90600		36400	J	14.4	J	39.6		264		20.5	J
Pyrene	--	9930		29900		18200	J	17.4		66.4		438		32.4	
Total HPAH	14000	39504		99738		57905		113	J	506		2400		240	

Note(s)

1. Sample ID in colored font SD-CONF001-A indicates that sample was validated.
2. Laboratory qualifiers (Q) are defined as follows:
   - U = analyte not detected at reporting limit presented.
   - J = result is estimated.
   - D = reported value if from a dilution.
   - H = hold time violation: hold time was exceeded.
3. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

Abbreviation(s)

DU = decision unit
DMMU = dredged material management unit
ft = feet
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
Q = qualifier
SQS = Washington State Sediment Quality Standards
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 7

EXAMPLE OF DATA SELECTION FOR GEOSPATIAL INTERPOLATION [1]

DU	4													
DMMU	18A				18B									
Sample Location	SD-CONF018				SD-CONF020									
Sample Date	1/8/2019				1/16/2019									
Sample ID	SD-CONF018-A		SD-CONF018-B		SD-CONF020-A		SD-CONF020-B		SD-CONF020-C		SD-CONF020-D		SD-CONF020-E	
Depth Interval (ft)	0-0.5		0.5-1		0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals														
TOC (percent)	0.78		0.50		1.33		0.75		0.86		2.51		0.89	
Metals (mg/kg)														
Arsenic	7.76		2.49		158		38.0		4.89		4.31		2.51	
Copper	33.4		11.3		1260		415		52.0		27.0		15.0	
Lead	11.6		1.57		690		114		14.7		22.1		3.13	
Mercury	0.0622		0.0237	J	7.18		3.81		0.896		0.456		0.117	
PCBs (µg/kg)														
Aroclor 1016	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1221	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1232	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1242	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1248	11.3		2.0	U	1280		34.3	U	9.4		7.5		1.0	J
Aroclor 1254	24.6		2.0	U	2920		1310		19.0		14.6		1.7	
Aroclor 1260	5.2		2.0	U	601		97.3		8.2		4.5		1.1	J
Aroclor 1262	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Aroclor 1268	1.9	U	2.0	U	95.2	U	34.3	U	1.7	U	1.9	U	1.6	U
Total PCBs[2]	41.1		2.0	U	4801		1407		36.6		26.6		3.8	J
Total PCBs (mg/kg-OC)	5.3		0.40	U	361		188		4.3		nc		0.43	

DU	4													
DMMU	17C													
Sample Location	SD-CONF045													
Sample Date	1/15/2019													
Sample ID	SD-CONF045-A		SD-CONF045-B		SD-CONF045-C		SD-CONF045-D		SD-CONF045-E		SD-CONF045-F		SD-CONF045-G	
Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5		2.5-3		3-3.5	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals														
TOC (percent)	1.19		1.00		na		na		na		1.03		na	
Metals (mg/kg)														
Arsenic	60.5		120		na		na		na		4.53		na	
Copper	1070		2320		42.1		30.4		883		24.4		na	
Lead	618		428		na		na		na		9.27		na	
Mercury	11.1		7.76		11.7		0.285		10.3		0.117		0.174	
PCBs (µg/kg)														
Aroclor 1016	85.6	U	8.6	U	na		na		na		2.0	U	na	
Aroclor 1221	85.6	U	8.6	U	na		na		na		2.0	U	na	
Aroclor 1232	85.6	U	8.6	U	na		na		na		2.0	U	na	
Aroclor 1242	85.6	U	8.6	U	na		na		na		2.0	U	na	
Aroclor 1248	85.6	U	114		na		na		na		2.0	U	na	
Aroclor 1254	745		183		na		na		na		3.4		na	
Aroclor 1260	190		51.5		na		na		na		4.7		na	
Aroclor 1262	85.6	U	8.6	U	na		na		na		2.0	U	na	
Aroclor 1268	85.6	U	8.6	U	na		na		na		2.0	U	na	
Total PCBs[2]	935		349		na		na		na		8.1		na	
Total PCBs (mg/kg-OC)	78.6		34.9		na		na		na		0.79		na	

DU	5									
DMMU	16A									
Sample Location	SD-CONF032									
Sample Date	10/28/2019									
Sample ID	SD-CONF032-A		SD-CONF032-B		SD-CONF032-C		SD-CONF032-D		SD-CONF032-E	
Depth Interval (ft)	0-0.5		0.5-1		1-1.5		1.5-2		2-2.5	
Analyte	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Conventionals										
TOC (percent)	1.50									
Metals (mg/kg)										
Arsenic	20.7									
Copper	138									
Lead	84.4									
Mercury	0.824		2.44		0.666		0.556		0.148	
PCBs (µg/kg)										
Aroclor 1016	9.8	U								
Aroclor 1221	9.8	U								
Aroclor 1232	9.8	U								
Aroclor 1242	9.8	U								
Aroclor 1248	85.4									
Aroclor 1254	174									
Aroclor 1260	99.7									
Aroclor 1262	9.8	U								
Aroclor 1268	9.8	U								
Total PCBs[2]	359									
Total PCBs (mg/kg-OC)	23.9									

This table shows examples of how the data were selected to create the dataset that was used in the geospatial interpolation. In general, the deepest sample that was analyzed for an analyte was selected regardless if the sample was removed or not. At some locations, analyte concentrations were estimated from shallower sample intervals (not all analytes were analyzed in each sample interval).

Note(s)

1. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
2. Total PCBs calculated by summing detections or, if all not detected, using the highest non-detected value.

[hatched box] Indicates sample removed during re-dredging

[red box] Indicates analyte selected for geospatial interpolation

Abbreviation(s)

DU = decision unit
DMMU = dredged material management unit
ft = feet
mg/kg = milligram(s) per kilogram
mg/kg-OC = milligram(s) per kilogram, organic-carbon-normalized value
NA = not applicable
nc = not calculated; TOC <0.5% or >2%
na = not analyzed
PCB = polychlorinated biphenyl
Q = qualifier
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 8

RAIN BUCKET MEASUREMENTS IN RESIDUAL MANAGEMENT LAYER AREAS

RML Area Designation		Rain Gauge Bucket Designation		Final Measurement (Inches)	Date of Final Measurement	First Measurement Thickness (Inches)	First Measurement Date	Second Measurement Thickness (Inches)	Second Measurement Date	Third Measurement Thickness (Inches)	Third Measurement Date	Inspection & Testing Report(s) Referenced In
DMMU	4A	RB-	1	6.25	12/27/18	2.5	12/27/2018	3.75	12/27/2018			018
DMMU	4A	RB-	2	7.00	12/27/18	7	12/27/2018					018
DMMU	5A	RB-	1	4.50	01/07/19	4.5	1/7/2019					025
DMMU	5A	RB-	2	5.50	01/07/19	5.5	1/7/2019					025
DMMU	6A	RB-	2	4.75	01/11/19	4.75	1/11/2019					031
DMMU	6A	RB-	1	5.75	01/12/19	0.25	1/12/2019	0.5	1/12/2019	5	1/12/2019	032
DMMU	7A	RB-	2	7.50	01/08/19	7.5	1/8/2019					026
DMMU	7A	RB-	1	5.50	01/09/19	5.5	1/9/2019					027
DMMU	8A	RB-	1	6.50	01/18/19	6.5	1/18/2019					039
DMMU	8A	RB-	2	6.25	01/18/19	6.25	1/18/2019					039
DMMU	8B	RB-	1	7.00	01/15/19	7	1/15/2019					034
DMMU	8B	RB-	2	5.25	01/18/19	5.25	1/18/2019					039
DMMU	9B	RB-	1	5.25	01/19/19	5 1/4	1/19/2019					040
DMMU	9B	RB-	2	4.50	01/19/19	4 1/2	1/19/2019					040
DMMU	9C	RB-	1	7.00	01/19/19	7	1/19/2019					040
DMMU	9C	RB-	2	5.75	01/19/19	5.75	1/19/2019					040
DMMU	9D	RB-	1	7.25	01/16/19	7.25	1/16/2019					037
DMMU	9D	RB-	2	4.75	01/16/19	4.75	1/16/2019					037
DMMU	10A	RB-	1	7.25	12/09/19	0	12/9/2019	1.25	12/9/2019	6	12/9/2019	065
DMMU	10B	RB-	1	5.00	12/09/19	5	12/9/2019					065
DMMU	10B	RB-	2	8.25	12/09/19	1.25	12/9/2019	7	12/9/2019			065
DMMU	10C	RB-	2	8.25	12/09/19	8.25	12/9/2019					065
DMMU	10C	RB-	1	7.00	12/10/19	7	12/10/2019					066
DMMU	11A	RB-	2	4.75	12/10/19	4.75	12/10/2019					066
DMMU	11B	RB-	1	9.25	12/10/19	0	12/10/2019	2.75	12/10/2019	6.5	12/10/2019	066
DMMU	11B	RB-	2	6.50	12/10/19	2	12/10/2019	4.5	12/10/2019			066
DMMU	11C	RB-	1	8.00	12/10/19	8	12/10/2019					066
DMMU	11C	RB-	2	4.75	12/10/19	4.75	12/10/2019					066
DMMU	12A	RB-	1	4.50	12/11/19	4.5	12/11/2019					067
DMMU	12B	RB-	1	4.00	12/12/19	4	12/12/2019					068
DMMU	12B	RB-	2	7.25	12/12/19	7.25	12/12/2019					068
DMMU	12C	RB-	1	6.00	12/12/19	3.5	12/12/2019	2.5	12/12/2019			068
DMMU	12C	RB-	2	6.25	12/12/19	2	12/12/2019	4.25	12/12/2019			068
DMMU	12D	RB-	2	10.00	01/08/20	10	1/8/2019					084
DMMU	12D	RB-	1	4.75	01/08/20	4.75	1/8/2020					084
DMMU	13A	RB-	1	5.00	12/16/19	5	12/16/2019					069
DMMU	13A	RB-	2	8.00	12/16/19	8	12/16/2019					069

TABLE 8

RAIN BUCKET MEASUREMENTS IN RESIDUAL MANAGEMENT LAYER AREAS

RML Area Designation		Rain Gauge Bucket Designation		Final Measurement (Inches)	Date of Final Measurement	First Measurement		Second Measurement		Third Measurement		Inspection & Testing Report(s) Referenced In
						Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	
DMMU	13B	RB-	1	5.50	12/16/19	5.5	12/16/2019					069
DMMU	13B	RB-	2	6.00	12/16/19	6	12/16/2019					069
DMMU	13C	RB-	1	4.50	12/16/19	3	12/16/2019	1.5	12/16/2019			069
DMMU	13C	RB-	2	6.25	12/16/19	6.25	12/16/2019					069
DMMU	13D	RB-	2	5.00	12/16/19	3.5	12/16/2019	1.5	12/16/2019			069
DMMU	13D	RB-	1	6.50	12/17/19	6.5	12/17/2019					070
DMMU	13E	RB-	2	4.75	12/17/19	4.75	12/17/2019					070
DMMU	13E	RB-	1	6.00	01/08/20	1	1/8/2020	5	1/8/2020			084
DMMU	14D	RB-	1	4.25	12/17/19	4.25	12/17/2019					070
DMMU	14D	RB-	2	4.00	12/17/19	4	12/17/2019					070
DMMU	14E	RB-	1	4.75	12/17/19	4.75	12/17/2019					070
DMMU	14E	RB-	2	4.25	12/17/19	4.25	12/17/2019					070
DMMU	14F	RB-	1	5.25	12/17/19	0	12/17/2019	5.25	12/17/2019			070
DMMU	14F	RB-	2	7.25	12/17/19	7.25	12/17/2019					070
DMMU	14G	RB-	1	6.50	12/18/19	6.5	12/18/2019					071
DMMU	14G	RB-	2	8.50	12/18/19	8.5	12/18/2019					071
DMMU	15D	RB-	1	7.00	12/18/19	7	12/18/2019					071
DMMU	15D	RB-	2	6.50	12/18/19	0.5	12/18/2019	1.25	12/18/2019	4.75	12/18/2019	071
DMMU	15E	RB-	1	8.50	12/18/19	0	12/18/2019	3	12/18/2019	5.5	12/18/2019	071
DMMU	15E	RB-	2	7.75	12/18/19	7.75	12/18/2019					071
DMMU	15F	RB-	2	4.75	12/18/19	4.75	12/18/2019					071
DMMU	15F	RB-	1	5.00	12/19/19	5	12/19/2019					072
DMMU	15G	RB-	2	5.00	12/19/19	3.25	12/19/2019	1.75	12/19/2019			072
DMMU	15G	RB-	1	4.50	01/07/20	1	1/7/2020	1	1/7/2020	2.5	1/7/2020	082
DMMU	16A	RB-	1	6.75	01/20/20	3.5	1/20/2020	3.25	1/20/2010			094
DMMU	16A	RB-	2	4.50	01/21/20	0.75	1/21/2020	0.25	1/21/2020	3.5	1/21/2020	096
R-DMMU	16B-A	RB-	1	9.00	03/25/20	9	3/25/2020					111
DMMU	16B	RB-	1	5.75	12/23/19	2.5	12/23/2019	0.75	12/23/2019	2.5	12/23/2019	074
DMMU	16B	RB-	2	4.25	01/21/20	4.25	1/21/2020					096
R-DMMU	16AB-B	RB-	1	6.75	03/25/20	6.75	3/25/2020					111
DMMU	16C	RB-	2	6.50	12/20/19	3.25	12/20/2019	3.25	12/20/2019			073
DMMU	16C	RB-	1	5.75	12/26/19	3	12/26/2019	0.5	12/26/2019	2.25	12/26/2019	075
R-DMMU	16A-C	RB-	1	4.75	03/25/20	4.75	3/25/2020					111
DMMU	16D	RB-	1	4.50	12/20/19	4.5	12/20/2019					073
DMMU	16D	RB-	2	7.50	12/20/19	7.5	12/20/2019					073
DMMU	16E	RB-	1	6.50	12/23/19	3.5	12/23/2019	3	12/23/2019			074
DMMU	16E	RB-	2	10.50	12/23/19	10.5	12/23/2019					074

TABLE 8

RAIN BUCKET MEASUREMENTS IN RESIDUAL MANAGEMENT LAYER AREAS

RML Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	First Measurement Thickness (Inches)	First Measurement Date	Second Measurement Thickness (Inches)	Second Measurement Date	Third Measurement Thickness (Inches)	Third Measurement Date	Inspection & Testing Report(s) Referenced In
DMMU 16F	RB- 2	5.25	12/23/19	0	12/23/2019	5.25	12/23/2019			074
DMMU 16F	RB- 1	5.00	01/07/20	5	1/7/2020					082
DMMU 17A	RB- 1	5.50	01/22/20	5.5	1/22/2020					097
DMMU 17A	RB- 2	10.75	01/22/20	10.75	1/22/2020					097
DMMU 17B	RB- 1	5.75	01/20/20	5.75	1/20/2020					094
DMMU 17B	RB- 2	5.00	01/21/20	5	1/21/2020					096
DMMU 17C	RB- 2	6.00	12/23/20	6	12/23/2019					074
DMMU 17C	RB- 1	4.00	01/21/20	4	1/21/2020					096
DMMU 17D	RB- 1	6.00	12/26/19	6	12/26/2019					075
DMMU 17D	RB- 2	5.75	12/26/19	5.75	12/26/2019					075
DMMU 17E	RB- 1	5.50	12/26/19	5.5	12/26/2019					075
DMMU 17E	RB- 2	7.00	12/26/19	0	12/26/2019	7	12/26/2019			075
DMMU 17F	RB- 1	5.75	12/26/19	5.75	12/26/2019					075
DMMU 17F	RB- 2	6.50	12/26/19	6.5	12/26/2019					075
DMMU 17G	RB- 1	5.50	12/26/19	5.5	12/26/2019					075
DMMU 17G	RB- 2	5.50	12/26/19	1	12/26/2019	4.5	12/26/2019			075
DMMU 17H	RB- 1	4.50	12/27/19	4.5	12/27/2019					076
DMMU 17H	RB- 2	11.00	12/27/19	11	12/27/2019					076
DMMU 18A	RB- 1	5.75	01/18/20	5.75	1/18/2020					093
DMMU 18A	RB- 2	7.50	01/18/20	7.5	1/18/2020					093
DMMU 18B	RB- 2	4.00	12/27/19	2	12/27/2019	2	12/27/2019			076
DMMU 18B	RB- 1	5.75	01/18/20	5.75	1/18/2020					093
DMMU 18C	RB- 1	8.50	12/30/19	8.5	12/30/2019					077
DMMU 18C	RB- 2	8.00	12/30/19	8	12/30/2019					077
DMMU 18D	RB- 1	4.75	12/30/19	3.25	12/30/2019	1.5	12/30/2019			077
DMMU 18D	RB- 2	8.50	12/30/19	8.5	12/30/2019					077
DMMU 18E	RB- 1	10.00	01/30/20	10	1/30/2020					103
DMMU 18E	RB- 2	8.75	01/30/20	8.75	1/30/2020					103
DMMU 18F	RB- 1	4.50	01/14/20	4.5	1/14/2020					089
DMMU 18F	RB- 2	6.00	01/14/20	2.5	1/14/2020	3.5	1/14/2020			089
DMMU 18G	RB- 1	7.25	01/13/20	7.25	1/13/2020					088
DMMU 18G	RB- 2	6.25	01/14/20	0	1/14/2020	6.25	1/14/2020			089
DMMU 18I	RB- 1	6.00	01/13/20	6	1/13/2020					088
DMMU 18I	RB- 2	6.50	01/13/20	6.5	1/13/2020					088
DMMU 19A	RB- 1	5.00	01/18/20	5	1/18/2020					093
DMMU 19A	RB- 2	5.00	01/18/20	5	1/18/2020					093
DMMU 19B	RB- 2	8.00	12/30/19	8	12/30/2019					077

TABLE 8

RAIN BUCKET MEASUREMENTS IN RESIDUAL MANAGEMENT LAYER AREAS

RML Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	First Measurement		Second Measurement		Third Measurement		Inspection & Testing Report(s) Referenced In
				Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	
DMMU 19B	RB- 1	5.25	01/18/20	5.25	1/18/2020					093
DMMU 19C	RB- 1	4.50	12/31/19	4.5	12/31/2019					078
DMMU 19C	RB- 2	5.00	12/31/19	2	12/31/2019	3	12/31/2019			078
DMMU 19D	RB- 1	10.50	12/31/19	10.5	12/31/2019					078
DMMU 19D	RB- 2	5.25	01/02/20	0.75	1/2/2020	0	1/2/2020	4.5	1/2/2020	079
DMMU 19E	RB- 1	6.75	01/14/20	6.75	1/14/2020					089
DMMU 19E	RB- 2	5.00	01/14/20	5	1/14/2020					089
DMMU 19G	RB- 1	5.25	01/14/20	5.25	1/14/2020					089
DMMU 19G	RB- 2	6.00	01/14/20	3.5	1/14/2020	0	1/14/2020	2.5	1/14/2020	089
DMMU 20A	RB- 1	4.25	01/02/20	0	1/2/2020	4.25	1/2/2020			079
DMMU 20A	RB- 2	8.00	01/02/20	1	1/2/2020	1	1/2/2020	6	1/2/2020	079
DMMU 20B	RB- 1	5.00	01/02/20	5	1/2/2020					079
DMMU 20B	RB- 2	7.75	01/02/20	7.75	1/2/2020					079
DMMU 20C	RB- 2	5.50	01/02/20	5.5	1/2/2020					079
DMMU 20C	RB- 1	7.75	01/03/20	7.75	1/3/2020					080
DMMU 20D	RB- 1	6.00	01/03/20	6	1/3/2020					080
DMMU 20D	RB- 2	7.50	01/03/20	7.5	1/3/2020					080
DMMU 20E	RB- 1	4.00	01/16/20	4	1/16/2020					091
DMMU 20E	RB- 2	7.50	01/16/20	7.5	1/16/2020					091
DMMU 20F	RB- 1	5.25	01/15/20	0	1/15/2020	0	1/15/2020	5.25	1/15/2020	090
DMMU 20F	RB- 2	4.75	01/15/20	4.75	1/15/2020					090
DMMU 21A	RB- 1	4.75	01/06/20	1.5	1/6/2020	3.25	1/6/2020			081
DMMU 21A	RB- 2	5.50	01/06/20	5.5	1/6/2020					081
DMMU 21B	RB- 1	5.00	01/06/20	1	1/6/2020	4	1/6/2020			081
DMMU 21B	RB- 2	4.25	01/06/20	4.25	1/6/2020					081
DMMU 21C	RB- 1	6.00	01/06/20	6	1/6/2020					081
DMMU 21C	RB- 2	8.25	01/06/20	8.25	1/6/2020					081

Average Layer Thickness (inches)	6.15
Maximum Final Thickness (inches)	11
Minimum Final Thickness (inches)	4
Number of Rain Gauge Buckets Placed	138

Abbreviation(s)
DMMU = dredged material management unit
RML = residual management layer

TABLE 9

DECISION UNIT CONFIRMATION CORE SAMPLE PLANNED AND ACTUAL SAMPLING LOCATIONS IN SHIPWAY

	Planned			Actual		
		Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet) [2]			Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet)	
Decision Unit	Location ID [1]	Easting	Northing	Location ID	Easting	Northing
DU 16	SD-CONF119	1262208	216914	SD-CONF119	1262188	216985
DU 16	SD-CONF120	1262208	217030	SD-CONF120	1262210	217031
DU 16	SD-CONF121	1262208	217146	SD-CONF121R2	1262206	217148
DU 16	SD-CONF122	1262208	217262	SD-CONF122R2	1262209	217264
DU 16	SD-CONF123	1262247	216914	SD-CONF123R2	1262246	216969
DU 16	SD-CONF124	1262247	217030	SD-CONF124R2	1262248	217030
DU 16	SD-CONF125	1262247	217146	SD-CONF125R2	1262249	217146
DU 16	SD-CONF126	1262247	217262	SD-CONF126	1262243	217263
DU 16	SD-CONF127	1262190	217068	SD-CONF127	1262188	217084
DU 16	SD-CONF2120	1262208	217030	SD-CONF2120R2	1262210	217031
DU 16	SD-CONF2126	1262247	217262	SD-CONF2126	1262243	217260

Note(s)

1. Field-duplicate sample collected at selected locations. Duplicate sample ID identified by a 200 series location ID (e.g., SD-CONF226 for duplicate core collected at location SD-CONF026).
2. Proposed sample locations were approximate and may have been adjusted based on bathymetry to avoid areas with steeper slopes or debris.

