UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 10

IN THE MATTER OF: Portland Harbor Superfund Site Portland, Multnomah County, Oregon Daimler Trucks North America LLC, Vigor Industrial LLC, Cascade General, Inc., and Shipyard Commerce Center LLC Respondents; Maritime Administration; United States Coast Guard; United States General Services Administration; Bonneville Power Administration; and United States Department of Defense Settling Federal Agencies; and the State of Oregon, acting by and through the Oregon Department of State Lands; City of Portland; and the Port of Portland, Settling Public Entities. Proceeding Under Sections 104, 107, and 122 of the Comprehensive, Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9607 and 9622	CERCLA Docket No. 10-2021-001 **ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR REMEDIAL DESIGN AT THE SWAN ISLAND BASIN PROJECT AREA**

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent (Settlement) is entered into voluntarily by the United States Environmental Protection Agency (EPA) and Daimler Trucks North America LLC, Vigor Industrial LLC, Cascade General, Inc., and Shipyard Commerce Center LLC (collectively, Respondent(s)); Maritime Administration, U.S. Coast Guard, U.S. General Services Administration, Bonneville Power Administration and U.S. Department of Defense (DOD) (collectively, Settling Federal Agencies or SFAs); and the State of Oregon, acting by and through the Department of State Lands (Department of State Lands or DSL), the City of Portland, and the Port of Portland (collectively, Settling Public Entities). This Settlement provides for the performance by the Respondents of 100% Remedial Design (RD) for the Swan Island Project Area as further described by the attached Statement of Work and the payment by Respondents of certain response costs incurred by the EPA pursuant to this Settlement, and by the Oregon Department of Environmental Quality and the Tribal Governments, pursuant to separate written agreements, at or in connection with the Work conducted under this Settlement, related to the selected remedy for the in-river portion of the Portland Harbor Superfund Site (the Site).

2. This Settlement is issued under the authority vested in the President of the United States by Sections 104, 107, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9607, and 9622 (CERCLA). This authority was delegated to the EPA Administrator on January 23, 1987, by Executive Order 12580, 52 Fed. Reg. 2923 (Jan. 29, 1987), and further delegated to the EPA Regional Administrators by EPA Delegation Nos. 14-14-C (Administrative Actions Through Consent Orders, Jan. 18, 2017) and 14-14-D (Cost Recovery Non-Judicial Agreements and Administrative Consent Orders, Jan. 18, 2017). This authority has been re-delegated by the Region 10, Regional Administrator (Regional Administrator) to the Region 10, Director, Superfund and Emergency Management Division, and Program Managers thereunder by EPA Delegations R10 14-14-C and 14-14-D (April 15, 2019).

3. In accordance with Section 122(j)(1) of CERCLA, 42 U.S.C. § 9622(j)(1), EPA notified the natural resource trustees for the Portland Harbor Site of negotiations with Respondents regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal trusteeship and encouraged the trustees to participate in the negotiation of this Settlement consistent with the process agreed to in the 2001 Memorandum of Understanding related to the Site.

4. EPA and Respondents recognize that this Settlement has been negotiated in good faith and that the actions undertaken by Respondents and the payments made by the United States on behalf of the SFAs and by Settling Public Entities in accordance with this Settlement do not constitute an admission of any liability. Respondents, SFAs, and Settling Public Entities do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement, the validity of the findings of facts, conclusions of law, and determinations in Sections V (Findings of Fact) and VI (Conclusions of Law and Determinations) of this Settlement. Respondents, SFAs, and Settling Public Entities agree to comply with and be bound by the terms of this Settlement and further agree that they will not contest the basis or validity of this Settlement or its terms. Respondents, the United States on behalf of the SFAs, and Settling Public Entities have agreed to share the costs of the Work to be performed under this Settlement solely to

facilitate the Work. This cost-sharing does not represent an assessment by Respondents or the Settling Public Entities of their liability, if any, for releases of hazardous substances within the Site or the Swan Island Basin Project Area or the equitable allocation of response costs associated with the Site or the Swan Island Basin Project Area.

II. PARTIES BOUND

5. This Settlement is binding upon EPA and upon Respondents and their successors and assigns, the United States on behalf of the SFAs, and the Settling Public Entities. Any change in ownership or corporate status of a Respondent including, but not limited to, any transfer of assets or real or personal property, shall not alter such Respondent's responsibilities under this Settlement.

6. Respondents are jointly and severally liable for carrying out all activities required by this Settlement. In the event of the insolvency or other failure of any Respondent to implement the requirements of this Settlement, the remaining Respondents shall complete all such requirements. Respondents are not jointly and severally liable for the SFAs' or the Settling Public Entities' requirements under this Settlement. SFAs and Settling Public Entities are not jointly or severally liable for Respondents' requirements under this Settlement.

7. Each undersigned representative of a Respondent, SFA, and Settling Public Entity certifies that she or he is fully authorized to enter into the terms and conditions of this Settlement and to execute and legally bind that Respondent, SFA, and Settling Public Entity to this Settlement.

8. Respondents shall provide a copy of this Settlement to each contractor hired to perform the Work required by this Settlement and to each person representing any Respondent with respect to the Work, and shall condition all contracts entered into under this Settlement on performance of the Work in conformity with the terms of this Settlement. Respondents or their contractors shall provide written notice of the Settlement to all subcontractors hired to perform any portion of the Work required by this Settlement. Respondents shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work in accordance with the terms of this Settlement.

III. STATEMENT OF PURPOSE

9. The purpose of this Settlement is to implement 100% RD at the Swan Island Basin Project Area as described in the attached SOW, including area-specific pre-remedial design sampling and related investigation to inform later RD. EPA signed a Record of Decision (ROD) for the Site on January 3, 2017, that selected Remedial Actions (RA) for the in-river portion of the Site from approximately river miles (RMs) 1.9 to 11.8. The ROD provides information about how Site data will influence pre-remedial investigation, RD, remedial construction, and future maintenance of remediated areas. The ROD states that the actual technologies assigned during RD will be dependent on a number of area-specific characteristics and environmental conditions to ensure that the final constructed remedy is appropriate for area-specific conditions, *e.g.*, Sediment Management Areas (SMAs). The ROD also identifies post-ROD and RD sampling activities that will support and refine the Site's Conceptual Site Model (CSM) to implement RD and RA. Data collected since the ROD as part of the Portland Harbor Pre-Remedial Design Investigation (Harbor-wide PDI) and Baseline Sampling Study (AECOM and Geosyntec, 2019) has been approved by EPA. EPA-approved Site

data will be used to refine SMAs, select appropriate remedial technologies, and identify any uncontrolled sources of recontamination.

IV. DEFINITIONS

10. Unless otherwise expressly provided in this Settlement, terms used in this Settlement that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement or its attached appendices, the following definitions shall apply:

"Account" shall mean an interest-bearing banking or trust account that exists or is established by Respondents with EPA named as a beneficiary, and identified as holding public funds at a depository qualified to hold public funds under ORS 295.002, for purposes of depositing and holding funds paid to Respondents by SFAs and Settling Public Entities for Work, EPA Future Response Costs, ODEQ Response Costs, and Tribal Response Costs under this Settlement.

"Affected Property" shall mean all real property at the Swan Island Basin Project Area and any other real property where EPA determines, at any time, that access or land, water, or other resource use restrictions are needed to implement the Work under this Settlement.

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9601-9675.

"Day" or "day" shall mean a calendar day. In computing any period of time under this Settlement, where the last day would fall on a Saturday, Sunday, or federal or State holiday, the period shall run until the close of business of the next working day.

"Effective Date" shall mean the effective date of this Settlement as provided in Section XXIX.

"EPA" shall mean the United States Environmental Protection Agency and its successor departments, agencies, or instrumentalities.

"EPA Hazardous Substance Superfund" shall mean the Hazardous Substance Superfund established by the Internal Revenue Code, 26 U.S.C. § 9507.

"EPA Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the EPA incurs in reviewing or developing deliverables submitted pursuant to this Settlement for the Swan Island Basin Project Area, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this Settlement, including but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Section IX (Property Requirements) (including, but not limited to, cost of attorney time and any monies paid to secure or enforce access or land, water, or other resource use restrictions, including, but not limited to, the amount of just compensation, ¶ 73 (Work Takeover), ¶ 17 (Emergencies and Releases), ¶ 99 (Access to Financial Assurance), ¶ 18 (Community Involvement (including the costs of any technical assistance grant under Section 117(e) of CERCLA, 42 U.S.C. §9617(e)), and the costs incurred

by the United States in enforcing the terms of this Settlement, including all costs incurred in connection with Dispute Resolution pursuant to Section XIV (Dispute Resolution) and all reasonable litigation costs. EPA Future Response Costs shall also include, but not be limited to, direct and indirect costs paid or incurred by EPA, prior to the Effective Date, in connection with negotiating this Settlement and charged to account 10SW beginning on September 15, 2020, and account 10TC beginning on September 1, 2020. EPA Future Response Costs shall not include the costs of EPA oversight or data collected by EPA concerning any other response action or Settlement Agreement associated with the Site or other activities that do not specifically pertain to this Settlement including the implementation of the attached SOW. EPA Future Response Costs shall not include costs incurred by SFAs or costs incurred by any department, instrumentality, or agency of the United States that are not related to overseeing and/or performing the Work.

"Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year. Rates are available online at https://www.epa.gov/superfund/superfund-interest-rates.

"National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

"Non-Settling Owner" shall mean any person, other than Respondents, Settling Federal Agencies, or Settling Public Entities, that owns or controls any Affected Property. The phrase "Non-Settling Owner's Affected Property" means Affected Property owned or controlled by Non-Settling Owner.

"ODEQ" shall mean the Oregon Department of Environmental Quality and any successor departments or agencies of the State.