Abbreviation(s)

DU = decision unit
NAD = North American Datum
WA SPC = Washington State Plane Coordinates

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

				First Measurement		Second Measurement		Third Measurement		
ENR Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	Inspection & Testing Report(s) Referenced In
ENR- A24	RB- 152	7.00	01/09/20	1.5	1/8/2020	5.5	1/9/2020			085
ENR- A26	RB- 169	5.00	01/14/20	5	1/14/2020					089
ENR- A28	RB- 181	5.50	01/16/20	5.5	1/16/2020					091
ENR- A28	RB- 184	4.50	01/16/20	0	01/16/20	4.5	01/16/20			091
ENR- B16	RB- 107	7.50	01/16/19	7.5	1/16/2019					037
ENR- B17	RB- 114	4.75	01/17/19	4.75	1/17/2019					038
ENR- B19	RB- 120	8.00	01/22/19	8	1/22/2019					041
ENR- B21	RB- 123	5.75	01/23/19	5.75	1/23/2019					042
ENR- B21	RB- 125	6.00	01/23/19	6	1/23/2019					042
ENR- B22	RB- 131	6.25	01/24/19	6.25	1/24/2019					043
ENR- B22	RB- 132	4.25	01/24/19	4.25	1/24/2019					043
ENR- B23	RB- 139	4.25	01/25/19	4.25	1/25/2019					044
ENR- B24	RB- 145	7.00	01/13/20	1	1/9/2020	1	1/13/2020	5	1/13/2020	088
ENR- B24	RB- 146	6.00	01/09/20	1	1/9/2020	2.25	1/9/2020	2.75	1/9/2020	085
ENR- B24	RB- 151	4.75	01/09/20	4.75	1/9/2020					085
ENR- B25	RB- 159	4.50	01/13/20	4.5	1/13/2020					088
ENR- B25	RB- 160	5.25	01/13/20	0	1/13/2020	0	1/13/2020	5.25	1/13/2020	088
ENR- B26	RB- 168	6.50	01/14/20	6.5	1/14/2020					089
ENR- B27	RB- 174	6.00	01/15/20	6	1/15/2020					090
ENR- B28	RB- 180	6.25	01/16/20	6.25	1/16/2020					091
ENR- B28	RB- 182	8.25	01/16/20	3	1/16/2020	5.25	1/16/2020			091
ENR- B28	RB- 183	5.75	01/16/20	5.75	1/16/2020					091
ENR- C05	RB- 028A	10.00	11/02/18	10	11/2/2018					012
ENR- C06	RB- 029	8.00	11/02/18	8	11/2/2018					012
ENR- C08	RB- 041	7.75	11/03/18	7.75	11/3/2018					013
ENR- C09	RB- 048	5.25	01/14/19	5.25	1/14/2019					033
ENR- C09	RB- 055	10.75	11/03/18	10.75	11/3/2018					013
ENR- C10	RB- 062	7.25	01/14/19	7.25	1/14/2019					033
ENR- C11	RB- 068	4.75	01/14/19	4.75	1/14/2019					033
ENR- C12	RB- 075	6.00	11/12/19	6	11/12/2019					032
ENR- C13	RB- 081	10.75	01/12/19	10.75	1/12/2019					032
ENR- C13	RB- 088	6.50	01/12/19	6.5	1/12/2019					032
ENR- C14	RB- 095	6.75	01/14/19	6.75	1/14/2019					033
ENR- C15	RB- 102	5.50	01/16/19	5.5	1/16/2019					037
ENR- C16	RB- 106	8.75	01/16/19	8.75	1/16/2019					037
ENR- C17	RB- 110	5.75	01/17/19	5.75	1/17/2019					038

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

				First Measurement		Second Measurement		Third Measurement		
ENR Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	Inspection & Testing Report(s) Referenced In
ENR- C17	RB- 113	5.50	01/17/19	5.5	1/17/2019					038
ENR- C18	RB- 117	4.75	01/17/19	4.75	1/17/2019					038
ENR- C19	RB- 119	9.50	01/22/19	9.5	1/22/2019					041
ENR- C20	RB- 121	8.25	01/22/19	8.25	1/22/2019					041
ENR- C21	RB- 122	5.50	01/08/20	0.75	1/8/2020	4.75	1/8/2020			084
ENR- C21	RB- 124	8.25	01/23/19	8.25	1/23/2019					042
ENR- C22	RB- 130	4.50	01/07/20	4.5	1/7/2020					082
ENR- C23	RB- 138	6.25	01/25/19	6.25	1/25/2019					044
ENR- C24	RB- 144	4.50	12/27/19	4.5	12/27/2019					076
ENR- C27	RB- 173	7.00	01/16/20	3.5	1/16/2020	3.5	1/16/2020			091
ENR- C28	RB- 179	5.75	01/17/20	5.75	1/17/2020					092
ENR- D05	RB- 021	4.00	10/25/18	4	10/25/2018					005
ENR- D05	RB- 022	8.25	10/30/18	8.25	10/30/2018					009
ENR- D07	RB- 034	6.75	10/29/18	6.75	10/29/2018					008
ENR- D07	RB- 035	7.00	10/29/18	0.75	10/29/2018	2.5	10/29/2018	3.75	10/29/2018	008
ENR- D08	RB- 040	7.25	10/31/18	7.25	10/31/2018					010
ENR- D09	RB- 046	5.00	11/01/18	5	11/1/2018					011
ENR- D09	RB- 047	7.75	11/01/18	7.75	11/1/2018					011
ENR- D09	RB- 054	8.75	11/01/18	8.75	11/1/2018					011
ENR- D10	RB- 060	8.00	11/05/18	0	11/5/2018	3.75	11/5/2018	4.25	11/5/2018	014
ENR- D10	RB- 061	4.25	11/05/18	4.25	11/5/2018					014
ENR- D12	RB- 073	5.50	01/11/19	5.5	1/11/2019					031
ENR- D12	RB- 074	5.50	01/11/19	5.5	1/11/2019					031
ENR- D13	RB- 080	6.25	01/12/19	6.25	1/12/2019					032
ENR- D13	RB- 086	5.00	01/12/19	1.5	1/12/2019	3.5	1/12/2019			032
ENR- D13	RB- 087	10.50	01/12/19	10.5	1/12/2019					032
ENR- D14	RB- 094	5.25	01/12/19	5.25	1/12/2019					032
ENR- D15	RB- 100	7.25	01/15/19	3	1/15/2019	4.25	1/15/2019			034
ENR- D15	RB- 101	5.50	01/16/19	3.75	1/16/2019	1.75	1/16/2019			037
ENR- D16	RB- 105	5.50	01/16/19	5.5	1/16/2019					037
ENR- D17	RB- 108	6.00	01/17/19	6	1/17/2019					038
ENR- D17	RB- 109	6.75	01/17/19	6.75	1/17/2019					038
ENR- D17	RB- 112	6.25	01/17/19	6.25	1/17/2019					038
ENR- D18	RB- 115	6.00	01/17/19	6	1/17/2019					038
ENR- D18	RB- 116	5.25	01/17/19	5.25	1/17/2019					038
ENR- D23	RB- 137	5.00	01/07/20	5	1/7/2020					082

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

				First Measurement		Second Measurement		Third Measurement		
ENR Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	Inspection & Testing Report(s) Referenced In
ENR- D24	RB- 150	6.75	12/27/19	6.75	12/27/2019					076
ENR- D26	RB- 167	10.50	01/15/20	10.5	1/15/2020					090
ENR- D28	RB- 177	5.00	01/17/20	5	1/17/2020					092
ENR- D28	RB- 178	5.50	01/17/20	0	1/17/2020	3.5	1/17/2020	2	1/17/2020	092
ENR- E02	RB- 002	7.50	01/31/19	7.5	1/31/2019					049
ENR- E02	RB- 004	5.75	01/31/19	5.75	1/31/2019					049
ENR- E03	RB- 007	8.75	10/26/18	8.75	10/26/2018					006
ENR- E04	RB- 011	5.75	10/25/18	5.75	10/25/2018					005
ENR- E05	RB- 015	9.25	10/23/18	9.25	10/23/2018					003
ENR- E05	RB- 016	10.25	10/25/18	10.25	10/25/2018					005
ENR- E05	RB- 020	8.25	10/24/18	8.25	10/24/2018					004
ENR- E06	RB- 026	9.25	10/23/18	9.25	10/23/2018					003
ENR- E06	RB- 027	7.25	10/25/18	7.25	10/25/2018					005
ENR- E07	RB- 033	8.75	10/27/18	8.75	10/27/2018					007
ENR- E08	RB- 038	9.00	10/30/18	9	10/30/2018					009
ENR- E08	RB- 039	6.75	10/31/18	6.75	10/31/2018					010
ENR- E09	RB- 045	9.75	11/01/18	9.75	11/1/2018					011
ENR- E09	RB- 052	4.50	10/31/18	0	10/31/2018	4.5	10/31/2018			010
ENR- E09	RB- 053	9.00	11/01/18	9	11/1/2018					011
ENR- E10	RB- 059	5.50	01/05/19	5.5	1/5/2019					024
ENR- E11	RB- 066	4.75	01/07/19	4.75	1/7/2019					025
ENR- E11	RB- 067	5.00	11/06/18	5	11/6/2018					015
ENR- E12	RB- 072	5.50	01/11/19	5.5	1/11/2019					031
ENR- E13	RB- 078	6.50	01/09/19	3.25	1/9/2019	3.25	1/9/2019			027
ENR- E13	RB- 079	4.75	01/11/19	4.75	1/11/2019					031
ENR- E13	RB- 085	5.75	01/11/19	2.75	1/11/2019	3	1/11/2019			031
ENR- E14	RB- 092	6.00	01/11/19	6	1/11/2019					031
ENR- E14	RB- 093	6.00	01/11/19	6	1/11/2019					031
ENR- E15	RB- 099	5.25	01/18/19	5.25	1/18/2019					039
ENR- E17	RB- 111	10.75	12/10/19	10.75	12/10/2019					066
ENR- E25	RB- 157	4.00	12/30/19	4	12/30/2019					077
ENR- E25	RB- 158	7.00	12/30/19	3	12/30/2019	4	12/30/2019			077
ENR- E26	RB- 166	6.00	01/07/20	6	1/7/2020					082
ENR- E27	RB- 171	6.75	01/03/20	6.75	1/3/2020					080
ENR- E27	RB- 172	4.75	01/16/20	4.75	1/16/2020					091
ENR- E27	RB- 118	6.25	01/16/20	6.25	1/16/2020					091

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

ENR Area Designation		Rain Gauge Bucket Designation		Final Measurement (Inches)	Date of Final Measurement	First Measurement Thickness (Inches)	First Measurement Date	Second Measurement Thickness (Inches)	Second Measurement Date	Third Measurement Thickness (Inches)	Third Measurement Date	Inspection & Testing Report(s) Referenced In
ENR-	E28	RB-	176	5.75	01/06/20	5.75	1/6/2020					081
ENR-	F01	RB-	001	8.50	01/31/19	3.25	1/31/2019	5.25	1/31/2019			049
ENR-	F02	RB-	003	5.75	01/29/19	5.75	1/29/2019					048
ENR-	F03	RB-	006	6.25	01/29/19	6.25	1/29/2019					048
ENR-	F04	RB-	009	6.75	01/28/19	6.75	1/28/2019					047
ENR-	F04	RB-	010	9.75	10/24/18	2.5	10/24/2018	7.25	10/24/2018			004
ENR-	F05	RB-	014	6.25	10/24/18	3.5	10/23/2018	2.75	10/24/2018			003, 004
ENR-	F05	RB-	018	9.50	01/26/19	9.5	1/26/2019					046
ENR-	F05	RB-	019	4.50	10/22/18	4.5	10/22/2018					002
ENR-	F06	RB-	025	8.25	10/24/18	8.25	10/24/2018					004
ENR-	F07	RB-	031	5.50	12/27/18	5.5	12/27/2018					018
ENR-	F07	RB-	032	10.00	10/27/18	10	10/27/2018					007
ENR-	F08	RB-	037	6.00	12/29/18	6	12/29/2018					020
ENR-	F09	RB-	043	6.00	01/03/19	6	1/3/2019					022
ENR-	F09	RB-	044	4.50	01/03/19	4.5	1/3/2019					022
ENR-	F09	RB-	051	7.75	01/03/19	2.25	1/3/2019	0	1/3/2019	5.5	1/3/2019	022
ENR-	F10	RB-	057	8.50	01/04/19	8.5	1/4/2019					023
ENR-	F10	RB-	058	4.50	01/05/19	4.5	1/5/2019					024
ENR-	F11	RB-	065	6.25	01/05/19	6.25	1/5/2019					024
ENR-	F12	RB-	070	7.00	01/07/19	7	1/7/2019					025
ENR-	F12	RB-	071	6.00	01/08/19	6	1/8/2019					026
ENR-	F13	RB-	083	5.25	01/08/19	2	1/8/2019	3.25	1/8/2019			026
ENR-	F13	RB-	084	5.00	01/09/19	0.75	1/9/2019	4.25	1/9/2019			027
ENR-	F14	RB-	091	7.25	01/10/19	7.25	1/10/2019					029
ENR-	F15	RB-	098	5.25	01/18/19	5.25	1/18/2019					039
ENR-	F26	RB-	165	9.25	01/02/20	9.25	1/2/2020					079
ENR-	F28	RB-	175	4.00	01/06/20	4	1/6/2020					081
ENR-	G03	RB-	005	6.25	01/29/19	6.25	1/29/2019					048
ENR-	G04	RB-	008	5.00	01/26/19	5	1/26/2019					046
ENR-	G05	RB-	012	10.75	01/26/19	10.75	1/26/2019					046
ENR-	G05	RB-	013	6.75	01/28/19	1.75	1/28/2019	5	1/28/2019			047
ENR-	G05	RB-	017	7.00	01/26/19	7	1/26/2019					046
ENR-	G06	RB-	024	4.25	01/26/19	4.25	1/26/2019					046
ENR-	G07	RB-	030	9.25	12/27/18	9.25	12/27/2018					018
ENR-	G08	RB-	036	5.50	12/28/18	5.5	12/28/2018					019
ENR-	G09	RB-	042	4.75	01/02/19	1.5	1/2/2019	0	1/2/2019	3.25	1/2/2019	021

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

ENR Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	First Measurement Thickness (Inches)	First Measurement Date	Second Measurement Thickness (Inches)	Second Measurement Date	Third Measurement Thickness (Inches)	Third Measurement Date	Inspection & Testing Report(s) Referenced In
ENR- G09	RB- 049	5.25	01/02/19	5.25	1/2/2019					021
ENR- G09	RB- 050	4.00	01/02/19	1	1/2/2019	0	1/2/2018	3	1/2/2018	021
ENR- G10	RB- 056	6.50	01/04/19	6.5	1/4/2019					023
ENR- G12	RB- 069	6.25	01/07/19	6.25	1/7/2019					025
ENR- G13	RB- 076	5.25	01/08/19	5.25	1/8/2019					026
ENR- G13	RB- 077	7.75	01/08/19	7.75	1/8/2019					026
ENR- G13	RB- 082	13.25	01/08/19	13.25	1/8/2019					026
ENR- G14	RB- 089	4.00	01/09/19	4	1/9/2019					027
ENR- G14	RB- 090	9.50	01/10/19	9.5	1/10/2019					029
ENR- G15	RB- 097	4.75	12/11/19	4.75	12/11/2019					067
ENR- G16	RB- 103	10.50	12/11/19	10.5	12/11/2019					067
ENR- G16	RB- 104	3.50	12/11/19	0.25	12/11/2019	3.25	12/11/2019			067
ENR- H02	RB- 129	5.75	01/23/20	2.75	1/23/2020	3	1/23/2020			099
ENR- H04	RB- 063	8.50	01/20/20	8.5	1/20/2020					094
ENR- H05	RB- 156	4.75	01/18/20	4.75	1/18/2020					093
ENR- H06	RB- 164	6.25	01/18/20	6.25	1/18/2020					093
ENR- H06	RB- 170	5.00	01/18/20	1	1/18/2020	4	1/17/2020			093
ENR- I02	RB- 128	9.00	01/28/20	3.25	1/28/2020	5.75	1/28/2020			101
ENR- I02	RB- 136	7.00	01/23/20	7	1/23/2020					099
ENR- I03	RB- 128	10.75	01/22/20	10.75	1/22/2020					097
ENR- I03	RB- 143	4.25	01/22/20	4.25	1/22/2020					097
ENR- I04	RB- 149	4.50	01/20/20	4.5	1/20/2020					094
ENR- I05	RB- 155	5.75	01/18/20	5.75	1/18/2020					093
ENR- I06	RB- 064	5.50	01/17/20	0	1/17/2020	3.5	1/17/2020	2	1/17/2020	092
ENR- I06	RB- 163	7.00	01/17/20	7	1/17/2020					092
ENR- J02	RB- 134	4.50	01/22/20	3.5	1/22/2020	1	1/22/2020			097
ENR- J02	RB- 135	4.25	01/22/20	4.25	1/22/2020					097
ENR- J03	RB- 142	5.50	01/22/20	5.5	1/22/2020					097
ENR- J04	RB- 148	4.75	01/21/20	4.75	1/21/2020					096
ENR- J05	RB- 154	7.25	01/21/20	7.25	1/21/2020					096
ENR- J05	RB- 023	4.00	01/21/20	4	1/21/2020					096
ENR- J06	RB- 161	7.00	01/17/20	7	1/17/2020					092
ENR- J06	RB- 162	4.50	01/17/20	4.5	1/17/2020					092
ENR- K02	RB- 126	4.00	01/29/20	3.25	1/29/2020	0.75	1/29/2020			102
ENR- K02	RB- 127	8.50	01/28/20	8.5	1/28/2020					101
ENR- K02	RB- 133	3.50	01/22/20	3.5	1/22/2020					097

TABLE 10

RAIN BUCKET MEASUREMENTS IN ENHANCED NATURAL RECOVERY AREAS

ENR Area Designation	Rain Gauge Bucket Designation	Final Measurement (Inches)	Date of Final Measurement	First Measurement		Second Measurement		Third Measurement		Inspection & Testing Report(s) Referenced In
				Thickness (Inches)	Date	Thickness (Inches)	Date	Thickness (Inches)	Date	
ENR- K03	RB- 140	4.50	01/22/20	0	1/22/2020	4.5	1/22/2020			097
ENR- K03	RB- 141	5.50	01/22/20	5.5	1/22/2020					097
ENR- K04	RB- 147	4.00	01/21/20	4	1/21/2020					096
ENR- K05	RB- 153	4.50	01/21/20	4.5	1/21/2020					096
Average Layer Thickness (inches)		6.46								
Maximum Final Thickness (inches)		13.25								
Minimum Final Thickness (inches)		3.50								
Number of Rain Gauge Buckets Placed		184								

Abbreviation(s)
ENR = enhanced natural recovery
RB = rain bucket

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

															Chemical Compliance Results							
Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
8/13/2018	Mobilization	NA																				
8/14/2018	Pile removal	Shipway	Intensive	1	14:15	Flood	N2	Shallow	5.5	5.4	150 DOWN NS	N	N									
8/14/2018	Pile removal	Shipway	Intensive	2	15:40	Flood	S2	Shallow	5.5	5.2	150 DOWN NS	N	N									
8/15/2018	Pile removal	Shipway	Intensive	1	10:00	Ebb	N0	Shallow	8.5	4.8	150 DOWN NB	N	N									
8/15/2018	Pile removal	Shipway	Intensive	2	10:22	Ebb	N0	Shallow	5.6	5	150 DOWN NS	N	N									
8/16/2018	Pile removal/debris removal	Shipway/ Shoreline (above MLLW)	Routine (Visual monitoring)																			
8/17/2018	Submerged debris removal	Near DMMU 14B	Intensive	1	11:50	Ebb	E7	Shallow	7.5	4.9	150 DOWN NS	N	N									
8/20/2018	Pile removal/debris removal	Shipway/ Shoreline	Routine (Visual monitoring)																			
	Work Stoppage																					
9/10/2018	Pile removal/debris removal	Shipway/ Shoreline (above MLLW)	Routine (Visual monitoring)																			
9/11/2018	Pile removal	Shipway	Routine (Visual monitoring)																			
9/12/2018	Submerged debris removal	Dredge areas	Intensive	1	12:00	Ebb	S5	Deep	6.3	5.1	150 DOWN NS	N	N									
9/12/2018	Submerged debris removal	Dredge areas	Intensive	2	14:30	Flood	S4	Deep	5.2	4.7	150 DOWN MD	N	N									
9/13/2018	Pile removal/debris removal	Shipway/ Dredge Areas (submerged)	Routine (Visual monitoring)																			
9/14/2018	Pile removal/debris removal	Shipway/ Dredge Areas (submerged)	Routine (Visual monitoring)																			
9/15/2018	Pile removal/debris removal, partial day of production dredging	Shipway/ Dredge Areas (submerged)	Routine (Visual monitoring)																			
9/17/2018	Dredging	DU 12 (DMMU 6A)	Intensive	1	9:00	Flood	S2	Deep	8.2	4.4	150 DOWN NB	N	Y	LMCWQ-005	2.5U	0.50 U	0.020 U	0.020 U	11.4 J	0.010 U		
9/17/2018	Dredging	DU 13 (DMMU 5A)	Intensive	2	14:45	Ebb	N1	Deep	6.4	4.2	300 UP NB	N	N									
9/18/2018	Dredging	DMMU 8B, 9C, 8A, 9B	Intensive	1	12:30	Flood	N2	Deep	8.1	4.4	150 UP NB	N	Y									