"ODEQ Response Costs" shall mean all direct and indirect costs that ODEQ incurs in coordinating and consulting with EPA in conjunction with EPA's planning and implementation of this Settlement to implement the SOW. ODEQ Response Costs are only those costs incurred to fulfill the requirements of this Settlement, including review of plans, reports, and assessments prepared pursuant to this Settlement, and scoping, planning, and negotiating this Settlement, but excluding any costs related to natural resource damages assessments, liability, or restoration. ODEQ Responses Costs are only those costs not inconsistent with the NCP, 40 C.F.R. Part 300, and are recoverable response costs pursuant to Sections 104 and 107 of CERCLA, 42 U.S.C. §§ 9604 and 9607. ODEQ Response Costs shall not include the costs of oversight or data gathered by ODEQ concerning any other response action or settlement agreement associated with the Site or other activities that do not specifically pertain to this Settlement.

"Owner Respondent" shall mean a Respondent who owns or controls some of the Affected Property. The phrase "Owner Respondent's Affected Property" means Affected Property owned or controlled by Owner Respondent.

"Owner Settling Public Entity" shall mean a Settling Public Entity who owns or controls some of the Affected Property. The phrase "Owner Settling Public Entity's Affected Property" means Affected Property owned or controlled by Owner Settling Public Entity.

"Paragraph" or "¶" shall mean a portion of this Settlement identified by an Arabic numeral or an upper- or lower-case letter.

"Parties" shall mean EPA, Respondents, SFAs, and the Settling Public Entities.

"Performance Standards" or "PS" shall mean the cleanup levels and other measures of achievement of the remedial action objectives, as set forth in the ROD.

"Portland Harbor Special Account" shall mean the special account within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3), through prior settlements related to the Site.

"Portland Harbor Superfund Site" or "Site" for purposes of this Settlement shall mean the in-river portion of the site in Portland, Multnomah County, Oregon listed on the National Priorities List (NPL) on December 1, 2000 (65 Fed. Reg. 75179-01) and for which a final remedy was selected in the January 2017 ROD. As described in the ROD, the Site extends in-river from approximately river mile (RM) 1.9 to 11.8 and includes certain riverbanks from the top of the bank to the river.

"RCRA" shall mean the Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992 (also known as the Resource Conservation and Recovery Act).

"Record of Decision" or "ROD" shall mean the EPA Record of Decision relating to the Site, signed on January 3, 2017, by the Administrator of EPA, all attachments thereto and any subsequent ROD amendment or Explanation of Significant Differences. A copy of the ROD can be found at https://semspub.epa.gov/work/10/100036257.pdf.

"Remedial Action" or "RA" shall mean the remedial action selected in the ROD.

"Remedial Design" or "RD" shall mean those remedial design activities to be undertaken to develop the final plans and specifications for the RA as stated in the SOW depicted as the Swan Island Basin Project Area on the map attached as Appendix B and as more specifically defined by the SOW, attached as Appendix A.

"Respondents" shall mean Daimler Trucks North America LLC and Vigor Industrial LLC and its affiliates Cascade General, Inc. and Shipyard Commerce Center LLC (collectively, Vigor).

"Section" shall mean a portion of this Settlement identified by a Roman numeral.

"Settlement" shall mean this Administrative Settlement Agreement and Order on Consent, the attached Statement of Work and all other appendices attached hereto (listed in Section XXV (Integration/Appendices)). In the event of conflict between this Settlement and any appendix, this Settlement shall control.

"Settling Federal Agencies" or "SFAs" shall mean the Maritime Administration, United States Coast Guard, United States General Services Administration, Bonneville Power Administration, and the United States Department of Defense. The Department of Defense (DOD) means the United States Department of Defense as described in 10 U.S.C. § 111, and its predecessor and successor departments, agencies, or instrumentalities.

"Settling Public Entities" shall mean the State of Oregon, acting by and through the Department of State Lands, the City of Portland, and the Port of Portland.

"Statement of Work" or "SOW" shall mean the document describing the activities Respondents have agreed to perform, which is attached as Appendix A.

"Supervising Contractor" shall mean the principal contractor retained by Respondents to supervise and direct the implementation of the Work under this Settlement.

"Swan Island Basin Project Area" or "Project Area" for purposes of this Settlement shall mean the active cleanup area designated on Figure 31d of the ROD between approximately River Mile 8.1 and River Mile 9.2 on the northeast side of the Willamette River, and more specifically depicted on the map attached as Appendix B to the Settlement. The Project Area is approximately 1.1 miles in length, 117 acres in size, and includes all riverbanks from top of the bank to the river.

"Transfer" shall mean to sell, assign, convey, lease, mortgage, or grant a security interest in, or where used as a noun, a sale, assignment, conveyance, or other disposition of any interest by operation of law or otherwise.

"Tribal Governments" shall mean the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. References to "Tribal Governments" in this Settlement may be a reference to an individual tribe, the tribes collectively, or some combination thereof.

"Tribal Response Costs" shall mean all direct and indirect costs that the Tribal Governments and their employees, agents, contractors, consultants and other authorized representatives incur in coordinating and consulting with EPA in conjunction with EPA's planning and implementation of this Settlement. Tribal Response Costs are only those costs incurred to fulfill the requirements of this Settlement, including review of plans, reports, and assessments prepared pursuant to this Settlement; but excluding any costs related to natural resource damages assessments, liability, or restoration. Tribal Response Costs are those costs that are not inconsistent with the NCP, 40 C.F.R. Part 300, and are recoverable response costs pursuant to Sections 104 and 107 of CERCLA, 42 U.S.C. §§ 9604 and 9607. Tribal Response

Costs shall not include the costs of oversight or data gathered by Tribal Governments concerning any other response action or settlement agreement associated with the Site or other activities that do not specifically pertain to this Settlement.

"United States" shall mean the United States of America and each department, agency, and instrumentality of the United States, including EPA, SFAs, and any federal natural resource trustee.

"Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any "hazardous substance" under ORS 465.200 *et seq*.

"Work" shall mean all activities and obligations Respondents have agreed will be performed under this Settlement to complete RD for design of the remedy that will be implemented within the Swan Island Basin Project Area including delineation of the SMA, implementation of area-specific pre-remedial design sampling, and application of the ROD technology decision tree in a manner that will ensure that the remedy is appropriate for actual area-specific characteristics, pursuant to the SOW as described in Appendix A and under this Settlement, except those required by Section XI (Record Retention).

V. FINDINGS OF FACT

11. Based on available information and investigation, EPA has found the following, which Respondents, SFAs, and Settling Public Entities neither admit nor deny:

a. Historical industrial, commercial, agricultural, and municipal practices and releases of contaminants dating back to the early 1900s contributed to the observed chemical distribution of sediments within the Site. Historical sources responsible for the existing contamination include, but are not limited to: ship building, repair and dismantling; wood treatment and lumber milling; storage of bulk fuels and manufactured gas plant (MGP) waste; chemical manufacturing and storage; metal recycling, production and fabrication; steel mills, smelters and foundries; electrical production and distribution; municipal combined sewer overflows; and stormwater from industrial, commercial, transportation, residential and agricultural land uses. Operations that continue to exist today include: bulk fuel storage; barge building; ship repair; automobile scrapping; recycling; steel manufacturing; cement manufacturing; operation and repair of electrical transformers; and many smaller industrial operations, as well as other commercial, agricultural, and municipal practices.

b. On December 1, 2000, the Portland Harbor Superfund Site was listed on the National Priorities List due mainly to concerns about contamination in the sediments and the potential risks to human health and the environment from consuming fish. The most widespread contaminants found at the Site include, but are not limited to, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and dioxins/furans.

c. In 2001, EPA entered into a Memorandum of Understanding for the Portland Harbor Site (the MOU) with the Oregon Department of Environmental Quality (ODEQ), National Oceanic and Atmospheric Administration within the Department of Commerce, the United States Fish and Wildlife Service within the Department of the Interior, the Oregon Department of Fish and Wildlife and the Tribal Governments. The MOU, among other things, established the roles and responsibilities between EPA and ODEQ on managing the upland and in-river portions of the Site and set up a framework for technical and legal coordination among EPA and the Natural Resource Trustees; and relative to the Tribal Governments it sought to acknowledge the federal government's consultation requirements concerning the Portland Harbor Superfund Site, and to ensure the Tribal Governments' participation in the response actions at the Portland Harbor Superfund Site.

d. The Tribal Governments have treaty-reserved rights and resources and other rights, interests, or resources in the Site. The National Oceanic and Atmospheric Administration, the United States Department of the Interior, the Oregon Department of Fish & Wildlife, and the Tribal Governments are designated Natural Resource Trustees overseeing the assessment of natural resource damages at the Site. To the extent practicable, EPA intends that the Work under this Settlement will be conducted so as to be coordinated with any natural resource damage assessment and restoration of the Swan Island Basin Project Area. EPA intends to provide the Tribal Governments and the federal and state Natural Resource Trustees an opportunity to review and comment on plans, reports, and other deliverables submitted by Respondent(s) to EPA under this Settlement.

e. A Site-wide remedial investigation and feasibility study (RI/FS) was initiated in 2001, and completed in 2017. As part of the RI/FS, baseline human health and ecological risk assessments were conducted to estimate the current and future effects of contaminants in sediments, surface water, groundwater seeps, and fish tissue on human health and the environment. The risk assessments provided the basis for taking action and identified the contaminants of potential concern (COPCs) and exposure pathways that the remedial action should address.

f. The baseline human health risk assessment (BHHRA) estimated cancer risks and noncancer health hazards from exposures to a set of chemicals in sediments (both beach and in-river), surface water, groundwater seeps, and fish tissue from samples collected at the Site.

g. The baseline ecological risk assessment (BERA) estimated risks to aquatic and aquatic-dependent species exposed to hazardous substances associated with the in-river portion of the Site.

h. The BHHRA and BERA concluded that contamination within the Site poses unacceptable risks to human health and the environment from numerous contaminants of potential concern in surface water, groundwater, sediment, and fish tissue. The selected remedy reduced the COPCs to 64 contaminants of concern (COCs) that contribute the most significant amount of risk to the human and ecological receptors. See ROD, Appendix II, Tables 1–5.

i. A subset of the COCs, called focused COCs, was developed in order to simplify analysis and develop and evaluate remedial alternatives for the Site. The focused COCs include PCBs, PAHs, dioxins and furans, and DDx; and they contribute the most significant amount of site-wide risk to human and ecological receptors.

j. PCBs are classified as probable human carcinogens. Children exposed to PCBs may develop learning and behavioral problems later in life. PCBs are known to impact the human immune system and skin, especially in children, and may cause cancer in people. Nursing infants can be exposed to PCBs in breast milk. PCBs can also bioaccumulate in fish, shellfish, and mammals. In birds and mammals, PCBs can cause adverse effects such as anemia and injuries to the liver, stomach, and thyroid gland.PCBs also can cause problems with the immune system, behavioral problems, and impaired reproduction.

k. PAHs are human health and ecological COCs. PAHs are suspected human carcinogens with potential to cause lung, skin, and bladder cancers with occupational exposure. Animal studies show that certain PAHs affect the hematopoietic, immune, reproductive and neurologic systems and cause developmental effects. They can cause inhibited reproduction, delayed emergence, sediment avoidance, and mortality. In fish, PAHs cause liver abnormalities and impairment of the immune system.

l. Dioxins and furans are human health and ecological COCs. Toxic effects in humans include reproductive problems, problems in fetal development or early childhood, immune system damage, and cancer. Nursing infants can be exposed to dioxins and furans in breast milk. Dioxins and furans can bioaccumulate in fish, shellfish, and mammals. Animal effects include developmental and reproductive problems, hemorrhaging, and immune system problems.

m. DDx, which represents collectively DDT and its primary breakdown products dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethene (DDE), are human health and ecological COCs. DDT is considered a possible human carcinogen. DDT and DDE are stored in the body's fatty tissues. In pregnant women, DDT and DDE can be passed to the fetus. Nursing infants can be exposed to DDx in breast milk. Laboratory animal studies showed effects on the liver and reproduction. These compounds can accumulate in fish, shellfish and mammals and can cause adverse reproductive effects such as eggshell thinning in birds.

n. The ROD requires active remediation (dredging, capping, and enhanced natural recovery) at areas exceeding the remedial action levels (RALs) for the focused COCs and contaminated riverbanks adjacent to some of those areas, referred to as Sediment Management Areas (SMAs). The ROD provides that areas with sediment contamination below the RALs but above final cleanup levels (approximately 1,774 acres) may recover naturally within a reasonable timeframe while areas within Swan Island Lagoon will require enhanced natural recovery (approximately 28 acres). The ROD estimated the remedial actions at the Site would take 13 years to construct. *See* ROD, Appendix II, Tables 17 and 21, and Errata #2 for the Portland Harbor Superfund Site ROD Table 17 (January 14, 2020). On December 9, 2019, EPA issued an Explanation of Significant differences (ESD) to document changes to: the sediment cleanup levels (CULs), target tissue level for shellfish, and principal threat waste threshold for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) measured as benzo(a)pyrene equivalents (BaP Eq); and the remedial action level (RAL) for total polycyclic aromatic hydrocarbons (PAHs). These changes were made pursuant to a toxicological update prepared under the EPA's Integrated Risk Information System (IRIS) program that resulted in a revised oral cancer slope factor.

o. In December 2017, EPA entered an Administrative Settlement Agreement and Order on Consent for Pre-Remedial Design Investigation and Baseline Sampling with certain parties to fulfill certain data needs identified in the ROD. In June 2019, the results of the PreRemedial Design and Baseline Sampling were presented to EPA. The data from the PreRemedial Design and Baseline Sampling, accepted for use by EPA, will be used in the development of the remedial design for the Swan Island Basin Project Area.

p. Respondent Daimler Trucks North America LLC (Daimler) (formerly Freightliner Corporation) is primarily engaged in the manufacture and assembly of heavy-duty trucks in North America. Respondent Daimler currently owns and operates properties near and adjacent to the Swan Island Basin Project Area from which there may have been releases of certain COCs to the Swan Island Basin portion of the Willamette River, including two industrial heavy-duty truck assembly facilities, a wind tunnel facility, and a number of commercial building properties. Daimler also formerly owned and operated properties within the Swan Island Basin Project Area at the time of disposal of hazardous substances at the Site. Although numerous other potentially responsible parties own or operate, or have owned or operated, facilities at or near the Swan Island Basin Project Area, from which hazardous substances have been allegedly released, Respondent Daimler has agreed to step forward to jointly perform the Work with the other Respondent and in cooperation with the SFAs and Settling Public Entities.

q. Respondents Vigor Industrial LLC and Cascade General, Inc. are operators at the Portland Shipyard. Respondent Shipyard Commerce Center LLC is owner of the Portland Shipyard. The Portland Shipyard is located on the northern tip of the Swan Island peninsula, parts of which are within the Swan Island Basin Project Area. There have been documented releases of certain COCs from the Portland Shipyard into the Willamette River and the Swan Island Basin.

r. Settling Public Entity, the State of Oregon, acting by and through the Department of State Lands, currently owns or manages, and has owned or managed, at the time of disposal of hazardous substances at the Site, certain submerged lands held in trust by the State of Oregon within the Portland Harbor Superfund Site, including within the Swan Island Basin Project Area.

s. Settling Public Entity, City of Portland, currently owns or manages, and has owned or managed,property, including City stormdrains and outfalls, within the Swan Island Basin and broader Portland Harbor Superfund Site, during which time disposal of hazardous substances has occurred.

t. Settling Public Entity, Port of Portland, currently owns or manages, and has owned or managed, property within the Portland Harbor Superfund Site, including within the Swan Island Basin Project Area, during which time disposal of hazardous substances has occurred.

u. The Maritime Administration and its predecessor agencies leased property within the Swan Island Basin Project Areas for construction and operation of a shipyard, and contracted for the repair and maintenance of Maritime Administration-owned ships within the Portland Harbor Superfund Site, including the Swan Island Basin Project Area, at the time of disposal of a hazardous substance at the Site.

v. The United States Coast Guard currently owns or operates its Marine Safety Office on property near the Swan Island Basin Project Area within the Portland Harbor Superfund Site, and has owned and operated that property at the time of disposal of a hazardous substance at the Site, including within the Swan Island Basin Project Area. Current and past operations at that property include administrative and training activities and the docking and maintenance of watercraft.

w. The United States General Services Administration, through its predecessor agencies, leased and then subleased the shipyard within the Swan Island Basin Project Area for several years and owned other properties within the Site at the time of disposal of a hazardous substance at the Site.

x. The Bonneville Power Administration, owns one property from which releases of hazardous substances have occurred, and historically owned or operated the Pennwalt substation, within the Portland Harbor Superfund Site at the time of disposal of a hazardous substance at the Site.

y. The United States Department of Defense, through the Department of the Navy, currently owns or operates a naval reserve facility at the Portland Harbor Superfund Site, near the Swan Island Basin Project Area, at the time of disposal of a hazardous substance at the Site. Current and past operations at the naval reserve facility include administrative and training activities, as well as some motor vehicle and small boat maintenance. Additionally, the United States Department of Defense, through the Department of the Navy, historically owned a dry dock within the Swan Island Basin Project Area and contracted for the repair and maintenance of Navy-owned ships within the Portland Harbor Superfund Site, including the Swan Island Basin Project Area, at the time of disposal of a hazardous substance.

z. The United States Department of Defense, through the U.S. Army Corps of Engineers, has conducted operations within the Portland Harbor Superfund Site at certain United States-owned properties adjacent to the river, at the time of disposal of a hazardous substance at the Site.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

12. Based on the Findings of Fact set forth above and the administrative record, EPA makes the following conclusions of law and determinations, which Respondents, SFAs, and Settling Public Entities neither admit nor deny:

a. The Portland Harbor Superfund Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site, as identified in the Findings of Fact above, includes "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each Respondent, SFA, and Settling Public Entity is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Each Respondent, SFA, and Settling Public Entity is alleged by EPA to be a responsible party under Section 107(a)(1) or Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(1) or (2).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility as defined by Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

f. The RD required by this Settlement as defined in the SOW is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement, will be consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VII. SETTLEMENT AGREEMENT AND ORDER

13. Based upon EPA's Findings of Fact, Conclusions of Law, and Determinations set forth above, and the administrative record for the Site, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement, including, but not limited to, all appendices to this Settlement and any amendments or modifications to this Settlement. Settling Public Entities agree to comply with the provisions of this Settlement that establish requirements for the Settling Public Entities. The United States on behalf of the SFAs agrees to comply with those provisions that establish requirements for SFAs.

VIII. PERFORMANCE OF THE WORK

14. **Coordination and Supervision**

a. **Project Coordinators**.

(1) Respondents' Project Coordinator must have sufficient technical expertise to coordinate the Work. Respondents' Project Coordinator may not be an attorney representing any Respondent in this matter and may not act as the Supervising Contractor. Respondents' Project Coordinator may assign other representatives, including other contractors, to assist in coordinating the Work.

(2) EPA's designated Project Coordinator is Elisabeth Novak, a Remedial Project Manager in Region 10's Superfund and Emergency Management Division. EPA may designate other representatives, which may include its employees, contractors and/or consultants, to oversee the Work. EPA's Project Coordinator will have the same authority as a remedial project manager and/or an on-scene coordinator, as described in the NCP. This includes the authority to halt the Work and/or to conduct or direct any necessary response action when he or she determines that conditions at the Site constitute an emergency or may present an immediate threat to public health or welfare or the environment due to a release or threatened release of Waste Material.

(3) Respondents' Project Coordinator shall meet monthly with EPA's Project Coordinator in person, by telephone, or other electronic means, unless

Respondents' Project Coordinator and EPA's Project Coordinator agree upon a different schedule.

b. **Supervising Contractor.** Respondents' proposed Supervising Contractor must have sufficient technical expertise to supervise the Work and a quality assurance system that complies with ASQ/ANSI E4:2014, "Quality management systems for environmental information and technology programs - Requirements with guidance for use" (American Society for Quality, February 2014).

c. **Procedures for Disapproval/Notice to Proceed**

(1) Respondents shall designate, and notify EPA, within 10 days after the Effective Date, of the name(s), title(s), contact information, and qualifications of Respondents' proposed Project Coordinator and Supervising Contractor, whose qualifications shall be subject to EPA's review for verification based on objective assessment criteria (*e.g.,* experience, capacity, technical expertise) and do not have a conflict of interest with respect to the project.