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
9/19/2018	Dredging	DMMU 9C	Intensive	1	9:00	Flood	N0	Deep	9.6	5	150 DOWN NS	N	Y	LMCWQ-027	3.47	0.5 U	0.02 U	0.02 U	10 J	0.010 U	N	Copper exceeded the chronic criterion but not the acute criterion at 150 ft.
9/19/2018	Dredging	DMMU 9C	Intensive	1							300 DOWN NS	N	Y	LMCWQ-030	2.5						N	Copper below the chronic criteria at 300 ft. No chemical exceedance.
9/19/2018	Dredging	DMMU 9C	Intensive	2	12:20	Flood	N0	Deep	8	4.9	150 UP NS	N	N									
9/20/2018	Barge Dewatering	DMMU 10B	Intensive	1	10:40	Flood	E1	Deep	4.9	4.8	150 DOWN NS	N	Y	LMCWQ-047	3.61	1 U	0.02 U	0.02 U	40 U	0.010 U	N	Copper exceeded the chronic but not the acute at 150 ft.
9/20/2018	Dredging	DMMU 10B	Intensive	2	14:20	Flood	E5	Deep	7.3	4.3	150 UP NB	N	N									
9/21/2018	Dredging	DMMU 10B	Intensive	1	14:00	Flood	E5	Deep	9.1	4.8	150 DOWN NS	N	N									
9/22/2018	Dredging	DMMU 10A	Intensive	1 (partial)	11:45	Flood	E12	Deep	15.9	4.4	150 DOWN NB	Y (Turbidity)	Y	LMCWQ-054	3.51	0.6	0.02 U	0.032 J	4.45 J	0.006 J	N	Partial Round Copper and mercury exceeded the chronic but not the acute at 150 ft.
9/22/2018	Dredging	DMMU 10A	Intensive	1 (partial)							300 DOWN NB	N	Y	LMCWQ-057				0.038				Analysis for dissolved copper on hold.
9/22/2018	Dredging	DMMU 10A	Intensive	1 (partial)							300 DOWN NB	N	Y	LMCWQ-056				0.020 U				Analysis for total mercury for average at 300 ft.
9/24/2018	Dredging	DMMU 8A, 8B, 9B, 9C, and 9D	Intensive	1	9:30	Ebb	W7	Deep	8	4.6	150 DOWN NB	N	Y	LMCWQ-063	2.73	0.5 U	0.02 U	0.02 U	6.09 J	0.004 J	N	
9/24/2018	Dredging	DMMU 8A, 8B, 9B, 9C, and 9D	Intensive	2	13:45	Flood	E1	Deep	7.6	4.5	300 DOWN NB	N	N									
9/25/2018	Dredging	DMMU 10C	Intensive	1	8:30	Ebb	N1	Deep	5.1	5.1	150 DOWN NS	Y (DO)	N									Low DO at mid-depth and near bottom compliance and ambient stations. DO probe calibrated.
9/26/2018	Dredging	DMMU 8A, 8B, 9B, and 9C	Intensive	1	12:00	Tide change	N3	Deep	4.8	4.4	150 DOWN NB	N	Y									Apparent turbidity exceedance, not confirmed.
9/27/2018	Dredging	DMMU 12D	Intensive	1 (partial)	9:30	Ebb	N5	Deep	5	NA	150 UP NS	N	N									Partial Round only (weather and boat mechanical problems)
9/28/2018	Dredging	DMMU 12C	Intensive	1	13:30	Flood	N4	Deep	8.4	5.1	150 UP NB	N	Y									Boat repair and delay in unloading material barges
9/28/2018	Dredging	DMMU 12C	Intensive	1							300 UP NB	N	Y	LMCWQ-089				0.020 U				

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
9/28/2018	Dredging	DMMU 12C	Intensive	1							300 UP MD	N	Y	LMCWQ-090				0.020 U				
9/29/2018	Dredging	DMMU 12C	Intensive	1	9:40	Ebb	N4	Deep	13.4	4.4	300 UP NB	Y (Turbidity)	N									Limited duration of dredging, confirmed turbidity exceedance
9/29/2018	Dredging	DMMU 12C	Intensive	2 (upcurrent only)	10:30	Ebb	N5	Deep	9.3	4.4	300 UP NB	N (Sample for previous exceedance)	Y	LMCWQ-100	1.13 J	1.01 U	—	0.043	7.56	0.031	N	Dissolved Hg not analyzed. Total Hg below Acute criterion. Total Hg and PCBs at 300 ft below Chronic criterion.
9/29/2018	Dredging	DMMU 12C	Intensive	2 (upcurrent only)							300 UP NS	N	Y	LMCWQ-099				0.021		0.010 U		
9/29/2018	Dredging	DMMU 12C	Intensive	2 (upcurrent only)							300 UP MD	N	Y	LMCWQ-101				0.032		0.010 U		
10/1/2018	Dredging	DMMU 1A/2B	Intensive	1	9:30	Tide change	S8	Shallow	6.1	4.4	150 DOWN NS & NB	N	Y									
10/1/2018	Dredging	DMMU 12C	Intensive	2	13:20	Ebb	S5	Deep	7.9	4.4	300 DOWN MD	N	N									
10/2/2018	Dredging	DMMU 1A/2B	Intensive	1	9:20	Flood	S9	Shallow	5.2	4.5	150 DOWN MD	N	Y									
10/2/2018	Dredging	DMMU 12A	Intensive	2	13:45	Ebb	S14	Deep	8.6	4.4	150 UP NB	N	N									
10/3/2018	Dredging	DMMU 13D	Intensive	1	9:30	Flood	N0	Deep	6	4.3	150 DOWN NB	N	Y									
10/3/2018	Dredging	DMMU 1B/2B	Intensive	2	14:00	Ebb	E2	Shallow	7.6	4.6	150 DOWN NS	N	N									
10/4/2018	Dredging	DMMU 1B/2B	Intensive	1	8:50	Flood	N12	Shallow	9.4	4.6	150 UP NB	N	Y									
10/4/2018	Dredging	DMMU 13B	Intensive	2	15:00	Ebb	N4	Deep	6.9	4.9	300 DOWN NB	N	N									
10/5/2018	Dredging	DMMU 10C	Intensive	1	9:45	Flood	S4	Deep	6.6	5.1	150 DOWN NS	N	Y									
10/6/2018	Dredging	DMMU 1A/2A	Intensive	1	9:15	Flood	N14	Shallow	5.1	1.2	150 UP NS	N	Y									
10/6/2018	Dredging	DMMU 1B/2B	Intensive	2	12:00	Flood	N13	Shallow	4.4	1.3	300 UP NS	N	N									

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

															Chemical Compliance Results							
Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
10/8/2018	Dredging	DMMU 13E	Intensive	1	11:30	Flood	W1	Deep	2.1	0.9	300 DOWN NB	N	Y									
10/8/2018	Dredging	DMMU 16E	Intensive	2	14:00	Flood	N2	Deep	3.3	1	150 DOWN NB	N	N									
10/9/2018	Dredging		No monitoring (unsafe sea conditions)																			Monitoring not conducted. Unsafe sea conditions.
10/10/2018	Dredging	DMMU 1A/2A	Intensive	1	10:30	Ebb	S1	Shallow	7.3	2.7	150 UP NS	N	N									
10/10/2018	Dredging	DMMU 1A/2A	Intensive	2	13:00	Flood	S1	Shallow	4.2	1.3	150 DOWN MD	N	Y									
10/11/2018	Dredging	DMMU 1A/2A	Intensive	1	9:00	Ebb	N4	Shallow	5	1.4	150 DOWN NS	N	N									
10/11/2018	Dredging	DMMU 13C	Intensive	2	9:55	Ebb	N3	Deep	4.7	1.1	150 UP NB	N	Y									
10/12/2018	Dredging	DMMU 1B/2B	Intensive	1	9:50	Ebb	N0	Shallow	13.3	1.1	150 DOWN NB	Y	Y	LMCWQ-208	1.61 J	1.01 U	—	0.02 U	12.6 U	0.010 U	N	Dissolved Hg not analyzed. Total Hg below Acute criterion.
10/12/2018	Dredging	DMMU 1B/2B	Intensive	2	13:25	Tide change	E1	Shallow	8.2	1.3	150 DOWN NS	Y (Apparent turbidity exceedance)	N									Apparent turbidity exceedance (not confirmed).
10/13/2018	Dredging	DMMU 1B/2B	Intensive	1	9:35	Ebb	N6	Shallow	4.6	1.1	300 UP MD	N	Y									
10/15/2018	Dredging	DMMU 12C	Intensive	1	10:00	Tide change	N5	Deep	4.6	1.4	300 DOWN NB	N	Y									
10/15/2018	Dredging	DMMU 1B/2B	Intensive	2	12:30	Ebb	N9	Shallow	2.2	1.3	150 DOWN NS	N	N									
10/16/2018	Dredging		No monitoring (WQ instrument																			
10/17/2018	Dredging	DMMU 13E	Intensive	1	11:20	Tide change	N2	Deep	4.4	1.3	300 DOWN NB	N	Y									
10/18/2018	Dredging	DMMU 9A/10A	Intensive	1 (partial)	11:00	Flood	N0	Deep	3.8	1.1	150 DOWN NB	N	Y (partial)									Dredge equipment failure just after start of monitoring.
10/22/2018	ENR material placement	ENR F05	Intensive	1	13:00	Flood	N2	Deep	1.8	1.1	300 DOWN NB	N	N									
10/22/2018	ENR material placement	ENR F05	Intensive	2	14:00	Flood	E2	Deep	4.4	1.4	300 UP NS	N	N									

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
10/22/2018	Dredging	DMMU 9A	Intensive	3	14:30	Flood	E2	Deep	3.7	1.2	300 UP MD	N	N									
10/23/2018	ENR material placement	ENR F06/E06	Intensive	1	10:00	Ebb	S5	Deep	5.7	1.9	300 DOWN NS	Y (Apparent DO exceedance)	N									Low DO at near bottom compliance and ambient stations.
10/23/2018	ENR material placement	ENR E06	Intensive	2	12:45	Flood	S9	Deep	3.4	1.4	150 UP NS	Y (Apparent DO exceedance)	N									Low DO at near bottom compliance and ambient stations.
10/23/2018	Dredging	DMMU 9B	Intensive	3	14:00	Flood	S12	Deep	6	1.2	150 UP NB	N	Y									
10/24/2018	ENR material placement	ENR E04	Intensive	1	10:15	Ebb	S6	Deep	4.8	1.2	300 UP NB	Y (DO)	N									
10/24/2018	ENR material placement	ENR E04	Intensive	2	12:45	Flood	S7	Deep	4.4	1.2	150 DOWN NB	N	N									
10/24/2018	ENR material placement	ENR E04	Intensive	3	13:55	Flood	S4	Deep	4.2	1.5	150 UP NB	N	N									
10/25/2018	Dredging	DMMU 12A	Intensive	1	10:30	Ebb	S5	Deep	5.6	1.4	150 DOWN NB	Y (Apparent DO exceedance)	N									No water samples collected, exceedance driven sampling in effect.
10/25/2018	ENR material placement	ENR D05	Intensive	2	11:00	Ebb	S8	Deep	7.9	1.6	300 DOWN NS	Y (Turbidity and apparent DO)	N									
10/25/2018	ENR material placement	ENR D06	Intensive	3	15:25	Flood	W1	Deep	5.7	1.4	300 DOWN NS	Y (Apparent DO exceedance)	N									Modification of placement methods.
10/26/2018	ENR material placement	ENR E03	Intensive	1	9:00	Ebb	S6	Deep	3.6	2.3	150 DOWN NS	Y (Apparent DO exceedance)	N									Modification of placement methods.
10/26/2018	Dredging	DMMU 12A	Intensive	2	9:30	Ebb	S6	Deep	6.2	1.7	150 UP NB	Y (Apparent DO exceedance)	N									
10/26/2018	ENR material placement	ENR E03	Intensive	3	10:00	Ebb	S3	Deep	11.6	2.1	150 DOWN NS	Y (Turbidity and apparent DO)	N									Modification of placement methods.
10/26/2018	ENR material placement	ENR E03	Intensive	4	12:45	Tide change	S7	Deep	2.8	1.4	150 UP NB	Y (Apparent DO exceedance)	N									Modification of placement methods.
10/26/2018	Dredging	DMMU 12A	Intensive	5	13:15	Flood	S10	Deep	3.3	2.1	300 UP NS	Y (Apparent DO exceedance)	N									
10/26/2018	ENR material placement	ENR E03	Intensive	6	14:10	Flood	S13	Deep	10	1.3	150 UP NB	Y (Apparent turbidity exceedance)	N									Modification of placement methods.
10/26/2018	ENR material placement	ENR E07	Intensive	7	14:55	Flood	S13	Deep	7.2	2.3	150 DOWN NB	Y (Apparent DO exceedance)	N									Modification of placement methods.

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

															Chemical Compliance Results							
Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
10/27/2018	ENR material placement	ENR D07	Intensive	1	10:30	Ebb	E1	Deep	6.1	1.2	150 UP NB	N	N									Modification of placement methods.
10/27/2018	Dredging	DMMU 12A/13A	Intensive	2	14:50	Flood	N1	Deep	5.9	2	150 UP NS	Y (Apparent DO exceedance)	N									
10/29/2018	Dredging	DMMU 12A	Intensive	1	9:30	Tide change	S14	Deep	4.9	1.3	150 DOWN NB	N	N									
10/29/2018	ENR material placement	ENR D07	Intensive	2	11:00	Ebb	S13	Deep	11.2	1.5	150 DOWN NS	Y (Turbidity)	N									Modification of placement methods.
10/29/2018	Dredging	DMMU 13A	Intensive	3	11:45	Ebb	S13	Deep	3.6	2.8	150 UP NB	N	N									
10/29/2018	ENR material placement	ENR D07	Intensive	4	13:15	Ebb	S7	Deep	10.2/1.8	1.5	150 UP NB	N	N									Modification of placement methods.
10/29/2018	ENR material placement	ENR D07	Intensive	5	14:10	Flood	S9	Deep	4.3	2.1	150 DOWN NS	N	N									Modification of placement methods.
10/30/2018	ENR material placement	ENR D06	Intensive	1	9:30	Flood	S7	Deep	5.4	1.8	150 UP NS	N	N									Modification of placement methods.
10/30/2018	Dredging	DMMU 10A	Intensive	2	11:00	Tide change	S7	Deep	6.3	1.4	150 DOWN NB	N	N									
10/30/2018	Dredging	DMMU 10A	Intensive	3	12:30	Ebb	S7	Deep	2.4	1.6	300 UP NB	N	N									
10/30/2018	ENR material placement	ENR E08	Intensive	4	13:20	Ebb	S5	Deep	2.2	2.3	150 UP NS	N	N									Modification of placement methods.
10/30/2018	ENR material placement	ENR E08	Intensive	5	14:10	Ebb	S6	Deep	8.1/4	1.4	150 UP NB	N	N									Modification of placement methods.
10/31/2018	ENR material placement	ENR D08	Intensive	1	9:30	Flood	S16	Deep	4.3	1.6	150 UP NS	N	N									Modification of placement methods.
10/31/2018	ENR material placement	ENR D08	Intensive	2	10:45	Flood	S12	Deep	4.8	1.4	300 UP NB	N	N									Modification of placement methods.
10/31/2018	Dredging	DMMU 13A	Intensive	3	11:10	Flood	S14	Deep	6.2	1.7	300 UP MD	N	N									
10/31/2018	ENR material placement	ENR D08	Intensive	4	11:40	Tide change	S14	Deep	10/6.7	1.5	150 DOWN NB	Y	N									Modification of placement methods.
10/31/2018	Dredging	DMMU 13A	Intensive	5	13:00	Ebb	S13	Deep	14.5/11.4	1.3	300 DOWN NB	Y	Y (300 ft)	LMCWQ-271	0.99 J	1.01 U	—	0.111	12.6 U	0.024 J	N	Dissolved Hg not analyzed. Total Hg below Acute criterion. 300 ft samples collected on 10/31 &11/1 analyzed for total Hg.

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

															Chemical Compliance Results							
Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Cu (diss. μg/L)	Pb (diss. μg/L)	Hg (diss. μg/L)	Hg (total μg/L)	Zn (diss. μg/L)	Total PCBs (μg/L)	Chemical Exceedance (Y/N)	Comments
10/31/2018	Dredging	DMMU 13A	Intensive								300 UP NB	N	Y	LMCWQ-272				0.02 U				Analysis for total Hg.
10/31/2018	Dredging	DMMU 13A	Intensive								300 UP NS	N	Y	LMCWQ-273				0.02 U				Analysis for total Hg.
10/31/2018	Dredging	DMMU 13A	Intensive						10.3	1.5	300 DOWN MD	Y	Y	LMCWQ-274				0.028				Analysis for total Hg.
10/31/2018	Dredging	DMMU 13A	Intensive								300 DOWN NS	N	Y	LMCWQ-275				0.02 U				Analysis for total Hg.
10/31/2018	Dredging	DMMU 13A	Intensive	6	14:20	Ebb	S12	Deep	17.1/39.6	1.5	150 DOWN NB	Y	y (150 ft)	LMCWQ-276	0.7 J	1.01 U	—	0.165	12.6 U	0.045 J	N	Dissolved Hg not analyzed. Total Hg below Acute criterion.
11/1/2018	ENR material placement	ENR D09	Intensive	1	10:10	Flood	S7	Deep	3.5	1.6	150 UP NS	N	N									Modification of placement methods.
11/1/2018	ENR material placement	ENR D09	Intensive	2	11:30	Flood	S9	Deep	3.6	1.4	150 DOWN NB	N	N									Modification of placement methods.
11/1/2018	ENR material placement	ENR D09	Intensive	3	12:55	Tide change	S12	Deep	6	1.2/1.7	150 UP NB & 150 DOWN NS	N	N									Modification of placement methods.
11/1/2018	Dredging	DMMU 13B	Intensive	4	13:20	Ebb	S12	Deep	5.5	1.2	150 DOWN NB	N	y (150 ft & 300 ft)									
11/1/2018	Dredging	DMMU 13B	Intensive								300 DOWN NS	N	Y	LMCWQ-284				0.02 U				Analysis for total Hg.
11/1/2018	Dredging	DMMU 13B	Intensive								300 DOWN NB	N	Y	LMCWQ-285				0.02 U				Analysis for total Hg.
11/1/2018	Dredging	DMMU 13B	Intensive								300 DOWN MD	N	Y	LMCWQ-286				0.02 U				Analysis for total Hg.
11/1/2018	Dredging	DMMU 13B	Intensive								300 UP NS	N	Y	LMCWQ-289				0.02 U				Analysis for total Hg.
11/1/2018	Dredging	DMMU 13B	Intensive								300 UP NB	N	Y	LMCWQ-290				0.02 U				Analysis for total Hg.
11/2/2018	ENR material placement	ENR C05	Intensive	1	13:15	Flood	S15	Deep	3.7	1.7	150 UP NS	N	N									Modification of placement methods.
11/2/2018	Dredging	DMMU 14D	Intensive	2	13:55	Ebb	S14	Deep	6.8/5.3	1.3	150 DOWN NB	N	Y (300 ft)									
11/2/2018	ENR material placement	ENR C07	Intensive	3	15:05	Ebb	S2	Deep	5.3	1.5	150 DOWN NS	N	N									Modification of placement methods.

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
11/2/2018	Dredging	DMMU 14D	Intensive	4	15:30	Ebb	S2	Deep	5.3	1.3	300 DOWN NB	N	N									
11/3/2018	Dredging	DMMU 14E	Intensive	1	9:50	Flood	S6	Deep	6.9/15.5	1.4	150 DOWN NB	Y (Turbidity)	Y (150 ft & 300 ft)	LMCWQ-299	0.53 J	1.01 U	—	0.021	12.6 U	0.079 J	N	Dissolved Hg not analyzed. Total Hg below Acute criterion.
11/3/2018	ENR material placement	ENR E10	Intensive	2	13:30	Flood	S10	Deep	6.8	1.8	300 UP NS	Y (Apparent turbidity exceedance)	N									Modification of placement methods.
11/3/2018	ENR material placement	ENR E10	Intensive	3	14:30	Tide change	S7	Deep	8.5/6.7	1.3	150 DOWN NS	Y (Turbidity)	N									Modification of placement methods.
11/5/2018	ENR material placement	ENR D10	Intensive	1	10:45	Flood	S7	Deep	4.6	1.4	300 DOWN NB	N	N									Modification of placement methods.
11/5/2018	ENR material placement	ENR C10	Intensive	2	14:00	Flood	S7	Deep	4.1	1.8	150 UP NS	N	N									Modification of placement methods.
11/6/2018	ENR material placement	ENR D11/D12	Intensive	1	9:50	Flood	S7	Deep	14/5.6	2.3	150 UP NS	N	N									Modification of placement methods.
11/6/2018	Dredging	DMMU 15G	Intensive	2	11:25	Flood	S7	Deep	4.2	2.1	300 UP NS	N	N									
11/6/2018	ENR material placement	ENR D12	Intensive	3	12:40	Flood	S7	Deep	6.2	1.9	150 UP NS	N	N									Modification of placement methods.
11/6/2018	Dredging	DMMU 15F	Intensive	4	13:50	Flood	S7	Deep	4	1.2	150 DOWN NB	N	N									
11/7/2018	Dredging	DMMU 15E	Intensive	1	13:10	Flood	S7	Deep	4.6	4	150 UP NS	N	N									
11/7/2018	Dredging	DMMU 15E	Intensive	2	14:00	Flood	S7	Deep	5.5	1.6	300 DOWN NB	N	N									
11/8/2018	Dredging	DMMU 15D	Intensive	1	9:30	Ebb	E2	Deep	6	1.2	300 DOWN NB	Y (Apparent DO exceedance)	N									
11/8/2018	Dredging	DMMU 14D	Intensive	2	13:20	Flood	E2	Deep	5.1	1.3	150 UP NB	N	N									
11/9/2018	Dredging	DMMU 15D	Intensive	1	9:15	Ebb	E1	Deep	5.2	1.8	150 UP NB	N	N									
11/9/2018	Dredging	DMMU 15D	Intensive	2	11:00	Ebb	N0	Deep	6.5	1.6	300 DOWN NB	N	N									
11/10/2018	Dredging	DMMU 14F	Intensive	1	9:35	Ebb	S3	Deep	5.8	1.3	150 DOWN NB	N	N									

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
11/10/2018	Dredging	DMMU 14F	Intensive	2	10:35	Ebb	S7	Deep	2.4	2	300 UP NS	N	N									
11/12/2018	Dredging	DMMU 14G	Intensive	1	10:35	Ebb	N3	Deep	4.6	1.7	150 DOWN NS	N	N									
11/12/2018	Dredging	DMMU 16E	Intensive	2	12:45	Ebb	N4	Deep	4.3	1.8	300 DOWN NB	N	N									
11/13/2018	Dredging	DMMU 14E	Intensive	1	9:50	Ebb	S6	Deep	4.8	1.4	150 UP NB	N	N									
11/13/2018	Dredging	DMMU 14E	Intensive	2	10:55	Ebb	S7	Deep	5.1	1.9	150 DOWN NS	N	N									
11/14/2018	Dredging		Routine (Visual monitoring)																			Per USEPA direction.
11/15/2018	Dredging	DMMU 15G	Routine	1	10:00	Flood	S7	Deep	2.7	1.4	150 DOWN NB	N	N									
11/15/2018	Dredging	DMMU 15G	Routine	2	11:00	Tide change	S6	Deep	2.5	1.3	300 DOWN NB	N	N									
11/16/2018	Dredging		Routine (Visual monitoring)																			
11/17/2018	Dredging		Routine (Visual monitoring)																			
11/19/2018	Dredging		Routine (Visual monitoring)																			
11/20/2018	Dredging	DMMU 2B	Routine	1	11:00	Flood	E1	Shallow	3.6	1	150 UP NS	N	N									
11/20/2018	Dredging	DMMU 2B	Routine	2	12:13	Flood	N1	Shallow	5.3	1.2	150 UP NS	N	N									
11/21/2018	Dredging		Routine (Visual monitoring)																			
11/26/2018	Dredging		Routine (Visual monitoring)																			
11/27/2018	Dredging	DMMU 16E	Routine	1	11:00	Ebb	S12	Deep	5.3	1.3	150 DOWN NS	N	N									
11/28/2018	Dredging		Routine (Visual monitoring)																			

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
11/29/2018	Dredging		Routine (Visual monitoring)																			
11/30/2018	Dredging	DMMU 17E	Routine	1	9:25	Flood	W2	Deep	5.9	1.4	150 UP NS	N	N									
11/30/2018	Dredging	DMMU 17E	Routine	2	10:25	Flood	N0	Deep	3.4	2.9	150 UP NS	N	N									
12/1/2018	Dredging		Routine (Visual monitoring)																			
12/3/2018	Dredging		Routine (Visual monitoring)																			
12/4/2018	Dredging	DMMU 16D	Routine	1	10:15	Flood	N5	Deep	4.3	0.6	150 DOWN NB	N	N									
12/4/2018	Dredging	DMMU 16C/16D	Routine	2	12:40	Flood	N5	Deep	3.4	0.5	150 DOWN NB	N	N									
12/5/2018	Dredging		Routine (Visual monitoring)																			
12/6/2018	Dredging	DMMU 18C	Routine	1	10:00	Tide change	E3	Deep	4.2	1	150 UP NB	N	N									
12/6/2018	Dredging	DMMU 18C	Routine	2	11:00	Flood	N1	Deep	5.9	1.1	150 DOWN NB	N	N									
12/7/2018	Dredging		Routine (Visual monitoring)																			
12/8/2018	Dredging		Routine (Visual monitoring)																			
12/10/2018	Dredging	DMMU 19D	Routine	1	11:30	Ebb	S11	Deep	5.5	0.9	150 UP NB	N	N									
12/10/2018	Dredging	DMMU 19D	Routine	2	13:00	Tide change	S11	Deep	4.8	2.4	300 UP NB	N	N									
12/11/2018	Dredging		Routine (Visual monitoring)																			
12/12/2018	Dredging	DMMU 16D	Routine	1	9:30	Ebb	S3	Deep	4.6	0.7	150 UP NB	N	N									
12/12/2018	Dredging	DMMU 16D	Routine	2	10:55	Ebb	S9	Deep	4.5	0.7	300 UP MD	N	N									

TABLE 11

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 1

Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
12/13/2018	Dredging		Routine (Visual monitoring)																			
12/14/2018	Dredging		Routine (Visual monitoring)																			
12/15/2018	Dredging		Routine (Visual monitoring)																			
12/17/2018	Dredging	DMMU 19C	Routine	1	9:20	Flood	S12	Deep	1.7	1.1	150 DOWN NS	N	N									
12/17/2018	Dredging	DMMU 20A	Routine	2	10:40	Flood	S14	Deep	3.1	1.2	150 UP NB	N	N									
12/18/2018	Dredging		Routine (Visual monitoring)																			
12/19/2018	Dredging	DMMU 19C	Routine	1	10:45	Flood	S22G22	Deep	4.8	2.6	150 UP NS	N	N									
12/19/2018	Dredging	DMMU 19C	Routine	2	13:10	Tide change	S14	Deep	2.2	2.3	300 UP NS	N	N									
12/20/2018	Dredging		Routine (Visual monitoring)																			
12/21/2018	Dredging		Routine (Visual monitoring)																			
12/26/2018	Dredging	DMMU 15D2	Routine	1	14:06	Ebb	S9	Deep	4.9	0.9	150 DOWN NS	N	N									
12/26/2018	RML material placement	DMMU 4A	Routine	2	14:40	Flood	S9	Shallow	1.8	0.7	150 UP NS	N	N									Modification of placement methods, partially submerged bucket.
12/27/2018	Dredging/RML/ENR Placement		Routine (Visual monitoring)																			
12/28/2018	Dredging	DMMU 17C	Routine	1	9:30	Tide change	N0	Deep	1.7	0.3	300 UP NB	N	N									
12/28/2018	RML material placement	DMMU 4A	Routine	2	13:15	Ebb	E3	Shallow	3.8	0.7	300 DOWN NS	N	N									Modification of placement methods, partially submerged bucket.
12/29/2018	Dredging/RML/ENR Placement		Routine (Visual monitoring)																			
1/2/2019	ENR material placement	ENR G09	Routine	1	9:30	Flood	N1	Deep	15.4	1.1	150 UP MD	Y	N									Modification of placement methods, partially submerged bucket.

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
1/2/2019	ENR material placement	ENR G09	Intensive	2	10:45	Flood	E2	Deep	3.6	3.7	150 UP NS	N	N									Modification of placement methods, partially submerged bucket.
1/2/2019	Dredging	DMMU 14D	Routine	3	13:25	Tide change	S4	Deep	2.3	4.1	150 DOWN NS	N	N									
1/3/2019	Dredging/RML/ENR Placement		Routine (Visual monitoring)																			ENR placement WQ monitoring not conducted; unsafe conditions; dredging and ENR placement suspended.
1/4/2019	Dredging	DMMU 17C	Routine	1	8:40	Ebb	S15	Deep	2.6	2.2	150 UP NS	N	N									
1/4/2019	ENR material placement	ENR G10	Intensive	2	10:00	Tide change	S19	Deep	3.4	0.6	300 UP NB	N	N									Modification of placement methods, partially submerged bucket.
1/4/2019	ENR material placement	ENR G10	Intensive	3	14:10	Flood	S20G20	Deep	2.9	1.6	300 UP NS	N	N									Modification of placement methods, partially submerged bucket.
1/5/2019	ENR material placement	ENR E10	Intensive	1	10:20	Ebb	N0	Deep	5.3	0.8	150/300 DOWN MD	N	N									Modification of placement methods, partially submerged bucket.
1/5/2019	ENR material placement	ENR F11	Intensive	2	12:30	Flood	N0	Deep	2.9	1	150 DOWN MD	N	N									Modification of placement methods, partially submerged bucket.
1/7/2019	ENR material placement	ENR D12	Intensive	1	9:45	Ebb	S12	Deep	5.4	0.8	150 DOWN MD	N	N									Modification of placement methods, partially submerged bucket.
1/7/2019	Dredging	DMMU 18B	Routine	2	10:10	Ebb	S14	Deep	1.9	2	150 UP NS	N	N									
1/8/2019	ENR material placement	ENR G13	Intensive	1	11:10	Ebb	N9	Deep	5.8	0.5	150 DOWN MD	Y (Apparent turbidity exceedance)	N									Unconfirmed exceedance of turbidity criteria.
1/8/2019	ENR material placement	ENR G14	Intensive	2	13:30	Flood	N3	Deep	3.8	1.6	150 UP NS	N	N									Modification of placement methods, partially submerged bucket.
1/9/2019	ENR material placement	ENR F13	Intensive	1	9:30	Ebb	W6	Deep	3.6	1.2	150 DOWN NS	N	N									Modification of placement methods, partially submerged bucket.
1/9/2019	Dredging	DMMU 16C	Routine	2	9:50	Ebb	W6	Deep	4.9	0.4	150 DOWN NB	N	N									
1/9/2019	ENR material placement	ENR E13	Intensive	3	13:45	Flood	N4	Deep	3.8	0.9	150 DOWN NS	N	N									Modification of placement methods, partially submerged bucket.
1/10/2019	ENR material placement	ENR G14	Intensive	1	11:00	Ebb	S8	Deep	4.7	1.2	150 DOWN NS	N	N									Modification of placement methods, partially submerged bucket.
1/10/2019	ENR material placement	ENR F14	Intensive	2	13:55	Tide change	S12	Deep	2.9	1.1	150 DOWN NS	N	N									Modification of placement methods, partially submerged bucket.

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
1/11/2019	Dredging/RML/ENR Placement		Routine (Visual monitoring)																			RML/ENR placement monitoring reduced to routine monitoring following 2 days without exceedance.
1/12/2019	Dredging/RML/ENR Placement		Routine (Visual monitoring)																			
1/14/2019	Dredging	DMMU 17D	Routine	1	9:40	Flood	N13	Deep	3	0.9	150 DOWN NS	N	N									
1/14/2019	ENR material placement	ENR C11	Routine	2	10:00	Tide change	N12	Deep	1.4	0.9	150 UP NS	N	N									Modification of placement methods, partially submerged bucket.
1/15/2019	ENR material placement		Routine (Visual monitoring)																			
1/16/2019	ENR material placement		Routine (Visual monitoring)																			
1/17/2019	ENR material placement	ENR C17	Routine	1	9:30	Flood	N0	Deep	3.3	0.4	150 DOWN MD	N	N									
1/17/2019	Placement of Filter Rock	DMMU 10A	Intensive	2	10:20	Flood	W3	Deep	0.9	0.7	300 DOWN NS	N	N									Placing Filter Rock with Bucket Near Bottom.
1/17/2019	ENR material placement	ENR C17	Routine	3	13:00	Ebb	N7	Deep	0.7	0.6	150/300 UP NS	N	N									
1/17/2019	Placement of Filter Rock	DMMU 10A	Intensive	4	13:30	Ebb	N7	Deep	2.1	0.3	150 DOWN NB	N	N									Placing Filter Rock with Bucket Near Bottom.
1/18/2019	Placement of Filter Rock	DMMU 9A	Intensive	1	10:00	Flood	S17	Deep	4.8	0.4	150 DOWN NB	N	N									Placing Filter Rock with Bucket Near Bottom.
1/18/2019	Placement of Filter Rock	DMMU 9A	Intensive	2	12:50	Tide change	S16	Deep	0.7	0.2	150 DOWN MD and 300 UP NB	N	N									Placing Filter Rock with Bucket Near Bottom.
1/19/2019	Placement of Riprap	DMMU 10A	Intensive	1	10:50	Flood	S14	Deep	2.2	0.8	300 UP NS	N	N									Placing riprap with bucket near bottom.
1/19/2019	Placement of Riprap	DMMU 10A	Intensive	2	12:45	Flood	S19	Deep	1	0.4	150 DOWN NB	N	N									Placing riprap with bucket near bottom.
1/21/2019	Placement of Riprap	DMMU 10A	Intensive	1	9:00	Ebb	W4	Deep	1.5	1.1	150 UP NS	N	N									Placing riprap with bucket near bottom.
1/21/2019	Placement of Riprap	DMMU 9A	Intensive	2	11:10	Tide change	W1	Deep	1.8	0.8	300 UP NS	N	N									Placing riprap with bucket near bottom.
1/22/2019	ENR material placement	ENR C19	Routine	1	9:10	Ebb	S10	Deep	5.5	0.8	300 DOWN NS	N	N									Modification of placement methods, bucket just above the water surface.

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
1/22/2019	ENR material placement	ENR C20	Routine	2	12:30	Flood	S8	Deep	5.2	0.8	150 DOWN NS	N	N									Modification of placement methods, bucket just above the water surface.
1/23/2019	ENR material placement Riprap placement		Routine (Visual monitoring)																			
1/24/2019	ENR material placement	ENR C22	Routine	1	11:40	Ebb	N6	Deep	3.6	2.6	150 DOWN NS	N	N									Modification of placement methods, bucket just above the water surface.
1/24/2019	ENR material placement	ENR B22	Routine	2	13:35	Tide change	N6	Deep	2.6	3.5	150 DOWN NS	N	N									Modification of placement methods, bucket just above the water surface.
1/25/2019	ENR material placement Riprap placement		Routine (Visual monitoring)																			
1/26/2019	ENR material placement		Routine (Visual monitoring)																			
1/28/2019	ENR material placement	ENR F5	Routine	1	9:30	Flood	N5	Deep	3.8	1.3	150 UP NS	N	N									Modification of placement methods, bucket just above the water surface.
1/28/2019	ENR material placement	ENR F5	Routine	2	12:50	Ebb	N5	Deep	4.3	1.1	150 DOWN NS	N	N									Modification of placement methods, bucket just above the water surface.
1/29/2019	ENR material placement Riprap placement		Routine (Visual monitoring)																			
1/30/2019	Placement of Riprap		Routine (Visual monitoring)																			
1/31/2019	ENR material placement Riprap placement		Routine (Visual monitoring)																			Placement of ENR material and sand in shipway.
2/1/2019	Placement of Riprap		Routine (Visual monitoring)																			
2/2/2019	Sand placement in shipway Riprap placement		Routine (Visual monitoring)																			
2/4/2019	Placement of Riprap		Routine (Visual monitoring)																			Weather standdown.
2/5/2019	Placement of Riprap		Routine (Visual monitoring)																			
2/6/2019	Riprap placement Gravel berm and bulkhead installation at shipway (night)		Routine (Visual monitoring)																			Visual report of elevated turbidity investigated during riprap placement. Elevated turbidity was not confirmed.
2/7/2019	Placement of Riprap		Routine (Visual monitoring)																			Night work - drilling holes in concrete slab in the dry.

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
2/11/2019	Placement of Riprap		Routine (Visual monitoring)																			
2/12/2019	Placement of Riprap		Routine (Visual monitoring)																			
2/13/2019	Sand Placement in Shipway	DMMU 1A	Routine	1	11:20	Ebb	W2	Shallow	25.4	2.9	150 DOWN NS	Y	N									
2/13/2019	Sand Placement in Shipway	DMMU 1A	Intensive	2	12:40	Ebb	S8	Shallow	27.3	2.5	150 UP NS	Y	N									
2/14/2019	Sand Placement in Shipway	DMMU 2A	Intensive	1	12:00	Ebb	N6	Shallow	14.2	4.5	150 DOWN NS	Y	N									
2/14/2019	Sand Placement in Shipway	DMMU 2A	Intensive	2	15:35	Ebb	N9	Shallow	81.6	0.5	150 UP NS	Y	N									Additional monitoring at approximately 525 ft, no exceedance.
2/15/2019	Sand Placement in Shipway	DMMU 1A/2A	Intensive	1	11:55	Tide change	S2	Shallow	5.3	3.8	150 DOWN NS	N	N									
2/15/2019	Sand Placement in Shipway	DMMU 1A/2A	Intensive	2	13:00	Ebb	E1	Shallow	16.7	2.2	300 DOWN NS	Y	N									
2/15/2019	Controlled density fill under slab in shipway	DMMU 1A/2A	Visual monitoring																			Monitoring during controlled density fill under slab in shipway.
2/16/2019	Filter Rock Placement in Shipway	DMMU 1A/2A	Intensive	1	15:30	Ebb	W2	Shallow	14	1.4	150 DOWN NS	Y	N									
2/18/2019	Filter Rock Placement in Shipway	DMMU 1A/2A	Intensive	1	11:15	Flood	S1	Shallow	0.6	0.5	150 DOWN MD	N	N									
2/18/2019	Placement of Riprap in Shipway	DMMU 1A/2A	Intensive	2	14:50	Tide change	S5	Shallow	1	1.4	150 UP NS	N	N									
2/19/2019	RML Placement (thin cap)	DMMU 11B	Routine	1	13:40	Flood	S2	Deep	3	0.4	300 DOWN NB	N	N									Resumption of RML placement.
2/19/2019	RML Placement (thin cap)	DMMU 11C	Routine	2	16:00	Tide change	S3	Deep	2.8	0.3	300 UP NB	N	N									Resumption of RML placement.
2/20/2019	Sand Placement in Shipway	DMMU 1A/2A	Intensive	1	9:30	Ebb	W6	Shallow	20.8	1.2	150 DOWN NS	Y	N									
2/21/2019	RML Placement (thin cap)	DMMU 14G	Routine	1	15:00	Flood	E2	Deep	1.7	0.2	300 DOWN NB	N	N									
2/21/2019	RML Placement (thin cap)	DMMU 14G	Routine	2	16:35	Flood	E2	Deep	1.9	1.3	300 DOWN NS	N	N									

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
2/22/2019	Controlled density fill under slab in shipway	DMMU 1A/2A	Visual monitoring																			Monitoring during controlled density fill under slab in shipway.
2/26/2019	Filter Rock Placement in Shipway	DMMU 1A	Intensive	1	10:05	Ebb	N10	Shallow	4.8	1	150 DOWN NS	N	N									Monitoring conducted after suspension of material placement.
2/27/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A	Intensive	1	12:20	Ebb	N5	Shallow	2.5	0.8	150 UP NS	N	N									
2/27/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A	Intensive	2	13:45	Ebb	N10	Shallow	5.1	0.2	150 UP NS	N	N									
2/28/2019	Filter Rock Placement in Shipway	DMMU 1A/2A	Intensive	1	12:40	Ebb	S4	Shallow	4.7	0.3	300 DOWN NS	N	N									
2/28/2019	Filter Rock Placement in Shipway	DMMU 1A/2A	Intensive	2	14:45	Ebb	N0	Shallow	11.3	0.7	150 DOWN NS	Y	N									
3/4/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/5/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/6/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/7/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/8/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/9/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			Nighttime visual monitoring only.
3/11/2019	Nighttime construction activities in Shipway	Shipway DMMU 1A/2A/1B/2B	Visual monitoring																			
3/12/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	1	14:40	Ebb	N3	Shallow	2.8	2	150 DOWN NS	N	N									
3/12/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	2	15:50	Tide change	E1	Shallow	1.8	2.1	150 UP NS	N	N									
3/13/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	1	9:50	Ebb	S5	Shallow	5.6	1.5	150 UP NS	N	N									
3/13/2019	Sand Placement in Shipway	DMMU 1A/2A	Intensive	2	13:50	Ebb	S6	Shallow	56	0.3	150 UP NB	Y	N									Additional monitoring at 800 ft.