(2) EPA shall issue notices of disapproval and/or authorizations to proceed regarding the proposed Project Coordinator and Supervising Contractor, as applicable. If EPA issues a notice of disapproval, Respondents shall, within 30 days, submit to EPA a list of supplemental proposed Project Coordinators and/or Supervising Contractors, as applicable, including a description of the qualifications of each. EPA shall issue a notice of disapproval or authorization to proceed regarding each supplemental proposed coordinator and/or contractor. Respondents may select any coordinator/contractor covered by an authorization to proceed and shall, within 21 days, notify EPA of Respondents' selection.

(3) Respondents may change their Project Coordinator and/or Supervising Contractor, as applicable, by following the procedures of ¶¶ 14.c(1) and 14.c(2).

15. **Performance of Work in Accordance with SOW.** Respondents shall develop the RD in accordance with the SOW and all EPA-approved, conditionally approved, or modified deliverables as required by the SOW. All deliverables required to be submitted for approval under the Settlement or SOW shall be subject to approval by EPA in accordance with ¶ 5.5 (Approval of Deliverables) of the SOW**.**

16. **Relationship to other work at the Portland Harbor Superfund Site.** While all approved data, including baseline data will be considered, all final decisions regarding RD at the Project Area, including delineation of SMAs, implementation of any sampling necessary for design, and application of the ROD's technology matrix, will be made under this Settlement and this SOW.

17. **Emergencies and Releases**. Respondents shall comply with the emergency and release response and reporting requirements required in ¶ 3.12 of the SOW. Subject to Section XVII (Covenants by EPA), nothing in this Settlement, including ¶ 3.12 of the SOW, limits any authority of EPA to perform the following: (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste

Material on, at, or from the Swan Island Basin Project Area, or (b) to direct or order such action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Swan Island Basin Project Area. If, due to Respondents' failure to take appropriate response action under ¶ 3.12 of the SOW, EPA takes such action instead, Respondents shall reimburse EPA under Section XIII (Payment of Response Costs) for all costs of the response action.

18. **Community Involvement**. If requested by EPA, Respondents shall conduct community involvement activities regarding the Work under EPA's oversight as provided for in, and in accordance with, Section 2 (Community Involvement) of the SOW. Such activities may include, but are not limited to, designation of a Community Involvement Coordinator. Costs incurred by EPA under this Section constitute EPA Future Response Costs to be reimbursed under Section XIII (Payment for Response Costs).

19. **Modification of SOW or Related Deliverables**

a. If EPA determines that it is necessary to modify the work specified in the SOW and/or in deliverables developed under the SOW in order to carry out the RD, then EPA may notify Respondents of such modification. Any oral modification will be memorialized by EPA promptly, but shall have as its effective date the date of EPA's Project Coordinator's oral direction. Any such modification must be in accordance with Section III (Statement of Purpose), provided that EPA retains its authority under ¶ 17 (Emergencies and Releases). If Respondents object to the modification they may, within 30 days after EPA's notification, seek dispute resolution under Section XIV (Dispute Resolution).

b. The SOW and/or related work plans shall be modified, as follows: (1) in accordance with the modification issued by EPA; or (2) if Respondents invoke dispute resolution, in accordance with the final resolution of the dispute. The modification shall be incorporated into and enforceable under this Settlement, and Respondents shall implement all work required by such modification. Respondents shall incorporate the modification into the deliverable required under the SOW, as appropriate.

c. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions as otherwise provided in this Settlement and to the extent consistent with Section III (Statement of Purpose) and the Work.

IX. PROPERTY REQUIREMENTS

20. **Agreements Regarding Access and Non-Interference.** Respondents shall, with respect to any Non-Settling Owner's Affected Property, use best efforts to secure from such Non-Settling Owner an agreement, enforceable by Respondents and the EPA, providing that such Non-Settling Owner, and Owner Respondent or Owner Settling Public Entity shall, with respect to their Affected Property: (i) provide EPA, DEQ, the Respondents , and their representatives, contractors, and subcontractors with access at all reasonable times to such Affected Property to conduct any activity regarding the Settlement, including those activities listed in ¶ 20.a (Access Requirements); and (ii) refrain from using such Affected Property in any manner that EPA determines will pose an unacceptable risk to human health or to the environment due to exposure to Waste Material, or that

interferes with or adversely affects the implementation or integrity of the Work under this Settlement. Respondents shall provide a copy of such access and use restriction agreement(s) to EPA.

a. **Access Requirements.** The following is a list of activities for which access is required regarding the Affected Property:

(1) Monitoring the Work;

(2) Verifying any data or information submitted to the United States;

(3) Conducting investigations regarding contamination at or near the Swan Island Basin Project Area;

(4) Obtaining samples;

(5) Assessing the need for, planning, implementing, or monitoring response actions;

(6) Assessing implementation of data management and institutional controls defined in the approved data management work plan and ICIAP as provided in the SOW;

(7) Implementing the Work pursuant to the conditions set forth in ¶ 73 (Work Takeover);

(8) Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Respondents or their agents, consistent with Section X (Access to Information);

(9) Assessing Respondents' compliance with the Settlement;

(10) Determining whether the Affected Property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the Settlement; and

(11) Implementing, monitoring, maintaining, reporting on, and enforcing any land, water, or other resource use restrictions regarding the Affected Property needed to accomplish the Work.

21. **Best Efforts**. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Respondents would use so as to achieve the goal in a timely manner, including the cost of employing professional assistance and the payment of reasonable sums of money to secure access, as required by this Section. If Respondents are unable to accomplish what is required through "best efforts" in a timely manner, they shall notify EPA, and include a description of the steps taken to comply with the requirements. If EPA deems it appropriate, it may assist Respondents, or take independent action, in obtaining such access. All costs incurred by EPA the United States Department of Justice in providing such assistance or taking such action, including

the cost of attorney time and the amount of monetary consideration or just compensation paid, constitute EPA Future Response Costs to be reimbursed under Section XIII (Payment of Response Costs).

22. If EPA determines in a decision document prepared in accordance with the NCP that institutional controls in the form of state or local laws, regulations, ordinances, zoning restrictions, or other governmental controls or notices are needed, Respondents shall cooperate with EPA's efforts to secure and ensure compliance with such institutional controls.

23. In the event of any Transfer of the Affected Property, unless EPA otherwise consents in writing, Respondents shall continue to comply with its obligations under the Settlement, including their obligation to secure access.

24. **Notice to Successors-in-Title**. Prior to entering into a contract to Transfer its Affected Property, or 60 days prior to Transferring its Affected Property, whichever is earlier, Owner Respondent or Owner Settling Public Entity shall do the following: (a) Notify the proposed transferee that EPA has determined that an RD must be performed at the Swan Island Basin Project Area, that potentially responsible parties have entered into an Administrative Settlement Agreement and Order on Consent requiring implementation of such RD, (identifying the name, docket number, and the effective date of this Settlement); and (b) Notify EPA of the name and address of the proposed transferee and provide EPA with a copy of the above notice that it provided to the proposed transferee. The Department of State Lands may satisfy the requirements of ¶ 24(a) and (b) by providing transferee with notice in or with a DSL-issued use authorization that constitutes a "Transfer" under this provision and by providing EPA both the name and address of the transferee and a copy of the above notice.

25. Notwithstanding any provision of the Settlement, EPA retains all of its access authorities and rights, as well as all of its rights to require land, water, or other resource use restrictions, including enforcement authorities related thereto under CERCLA, RCRA, and any other applicable statute or regulations.

X. ACCESS TO INFORMATION

26. Respondents shall provide to EPA, upon request, copies of all records, reports, documents and other information (including records, reports, documents and other information in electronic form) (hereinafter referred to as "Records") within their possession or control or that of its contractors or agents relating to activities at the Swan Island Basin Project Area or to the implementation of this Settlement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work. Respondents will provide to the U.S. Department of Justice on behalf of the SFAs, upon request, any documents described in this paragraph.

27. **Privileged and Protected Claims**

a. Respondents may assert all or part of a Record requested by EPA is privileged or protected as provided under federal law, in lieu of providing the Record, provided Respondents comply with ¶ 27.b, and except as provided in ¶ 27.c.

b. If Respondents assert such a privilege or protection, they shall provide EPA with the following information regarding such Record: its title; its date; the name, title, affiliation (*e.g.*, company or firm), and address of the author, of each addressee, and of each recipient; a description of the Record's contents; and the privilege or protection asserted. If a claim of privilege or protection applies only to a portion of a Record, Respondents shall provide the Record to EPA in redacted form to mask the privileged or protected portion only. Respondents shall retain all Records that it claims to be privileged or protected until EPA has had a reasonable opportunity to dispute the privilege or protection claim and any such dispute has been resolved in Respondents' favor.

c. Respondents may make no claim of privilege or protection for the following information: (1) any data regarding the Swan Island Basin Project Area collected in performing the Work under this Settlement, including, but not limited to, all sampling, analytical, monitoring, hydrogeological, scientific, chemical, radiological, or engineering data, or the portion of any other Record that evidences conditions at or around the Swan Island Basin Project Area; or (2) the portion of any Record that Respondents are required to create or generate pursuant to this Settlement.

28. **Business Confidential Claims**. Respondents may assert that all or part of a Record provided to EPA under this Section or Section XI (Record Retention) is business confidential to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Respondents shall segregate and clearly identify all Records or parts thereof submitted under this Settlement for which Respondents assert business confidentiality claims. Records claimed as confidential business information will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to EPA, or if EPA has notified Respondent(s) that the Records are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such Records without further notice to Respondents.