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
3/13/2019	Sand Placement in Shipway	DMMU 1A/2A	Intensive	3	15:15	Ebb	S2	Shallow	27.7	0.6	300 UP NB	Y (Apparent turbidity exceedance)	N									Change in placement methods, additional monitoring shows turbidity dissipating.
3/14/2019	Placement of Riprap in Shipway	DMMU 2A	Visual monitoring																			Riprap being placed in the dry.
3/16/2019	Placement of Fish Mix in Shipway	DMMU 1A/2A	Intensive	1	12:35	Flood	N10	Shallow	2.8	0.3	300 DOWN NB	N	N									Limited placement in water.
3/18/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	1	12:50	Flood	N10	Shallow	4.7	0.5	150 DOWN NS	N	N									
3/19/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	1	10:30	Tide change	N5	Shallow	1.8	0.8/0.6	150 DOWN NS/ 150 UP NB	N	N									
3/19/2019	Placement of Gravel Beach Mix in Shipway	DMMU 1A/2A	Intensive	2	11:45	Flood	N5	Shallow	5.2	0.5	300 UP NS	N	N									
3/19/2019	Placement of Fish Mix in Shipway	DMMU 1A/2A	Intensive	3	15:20	Flood	N6	Shallow	3.1	0.3	150 UP NS	N	N									
3/20/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	1	12:45	Flood	N3	Shallow	2.3	0.3	300 UP MD	N	N									Problem with WQ instrument prevented second round.
3/21/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	1	9:45	Ebb	S6	Shallow	2.4	0.3	300 UP MD	N	N									
3/21/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	2	11:20	Tide change	S7	Shallow	14.5	1.1	150 DOWN NS	Y	N									
3/21/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	3	13:15	Flood	S7	Shallow	4	1.2	150 UP NS	N	N									
3/22/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	1	8:55	Ebb	S7	Shallow	3.4	0.7	150 DOWN NS	N	N									
3/22/2019	Placement of Fish Mix in Shipway	Shipway	Intensive	2	13:05	Flood	S1	Shallow	4.8	1.2	150 DOWN NS	N	N									
3/25/2019	Sand Placement in Shipway	Shipway	Intensive	1	11:45	Ebb	N3	Shallow	8.4	0.4	150 DOWN MD	Y	N									
3/25/2019	Sand Placement in Shipway	Shipway	Intensive	2	13:40	Ebb	N6	Shallow	9.7	0.6	150 DOWN MD	Y	N									
3/26/2019	Sand Placement in Shipway	Shipway	Intensive	1	9:20	Ebb	S12	Shallow	4.2	0.2	150 DOWN MD	N	N									
3/26/2019	Sand Placement in Shipway	Shipway	Intensive	2	11:10	Ebb	S13	Shallow	34.1	0.4	150 DOWN NB	Y	N									

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Date	Activity	Area	Monitoring Level [1]	Monitoring Round	Time	Tide	Wind	Depth	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [2]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
															Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
3/26/2019	Placement of Gravel Beach Mix in Shipway	Shipway	Intensive	3	13:50	Ebb	S12	Shallow	3.7	0.3	300 UP NB	N	N									
3/26/2019	Sand Placement in Shipway	Shipway	Intensive	4	14:50	Ebb	S11	Shallow	5.1	0.6	150 DOWN NB	N	N									
3/27/2019	Sand Placement in Shipway	Shipway	Intensive	1	9:25	Tide change	N11	Shallow	1.4	0.7	300 UP NB	N	N									
3/27/2019	Placement of Fish Mix in Shipway	Shipway	Intensive	2	11:50	Ebb	N9	Shallow	5.7	0.8	300 DOWN NS	N	N									
3/28/2019	Sand Placement in Shipway	Shipway	Intensive	1	8:05	Flood	S6	Shallow	7.6	0.1	150 DOWN MD	Y	N									
3/28/2019	Sand Placement in Shipway	Shipway	Intensive	2	13:20	Ebb	E1	Shallow	4.3	0.1	150 DOWN MD	N	N									
Completion of in-water construction activities for Season 1.																						

Note(s)
1. Monitoring Level: Intensive/Routine/Additional.
2. Compliance Station Codes: 150/300 — 100 or 300 feet from activity; UP/DOWN — Upcurrent or Downcurrent from Activity; NS/MD/NB — Near surface sample, Mid-depth sample, Near bottom sample, respectively.

Data Qualifier
U = analyte not detected at reporting limit presented.
J = analyte positively identified; value is approximate concentration in sample.

Abbreviations
Cu = copper
DMMU = dredged material management unit
DO = dissolved oxygen
DU = decision unit
ENR = enhanced natural recovery
ft = feet
Hg = mercury
MD = mid-depth sample
MLLW = mean lower low water
NA = not analyzed
NB = near bottom sample
NS = near surface sample
NTU = nephelometric turbidity unit
Pb = lead
PCB = polychlorinated biphenyl
RML = residual management layer
µg/L = microgram(s) per liter
WQ = water quality
USEPA = United States Environmental Protection Agency
Zn = zinc

TABLE 12

SUMMARY OF WATER QUALITY MONITORING EFFORTS DURING CONSTRUCTION SEASON 1

Activity Monitored	Total Days with Monitoring	Total Rounds of Monitoring	Intensive Monitoring Rounds	Routine Monitoring Rounds	Rounds with One or More Cases of Apparent or Confirmed Noncompliance	Turbidity Exceedance (one or more in a round)
Pile Removal	2	4	4	0	0	
Submerged Debris Removal	2	3	3	0	0	
Dredging	61	97	71	26	13	7
Barge Dewatering	1	1	1	0	0	
ENR/RML Material Placement	30	63	47	16	16	9
Shoreline Slope Armoring						
Placement of Filter Rock (Shoreline Slope)	2	4	4	0	0	
Placement of Riprap (Shoreline Slope)	2	4	4	0	0	
Work in Shipway						
Filter Rock Placement in Shipway	4	5	5	0	2	2
Placement of Riprap in Shipway	1	1	1	0	0	
Placement of Gravel Beach Mix in Shipway	9	14	14	0	1	1
Placement of Fish Mix in Shipway	4	4	4	0	0	
Sand Placement in Shipway	9	17	17	1	12	12
Totals	**100** [1]	**217** [2]	**174**	**43**	**44** [3]	**31** [4]
						14 % [5]

Note(s)

1. Total days when intensive or routine water quality monitoring was conducted. Additional days of visual monitoring or standby were not included in count.
2. Total rounds of monitoring (including partial rounds) with reported results.
3. Rounds of monitoring with one or more compliance stations showing noncompliance of the conventional water quality parameters. Count includes dissolved oxygen noncompliance and turbidity exceedances (apparent and confirmed).
4. Rounds of monitoring with one or more compliance stations with turbidity exceedances. Count includes confirmed and apparent but unconfirmed turbidity exceedances.
5. Percentage of total monitoring rounds with one or more turbidity exceedances (apparent and confirmed).

Abbreviation(s)

ENR = enhanced natural recovery
RML = residual management unit

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
9/4/2019	Dredging	DMMU 18F	Intensive	1	-0.4	-1.9	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	No samples collected due to field instrument malfunction
9/4/2019	Dredging	DMMU 18F	Intensive	2	2.7	0.5	150-ft near bottom downcurrent	N	Y	LMCWQ-351	2.0 U	0.22 J	0.020 U	0.020 U	40 U	0.010 U	N	none
9/6/2019	Dredging	DMMU 18G	Intensive	1	4.8	0.2	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/6/2019	Dredging & Dewatering	DMMU 18G	Intensive	2	4.1	1.0	150-ft near bottom upcurrent	N	Y	LMCWQ-372	--	--	0.020 U	0.020 U	--	0.010 U	N	Inadvertently analyzed second day sample for PCBs and Hg
9/9/2019	Dredging & Dewatering	DMMU 19E	Intensive	1	5.1	2.0	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/9/2019	Dredging & Dewatering	DMMU 19E	Intensive	2	3.9	1.6	300-ft near surface upcurrent	N	Y	LMCWQ-383	1.3 J	0.30 J	0.020 U	0.013 J	40 U	0.010 U	N	none
9/10/2019	Dredging & Dewatering	DMMU 19E	Intensive	1	5.4	1.1	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/10/2019	Dredging & Dewatering	DMMU 19E	Intensive	2	9.4	1.0	150-ft near bottom downcurrent	Y	Y	LMCWQ-397	1.0 J	0.15 J	0.020 U	0.011 J	40 U	0.010 U	N	none
9/11/2019	Dredging & Dewatering	DMMU 20E	Intensive	1	4.5	2.0	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/11/2019	Dredging & Dewatering	DMMU 19E	Intensive	2	3.7	1.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/16/2019	Dredging & Dewatering	DMMU 18I	Routine	1	1.8	1.7	150 and 300-ft near surface down and upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/16/2019	Dredging & Dewatering	DMMU 17A	Routine	2	4.5	1.8	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/17/2019	Dewatering	DMMU 15A	Routine	1	2.5	1.3	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/17/2019	Dredging & Dewatering	DMMU 17A	Routine	2	3.8	1.3	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/18/2019	Dredging & Dewatering	DMMU 15A	Intensive	1	2.0	1.8	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/18/2019	Dredging & Dewatering	DMMU 15A	Intensive	2	4.6	2.0	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/20/2019	Dredging & Dewatering	DMMU 14A	Intensive	1	3.6	1.5	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/20/2019	Dredging & Dewatering	DMMU 14A	Intensive	2	2.0	1.9	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/20/2019	Dredging & Dewatering	DMMU 15A	Intensive	3	4.0	1.7	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results						Chemical Exceedance (Y/N)	Comments
											Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)		
9/23/2019	Dredging & Dewatering	DMMU 15A	Routine	1	3.8	1.4	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/23/2019	Dredging & Dewatering	DMMU 14A	Routine	2	5.7	1.5	150-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/23/2019	Dredging & Dewatering	DMMU 14A	Routine	3	4.6	1.4	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/25/2019	Dredging & Dewatering	DMMU 15A	Routine	1	4.6	2.6	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/25/2019	Dredging & Dewatering	DMMU 15A	Routine	2	3.8	1.4	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/26/2019	Dredging & Dewatering	DMMU 3A	Intensive	1	1.9	1.6	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/26/2019	Dredging & Dewatering	DMMU 3A	Intensive	2	2.6	1.4	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/27/2019	Dredging & Dewatering	DMMU 3A	Intensive	1	2.0	1.7 & 1.3	150 near surface & near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/27/2019	Dredging & Dewatering	DMMU 3A	Intensive	2	2.2	1.3 & 1.4	150-ft near bottom downcurrent & 300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/30/2019	Dredging & Dewatering	DMMU 3A	Routine	1	1.9	2.2 & 2.1	150-ft near surface and near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
9/30/2019	Dredging & Dewatering	DMMU 15A	Routine	2	4.8	1.5	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/2/2019	Dredging & Dewatering	DMMU R15F	Routine	1	3.9	2.3	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/2/2019	Dewatering	DMMU R15F	Routine	2	2.7	1.5	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/7/2019	Dredging & Dewatering	DMMU 14D1	Intensive	1	1.5	0.3	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/7/2019	Dredging & Dewatering	DMMU 14C	Intensive	2	3.6	0.1	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/8/2019	Dredging & Dewatering	DMMU 14D1	Intensive	1	1.9	0.7	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/8/2019	Dredging & Dewatering	DMMU 14D1	Intensive	2	0.6	0	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/11/2019	Dredging & Dewatering	DMMU 15D1	Routine	1	9.1	9.4	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/11/2019	Dredging & Dewatering	DMMU 14D1	Routine	2	3.7	0.2	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/14/2019	Dredging & Dewatering	DMMU 14D1	Routine	1	5.4	2.9	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/14/2019	Dredging & Dewatering	DMMU 15C	Routine	2	5.7	2.7	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
10/16/2019	Dredging & Dewatering	DMMU 16B	Routine	1	5.7	3.5	300-ft mid depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/17/2019	Dredging & Dewatering	DMMU 16C1	Routine	2	7.9	4.1	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/17/2019	Dredging & Dewatering	DMMU 16B	Routine	3	7.9	3.5	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/21/2019	Dredging & Dewatering	DMMU 16A	Routine	1	7.9	3.5	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/21/2019	Dredging & Dewatering	DMMU 16A	Routine	2	6.6	4.1	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/23/2019	Dredging & Dewatering	DMMU R-17C	Routine	1	7.1	6.9	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/24/2019	Dredging & Dewatering	DMMU R-17D	Routine	2	7.5	7.2	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/29/2019	Dredging & Dewatering	DMMU R-19B	Routine	1	6.3	3.1	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/29/2019	Dredging & Dewatering	DMMU R-19C/D	Routine	2	7.6	6.9	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/30/2019	Filter Rock Placement	Station 3+75	Intensive	1	4.6	3.9	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/30/2019	Filter Rock Placement	Station 3+75	Intensive	2	5.8	4.2	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/31/2019	Filter Rock Placement	Station 3+75	Intensive	1	6.2	3.7	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/31/2019	Filter Rock Placement	Station 3+76	Intensive	2	6.2	3.6	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/31/2019	Dredging & Dewatering	DMMU R15G	Routine	1	6.9	3.5	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
10/31/2019	Dredging & Dewatering	DMMU R15G	Routine	2	6.2	3.8	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/4/2019	Filter Rock Placement	Station 4+00	Routine	1	4.4	2.8	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/4/2019	Filter Rock Placement	Station 4+00	Routine	2	6.6	2.6	150-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/4/2019	Dredging & Dewatering	DMMU R15D2/E	Routine	1	7.1	2.7	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/4/2019	Dredging & Dewatering	DMMU R15D2/E	Routine	2	7.0	2.9	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/6/2019	Filter Rock Placement	Station 4+50	Routine	1	4.8	0.1	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
11/6/2019	Filter Rock Placement	Station 5+00	Routine	2	3.3	0.1	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/6/2019	Dredging & Dewatering	DMMU R16-C2/D	Routine	1	0.9	0.1 to 0.5	300-ft near bottom up and downcurrent & near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/6/2019	Dredging & Dewatering	DMMU R16-C2/D	Routine	2	4.9	0.1	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/11/2019	Dredging & Dewatering	DMMU R-12C	Routine	1	5.0	0.3	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/11/2019	Dredging & Dewatering	DMMU R-12C	Routine	2	4.3	0.1	150-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/11/2019	Filter Rock Placement	Station 5+25	Routine	1	3.3	0.1	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/11/2019	Filter Rock Placement	Station 5+75	Routine	2	4.5	0.1	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/13/2019	Dredging & Dewatering	DMMU R-11C	Routine	1	6.0	2.5	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/13/2019	Filter Rock Placement	Station 6+00	Routine	1	4.3	3.1 to 3.7	150-ft near surface upcurrent & near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/13/2019	Filter Rock Placement	Stations 6+00 & 6+25	Routine	2	4.8	3.6	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/18/2019	Dredging & Dewatering	DMMU R-12A/B &R-12C	Routine	1	6.7	2.8	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/18/2019	Dredging & Dewatering	DMMU R-12A/B &R-12C	Routine	2	7.7	3.6	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/20/2019	Dredging & Dewatering	DMMU R-18I	Routine	1	7.5	3.3	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/20/2019	Dredging & Dewatering	DMMU R-17G/H	Routine	2	5.3	4.7	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/20/2019	Filter Rock Placement	Stations 4+00 & 4+50	Routine	1	4.3	3.9	150-ft near surface up and downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/20/2019	Filter Rock Placement	Stations 4+00 & 4+50	Routine	2	6.6	3.3	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/22/2019	Riprap Placement	Stations 4+50 & 5+00	Routine	1	7.6	3.6	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
11/22/2019	Riprap Placement	Stations 4+50 & 5+00	Routine	2	7.5	3.5	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/4/2019	Riprap Placement	Stations 5+00 & 5+50	Routine	1	4.5	3.9	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/4/2019	Riprap Placement	Stations 5+00 & 5+50	Routine	2	4.4	4.0	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
12/6/2019	Filter Rock Placement	Stations 4+00 & 3+75	Routine	1	3.9	4.0	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/6/2019	Filter Rock Placement	Stations 4+00 & 3+75	Routine	2	3.4	2.7 to 3.0	150-ft mid-depth and near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/9/2019	Filter Rock Placement	Stations 6+00 & 6+50	Routine	1	7.5	2.9	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/9/2019	Filter Rock Placement	Stations 6+00 & 6+50	Routine	2	7.2	2.6	300-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/9/2019	ENR/RML Placement	DMMU 10A	Intensive	1	6.2	3.1	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/9/2019	ENR/RML Placement	DMMU 10A	Intensive	2	15.1	2.6	150-ft mid-depth downcurrent	Y	N	NA	--	--	--	--	--	--	--	none
12/9/2019	ENR/RML Placement	DMMU 10A	Intensive	3	10.8	2.9	150-ft near surface upcurrent	Y	N	NA	--	--	--	--	--	--	--	none
12/9/2019	ENR/RML Placement	DMMU 10A	Intensive	4	7.1	2.7	300-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/10/2019	ENR/RML Placement	DMMU 11A & 11B	Intensive	1	7.0	3.1	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/10/2019	ENR/RML Placement	DMMU 11C	Intensive	2	7.2	2.8	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/11/2019	Filter Rock/Riprap Placem	Stations 5+00 - 6+00	Routine	1	5.8	3.7	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/11/2019	Filter Rock/Riprap Placem	Stations 5+00 - 6+00	Routine	2	7.6	3.9	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/17/2019	ENR/RML Placement	DMMU 14D2	Routine	1	8.4	3.9	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/17/2019	ENR/RML Placement	DMMU 14F	Routine	2	8.5	3.9	150-ft near-bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/17/2019	Riprap Placement	Stations 3+50 - 3+75	Routine	3	5.2	4.3	150-ft and 300-ft near-surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/17/2019	Riprap Placement	Stations 3+50 - 3+75	Routine	4	6.9	3.9	300-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/19/2019	ENR/RML Placement	DMMU 15G	Routine	1	7.7	4.1	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/19/2019	Riprap Placement	Stations 6+00 - 6+25	Routine	2	5.6	4.0	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/19/2019	Riprap Placement	Stations 6+00 - 6+25	Routine	3	5.2	4.2	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/23/2019	Riprap Placement	Stations 6+00 - 6+25	Routine	1	7.1	5.8	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
12/23/2019	ENR/RML Placement	DMMU 17D	Routine	2	8.0	5.5	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/26/2019	Riprap Placement	Stations 6+00 - 6+75	Routine	1	5.4	4.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/26/2019	Riprap Placement	Stations 6+00 - 6+75	Routine	2	8.6	4.7	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/26/2019	ENR/RML Placement	DMMU 16C1 & 17D	Routine	1	8.3	4.6	150 & 300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/26/2019	ENR/RML Placement	DMMU 17E	Routine	2	8.2	4.8	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/30/2019	Riprap Placement	Stations 6+00 - 6+75	Routine	1	8.1	3.5	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/30/2019	Riprap Placement	Stations 6+00 - 6+75	Routine	2	3.8	3.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/30/2019	ENR/RML Placement	DMMU 18D	Routine	1	8.1	3.3	150-ft and 300-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
12/30/2019	ENR/RML Placement	ENR D25-DMMU 18F	Routine	2	6.9	4	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/2/2020	ENR/RML Placement	DMMU 20B	Routine	1	8.2	4.3	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/2/2020	ENR/RML Placement	DMMU 20C	Routine	2	8.7	4.8	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/2/2020	Riprap Placement	Stations 5+75 - 7+00	Routine	1	7.4	3.2	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/2/2020	Riprap Placement	Stations 5+75 - 7+00	Routine	2	5.8	3.5	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/8/2020	ENR/RML Placement	ENR C20	Routine	1	8.9	15.3	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	Ambient turbidity elevated due to weather conditions
1/8/2020	ENR/RML Placement	ENR A24	Routine	2	12.7	13	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	Ambient turbidity elevated due to weather conditions
1/8/2020	Riprap Placement	Stations 4+25 to 4+75	Routine	1	15.1	17.6	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	Ambient turbidity elevated due to weather conditions
1/10/2020	Riprap Placement	Stations 0+20 to 0+45	Routine	1	6.5	7.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/10/2020	Riprap Placement	Stations 0+20 to 0+45	Routine	2	6.7	8.7	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/14/2020	GBM Placement	DMMU 15A	Intensive	1	7.6	8.3	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/14/2020	GBM Placement	DMMU 15A	Intensive	2	6.1	6.1	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/15/2020	GBM Placement	DMMU 15A	Intensive	1	5.8	4.3	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
1/15/2020	GBM Placement	DMMU 15A	Intensive	2	6.4	7.1	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/15/2020	ENR/RML Placement	DMMU 19G	Routine	1	6.1	4.7	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/15/2020	ENR/RML Placement	ENR C27	Routine	2	6.5	5.6	300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/17/2020	ENR/RML Placement	ENR D28	Routine	1	7.9	3.4	300-ft mid depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/17/2020	ENR/RML Placement	ENR J06	Routine	2	7.8	4.3	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/21/2020	ENR/RML Placement	DMMU 17C	Routine	1	8.5	4.6	150-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/21/2020	ENR/RML Placement	ENR J05	Routine	2	7.9	4.5	150-ft mid-depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/21/2020	GBM Placement	DMMU 3A	Routine	1	6.8	4.3	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/23/2020	FM Placement	DMMU 3A	Intensive	1	4.2	3.4/3.9	150-ft near surface downcurrent, 150-ft near bottom downcurrent, 300-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/23/2020	FM Placement	DMMU 3A	Intensive	2	30	5.5	150-ft near surface upcurrent	Y	N	NA	--	--	--	--	--	--	--	none
1/23/2020	FM Placement	DMMU 3A	Intensive	3	8.1	5.5	300-ft near surface upcurrent and downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/23/2020	ENR/RML Placement	ENR I02	Routine	1	9.5	5.6	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/23/2020	ENR/RML Placement	ENR I02	Routine	2	8.6	6.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/24/2020	FM Placement	ENR J01	Intensive	1	8.9	9.1	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/27/2020	FM Placement	ENR J01	Routine	1	9.5	5.2	150-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/27/2020	FM Placement	ENR I01	Routine	2	10	8.8	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
1/29/2020	ENR/RML Placement	ENR K01/K02	Routine	1	9.1	5.4	300-ft mid-depth downcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
1/29/2020	ENR/RML Placement	ENR K01/K02	Routine	2	10.2	5.5	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
2/3/2020	Telebelt Placement	ENR G11	Intensive	1	16.3	27	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
2/3/2020	Telebelt Placement	ENR G11	Intensive	2	15.6	27.3	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
2/4/2020	Telebelt Placement	ENR D11-G11	Intensive	1	14.8	13.4	150-ft near surface upcurrent	N	N	NA	--	--	--	--	--	--	--	none
2/4/2020	Telebelt Placement	ENR D11-G11	Intensive	2	18.1	17.5	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/9/2020	Dredging & Dewatering	Sta 4+94 to 6+25	Intensive	1	4.7	5.8	150-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/9/2020	Dredging & Dewatering	Sta 4+94 to 6+25	Intensive	2	6.6	3.5	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/10/2020	Dredging & Dewatering	Sta 4+94 to 6+25	Intensive	1	5.9	3.4	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/10/2020	Dredging & Dewatering	Sta 4+94 to 6+25	Intensive	2	6.2	3.5	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/13/2020	Dredging & Dewatering	Sta 7+25 to 8+75	Intensive	1	6.4	4	300-ft near surface downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/13/2020	Dredging & Dewatering	Sta 7+25 to 8+75	Intensive	2	5.9	3.8	150-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/16/2020	Dredging & Dewatering	Sta 6+25 to 7+25	Intensive	1	6.9	3.6	300-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/16/2020	Dredging & Dewatering	Sta 6+25 to 7+25	Intensive	2	8.3	4.5	150-ft mid depth upcurrent	N	N	NA	--	--	--	--	--	--	--	none

TABLE 13

CUMULATIVE WATER QUALITY MONITORING ACTIVITIES FOR CONSTRUCTION SEASON 2

Date	Activity	Area [1]	Monitoring Level [2]	Monitoring Round	Highest Turbidity (NTU)	Ambient Turbidity (NTU)	Compliance Station (w/ highest turbidity) [3]	Conventional Parameter Exceedance (Y/N)	Sample Collected (Y/N)	Sample ID No. Analyzed	Chemical Compliance Results: Cu (diss. µg/L)	Pb (diss. µg/L)	Hg (diss. µg/L)	Hg (total µg/L)	Zn (diss. µg/L)	Total PCBs (µg/L)	Chemical Exceedance (Y/N)	Comments
3/17/2020	Dredging & Dewatering	Sta 6+25 to 7+25	Intensive	1	5.8	3.8	300-ft near bottom upcurrent	N	N	NA	--	--	--	--	--	--	--	none
3/17/2020	Dredging & Dewatering	Sta 6+25 to 7+25	Intensive	2	7.5	4.4	150-ft near bottom downcurrent	N	N	NA	--	--	--	--	--	--	--	none
								4										

Note(s)
1. See Appendix R for locations with stations X+XX.
2. Monitoring Level: Intensive/Routine/Additional.
3. Compliance Station Codes: 150/300 — 100 or 300 feet from activity; UP/DOWN — Upcurrent or Downcurrent from Activity; NS/MD/NB — Near surface sample, Mid-depth sample, Near bottom sample, respectively.

Data Qualifier
U = analyte not detected at reporting limit presented.
J = analyte positively identified; value is approximate concentration in sample.

Abbreviation(s)
Cu = copper
DMMU = dredged material management unit
ENR = enhanced natural recovery
ft = feet
GBM = gravel beach mix
Hg = mercury
NA = not analyzed
NTU = nephelometric turbidity unit
Pb = lead
PCB = polychlorinated biphenyl
RML = residual management unit
µg/L = microgram(s) per liter
Zn = zinc

TABLE 14

SUMMARY OF WATER QUALITY MONITORING EFFORTS DURING CONSTRUCTION SEASON 2

Activity Monitored	Total Days with Monitoring	Total Rounds of Monitoring	Intensive Monitoring Rounds	Routine Monitoring Rounds	Turbidity Exceedance (one or more in a round)
Dredging and Backfill Material Placement					
Dewatering	2	2		2	
Dredging	2	3	3		
Dredging & Dewatering	33	67	30	37	1
ENR/RML Placement	14	28	6	22	2
Fish Mix Placement	2	6	4	2	1
Gravel Beach Mix Placement	1	5	4	1	
Telebelt Placement of ENR Material	2	4	4		
Shoreline Slope Armoring					
Filter Rock Placement	2	18	4	14	
Filter Rock/Riprap Placement	1	2		2	
Riprap Placement	3	18		18	
Totals	**62** [1]	**153** [2]	**55**	**98**	**4**
					2.6 % [3]

Note(s)

1. Total days when intensive or routine water quality monitoring was conducted. More than one activity may have been monitored during the same day. Additional days of visual monitoring or standby were not included in count.
2. Total rounds of monitoring (including partial rounds) with reported results.
3. Percentage of total monitoring rounds with one or more turbidity exceedances (apparent and confirmed).

Abbreviation(s)

ENR = enhanced natural recovery
RML = residual management unit

TABLE 15

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Sample ID	LMCWQ-005	LMCWQ-013	LMCWQ-014	LMCWQ-027	LMCWQ-030	LMCWQ-039	LMCWQ-040	LMCWQ-047	LMCWQ-054
Activity Monitored	Dredging	QC Sample	QC Sample	Dredging	Dredging	QC Sample	QC Sample	Barge Dewatering	Dredging
Monitoring Location	150 ft Downcurrent Near-Bottom (43.9 ft)	Ambient Near-Surface (2 ft)	Ambient Near-Surface (2 ft) Field Duplicate	150 ft Downcurrent Near-Surface (2 ft)	300 ft Downcurrent Near-Surface (2 ft)	Rinsate Blank	Filter Blank	150 ft Downcurrent Near-Surface (2 ft)	150 ft Downcurrent Near-Bottom (37 ft)
Sample Date	9/17/2018	9/17/2018	9/17/2018	9/19/2018	9/19/2018	9/19/2018	9/19/2018	9/20/2018	9/22/2018
Sample Time	10:35	13:30	13:35	9:04	9:45	11:30	11:32	11:44	13:31
Sample Turbidity (NTUs)	8.2	4.4	4.4	9.6	5.9	--	--	4.9	15.9
Background Turbidity (NTUs)	4.4	4.4	4.4	5.0	5.0	--	--	4.8	4.4
Difference	3.8	0	0	4.6	0.9	--	--	0.1	11.5

Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]
Dissolved Metals (µg/L)																				
Copper	4.8	3.1	2.50	U	1.91	J	2.50	U	**3.47**	J	2.50		--		0.576		**3.61**		**3.51**	
Lead	210	8.1	0.50	U	0.50	U	0.50	U	0.5	U	--		--		0.1	U	1	U	0.6	
Mercury	1.8		0.020	U	0.020	U	0.020	U	0.02	U	--		--		0.02	U	0.02	U	0.02	U
Zinc	90	81	11.4	J	11.0	J	21.3		10.0	J	--		--		2.90	J	40	U	4.45	J
Total Metals (µg/L)																				
Mercury		0.025	0.020	U	0.020	U	0.020	U	0.02	U	--		0.02	U	0.02	U	0.02	U	**0.032**	J
PCBs (µg/L)																				
Aroclor 1016	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1221	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1232	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1242	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1248	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1254	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.006	J
Aroclor 1260	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1262	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Aroclor 1268	NE	NE	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.010	U
Total PCBs[4]	10	0.03	0.010	U	0.011	U	0.010	U	0.010	U	--		0.010	U	--		0.010	U	0.006	J

TABLE 15

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Sample ID	LMCWQ-056	LMCWQ-057	LMCWQ-063	LMCWQ-089	LMCWQ-090	LMCWQ-100	LMCWQ-099	LMCWQ-101	LMCWQ-208
Activity Monitored	Dredging	Dredging	Dredging	Dredging	Dredging	Dredging	Dredging	Dredging	Dredging
Monitoring Location	300 ft Downcurrent Near-Surface (2 ft)	300 ft Downcurrent Near-Bottom (33.5 ft)	150 ft Downcurrent Near-Bottom (28 ft)	300 ft Upcurrent Near-Bottom (48 ft)	300 ft Upcurrent Mid-depth (25 ft)	300 ft Upcurrent Near-Bottom (48 ft)	300 ft Upcurrent Near-Surface (48 ft)	300 ft Upcurrent Mid-depth (25 ft)	150 ft Downcurrent Near-Bottom (28 ft)
Sample Date	9/22/2018	9/22/2018	9/24/2018	9/28/2018	9/28/2018	9/29/2018	9/29/2018	9/29/2018	10/12/2018
Sample Time	12:51	13:00	10:52	14:39	14:46	10:40	10:31	10:57	10:47
Sample Turbidity (NTUs)	5.5	9	8	4.7	4.5	9.3	4.7	4.6	13.3
Background Turbidity (NTUs)	5.2	4.4	4.6	5.6	4.7	4.4	4.6	4.4	1.1
Difference	0.3	4.6	3.4	-0.9	-0.2	4.9	0.1	0.2	12.2

Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]	Result	Q[2]
Dissolved Metals (µg/L)																				
Copper	4.8	3.1	--		--		2.73		--		--		1.13	J	--		--		1.61	J
Lead	210	8.1	--		--		0.5	U	--		--		1.01	U	--		--		1.01	U
Mercury	1.8		--		--		0.02	U	--		--		—[4]		--		--		—[4]	
Zinc	90	81	--		--		6.09	J	--		--		7.56		--		--		12.6	U
Total Metals (µg/L)																				
Mercury		0.025	0.02	U	**0.038**		0.02	U	0.02	U	0.02	U	**0.043**		0.021		**0.032**		0.02	U
PCBs (µg/L)																				
Aroclor 1016	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1221	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1232	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1242	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1248	NE	NE	--		--		0.010	U	--		--		0.013		0.010	U	0.010	U	0.010	U
Aroclor 1254	NE	NE	--		--		0.004	J	--		--		0.014		0.010	U	0.010	U	0.010	U
Aroclor 1260	NE	NE	--		--		0.010	U	--		--		0.004	J	0.010	U	0.010	U	0.010	U
Aroclor 1262	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1268	NE	NE	--		--		0.010	U	--		--		0.010	U	0.010	U	0.010	U	0.010	U
Total PCBs[4]	10	0.03	--		--		0.004	J	--		--		**0.031**	J	0.010	U	0.010	U	0.010	U

Average (Total Hg = 0.024 µg/L) [3] (LMCWQ-056 and LMCWQ-057)

Average (Total Hg = 0.032 µg/L) [3] (LMCWQ-100, LMCWQ-099 and LMCWQ-101)

Average (Total PCBs = 0.014 µg/L) [3] (LMCWQ-100, LMCWQ-099 and LMCWQ-101)

Average (Total Hg [300 ft Upcurrent 9/29 & 9/28] = 0.0232 µg/L) (LMCWQ-089 through LMCWQ-101)

TABLE 15

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Sample ID			LMCWQ-271		LMCWQ-272		LMCWQ-273		LMCWQ-274		LMCWQ-275		LMCWQ-284		LMCWQ-285		LMCWQ-286		LMCWQ-289		LMCWQ-290	
Activity Monitored			Dredging		Dredging		Dredging		Dredging		Dredging		Dredging		Dredging		Dredging		Dredging		Dredging	
Monitoring Location			300 ft Downcurrent Near-Bottom (55 ft)		300 ft Upcurrent Near-Bottom (12 ft)		300 ft Upcurrent Near-Surface (2 ft)		300 ft Downcurrent Mid-depth (27 ft)		300 ft Downcurrent Near-Surface (2 ft)		300 ft Downcurrent Near-Surface (2 ft)		300 ft Downcurrent Near-Bottom (45 ft)		300 ft Downcurrent Mid-depth (23 ft)		300 ft Upcurrent Near-Surface (2 ft)		300 ft Upcurrent Near-Bottom (5.2 ft)	
Sample Date			10/31/2018		10/31/2018		10/31/2018		10/31/2018		10/31/2018		11/1/2018		11/1/2018		11/1/2018		11/1/2018		11/1/2018	
Sample Time			13:32		13:41		13:51		13:58		14:05		13:44		13:50		13:57		14:33		14:41	
Sample Turbidity (NTUs)			11.4		2.5		1.7		10.3		5.4		2.4		2		1.9		1.8		1.9	
Background Turbidity (NTUs)			1.3		2		2		1.5		2		1.6		1.2		1.2		1.7		1.3	
Difference			10.1		0.5		-0.3		8.8		3.4		0.8		0.8		0.7		0.1		0.6	
Analyte	**Acute Criteria[1]**	**Chronic Criteria[1]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**	**Result**	**Q[2]**
Dissolved Metals (µg/L)																						
Copper	4.8	3.1	0.99	J	--		--		--		--		--		--		--		--		--	
Lead	210	8.1	1.01	U	--		--		--		--		--		--		--		--		--	
Mercury	1.8		—[4]		--		--		--		--		--		--		--		--		--	
Zinc	90	81	12.6	U	--		--		--		--		--		--		--		--		--	
Total Metals (µg/L)																						
Mercury		0.025	**0.111**		0.02	U	0.02	U	0.028		0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
PCBs (µg/L)																						
Aroclor 1016	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Aroclor 1221	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Aroclor 1232	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Aroclor 1242	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Aroclor 1248	NE	NE	0.010		--		--		--		--		--		--		--		--		--	
Aroclor 1254	NE	NE	0.011		--		--		--		--		--		--		--		--		--	
Aroclor 1260	NE	NE	0.003	J	--		--		--		--		--		--		--		--		--	
Aroclor 1262	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Aroclor 1268	NE	NE	0.010	U	--		--		--		--		--		--		--		--		--	
Total PCBs[4]	10	0.03	0.024	J	--		--		--		--		--		--		--		--		--	
			Average (Total Hg [300 ft 10/31 & 11/1] = 0.0219 µg/L) [3]																			

TABLE 15

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q[2]	Result	Q[2]
Sample ID			**LMCWQ-276**		**LMCWQ-299**	
Activity Monitored			**Dredging**		**Dredging**	
Monitoring Location			**150 ft Downcurrent Near-Bottom (55 ft)**		**150 ft Downcurrent Near-Bottom (53 ft)**	
Sample Date			**10/31/2018**		**11/3/2018**	
Sample Time			**14:48**		**11:00**	
Sample Turbidity (NTUs)			**39.6**		**15.5**	
Background Turbidity (NTUs)			**1.5**		**1.4**	
Difference			**38.1**		**14.1**	
Dissolved Metals (µg/L)						
Copper	4.8	3.1	0.7	J	0.53	J
Lead	210	8.1	1.01	U	1.01	U
Mercury	1.8		—[4]		—[4]	
Zinc	90	81	12.6	U	12.6	U
Total Metals (µg/L)						
Mercury		0.025	**0.165**		0.021	
PCBs (µg/L)						
Aroclor 1016	NE	NE	0.010	U	0.010	U
Aroclor 1221	NE	NE	0.010	U	0.010	U
Aroclor 1232	NE	NE	0.010	U	0.010	U
Aroclor 1242	NE	NE	0.010	U	0.010	U
Aroclor 1248	NE	NE	0.017		0.035	
Aroclor 1254	NE	NE	0.021		0.037	
Aroclor 1260	NE	NE	0.007	J	0.007	J
Aroclor 1262	NE	NE	0.010	U	0.010	U
Aroclor 1268	NE	NE	0.010	U	0.010	U
Total PCBs[4]	10	0.03	**0.045**	J	**0.079**	J

Bold values exceed one or more of the Aquatic Life Criteria
but may not be an exceedance based on distance from the turbidity generating activity.

Note(s)
1. Criteria obtained from the following:
   a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. USEPA, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
   b. Acute and chronic criteria for metals (except for mercury) are based on the dissolved fraction. The chronic criterion for mercury is based on total recoverable and the acute criterion is based on the dissolved fraction.
   c. Criteria for total PCBs based on total recoverable fraction (USEPA, 2002).
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = analyte positively identified; value is approximate concentration in sample.
3. Average at compliance boundary uses 1/2 Reporting Limit for undetected analytes in calculation.
4. Not analyzed due to insufficient sample volume collected for Method 200.8 and Method 7470A.

Abbreviation(s)
— = not analyzed
ft = feet
Hg = mercury
NE = not established
NTU = nephelometric turbidity unit
PCB = polychlorinated biphenyl
QC = quality control
µg/L = microgram(s) per liter
USEPA = United States Environmental Protection Agency
WAC = Washington Administrative Code

Reference(s)
USEPA (United States Environmental Protection Agency). 2002. National Recommended Water Quality Criteria: 2002. USEPA, Office of Water,

TABLE 16

ANALYTICAL RESULTS FOR AMBIENT WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Sample ID	LMCWQ-320	LMCWQ-321	LMCWQ-322	LMCWQ-323	LMCWQ-324	LMCWQ-325	LMCWQ-326
Activity Monitored	—	—	—	—	—	—	—
Monitoring Location	Ambient (Mouth of West Waterway)	Ambient (Mouth of West Waterway)	Ambient (Elliott Bay 2,000 ft north of project area)	Ambient (Mouth of West Waterway)	Ambient (Mouth of West Waterway)	Ambient (Elliott Bay 2,000 ft north of project area)	Ambient (Elliott Bay 2,000 ft north of project area)
Sample Date	11/7/2018	11/7/2018	11/7/2018	11/8/2018	11/8/2018	11/8/2018	11/8/2018
Sample Time	14:44	14:47	14:51	9:39	10:08	10:16	10:22
Sample Depth	2 ft	46 ft	2 ft	2 ft	40 ft	2 ft	40 ft
Sample Turbidity (NTUs)	3.0	1.6	2.6	3.6	1.2	1.6	1.4
Tide	Flood	Flood	Flood	Ebb	Ebb	Ebb	Ebb

Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]
Dissolved Metals (µg/L)																							
Copper	4.8	3.1	0.88	J		0.82	J		1.12	J		1.15	J		1.88	J		1.72	J		1.61	J	
Lead	210	8.1	1.01	U		1.01	U		1.01	U		1.01	U		1.01	U		1.01	U		1.01	U	
Zinc	90	81	12.6	U		12.6	U		12.6	U		12.6	U		12.6	U		12.6	U		12.60	U	

TABLE 16

ANALYTICAL RESULTS FOR AMBIENT WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 1

Sample ID	LMCWQ-327	LMCWQ-328	LMCWQ-329	LMCWQ-330	LMCWQ-331	LMCWQ-332
Activity Monitored	—	—	—	—	—	—
Monitoring Location	Ambient (Elliott Bay 2,000 ft north of project area)	Ambient (Elliott Bay 2,000 ft north of project area)	Ambient (Mouth of West Waterway)	Ambient (Mouth of West Waterway)	Filter Blank	Filter Blank
Sample Date	11/8/2018	11/8/2018	11/8/2018	11/8/2018	11/12/2018	11/12/2018
Sample Time	13:23	13:27	13:35	13:40	11:34	11:41
Sample Depth	2 ft	40 ft	2 ft	40 ft	—	—
Sample Turbidity (NTUs)	2.2	1.4	2.1	1.4	—	—
Tide	Flood	Flood	Flood	Flood	—	—

Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]	Result	Q1[2]	Q2[2]
Dissolved Metals (µg/L)																				
Copper	4.8	3.1	0.84	J		0.65	J		0.7	J		0.52	J		0.23			0.19		
Lead	210	8.1	1.01	U		1.01	U		1.01	U		1.01	U		0.006	J		0.009	J	
Zinc	90	81	12.6	U		12.6	U		12.6	U		12.6	U		1.13			1.06		

Note(s)

1. Criteria obtained from the following:
    a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. USEPA, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
    b. Acute and chronic criteria for selected metals are based on the dissolved fraction.
2. Laboratory qualifiers (Q1) and data validation qualifiers (Q2) are defined as follows:
    U = analyte not detected at reporting limit presented.
    J = analyte positively identified; value is approximate concentration in sample.

Abbreviation(s)

— = not applicable
ft = feet
NTU = nephelometric turbidity unit
µg/L = microgram(s) per liter
USEPA = United States Environmental Protection Agency
WAC = Washington Administrative Code

Reference(s)

USEPA (United States Environmental Protection Agency). 2002. National Recommended Water Quality Criteria: 2002. USEPA, Office of Water,

TABLE 17

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CONSTRUCTION SEASON 2

	Sample ID		LMCWQ-351		LMCWQ-372		LMCWQ-383		LMCWQ-397	
	Activity Monitored		Dredging		Dredging & Dewatering		Dredging & Dewatering		Dredging & Dewatering	
	Monitoring Location		150 ft Down-Current Near Bottom (51 ft)		150 ft Upcurrent Near Bottom (56 ft)		300 ft Upcurrent Near Surface (2 ft)		150 ft Down-Current Near Bottom (52 ft)	
	Sample Date		9/4/2019		9/6/2019		9/9/2019		9/10/2019	
	Sample Time		13:55		14:45		12:31		13:32	
	Sample Turbidity (NTUs)		2.7		4.1		3.9		9.4	
	Background Turbidity (NTUs)		0.5		1.0		1.6		1.0	
	Difference		2.2		3.1		2.3		8.4	
Analyte	**Acute Criteria[1]**	**Chronic Criteria[1]**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Dissolved Metals (µg/L)										
Copper	4.8	3.1	2.0	U	--		1.3	J	1.0	J
Lead	210	8.1	0.22	J	--		0.30	J	0.15	J
Mercury	1.8		0.020	U	0.020	U	0.020	U	0.02	U
Zinc	90	81	40	U	--		40	U	40	U
Total Metals (µg/L)										
Mercury		0.025	0.020	U	0.020	U	0.013	J	0.011	J
PCBs (µg/L)										
Aroclor 1016	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1221	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1232	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1242	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1248	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1254	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1260	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1262	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Aroclor 1268	NE	NE	0.010	U	0.010	U	0.010	U	0.010	U
Total PCBs[4]	10	0.03	0.010	U	0.010	U	0.010	U	0.010	U

Bold values exceed one or more of the Aquatic Life Criteria but may not be an exceedance based on distance from the turbidity generating activity.