29. Notwithstanding any provision of this Settlement, EPA retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

XI. RECORD RETENTION

30. Until 10 years after completion of the Remedial Action, Respondents shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in their possession or control or that come into their possession or control that relate in any manner to its liability under CERCLA with respect to the Site, provided, however, that a Respondent who is potentially liable as owners or operators of the Site must retain, in addition, all Records that relate to the liability of any other person under CERCLA with respect to the Site. Each Respondent must also retain, and instruct its contractors and agents to preserve, for the same period of time specified above, all non-identical copies of the last draft or final version of any Records (including Records in

electronic form) now in their possession or control or that come into their possession or control that relate in any manner to the performance of the Work, provided, however, that each Respondent (and its contractors and agents) must retain, in addition, copies of all data generated during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention requirements shall apply regardless of any corporate retention policy to the contrary.

31. At the conclusion of the document retention period, Respondents shall notify EPA at least 90 days prior to the destruction of any such Records and, upon request by EPA, and except as provided for in ¶ 27 (Privileged and Protected Claims), Respondents shall deliver any such Records to EPA.

32. Respondents and Settling Public Entities certify that to the best of their knowledge and belief, after thorough inquiry, they have not altered, mutilated, discarded, destroyed, or otherwise disposed of any Records (other than identical copies) relating to their potential liability regarding the Site since notification of potential liability by EPA. Save for Cascade General, Inc.'s and Shipyard Commerce Center LLC's obligation to update their CERCLA Section 104(e) response within six months of the Effective Date, Respondents and Settling Public Entities further certify that to the best of their knowledge and belief, after thorough inquiry, they have fully complied with any and all EPA requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927, and state law.

33. The United States on behalf of the SFAs acknowledges that each SFA: (1) is subject to all applicable federal record retention laws, regulations and policies; and (2) has certified that it has fully complied with those record retention policies and any and all EPA requests for information regarding the Site pursuant to Section 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927, and applicable state law.

XII. COMPLIANCE WITH OTHER LAWS

34. Nothing in this Settlement limits Respondents' obligations to comply with the requirements of all applicable federal and state laws and regulations. Respondents must also comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the SOW. The activities conducted pursuant to this Settlement, if approved by EPA, shall be considered consistent with the NCP.

35. **Permits**. As provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and Section 300.400(c)(3) of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site (*i.e.* within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Where any portion of the Work that is not on-site requires a federal, state, or local permit or approval, Respondents shall submit timely and complete applications and take all other actions necessary to obtain and to comply with all such permits or approvals.

36. Respondents may seek relief under the provisions of Section XV (Force Majeure) for any delay in performance of the Work resulting from a failure to obtain, or a delay in obtaining, any

permit or approval referenced in ¶ 35 (Permits) and required for the Work, provided that it has submitted timely and complete applications and taken all other actions necessary to obtain all such permits or approvals. This Settlement is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

XIII. PAYMENT OF RESPONSE COSTS

37. **Payments by the United States on behalf of the SFAs.**

a. **Payment to Respondents**. As soon as reasonably practicable after the Effective Date and after receipt of accurate payment instructions provided by Respondents, the United States, on behalf of the SFAs, shall deposit $12,000,000.00 into the Account, in full settlement of contribution claims for the Work, EPA Future Response Costs, ODEQ Response Costs, and Tribal Response Costs. The payment shall be by Automated Clearing House (ACH) Electronic Funds Transfer in accordance with instructions provided by Respondents.

b. **Effect of Payment**. The payment by the United States on behalf of the SFAs under this Settlement is intended to completely resolve any liability of the Settling Federal Agencies with regard to the Work, EPA Future Response Costs, ODEQ Response Costs, and Tribal Response Costs. The respective amounts of response costs paid by Respondents, SFAs, and the Settling Public Entities under this Settlement are without prejudice to any issue of liability of the Respondents, SFAs, and the Settling Public Entities for any further response action(s) at or within the Portland Harbor Superfund Site or the Swan Island Basin Project Area, or to the equitable allocation of any costs among the Parties (and other parties) in a future agreement or proceeding relating to work other than that described in Appendix A of this Settlement.

c. The Parties to this Settlement recognize and acknowledge that the payment obligations of the United States by and on behalf of the SFAs under this Settlement can only be paid from appropriated funds legally available for such purpose. Nothing in this Settlement shall be interpreted or construed as a commitment or requirement that the United States or any SFA obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other applicable provision of law.

d. **Interest**. In the event that the payment required by ¶ 37.a is not made within 120 days after the Effective Date and receipt of accurate payment instructions provided by Respondents, the United States by or on behalf of the SFAs shall pay Interest on the unpaid balance at the rate established pursuant to Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), with such Interest commencing on the 121st day and continuing through the date of the payment.

38. **Payments by the Port of Portland.**

a. **Payment to Respondents**. The Port of Portland (Port) shall pay a total of $12,000,000.00 into the Account established by the Respondents as follows:

(1) **Payment 1**: The Port shall deposit $2,400,000 within 30 days of the Effective Date or receipt of accurate payment instructions provided by Respondents, whichever is later;

(2) **Payment 2**: The Port shall deposit $2,400,000 in the Account by January 15, 2022;

(3) **Payment 3**: The Port shall deposit $2,400,000 in the Account by January 15, 2023;

(4) **Payment 4**: The Port shall deposit $2,400,000 in the Account by January 15, 2024; and

(5) **Payment 5**: The Port shall deposit $2,400,000 in the Account by January 15, 2025.

b. The payments shall be by wire transfer or Automated Clearing House (ACH) Electronic Funds Transfer in accordance with instructions provided by Respondents.

39. **Payments by the City of Portland.**

a. The City of Portland (City) shall pay a total of $3,600,000.00 into the Account established by the Respondents as follows:

(1) **Payment 1**: The City shall deposit $1,200,000 within 30 days of the Effective Date or receipt of accurate payment instructions provided by Respondents, whichever is later; and

(2) **Payment 2**: The City shall deposit $1,200,000 into the Account by August 15, 2021.

(3) **Payment 3**: The City shall deposit $1,200,000 into the Account by August 15, 2022.

b. The payments shall be by Automated Clearing House (ACH) Electronic Funds Transfer in accordance with instructions provided by Respondents.

40. **Payments by the State of Oregon.**

a. **Payment to Respondents**. The State of Oregon, by and through its Department of State Lands (State) shall pay a total of $3,600,000.00 into the Account established by the Respondents in three payments as follows:

(1) **Payment 1**: The State shall deposit $1,200,000 within 30 days of the Effective Date or receipt of accurate payment instructions provided by Respondents, whichever is later;

(2) **Payment 2**: The State shall deposit $1,200,000 by May 15, 2022;

(3) **Payment 3**: The State shall deposit $1,200,000 by May 15, 2023;

b. The payments shall be by Automated Clearing House (ACH) Electronic Funds Transfer in accordance with instructions provided by Respondents.

41. **Payments by Respondents for EPA Future Response Costs**. Respondents shall pay to EPA all EPA Future Response Costs not inconsistent with the NCP and incurred in accordance with Section III (Statement of Purpose).

a. **Periodic Bills**. On a semi-annual basis, EPA will send Respondents a bill or bills requiring payment of EPA Future Response Costs that includes a SCORPIOS Report or similar EPA prepared cost summary report, which includes direct and indirect costs incurred by EPA, its contractors, its subcontractors, and the United States Department of Justice. Respondents shall make all payments within 30 days after Respondents' receipt of each bill requiring payment, except as otherwise provided in ¶ 43 (Contesting EPA Future Response Costs).

b. **Payments.** Payments made pursuant to this Paragraph 41 shall be made by EFT in accordance with EFT instructions provided by EPA, or by submitting a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund," referencing the name and address of the party making the payment, the Site name, the EPA Region, the account number 10SW for the Swan Island Basin Project Area, or 10TC for a bill that covers an equal portion of the Site-wide RD costs, and the EPA docket number for this action. Respondents shall send the check to:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
P.O. Box 979076
St. Louis, MO 63197-9000

Respondents shall use the following address for payments made by overnight mail:

U.S. Bank
1005 Convention Plaza
Mail Station SL-MO-C2GL
St. Louis, MO 63101-1229

c. **Notice.** At the time of payment, Respondents shall send notice that payment has been made to EPA to the Region 10 Project Coordinator and to the Servicing Finance Office, EPA Finance Center, MS-NWD, Cincinnati, OH 45268.

d. **Deposit of EPA Future Response Costs Payments**. The total amount to be paid by Respondents pursuant to ¶ 41.a (Periodic Bills) shall be deposited by EPA in the Portland Harbor Special Account to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund, provided, however, that EPA may deposit a EPA Future Response Costs payment directly into the EPA Hazardous Substance Superfund if, at the time the payment is received, EPA estimates that the Portland Harbor Special Account balance is sufficient to address currently anticipated future response actions to be conducted or financed by EPA at or in connection with the Site. Any decision by EPA to deposit an EPA Future Response Costs payment directly into the EPA Hazardous

Substance Superfund for this reason shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement or in any other forum.

42. **Interest**. In the event that any payment for EPA Future Response Costs is not made by the date required, Respondents shall pay Interest on the unpaid balance. The Interest on EPA Future Response Costs shall begin to accrue on the date of the bill. The Interest shall accrue through the date of Respondent's payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the EPA by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVI (Stipulated Penalties).

43. **Contesting EPA Future Response Costs**. Respondents may initiate the procedures of Section XIV (Dispute Resolution) regarding payment of any EPA Future Response Costs billed under ¶ 41 (Payments by Respondents for EPA Future Response Costs) if they determine that EPA has made a mathematical error or included a cost item that is not within the definition of EPA Future Response Costs, or if it believes EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. To initiate such dispute, Respondents shall submit a Notice of Dispute in writing to the EPA Project Coordinator within 30 days after receipt of the bill. Any such Notice of Dispute shall specifically identify the contested EPA Future Response Costs and the basis for objection. If Respondents submit a Notice of Dispute, Respondents shall within the 30-day period, also as a requirement for initiating the dispute, (a) pay all uncontested EPA Future Response Costs to EPA in the manner described in ¶ 41, and (b) establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation (FDIC) and remit to that escrow account funds equivalent to the amount of the contested EPA Future Response Costs. Respondents shall send to the EPA Project Coordinator a copy of the transmittal letter and check paying the uncontested EPA Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. If EPA prevails in the dispute, within 5 days after the resolution of the dispute, Respondents shall pay the sums due (with accrued interest) to EPA in the manner described in ¶ 41. If Respondents prevails concerning any aspect of the contested costs, Respondents shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to EPA in the manner described in ¶ 41.Respondents shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XIV (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Respondents' obligation to reimburse EPA for EPA Future Response Costs.

44. **Payment of ODEQ Response Costs**

a. Respondents shall be responsible under this Settlement for reimbursing ODEQ Response Costs incurred pursuant to this Settlement that are not inconsistent with the NCP under the terms of a separate agreement to be executed by Respondents and ODEQ (ODEQ Agreement).

b. Disputes regarding ODEQ Response Cost bills shall be resolved in accordance with a process agreed to between ODEQ and Respondents under the ODEQ Agreement, and neither ruled by nor conducted under the dispute resolution provisions of this Settlement.

c. Nothing in this Paragraph shall be construed to limit ODEQ's authority under any source other than this Settlement to seek funding from Respondents or any other party of any costs that ODEQ may incur or may have incurred.

45. **Payment of Tribal Response Costs**

a. Respondents shall be responsible for funding Tribal Response Costs incurred pursuant to this Settlement that are not inconsistent with the NCP and as agreed to by the Tribal Governments and Respondents under one or more separate agreements.

b. Disputes regarding Tribal Response Cost bills shall be resolved in accordance with a process agreed to between the Tribal Governments and Respondents under one or more separate agreements entered into between Respondents and the Tribal Governments, and neither ruled by nor conducted under the dispute resolution provisions of this Settlement.

c. Nothing in this section shall in any way be construed to limit the rights of the Tribal Governments to seek to recover response costs incurred by the Tribal Governments related to this Settlement and disputed by Respondents, or for natural resource damages as defined by 42 U.S.C. § 9607(a)(4)(C).

XIV. DISPUTE RESOLUTION

46. Unless otherwise expressly provided for in this Settlement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement. The Parties shall attempt to resolve any disagreements concerning this Settlement expeditiously and informally.

47. **Informal Dispute Resolution**. If Respondents object to any EPA action taken pursuant to this Settlement, including billings for EPA Future Response Costs, they shall send EPA a written Notice of Dispute describing the objection(s) within 30 days after such action, unless the objection(s) has/have been resolved informally. EPA and Respondents shall have 30 days from EPA's receipt of Respondent's Notice of Dispute to resolve the dispute through informal negotiations (the Negotiation Period). The Negotiation Period may be extended at the sole discretion of EPA. Any agreement reached by the Parties pursuant to this Section shall be in writing and shall, upon signature by the Parties, be incorporated into and become an enforceable part of this Settlement.

48. **Formal Dispute Resolution**. If the Parties are unable to reach an agreement within the Negotiation Period, Respondents shall, within 20 days after the end of the Negotiation Period, submit a statement of position to EPA. At or about the time Respondents submit their statement of position initiating formal dispute resolution, Respondents may meet with the Regional Administrator, EPA Region 10 or, if the Regional Administrator is not available, the Deputy Regional Administrator. EPA may, within 20 days thereafter, submit a statement of position. The Respondent may request that technical experts, such as the Contaminated Sediments Technical

Advisory Group (CSTAG), assist in resolving the dispute. A decision that CSTAG participation is needed is a decision that the Regional Administrator, EPA Region 10, will make. The Regional Administrator or Deputy Regional Administrator will issue a written decision on the dispute to Respondents. EPA's decision shall be incorporated into and become an enforceable part of this Settlement. Following resolution of the dispute, as provided by this Section, Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with EPA's decision, whichever occurs.

49. The invocation of formal dispute resolution procedures under this Section does not extend, postpone, or affect in any way any obligation of Respondents under this Settlement, except as provided by ¶ 43 (Contesting EPA Future Response Costs), as agreed by EPA.

50. Except as provided in ¶ 59, stipulated penalties with respect to the disputed matter shall continue to accrue, but payment shall be stayed pending resolution of the dispute. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any applicable provision of this Settlement. In the event that Respondents do not prevail on the disputed issue, stipulated penalties shall be assessed and paid as provided in Section XVI (Stipulated Penalties).

XV. FORCE MAJEURE

51. "Force Majeure" for purposes of this Settlement is defined as any event arising from causes beyond the control of Respondents, of any entity controlled by Respondents, or of Respondents' contractors that delays or prevents the performance of any obligation under this Settlement despite Respondents' best efforts to fulfill the obligation. The requirement that Respondents exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure and best efforts to address the effects of any potential force majeure (a) as it is occurring and (b) following the potential force majeure such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. "Force majeure" does not include financial inability to complete the Work or increased cost of performance.

52. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement for which Respondents intend or may intend to assert a claim of force majeure, Respondents shall notify the EPA Project Coordinator orally or, in his or her absence, EPA's Alternate Project Coordinator or, in the event both of EPA's designated representatives are unavailable, the Director of the Superfund and Emergency Management Division, EPA Region 10, within 24 hours of when Respondents first knew that the event might cause a delay. Within 10 days thereafter, Respondents shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a force majeure; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health or welfare, or the environment. Respondents shall include with any notice all available documentation supporting its claim that the delay was attributable to a force majeure. Respondents shall be deemed to know of any circumstance of which Respondents, any entity controlled by Respondents, or Respondents' contractors knew or should have known. Failure to comply with the above requirements regarding an event shall preclude

Respondents from asserting any claim of force majeure regarding that event; provided, however, that if EPA, despite the late or incomplete notice, is able to assess to its satisfaction whether the event is a force majeure under ¶ 51 and whether Respondents have exercised their best efforts under ¶ 51, EPA may, in its unreviewable discretion, excuse in writing Respondents' failure to submit timely or complete notices under this Paragraph.

53. If EPA agrees that the delay or anticipated delay is attributable to a force majeure, the time for performance of the obligations under this Settlement that are affected by the force majeure will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure shall not, of itself, extend the time for performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure, EPA will notify Respondents in writing of its decision. If EPA agrees that the delay is attributable to a force majeure, EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure.

54. If Respondents elect to invoke the dispute resolution procedures set forth in Section XIV (Dispute Resolution), they shall do so no later than 15 days after receipt of EPA's notice. In any such proceeding, Respondents shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Respondents complied with the requirements of ¶¶ 51 and 52. If Respondents carry this burden, the delay at issue shall be deemed not to be a violation by Respondents of the affected obligation of this Settlement identified to EPA.

55. The failure by EPA to timely complete any obligation under the Settlement is not a violation of the Settlement, provided, however, that if such failure prevents Respondents from meeting one or more deadlines under the Settlement, Respondent(s) may seek relief under this Section.

XVI. STIPULATED PENALTIES

56. **Stipulated Penalties.**

a. Respondents shall be liable to EPA for stipulated penalties in the amounts set forth in ¶¶ 57.a and 58 for failure to comply with the obligations specified in ¶¶ 57.b. and 58, as relevant, unless excused under Section XV (Force Majeure)."Comply" as used in the previous sentence includes compliance by Respondents with all applicable requirements of this Settlement, within the deadlines established under this Settlement. If Respondents initially submitted or resubmitted a deliverable that contains a material defect and the conditions are met for modifying the deliverable under ¶ 5.5(a)(2) of the SOW, or if Respondents resubmitted a deliverable that contains a material defect; then the material defect constitutes a lack of compliance for purposes of this Paragraph.

b. Each Settling Public Entity shall be liable to EPA for stipulated penalties in the amounts set forth in ¶ 57.a for failure to comply with its obligations specified in ¶ 57.b(1), unless excused under Section XV (Force Majeure).

57. **Stipulated Penalty Amounts: Payments, Financial Assurance, Major Deliverables, and Other Milestones.**

a. The following stipulated penalties shall accrue per violation per day for any noncompliance with any obligation identified in ¶ 57.b:

Penalty Per Violation Per Day	Period of Noncompliance
$ 500	1st through 7th day
$ 1,000	8th through 14th day
$ 2,500	15th through 30th day
$ 5,000	31st day and beyond

b. **Obligations**

(1) Payment of an amount due to the Account under Section XIII (Payment of Response Costs).

(2) Payment of any amount due of EPA Future Response Costs under ¶ 41 (Payments by Respondents for EPA Future Response Costs).

(3) Establishment and maintenance of a financial assurance requirement, in accordance with Section XXIV(Financial Assurance).

(4) Establishment of an escrow account to hold any disputed EPA Future Response Costs under ¶ 43 (Contesting EPA Future Response Costs).

(5) Submission of timely and quality deliverables for tasks 1a, 1b, 2a, 2b, 3a, 3b, 4a, 4b, 5a, 5b, 6a, 6b, 7a, 7b, 8a, 8b, 9a, 9b, 10, 11, 12, and 13 listed under ¶ 6.2 of the SOW.

58. **Stipulated Penalty Amounts: Other Deliverables.** The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate deliverables required by this Settlement, other than those specified in ¶ 57.b:

Penalty Per Violation Per Day	Period of Noncompliance
$ 250	1st through 7th day
$ 500	8th through 14th day
$ 1,000	15th through 30th day
$ 2,500	31st day and beyond

59. In the event that EPA assumes performance of a portion or all of the Work pursuant to ¶ 73 (Work Takeover), Respondents shall be liable for a stipulated penalty in the amount of $75,000 or 25% of the cost of the Work EPA performs, whichever is less. Stipulated penalties under this Paragraph are in addition to the remedies available to EPA under ¶¶ 73 (Work Takeover) and 99 (Access to Financial Assurance).

60. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. Penalties shall continue to accrue during any dispute resolution period and shall be paid within 15 days after the agreement or the receipt of EPA's decision if EPA prevails in such dispute. However, stipulated penalties shall not accrue, as follows: (a) with respect to a deficient submission under ¶ 5.5 (Approval of Deliverables) of the SOW, during the period, if any, beginning on the 31st day after EPA's receipt of such submission until the date that EPA notifies Respondents of any deficiency; and (b) with respect to a decision by the Regional Administrator, EPA Region 10 or the Deputy Regional Administrator under Section XIV (Dispute Resolution), during the period, if any, beginning on the 21st day after the Negotiation Period begins until the date that the Regional Administrator or the Deputy Regional Administrator issues a final decision regarding such dispute. Nothing in this Settlement shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement.

61. Following EPA's determination that Respondents have failed to comply with a requirement of this Settlement, EPA may give Respondents written notification of the failure and describe the noncompliance. EPA may send Respondents a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether EPA has notified Respondents of a violation.

62. All penalties accruing under this Section shall be due and payable to EPA within 30 days after Respondents' receipt from EPA of a demand for payment of the penalties, unless Respondents invoke the Dispute Resolution procedures under Section XIV (Dispute Resolution) within the 30-day period. All payments to EPA under this Section shall indicate that the payment is for stipulated penalties and shall be made in accordance with ¶ 41 (Payments by Respondents for EPA Future Response Costs).

63. If Respondents fail to pay stipulated penalties when due, Respondents shall pay Interest on the unpaid stipulated penalties as follows: (a) if Respondents have timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to ¶ 60 until the date of payment; and (b) if Respondents fail to timely invoke dispute resolution, Interest shall accrue from the date of demand under ¶ 62 until the date of payment. If Respondents fails to pay stipulated penalties and Interest when due, the United States may institute proceedings to collect the penalties and Interest.

64. The payment of penalties and Interest, if any, shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement.

65. Nothing in this Settlement shall be construed as prohibiting, altering, or in any way limiting the ability of EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(*l*) of CERCLA, 42 U.S.C. § 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3); provided, however, that EPA shall not seek civil penalties pursuant to Section 122(*l*) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided in this Settlement, except in the case of a willful violation of this Settlement or in the event that EPA assumes performance of a portion or all of the Work pursuant to ¶ 73 (Work Takeover).

66. Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Settlement.

XVII. COVENANTS BY EPA

67. **Covenants for Respondents by EPA.** Except as provided in Section XVIII (Reservation of Rights by EPA), EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work performed and EPA Future Response Costs paid. These covenants shall take effect upon the Effective Date. These covenants are conditioned upon the complete and satisfactory performance by Respondents of their obligations under this Settlement. These covenants extend only to Respondents and do not extend to any other person.

68. **Covenants for SFAs by EPA.** Except as provided in Section XVIII (Reservation of Rights by EPA), EPA covenants not to take administrative action against the SFAs pursuant to Sections 106 and 107(a) of CERCLA, 42 USC §§ 9606 and 9607(a), for the Work performed and EPA Future Response Costs paid. This covenant shall take effect upon the Effective Date. This covenant is conditioned upon the satisfactory performance by the United States on behalf of the SFAs of their obligations under this Settlement. EPA's covenant extends only to SFAs and does not extend to any other person.

69. **Covenants for Settling Public Entities by EPA.** Except as provided in Section XVIII (Reservation of Rights by EPA), ¶ 70, EPA covenants not to sue or to take administrative action against a Settling Public Entity pursuant to Section 107(a) of CERCLA,

42 USC §9607(a), for payments paid by that Settling Public Entity pursuant to Section XIII, ¶¶ 38, 39, and 40 of this Settlement. These covenants are conditioned upon the complete and satisfactory performance by the Settling Public Entity of its payment obligations under this Settlement, as described in ¶¶ 38, 39, and 40.

XVIII. RESERVATIONS OF RIGHTS BY EPA

70. Except as specifically provided in this Settlement, nothing in this Settlement shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing in this Settlement shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Settlement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

71. The covenants set forth in Section XVII (Covenants by EPA) above do not pertain to any matters other than those expressly identified therein. EPA reserves, and this Settlement is without prejudice to, all rights against Respondents, SFAs, and Settling Public Entities with respect to all other matters, including, but not limited to:

a. liability for failure by a Respondent, the United States on behalf of the SFAs, or a Settling Public Entity to meet a requirement of that Party under this Settlement;

b. liability for costs not included within the definition of EPA Future Response Costs;

c. liability for performance of response action other than the Work;

d. criminal liability;

e. liability for violations of federal or state law that occur during or after implementation of the Work;

f. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

g. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and

h. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site and not paid as EPA Future Response Costs under this Settlement.

72. In the event Respondents fail to complete the obligations to perform 100% of the RD for the Swan Island Project Area, EPA reserves, and this Settlement is without prejudice to, all rights against the Settling Public Entities along with other potentially responsible parties for liability to perform the RD.

73. **Work Takeover**

a. In the event EPA determines one of the following with respect to Respondents' performance: (1) Respondents have ceased implementation of any portion of the Work; (2) Respondents are seriously or repeatedly deficient or late in their performance of the Work; or (3) Respondents are implementing the Work in a manner that may cause an endangerment to human health or the environment, EPA may issue a written notice (Work Takeover Notice) to Respondents. Any Work Takeover Notices issued by EPA (which writing may be electronic) will specify the grounds upon which such notice was issued and will provide Respondents a period of 10 days within which to remedy the circumstances giving rise to EPA's issuance of such notice.

b. If, after expiration of the 10-day notice period specified in ¶ 74.a Respondents have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portion(s) of the Work as EPA deems necessary (Work Takeover). EPA will notify Respondents in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this ¶ 73.b. Funding of Work Takeover costs is addressed under ¶ 99 (Access to Financial Assurance).

c. Respondents may invoke the procedures set forth in ¶ 48 (Formal Dispute Resolution) to dispute EPA's implementation of a Work Takeover under ¶ 73.b. However, notwithstanding Respondents' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under ¶ 73.b until the earlier of (1) the date that Respondents remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, or (2) the date that a written decision terminating such Work Takeover is rendered in accordance with ¶ 48 (Formal Dispute Resolution).

d. Notwithstanding any other provision of this Settlement, EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XIX. COVENANTS BY RESPONDENTS, SFAs and SETTLING PUBLIC ENTITIES

74. **Covenants by Respondents.** Except for any claims that may arise if SFAs fail to complete their obligations under this Settlement Agreement, Respondents each covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, EPA Future Response Costs, ODEQ Response Costs, Tribal Response Costs and this Settlement, including, but not limited to the following:

a. any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim under Sections 107 and 113 of CERCLA, Section 7002(a) of RCRA, 42 U.S.C. § 6972(a), or state law relating to the Work, EPA Future Response Costs, and this Settlement; or

c. any claim arising out of response actions at or in connection with the Swan Island Basin Project Area relating to the Work, EPA Future Response Costs, and this Settlement, including any claim under the United States Constitution, the Oregon Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

75. Covenants by SFAs. SFAs agree not to assert any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 USC §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law with respect to the Work, EPA Future Response Costs, ODEQ Response Costs, Tribal Response Costs and this Settlement. This covenant does not preclude demand for reimbursement from the Superfund of costs incurred by a SFA in the performance of its duties (other than pursuant to this Settlement) as lead or support agency under the National Contingency Plan (40 C.F.R. Part 300).

76. Covenants by Settling Public Entities. Except for any claims that may arise if SFAs fail to complete their obligations under this Settlement Agreement, Settling Public Entities each covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, EPA Future Response Costs, ODEQ Response Costs, Tribal Response Costs and this Settlement, including, but not limited to the following:

a. any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C.§§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim under Sections 107 and 113 of CERCLA, Section 7002(a) of RCRA, 42 U.S.C. § 6972(a), or state law relating to the Work, EPA Future Response Costs, and this Settlement; or

c. any claim arising out of response actions at or in connection with the Swan Island Basin Project Area relating to the Work, EPA Future Response Costs, and this Settlement, including any claim under the United States Constitution, the Oregon Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 USC § 2412, or at common law.

77. These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to any of the reservations set forth in Section XVIII (Reservations of Rights by EPA), other than in ¶¶ 71.a (liability for failure to meet a requirement of the Settlement), 71.d (criminal liability), or 71.e (violations of federal/state law during or after implementation of the Work), but only to the extent that Respondents' and Settling Public Entities' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

78. Nothing in this Settlement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

79. Respondents and Settling Public Entities each reserve, and this Settlement is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on EPA's selection of response actions, or the oversight or approval of Respondents' deliverables or activities.

XX. OTHER CLAIMS

80. By issuance of this Settlement, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents. The United States or EPA shall not be deemed a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement.

81. Except as expressly provided in Section XIX (Covenants by Respondents, SFAs, and Settling Public Entities) and Section XVII (Covenants by EPA), nothing in this Settlement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages, and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

82. No action or decision by EPA pursuant to this Settlement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXI. EFFECT OF SETTLEMENT/CONTRIBUTION

83. Nothing in this Settlement shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Settlement. Except as provided in Section XIX (Covenants by Respondents, SFAs, Settling Public Entities), each of the Parties expressly reserves any and all rights (including, but not limited to, pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action that each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Settlement diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

84. The Parties agree that this Settlement constitutes an administrative settlement pursuant to which each Respondent and each SFA has, as of the Effective Date, resolved liability to the United States within the meaning of Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), and is entitled, as of the Effective Date, to protection from

contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, or as may be otherwise provided by law, for the "matters addressed" in this Settlement. The "matters addressed" in this Settlement for the purpose of this Paragraph are the Work, EPA Future Response Costs, ODEQ Response Costs, and Tribal Response Costs.

85. The Parties agree that this Settlement constitutes an administrative settlement pursuant to which each Settling Public Entity has, as of the Effective Date, resolved liability to the United States for payments paid by that Settling Public Entity pursuant to Section XIII, ¶¶ 38, 39, and 40 of this Settlement within the meaning of Section 113(f)(2)and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), and is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, or as may be otherwise provided by law, for the "matters addressed" in this Settlement. The "matters addressed" in this Settlement for the purpose of this Paragraph are the payments paid by that Settling Public Entity pursuant to Section XIII, ¶¶ 38, 39, and 40 of this Settlement.