Note(s)

1. Criteria obtained from the following:
   a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. U.S. Environmental Protection Agency, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
   b. Acute and chronic criteria for metals (except for mercury) are based on the dissolved fraction. The chronic criterion for mercury is based on total recoverable and the acute criterion is based on the dissolved fraction.
   c. Criteria for total PCBs based on total recoverable fraction (USEPA, 2002).
2. Laboratory qualifiers (Q) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = analyte positively identified; value is approximate concentration in sample.
3. Average at compliance boundary uses 1/2 Reporting Limit for undetected analytes in calculation.
4. Not analyzed due to insufficient sample volume collected for Method 200.8 and Method 7470A.

Abbreviation(s)

-- = not analyzed
EPA = U.S. Environmental Protection Agency
ft = feet
NE = not established
PCB = polychlorinated biphenyl
Q = qualifier
NTU = nephelometric turbidity unit
µg/L = microgram(s) per liter
WAC = Washington Administrative Code

Reference(s)

USEPA (U.S. Environmental Protection Agency). 2002. National Recommended Water Quality Criteria: 2002. USEPA, Office of Water,

TABLE 18

POST-ENR AND RML PLACEMENT
SEDIMENT SAMPLE PLANNED AND ACTUAL LOCATIONS

	Planned State Plane Coordinates (WA SPC North NAD 83; Survey Feet)		Actual State Plane Coordinates (WA SPC North NAD 83; Survey Feet)	
Location ID[1]	Easting	Northing	Easting	Northing
SD-POST001	1263343	216019	1263347	216025
SD-POST002	1263476	216249	1263476	216247
SD-POST003	1263343	216478	1263349	216481
SD-POST004	1263476	216708	1263479	216709
SD-POST005	1263343	216938	1263336	216945
SD-POST006	1262415	217167	1262417	217165
SD-POST206	1262415	217167	1262414	217171
SD-POST007	1262680	217167	1262682	217161
SD-POST008	1262945	217167	1262942	217172
SD-POST009	1263211	217167	1263212	217167
SD-POST010	1263476	217167	1263472	217171
SD-POST011	1262282	217397	1262290	217401
SD-POST012	1262547	217397	1262554	217399
SD-POST013	1262813	217397	1262810	217399
SD-POST014	1263078	217397	1263079	217392
SD-POST214	1263078	217397	1263079	217392
SD-POST015	1263343	217397	1263342	217400
SD-POST016	1262415	217627	1262417	217626
SD-POST017	1262680	217627	1262677	217626
SD-POST018	1262945	217627	1262947	217628
SD-POST019	1263211	217627	1263199	217627
SD-POST020	1263476	217627	1263475	217628
SD-POST220	1263476	217627	1263482	217627
SD-POST021	1262547	217857	1262545	217860
SD-POST022	1262813	217857	1262817	217863
SD-POST023	1263078	217857	1263074	217847
SD-POST024	1263343	217857	1263345	217859
SD-POST025	1263476	218086	1263473	218090

Note(s)
1. Field-duplicate sample identified by a 200 series location ID (e.g., SD-POST220 for duplicate core collected at location SD-POST020).

Abbreviation(s)
ENR = enhanced natural recovery
NAD = North American Datum
RML = residual management layer
WA SPC = Washington State Plane Coordinates

TABLE 19

ANALYTICAL RESULTS FOR POSTCONSTRUCTION SAMPLES

			Sample ID	SD-POST001	SD-POST002	SD-POST003	SD-POST004	SD-POST005	SD-POST006	SD-POST206 field duplicate	SD-POST007	SD-POST008	SD-POST009	SD-POST010	SD-POST011	SD-POST012	SD-POST013
	Cleanup Criteria		Sample Date	1/22/2020	1/20/2020	1/24/2020	1/22/2020	1/7/2020	2/21/2019	2/21/2019	1/18/2019	2/21/2019	1/7/2020	1/20/2020	11/13/2018	11/13/2018	1/18/2019
	Cleanup Level Subtidal SWAC (0 to 10 cm)	Cleanup Level Surface Sediment (point)	Surface-Weighted Average Concentration (SWAC)														
Conventionals																	
TOC (percent) [1]	—	—		0.02 U	0.02 U	0.04 J	0.02 U	0.02 U	0.05	0.05	0.02 UJ	0.02 U	0.02 U	0.02 U	0.04 J	0.04 J	0.03 J
Metals (mg/kg)																	
Antimony	—	150		0.02 UJ	0.20 UJ	0.19 U	0.20 U	0.20 UJ	0.03 UJ	0.02 J	0.19 UJ	0.19 U	0.02 J	0.21 UJ	0.19 UJ	0.2 UJ	0.19 UJ
Arsenic	7	57	1.8	1.04	1.17	4.22	1.49	1.67	1.83 J	3.77	1.08 J	1.83	3.16	5.59	0.73	1.04	0.59 J
Cadmium	0.398	—	0.05	0.10 U	0.07 J	0.10 U	0.05 J	0.10 U	0.04 J	0.10 U	0.10 U	0.04 J	0.10 U	0.04 J	0.09 U	0.10 U	0.10 U
Chromium	—	260		8.69	22.5 J	6.21	8.14	14.0 J	15.7 J	11.4	8.42 J	5.98	17.5 J	11.2 J	3.93 J	7.05 J	7.17 J
Cobalt	—	10		4.11	3.81	3.63	5.08	4.20	4.25 J	3.32	2.60 J	4.79	4.75	4.28	3.90 J	4.42 J	5.45 J
Copper	114	390	11.7	12.9	5.06 J	12.2	9.28	18.4 J	9.40	9.66	8.87	33.4	10.8 J	16.2 J	11.1 J	13.7 J	5.69
Lead	11	—	1.6	1.05	0.68 J	2.41	0.82	2.52 J	0.52 J	2.13	0.99	1.21	1.43 J	2.18 J	0.57 J	0.63 J	0.45
Mercury	0.41	0.41	0.01	0.0195 U	0.0189 U	0.0182 J	0.0237 U	0.022 U	0.0063 UJ	0.00509 J	0.00665 J	0.0251 J	0.0191 U	0.0246 U	0.00562 J	0.00443 J	0.00666 J
Nickel	—	140		12.5	9.26 J	12.8	26.3	20.1	13.2 J	16.3	10.8	10.7	17.7	17.6 J	9.34 J	11.1 J	12.2
Selenium	—	1		0.50 U	0.49 U	0.62	0.90	0.50 U	0.54	0.53	0.48 U	0.49	0.50 U	0.76	0.47 U	0.49 U	0.48 U
Vanadium	—	57.0		18.4	16.1	20.5	19.1	23.3 J	20.9 J	13.1	15.1 J	17.7	23.7 J	22.5	9.87 J	21.1 J	15.2 J
Zinc	—	410		10.4 U	14.6	17.2 U	15.3 U	21.4	14.3	14.2	17.4	19.7	32.4	25.5	16.9	15.0	22.8
Semivolatile Organic Compounds (µg/kg)																	
Aromatic Hydrocarbons																	
Acenaphthene	—	240		1.15 J	5.00 U	1.83 J	4.97 U	1.32 J	1.45 J	4.68 U	0.73 J	4.64 U	2.06 J	0.62 J	4.91 U	4.97 U	0.85 J
Phenanthrene	—	1500		0.97 UJ	41.9	3.34 UJ	4.97 U	12.5 J	4.80	2.57 J	2.15 J	0.76 J	11.2 U	1.61 J	4.91 U	4.97 U	4.62 U
Fluoranthene	—	2400		0.89 J	21.3	4.95 J	4.97 U	12.8	12.3	7.37	7.52	1.84 J	4.96 J	1.07 J	4.91 U	5.45 U	0.59 J
Benz[a]anthracene [1]	—	1700		5.00 U	2.38 J	2.39 J	4.97 U	2.42 J	5.75 J	19.4	3.45 J	4.64 U	5.00 U	4.99 U	4.91 U	4.97 U	4.62 U
Chrysene [1]	—	1700		5.00 U	3.85 J	2.94 J	4.97 U	5.10	7.22	15.7	3.45 J	4.64 U	2.00 J	4.99 U	4.91 U	2.84 J	4.62 U
Total benzofluoranthenes [1]	—	1800		10.000 U	9.99 U	14.4 J	9.94 U	9.11 J	10.4 J	81.4	7.16 J	9.28 U	9.99 U	9.98 U	3.36 J	6.18 J	9.23 U
Benzo[a]pyrene [1]	—	1500		5.00 U	5.00 U	3.00 J	4.97 U	1.46 J	3.96 J	36.4	2.67 J	4.64 U	5.00 U	4.99 U	4.91 U	2.59 J	4.62 U
Indeno[1,2,3-c,d]pyrene [1]	—	510		5.00 U	5.00 U	3.25 J	4.97 U	4.97 U	1.81 J	18.6	1.40 J	4.64 U	5.00 U	4.99 U	4.91 U	4.97 U	4.62 U
Dibenzo[a,h]anthracene [1]	—	180		5.00 U	5.00 U	3.11 J	4.97 U	4.97 U	5.88	11.5	4.63 U	4.64 U	5.00 U	4.99 U	4.91 U	6.75	4.62 U
Benzo[g,h,i]perylene	470	470	2.4	5.00 U	1.25 J	3.08 J	4.97 U	4.97 U	1.34 J	17.0	1.55 J	4.64 U	5.00 U	4.99 U	4.91 U	4.97 U	4.62 U
Total HPAH	—	14000		2.64 J	48.0 J	41.2 J	9.94 U	54.69 J	55.8	213	31.2 J	3.87 J	13.5 J	2.00 J	3.36 J	23.1 J	1.44 J
cPAHs (µg TEQ/kg dry wt)	9	—	2.7	1.75 U	1.87 J	2.91 J	1.74 U	2.31 J	6.42	49.6	8.24 J	3.50 U	1.70 J	1.75 U	3.55 J	4.41 J	3.49 U
Phthalate Esters																	
Bis[2-ethylhexyl]phthalate	—	710		50.0 U	50.0 U	49.8 U	49.7 U	49.7 U	47.3 U	46.9 U	46.5 U	46.8 U	49.9 U	49.9 U	49.4 U	49.4 U	46.5 U
Ionizable Organic Compounds																	
Pentachlorophenol	58	360	3.1	6.24 U	6.22 U	6.23 U	6.23 U	6.24 U	5.9 U	5.86 U	6.18 U	5.89 U	6.21 U	6.22 U	6.18 U	6.18 U	6.19 U
Organometallics																	
Tributyltin	150,000	—	1.9	3.86 U	3.86 U	3.86 U	3.84 U	0.918 J	3.74 U	3.75 U	1.04 J	3.82 U	0.793 J	3.83 U	0.525 J	2.07 J	3.79 U
Polychlorinated Biphenyls (µg/kg)																	
Total PCBs	2	180	1.6	2.0 U	2.0 U	2.0 U	2.0 U	8.5 J	2.0 U	2.0 U	2.0 U	2.0 U	2.6 J	2.0 U	2.0 U	0.90 J	2.0 U
Dioxins/Furans (ng/kg)																	
Total TEQ Dioxins/Furans (ND=1/2 EDL)	2	—	0.1	0.253	0.187	0.254 J	0.252	0.282 J	0.106 J	0.069	0.067	0.077 J	0.259 J	0.253	0.064 J	0.090	0.041 J

TABLE 19

ANALYTICAL RESULTS FOR POSTCONSTRUCTION SAMPLES

			Sample ID	SD-POST014	SD-POST214 field duplicate	SD-POST015	SD-POST016	SD-POST017	SD-POST018	SD-POST019	SD-POST020	SD-POST220 Field Duplicate	SD-POST021	SD-POST022	SD-POST023	SD-POST024	SD-POST025
	Cleanup Criteria		Sample Date	1/7/2020	1/7/2020	1/7/2020	11/13/2018	11/13/2018	1/18/2019	1/7/2020	1/22/2020	1/20/2020	11/13/2018	1/18/2019	1/18/2019	1/20/2020	1/22/2020
	Cleanup Level Subtidal SWAC (0 to 10 cm)	Cleanup Level Surface Sediment (point)	Surface-Weighted Average Concentration (SWAC)														
Conventionals																	
TOC (percent) [1]	—	—		0.02 U	0.02 U	0.02 U	0.04 J	0.04 J	0.05 J	0.02 U	0.02 U	0.02 U	0.03 J	0.06 J	0.07 J	0.03 J	0.02 U
Metals (mg/kg)																	
Antimony	—	150		0.05 J	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.04 UJ	0.20 UJ	0.19 U	0.27 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U
Arsenic	7	57	1.8	2.53	2.50	1.47	1.84	1.10	1.53 J	2.61	0.89 J	2.29 J	1.68	1.49 J	0.74 J	2.09	1.36
Cadmium	0.398	—	0.05	0.10 U	0.05 J	0.05 J	0.04 J	0.1 U	0.04 J	0.1 U	0.05 J	0.14 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Chromium	—	260		24.4 J	23.8 J	9.08 J	16.6 J	3.06 J	3.21 J	10.7 J	6.99	20.6 J	4.63 J	7.59 J	4.03 J	4.82 J	9.46
Cobalt	—	10		5.16	5.22	3.86	3.52 J	2.38 J	2.13 J	3.09	3.90 J	3.07 J	3.25 J	2.29 J	2.10 J	3.35	2.77
Copper	114	390	11.7	43.8 J	17.0 J	12.2 J	15.7 J	3.76 J	9.40	9.92 J	5.79 J	20.6 J	10.4 J	5.05	3.70	11.4 J	7.04
Lead	11	—	1.6	24.5 J	1.79 J	1.32 J	1.47 J	0.59 J	1.43	1.11 J	0.58 J	3.06 J	1.11 J	0.66	1.21	0.63 J	1.14
Mercury	0.41	0.41	0.01	0.014 J	0.00706 J	0.0169 J	0.00598 J	0.013 J	0.00578 J	0.02 U	0.0548 J	0.0242 U	0.0231 U	0.00573 J	0.00555 J	0.0223 U	0.0251 J
Nickel	—	140		20.3	18.5	13.5	24.2 J	5.32 J	4.81	18.0	12.3	13.5 J	8.55 J	10.4	5.47	6.62 J	8.74
Selenium	—	1		0.49 U	0.56	0.49 U	0.45 J	0.49 U	0.47 U	0.48 J	0.48 U	0.79	0.49 U	0.5 U	0.51 U	0.65	0.51 U
Vanadium	—	57.0		25.8 J	27.1 J	23.5 J	16.3 J	7.05 J	10.2 J	20.1 J	17.5	14.6	13.7 J	12.1 J	7.04 J	17.8	15.3
Zinc	—	410		33.2	28.3	20.7	33.6	10.2	14.3	14.4	13.6 U	18.7	13.4	14.0	9.60	12.2	11.9 U
Semivolatile Organic Compounds (µg/kg)																	
Aromatic Hydrocarbons																	
Acenaphthene	—	240		5.00 U	5.00 U	5.00 U	4.7 U	4.97 U	4.62 UJ	4.98 U	4.98 U	4.98 U	4.97 U	4.64 UJ	4.60 UJ	4.96 U	4.96 U
Phenanthrene	—	1500		6.07 U	3.38 UJ	0.91 UJ	6.43	4.97 U	4.62 U	1.52 UJ	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	1.06 J	4.96 U
Fluoranthene	—	2400		14.9	7.00	1.59 J	13.3 U	5.73 U	0.60 J	1.03 J	4.98 U	4.98 U	4.08 UJ	0.48 J	0.81 J	4.96 U	4.96 U
Benz[a]anthracene [1]	—	1700		5.27	2.78 J	5.00 U	6.87	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	4.96 U	4.96 U
Chrysene [1]	—	1700		7.29	3.38 J	5.00 U	7.09	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	4.96 U	4.96 U
Total benzofluoranthenes [1]	—	1800		18.0	6.12 J	10.0 U	18.5	3.58 J	9.24 U	9.97 U	9.96 U	9.95 U	3.67 J	9.28 U	9.19 U	9.92 U	9.93 U
Benzo[a]pyrene [1]	—	1500		6.19	2.31 J	5.00 U	7.76	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	4.96 U	4.96 U
Indeno[1,2,3-c,d]pyrene [1]	—	510		3.62 J	5.00 U	5.00 U	4.43 J	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	4.96 U	4.96 U
Dibenzo[a,h]anthracene [1]	—	180		5.00 U	5.00 U	5.00 U	6.97	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	6.71	4.64 U	4.60 U	4.96 U	4.96 U
Benzo[g,h,i]perylene	470	470	2.4	4.21 J	2.59 J	5.00 U	4.92	4.97 U	4.62 U	4.98 U	4.98 U	4.98 U	4.97 U	4.64 U	4.60 U	4.96 U	4.96 U
Total HPAH	—	14000		71.78 J	34.8 J	3.38 J	67.5 J	6.51 J	0.60 J	2.23 J	9.96 U	9.95 U	13.0 J	0.48 J	0.81 J	9.92 U	9.93 U
cPAHs (µg TEQ/kg dry wt)	9	—	2.7	4.29 J	1.96 J	1.75 U	11.5 J	3.61 J	3.49 U	1.74 U	1.74 U	1.74 U	4.04 J	3.5 U	3.47 U	1.74 U	1.74 U
Phthalate Esters																	
Bis[2-ethylhexyl]phthalate	—	710		49.9 U	49.9 U	49.7 U	49.8 U	49.7 U	46.4 U	49.9 U	49.8 U	49.9 U	49.9 U	46.0 U	42.4 J	49.7 U	49.9 U
Ionizable Organic Compounds																	
Pentachlorophenol	58	360	3.1	6.25 U	6.24 U	6.21 U	6.23 U	6.17 U	6.21 U	6.22 U	6.24 U	6.25 U	6.21 U	6.23 U	6.19 U	6.23 U	6.17 U
Organometallics																	
Tributyltin	150,000	—	1.9	8.31	0.682 J	3.86 U	1.1 J	3.74 U	3.79 U	3.8 U	3.82 U	3.84 U	3.81 U	3.75 U	3.78 U	3.86 U	3.85 U
Polychlorinated Biphenyls (µg/kg)																	
Total PCBs	2	180	1.6	8.9	2.0 U	2.0 U	2.2 J	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.9 J	2.0 U	2.0 U	2.0 U	2.0 U
Dioxins/Furans (ng/kg)																	
Total TEQ Dioxins/Furans (ND=1/2 EDL)	2	—	0.1	0.460 J	0.196 J	0.083	0.091 J	0.053	0.054	0.259	0.251	0.170	0.053 J	0.042 J	0.058	0.252	0.158 U

Note(s)
1. All results presented in dry weight because TOC values are below 0.5 percent.

Data Qualifier(s)
J = Result is estimate
U = The analyte is not detected above the reporting limit

Abbreviation(s)
cm = centimeter(s)
cPAH = carcinogenic polycyclic aromatic hydrocarbon
EDL = estimated detection limit
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram(s) per kilogram
ND = non detected
ng/kg = nanogram(s) per kilogram
PCB = polychlorinated biphenyl
SWAC = surface-weighted average concentration
TEQ = toxic equivalency quotient
µg TEQ/kg dry wt = microgram(s) TEQ per kilogram dry weight
TOC = total organic carbon
µg/kg = microgram(s) per kilogram

TABLE 20

PERIMETER SEDIMENT SAMPLING PLANNED AND ACTUAL LOCATIONS

Planned Location			Pre-Construction Actual Location			Post-Construction Actual Location		
	State Plane Coordinates (WA SPC North NAD 83; Survey Feet)			State Plane Coordinates (WA SPC North NAD 83; Survey Feet)			State Plane Coordinates (WA SPC North NAD 83; Survey Feet)	
Location ID	Easting	Northing	Location_ID	Easting	Northing	Location_ID	Easting	Northing
SD-PERXX-001	1262138	217174	SD-PER18-001	1262137	217177	SD-PER20-001	1262135	217176
SD-PERXX-002	1262170	217377	SD-PER18-002	1262169	217372	SD-PER20-002	1262166	217376
SD-PERXX-003	1262273	217525	SD-PER18-003	1262269	217522	SD-PER20-003	1262268	217524
SD-PERXX-004	1262371	217677	SD-PER18-004	1262378	217671	SD-PER20-004	1262377	217677
SD-PERXX-005	1263605	218168	SD-PER18-005	1263613	218167	SD-PER20-005	1263596	218170
SD-PERXX-006	1263597	217818	SD-PER18-006	1263595	217810	SD-PER20-006	1263598	217819
SD-PERXX-206	1263597	217818	SD-PER18-007	1263591	217463	SD-PER20-007	1263583	217468
SD-PERXX-007	1263588	217468	SD-PER18-008	1263587	217117	SD-PER20-008	1263584	217116
SD-PERXX-008	1263580	217118	SD-PER18-009	1263572	216761	SD-PER20-009	1263565	216770
SD-PERXX-009	1263571	216768	SD-PER18-010	1263502	216421	SD-PER20-010	1263506	216412
SD-PERXX-010	1263503	216418	SD-PER18-006	1263600	217818	SD-PER20-006	1263590	217821

Abbreviation(s)
NAD = North American Datum
WA SPC = Washington State Plane Coordinates

TABLE 21

ANALYTICAL RESULTS FOR PRE- AND POSTCONSTRUCTION PERIMETER MONITORING SEDIMENT SAMPLES

Sample Location	SD-PERXX-001		SD-PERXX-002		SD-PERXX-003		SD-PERXX-004		SD-PERXX-005		SD-PERXX-006	
	SD-PER18-001	SD-PER20-001	SD-PER18-002	SD-PER20-002	SD-PER18-003	SD-PER20-003	SD-PER18-004	SD-PER20-004	SD-PER18-005	SD-PER20-005	SD-PER18-006	SD-PER20-006
Sample Date	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020
Metals (mg/kg)												
Arsenic	4.14	18.1	2.82	3.51	1.59	2.82	2.72	1.58	3.72	4.40	9.28	7.73 J
Chromium	22.7	48.7	10.9	16.8	10.4	11.7	10.9	14.8	12.2	12.0	21.5	18.6
Cobalt	4.14	4.41	3.89	2.95	3.72	4.44	3.37	2.95	4.45	4.17	6.18	5.66
Copper	21.7	48.7 J	14.5	19.3 J	14.2	20.0 J	11.5	6.18 J	18.1	25.4 J	58.2	107 J
Lead	8.76	35.0	5.13	9.32	7.55	5.41	4.72	1.43	6.01	15.7	42.3	32.0 J
Mercury	0.0154 J	0.0701 J	0.0271 U	0.127 J	0.0213 U	0.0602 J	0.00746 J	0.0253 J	0.0268 J	0.168 J	0.746 J	0.721 J
Nickel	15.5	15.7	11.3	12.8	9.47	15.2	12.2	11.9	9.98	8.90	15.2	13.6
Selenium	0.55 U	0.82	0.60 U	0.66	0.56 U	0.58	0.57 U	0.48 U	0.70 U	0.76	0.84	0.82
Vanadium	26.5	24.8	25.6	21.5	18.2	31.1	23.3	16.7	32.6	29.1	41.5	37.7
Zinc	46.3	128	28.5	29.1	25.2	37.8	25.1	18.0	44.6	42.2	84.7	69.4
Semivolatile Organic Compounds (µg/kg)												
Aromatic Hydrocarbons												
Acenaphthene	18.0	230	2.24 J	12.0	0.92 J	1.56 J	2.71 J	4.97 U	2.42 J	4.39 J	24.6 J	18.1
Phenanthrene	220 J	1130	19.1	52.3	6.54 J	11.8	12.2 J	4.97 U	19.9 J	35.7	165 J	116
Fluoranthene	782	5860	20.1	94.2	18.8	28.2	15.6	0.62 J	23.7	71.2	214 J	182
Benz[a]anthracene	513	1750	12.0	55.5	8.13	12.4	7.16	4.97 U	14.9	36.9	80.0 J	68.3
Chrysene	756	2050	19.2	79.7	12.0	18.6	11.5	4.97 U	23.2	56.5	105 J	97.5
Total benzofluoranthenes	837	2120	34.2	123	19.8	43.4	20.7	9.95 U	33.1	113	253 J	247
Benzo[a]pyrene	340	852	12.9	54.6	7.00	16.9	8.53	4.97 U	14.6	50.2	124	117
Indeno[,2,3-c,d]pyrene	129	361	7.71	28.9	4.50 J	12.4	6.26	4.97 U	10.3	33.9	72.9	71.8
Dibenzo[a,h]anthracene	46.9	139 J	3.18 J	11.0	1.37 J	3.40 J	1.92 J	4.97 U	3.26 J	11.3	21.8	18.2
Benzo[g,h,i]perylene	133	268	11.2	34.4	7.66	15.3	9.46	4.97 U	13.3	41.5	96.4	93.3
Pyrene	297	4040	14.9	86.1	15.9	33.1	15	0.71 J	28.5	85.1	330 J	264
Total HPAH	3,834	17,301 J	135 J	567	95.2 J	184 J	96.1 J	1.33 J	165 J	500	1,297 J	1,159
Phthalate Esters												
Bis[2-ethylhexyl]phthalate	84.5	49.2 J	48.6 U	50.0 U	49.0 U	49.9 U	48.6 U	49.9 U	49.5 U	30.7 J	29.3 J	41.6 J
Ionizable Organic Compounds												
Pentachlorophenol	6.02 U	6.25 U	6.02 U	6.23 U	6.14 U	6.25 U	6.10 U	6.21 U	6.17 U	6.24	24.0 J	10.6
Polychlorinated Biphenyls (µg/kg)												
Total PCBs	7.5 J	58.7 J	4.1 J	52.2	4.9 J	24.0	5.0	2.0 U	8.0	36.0	87.7 J	133

TABLE 21

ANALYTICAL RESULTS FOR PRE- AND POSTCONSTRUCTION PERIMETER MONITORING SEDIMENT SAMPLES

Sample Location	SD-PERXX-206 field duplicate of SD-PER18-006		SD-PERXX-007		SD-PERXX-008		SD-PERXX-009		SD-PERXX-010	
	SD-PER18-206 field duplicate of SD-PER18-006	SD-PER20-206 field duplicate of SD-PER20-006	SD-PER18-007	SD-PER20-007	SD-PER18-008	SD-PER20-008	SD-PER18-009	SD-PER20-009	SD-PER18-010	SD-PER20-010
Sample Date	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020	8/20/2018	3/26/2020
Metals (mg/kg)										
Arsenic	8.15	12.8 J	7.68	3.16	16.3	3.17	5.31	5.43	11.7	18.2
Chromium	17.7	17.3	16.3	8.94	11.3	25.0	12.6	14.3	20.3	27.7
Cobalt	6.22	6.35	5.86	3.13	4.47	5.70	4.21	3.48	4.87	5.51
Copper	58.7	65.7 J	38.7	12.0 J	28.9	18.7 J	32.8	43.9 J	72.8	117 J
Lead	43.3	50.5 J	17.7	1.79	16.9	5.41	17.1	15.6	56.5	62.3
Mercury	0.93 J	0.668 J	0.162	0.0225 U	0.136	0.262 J	0.195	0.325 J	0.390	0.756 J
Nickel	15.7	12.9	13.5	14.4	8.98	16.6	8.49	12.1	11.7	13.7
Selenium	0.71 J	0.81	0.86	0.54	0.68 U	0.56	0.70 U	0.57 U	0.70 U	0.78
Vanadium	41.4	39.0	43.9	19.9	30.8	21.6	34.2	21.7	33.4	35.8
Zinc	78.3	118	53.7	16.4	52.0	33.3	46.6	45.5	102	125
Semivolatile Organic Compounds (µg/kg)										
Aromatic Hydrocarbons										
Acenaphthene	37.1 J	11.7	11.8 J	4.99 U	8.08 J	2.78 J	15.4 J	2.2 J	15.3 J	26.5
Phenanthrene	206 J	78.5	87.1 J	1.86 J	59.0 J	15.2	85.1 J	16.8	131 J	180
Fluoranthene	252	122	132	2.98 J	89.6	23.9	122	38.2	187	373
Benz[a]anthracene	85.2	59.0	54.2	3.01 J	42.6	12.2	47.0	14.4	108	180
Chrysene	106	80.7	72.9	3.92 J	63.1	15.2	60.5	18.4	150	223
Total benzofluoranthenes	279	168	135	7.41 J	127	42.8	134	37.7	304	480
Benzo[a]pyrene	143	83.9	66.7	3.39 J	62.1	18.7	67.2	16.8	153	219
Indeno[,2,3-c,d]pyrene	81.5	52.3	39.0	2.19 J	35.0	13.1	38.0	11.7	93.9	132
Dibenzo[a,h]anthracene	24.3	15.2	13.1	4.99 U	10.4	4.46 J	12.0	3.37 J	31.2	42.3
Benzo[g,h,i]perylene	107	64.5	52.9	4.77 J	47.6	15.1	51.9	14.1	119	150 J
Pyrene	392	181	180	3.74 J	121	36.2	149	40.4	250	465
Total HPAH	1,470	827	746	31.4 J	598	182 J	682	195 J	1,396	2,264 J
Phthalate Esters										
Bis[2-ethylhexyl]phthalate	45.3 J	53.7	61.3	50.0 U	44.6 J	49.7 U	101	36.7 J	124	281
Ionizable Organic Compounds										
Pentachlorophenol	6.24 U	17.5 J	6.20 U	6.19 U	6.19 U	6.62 U	6.19 U	5.51 J	16.1	38.4
Polychlorinated Biphenyls (µg/kg)										
Total PCBs	72 J	119 J	43.3 J	2.0 U	42.7	14.8	56.1	35.0	423 J	350.1 J

Note(s)
U = This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
J = Estimated concentration value detected below the reporting limit.

Abbreviation(s)
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram(s) per kilogram
PCB = polychlorinated biphenyl
µg/kg = microgram(s) per kilogram

TABLE 22

HEALTH AND SAFETY INCIDENT AND NEAR-MISS LOG

No.	Area	Inspection Date	Deficiency Code	Suspension Date	Deficiency Description	Action/Work Order: Short-Term Corrective Actions	Action/Work Order: Long-Term Preventive Actions	Point of Contact	Reporting Person	Company of Reporting Person	Comments
1	Project Office	10/30/2018	1	10/31/2018	Proper PPE was not used during cutting of metal sample tubes. No face shield and secondary ear protection.	Purchased ear protection and safety shield		Alec Anderson	Alec Anderson	Wood	AHA for the activity was modified
2	Outer Harbor	11/1/2018	24	11/2/2018	Sampling boat radio communication was crossed over during barge movement, preventing communication with operators	Sampling boat will not access radio during barge movement	Sampling boat will not access radio during barge movement	Alec Anderson	Matt Moldenhauer	ACC	The problem was discussed with boat crew
3	Project Office	12/3/2018	5		Slippery surface on dock surface with icy conditions and wet surfaces	Safety boots and training	Install mats or traction control over wood surface	Alec Anderson	Alec Anderson	Wood	
4	Project Office	12/14/2018	1	12/14/2018	Personnel within the restriction zone of the edge of the dock without PFD	Speak to personnel about PFD requirements		Alec Anderson	Lindsey Baumann	Jacobs	Unclear of personnel's company
5	Project Office	12/21/2018	4	1/2/2019	Core barrel rolled over on personnel's hand during transportation	Stopped using core barrel cart	Purchase new cart for carrying core barrels	Alec Anderson	Alec Anderson	Wood	
6	Outer Harbor	12/27/2018	1	1/2/2019	Personnel on top of crane didn't have hardhat and protective glasses	Spoke with personnel about proper PPE	Update AHA for activity	Alec Anderson	Lindsey Baumann	Jacobs	
7	Outer Harbor	1/14/2019	4	1/14/2019	Improper walkway used for access to the barge. Open walkway placed at steep angle with no handrails	Remove walkway and used a ladder	Training on proper use of walkway equipment	Alec Anderson	Alec Anderson	Wood	
8	Pier edge	9/3/2019	17		"Cletus" float was installed at pier adjacent to ladder so no safe ascent/descent route was available	Jim Stan spoke with Rod Gowdy about the issue, RG replied that it will be moved	Observe that ACC moves float to a safe location	Chelsea Foster	Chelsea Foster	Wood	
9	Outer Harbor	9/3/2019	1		Two ACC workers were observed spray painting on the Dungeness barge without safety glasses	Jim Stan informed workers that they were required to wear safety glasses in that area/during that task	Workers will be observed to ensure they are wearing proper PPE	Jim Stan	Chelsea Foster	Wood	
10	Project Office	9/4/2019	4		During morning meeting, ACC worker leaned on table in field office and it gave way, the worker sustained his balance and stood up as the table broke	Tell workers to not put their weight on foldable tables	Fix table but make sure it is used properly going forward	Stu Bills	Chelsea Foster	Wood	
11	Outer Harbor	9/4/2019	18		Water quality crew member sustained sun burn on neck due to high UV ray conditions	Treat sun burn with moisturizing cream and protective clothing	Wear SPF or protective clothing to prevent future event	Luke Kerner	Chelsea Foster	Wood	
12	Outside of trailer	9/5/2019	5		Piece of garbage on ground caused worker to slip and fall, no injury was sustained	picked up garbage	Watch footing around site, wear closed toe, good grip shoes	Chelsea Foster	Rich May	DOF	
13	Outside project trailer	9/9/2019	19		Cones and barrier tape marking 6 feet distance from edge of pier were moved during the mid-morning	SSHO repositioned barriers to mark correct 6 feet safety distance	Check that these portable barriers are correctly positioned each workday	Chelsea Foster	Chelsea Foster	Wood	
14	Outer Harbor	9/12/2019	14		Worker was seen jumping on a silt bag on the edge of the barge. The act was done in order to loosen sediment to keep up flow through the bag during dewatering.	Workers were instructed not to perform this task until an AHA has been completed.	An AHA will be created and reviewed by all participating parties to complete the task more safely.	Chelsea Foster	Jim Stan	Wood	

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15	Outer Harbor	9/13/2019	14		Worker was adjusting connection of the digging bucket to the crane for use and climbed outside of the railing to perform task. This put the worker above 6 feet off the ground without any fall protection.	Jim Stan of Wood corrected the action when the worker was back on the ground safely. ACC Superintendent was also informed of the occurrence	Workers should stay within railing whenever possible to complete task. If not possible, a fall protection harness must be used.	Chris Raymond	Jim Stan	Wood	
16	Outer Harbor	9/13/2019	14		Worker was repainting a portion of the crane to protect from weathering and leaned out past a railing above 6 feet off the ground. The worker exposed them self to a fall hazard when completing this maintenance task.	Chris Raymond of ACC spoke with worker to warn them of the offense and let them know it was an unsafe act	Workers should stay within railing whenever possible to complete task. If not possible, a fall protection harness must be used	Chris Raymond	Jim Stan	Wood	
17	Outside project trailer	9/17/2019	18	9/18/2019	Eye wash station was not setup during core barrel processing	Located the eye wash station and setup in the connex	Eye station in position in Connex	Alec Anderson	Alec Anderson	Wood	
18	Barge	9/18/2019	7	9/19/2019	Air lines do not have whip check	Install whip check on lines	install whip check on lines	Chris Raymond	Alec Anderson	Wood	
19	Barge	9/18/2019	24	9/19/2019	No emergency contact list or route to hospital	Provide list and route map for emergencies	Provide list and route map for emergencies	Alec Anderson	Alec Anderson	Wood	
20	Project Trailers	9/19/2019	1	9/20/2019	Field staff was not wearing face shield during cutting of core barrel.	Purchased face shield for sediment core processing	Update AHA for activity	Alec Anderson	Alec Anderson	Wood	
21	Project Trailers	9/19/2019	4	9/20/2019	Not stabilizing the casing on the saw horses	Retraining on cutting of the core barrel with one person stabilizing core barrel	Update AHA for activity and retraining with competent person	Alec Anderson	Piper Peterson	EPA	
22	Project Trailers	9/19/2019	6	9/20/2019	Trip hazards in the core processing connex	Retraining on housekeeping and reorganize the connex	Housekeeping in AHA	Alec Anderson	Piper Peterson	EPA	Notified by Email
23	Project Trailers	9/19/2019	4	9/20/2019	Remove the casing guide on the circular saw for bent cores	Retraining on cutting bent core barrels with competent person	Update AHA for activity and retraining with competent person	Alec Anderson	Piper Peterson	EPA	Notified by Email
24	Barge	9/24/2019	18	10/1/2019	Need double leak protection for air compressor	Order new containment for air compressor	Verify that other equipment has double containment	Chris Raymond	Chris Raymond	American	
25	Project Trailers	9/24/2019	11	9/24/2019	Loading zone near site has forklifts and truck traffic	Reroute foot traffic to the east of the building to avoid hazard	Training in the weekly meeting	Alec Anderson	Alec Anderson	Wood	
26	Barge	9/24/2019	24	10/3/2019	Sign posted on top of crane for areas that require fall protection	Install signs on crane for hazard	Inform workers of new signage	Alec Anderson	Chris Raymond	American	
27	Barge	10/4/2019	12	10/8/2019	No Smoking signs are not located on the dredge barge near gas tanks	Notify Barge workers of unsafe smoking areas	Post no smoking signs in hazardous areas	Alec Anderson	Alec Anderson	Wood	
28	WM Site	10/7/2019	24	10/7/2019	No safety protocol for WM site access	Discuss Safety protocol with WM crew for site access and notify field staff	Notify project staff of access requirements	Alec Anderson	Alec Anderson	WOOD	
29	WQ Boat	10/8/2019	11	10/8/2019	Water quality boat was on the water during a thunderstorm	Retreat under the West Seattle bridge until the storm passed	Monitor storm conditions throughout the day	Alec Anderson	Alec Anderson	Wood	

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30	Barge	10/15/2019	1	10/15/2019	Oversight believed they saw a tug boat crew member without a hard hat during a barge swap	American assured that the crew member had correct PPE, but reminded Island Tug	Notify subcontractor of correct PPE on site	Alec Anderson	Mark Endo	Jacobs	
31	WQ Boat	10/16/2019	24	10/18/2019	Water quality crew didn't have a proper AHA for night work and equipment was not purchased for operations	Update AHA and purchase new equipment	Implement new AHA in tailgate meeting	Alec Anderson	Piper Peterson	EPA	
32	Sampling Boat	10/28/2019	24	10/30/2019	Core sampling boat didn't have radio contact with the Mukilteo barge due to a dead battery on the radio	Contact barge crew via cellphone	Test radios at the marina during start-up procedure	Alec Anderson	Alec Anderson	Wood	
33	Barge	10/28/2019	17	10/31/2019	Personnel accessed the barge from the survey boat without the proper 3 points of contact across the barge fenders	Correct location of the landing survey boat to between the fender	Tailgate meeting about access to the barge	Alec Anderson	Jimmy Yeager	LMC	
34	Palouse	10/31/2019	24	11/5/2019	Emergency contacts and routes to the nearest hospital/ care facility are not posted on board	Print out contact list and maps for job shack	Print out contact list and maps for job shack	Alec Anderson	Alec Anderson	Wood	
35	Palouse	10/31/2019	6	12/5/2019	No Smoking signs are not located on the dredge barge near gas tanks	Post signs on the barge	Post signs on the barge	Alec Anderson	Alec Anderson	Wood	
36	Palouse	10/31/2019	14	12/5/2019	Fall protection signs required on spud tower	Post signs on access points to fall protection area	Post signs on access points to fall protection area	Alec Anderson	Alec Anderson	Wood	
37	Patriot	12/5/2019	24	12/10/2019	Emergency contacts and routes to the nearest hospital/ care facility are not posted on board	Inform crew of emergency procedures	Post emergency routes and phone numbers	Alec Anderson	Alec Anderson	Wood	
38	Patriot	12/5/2019	9	12/10/2019	Expired Fire Extinguishers on board under the crane	Removed fire extinguisher and additional fire extinguisher within 20 feet of location	Check all extinguishers	Alec Anderson	Alec Anderson	Wood	
39	Barge	12/20/2019	6	12/23/2019	Crew boat had high water levels inside the boat due to heavy rainfall and it was unstable when loading crew	Pump out water in the boat with hand pump and monitor water levels inside the boat	Replace bilge pump in boat	Alec Anderson	Alec Anderson	Wood	
40	Patriot	12/27/2019	9	1/10/2020	Loader on the material barge does not have fire extinguisher	Notify crew of deficiency and explain the risk of no extinguisher	Install new fire extinguisher	Alec Anderson	Alec Anderson	Wood	

Abbreviation(s)
AHA = activity hazard assessment
LMC = Lockheed Martin Corporation
PFD = personal flotation device
PPE = personal protective equipment
SSHO = site health and safety officer
WQ = water quality

Deficiency Code (s)
1. PPE Violation
4. Improper use of equipment
5. Trip Hazard
6. House Keeping
7. Guarding
9. Fire Extinguishers
11. Struck By
12. Fire Hazard
14. Fall Protection
17. Access/Egress
18. Health
19. Signs and Barricades
24. Communication

APPENDICES
(Provided Separately on DVD)

Appendix A—Design Drawings

Appendix B—Daily Construction Reports

Appendix C—Significant Memos

Appendix D—Weekly Construction Meetings

Appendix E—Quality Assurance Inspection and Testing Reports

Appendix F—Backfill Material Testing and Approval

Appendix G—Dredged Material Management Unit Approvals

Appendix H—Core Summary Logs

Appendix I—Decision Unit Geospatial Interpolations

Appendix J—Open-Water Dredging As-Built Drawings and Shoreline Stabilization

Appendix K—Data Validation Reports

Appendix L—Data Used in the Geospatial Interpolation of the Contiguous Areas of DUs 3, 4, 5, 6, 7, 8, and 9

Appendix M—Sheet Pile Wall Deformation Monitoring

Appendix N—Shipway Rock Buttress and Fill Drawings

Appendix O—Shipway Concrete Slab Backfill Memo

Appendix P—Shipway Fill As-Builts

Appendix Q—Disposal Barge Displacements, Bills of Lading, Transload Certificate of Disposal Forms, Gondola Tracking Records, Off-Site Disposal Requests and Approvals

Appendix R—Weekly Water Quality Monitoring Reports

Appendix S—Health and Safety Reports

Appendix T—Pre-Final and Final Construction Inspections

Appendix U—Institutional Control Implementation and Assurance Plan

Appendix V—Long-Term Monitoring and Maintenance Plan