86. The Parties further agree that this Settlement constitutes an administrative settlement pursuant to which each Respondent and each SFA has, as of the Effective Date, resolved its liability to the United States within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

87. The Parties further agree that this Settlement constitutes an administrative settlement pursuant to which each Settling Public Entity has, as of the Effective Date, resolved its liability to the United States for payments paid by that Settling Public Entity pursuant to Section XIII, ¶¶ 38, 39, and 40 of this Settlement, within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

88. Except with respect to litigation between a Respondent or a Settling Public Entity and any of its insurers or alleged insurers, each Respondent and Settling Public Entity shall, with respect to any suit or claim brought by it for matters related to this Settlement, notify EPA in writing no later than 60 days prior to the initiation of such suit or claim. Each Respondent and Settling Public Entity also shall, with respect to any suit or claim brought against it for matters related to this Settlement, notify EPA in writing within 10 days after service of the complaint or claim upon it. In addition, each Respondent and Settling Public Entity shall notify EPA within 10 days after service or receipt of any Motion for Summary Judgment and within 10 days after receipt of any order from a court setting a case for trial, for matters related to this Settlement.

89. In any subsequent administrative or judicial proceeding initiated by EPA, or by the United States on behalf of EPA, for injunctive relief, recovery of response costs, or other relief relating to the Site, Respondents and Settling Public Entities shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant by EPA set forth in Section XVII (Covenants by EPA).

XXII. INDEMNIFICATION

90. The United States does not assume any liability by entering into this Settlement or by virtue of any designation of Respondents as EPA's authorized representatives under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), and 40 C.F.R. § 300.400(d)(3). Respondents shall indemnify, save, and hold harmless the United States, its officials, agents, employees, contractors, subcontractors, employees, and representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, and any persons acting on Respondents' behalf or under their control, in carrying out activities pursuant to this Settlement. Further, Respondents agree to pay the United States all costs it incurs, including, but not limited to attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement. The United States shall not be held out as a party to any contract entered into, by, or on behalf of Respondents in carrying out activities pursuant to this Settlement. Neither Respondents nor any such contractor shall be considered an agent of the United States.

91. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

92. With the exception of any claims that may arise if SFAs fail to complete their obligations under this Settlement, Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States for damages or reimbursement or for set-off of any payments made, or to be made, to the United States, arising from or on account of any contract, agreement, or arrangement between Respondents and any person for performance of Work on or relating to the Swan Island Basin Project Area, including, but not limited to, claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of, any contract, agreement, or arrangement between Respondents and any person for performance of Work on or relating to the Swan Island Basin Project Area, including, but not limited to, claims on account of construction delays.

XXIII. INSURANCE

93. No later than 15 days before commencing any on-site Work, Respondents shall secure, and shall maintain until so notified by EPA, commercial general liability insurance with limits of liability of $1 million per occurrence, and automobile insurance with limits of liability of $1 million per accident, and umbrella liability insurance with limits of liability of $5 million in excess of the required commercial general liability and automobile liability limits, naming EPA as an additional insured with respect to all liability arising out of the activities performed by or on behalf of Respondents pursuant to this Settlement. In addition, for the duration of the Settlement, Respondents shall provide EPA with certificates of such insurance and a copy of each insurance policy. Respondents shall resubmit such certificates and copies of policies each year on the anniversary of the Effective Date. In addition, for the duration of the Settlement, Respondents shall

satisfy, or shall ensure that its contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondents in furtherance of this Settlement. If Respondents demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in a lesser amount, Respondents need provide only that portion of the insurance described above that is not maintained by the contractor or subcontractor. Respondents shall ensure that all submittals to EPA under this Paragraph identify the Site name, City, State and the EPA docket number for this action.

XXIV. FINANCIAL ASSURANCE

94. In order to ensure the completion of the Work, Respondents shall secure financial assurance in the amount of $43 million ("Estimated Cost of the Work"), for the benefit of EPA. The financial assurance must be one or more of the mechanisms listed below, in a form substantially identical to the relevant sample documents available from EPA or under the "Financial Assurance - Settlements" category on the Cleanup Enforcement Model Language and Sample Documents Database at https://cfpub.epa.gov/compliance/models/, and satisfactory to EPA. Respondent may use multiple mechanisms if they are limited to surety bonds guaranteeing payment, letters of credit, trust funds, and/or insurance policies:

a. A surety bond guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as acceptable sureties on federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;

b. An irrevocable letter of credit, payable to or at the direction of EPA, that is issued by an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency;

d. A policy of insurance that provides EPA with acceptable rights as a beneficiary thereof and that is issued by an insurance carrier that has the authority to issue insurance policies in the applicable jurisdiction(s) and whose insurance operations are regulated and examined by a federal or state agency;

e. A demonstration by a Respondent that it meets the financial test criteria of ¶ 96, accompanied by a standby funding commitment, which obligates the affected Respondent to pay funds to or at the direction of EPA, up to the amount financially assured through the use of this demonstration in the event of a Work Takeover; or

f. A guarantee to fund or perform the Work executed in favor of EPA by a company: (1) that is a direct or indirect parent company of a Respondent or has a "substantial business relationship" (as defined in 40 C.F.R. § 264.141(h)) with a Respondent; and (2) can demonstrate to EPA's satisfaction that it meets the financial test criteria of ¶ 96.

95. Respondents and Settling Public Entities have selected, and EPA has found satisfactory, a trust fund established pursuant to ¶94.c. above and a surety bond under ¶ 94.a above as initial forms of financial assurance. Within 30 days after the Effective Date, Respondents and Settling Public Entities shall secure all executed and/or otherwise finalized mechanisms or other documents consistent with the EPA-approved form of financial assurance and shall submit such mechanisms and documents to the EPA Project Coordinator.

a. Trust Fund. The Account (as defined at ¶ 10 above) into which payments made in the amounts and pursuant to the schedule in Section XIII above (Payments of Response Costs) are deposited shall constitute the trust fund established under ¶ 94.c above. EPA shall be named as beneficiary of the Account such that EPA can immediately access funds in the Account in the event of a Work Takeover under under ¶ 73.b.

b. Surety Bond. The surety bond shall be in the amount of $12 million, the approximate difference between funds being deposited into the Account pursuant to this Settlement and the Estimated Cost of the Work.

96. Respondents seeking to provide financial assurance by means of a demonstration under ¶ 94.e, or Respondents seeking to provide financial assurance by means of a guarantee under ¶ 94.f, must, within 30 days of the Effective Date:

a. Demonstrate that:

(1) The affected Respondent or guarantor has:

i. Two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and

ii. Net working capital and tangible net worth each at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

iii. Tangible net worth of at least $10 million; and

iv. Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; or

(2) The affected Respondent or guarantor has:

i. A current rating for its senior unsecured debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's; and

ii. Tangible net worth at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

iii. Tangible net worth of at least $10 million; and

iv. Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

b. Submit to EPA for the affected Respondent, or guarantor: (1) a copy of an independent certified public accountant's report of the entity's financial statements for the latest completed fiscal year, which must not express an adverse opinion or disclaimer of opinion; and (2) a letter from its chief financial officer and a report from an independent certified public accountant substantially identical to the sample letter and reports available from EPA or under the "Financial Assurance - Settlements" subject list category on the Cleanup Enforcement Model Language and Sample Documents Database at https://cfpub.epa.gov/compliance/models/.

97. Respondents providing financial assurance by means of a demonstration under ¶ 94.e, or Respondents providing financial assurance by means of a guarantee under ¶ 94.f, must also:

a. Annually resubmit the documents described in ¶ 96.b within 90 days after the close of the affected Respondent's or guarantor's fiscal year;

b. Notify EPA within 30 days after the affected Respondent or guarantor determines that it no longer satisfies the relevant financial test criteria and requirements set forth in this Section; and

c. Provide to EPA, within 30 days of EPA's request, reports of the financial condition of the affected Respondent or guarantor in addition to those specified in ¶ 96.b; EPA may make such a request at any time based on a belief that the affected Respondent or guarantor may no longer meet the financial test requirements of this Section.

98. Respondents shall each diligently monitor the adequacy of their own financial assurance. If Respondents become aware of any information indicating that the financial assurance they provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, the affected Respondent shall notify EPA of such information within 7 days. If EPA determines that the financial assurance provided by any Respondent under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, EPA will notify the affected Respondent of such determination. The affected Respondent shall, within 30 days after notifying EPA or receiving notice from EPA under this Paragraph, secure and submit to EPA for approval a

proposal for a revised or alternative financial assurance mechanism that satisfies the requirements of this Section. EPA may extend this deadline for such time as is reasonably necessary for the affected Respondent, in the exercise of due diligence, to secure and submit to EPA a proposal for a revised or alternative financial assurance mechanism, not to exceed 60 days. The affected Respondent shall follow the procedures of ¶ 100 (Modification of Amount, Form, or Terms of Financial Assurance) in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. A Respondent's inability to secure financial assurance in accordance with this Section does not excuse performance of any other obligation under this Settlement.

99. **Access to Financial Assurance**

a. If EPA issues a notice of implementation of a Work Takeover under ¶ 73.b, then, in accordance with any applicable financial assurance mechanism and/or related standby funding commitment, EPA is entitled to: (1) the performance of the Work; and/or (2) require that any funds guaranteed be paid in accordance with ¶ 99.d.

b. If EPA is notified by the issuer of a financial assurance mechanism that it intends to cancel such mechanism, and the affected that is relying on that mechanism fails to provide an alternative financial assurance mechanism in accordance with this Section at least 30 days prior to the cancellation date, the funds guaranteed under such mechanism must be paid prior to cancellation in accordance with ¶ 99.d.

c. If, upon issuance of a notice of implementation of a Work Takeover under ¶ 73.b, either: (1) EPA is unable for any reason to promptly secure the resources guaranteed under any applicable financial assurance mechanism and/or related standby funding commitment, whether in cash or in kind, to continue and complete the Work; or (2) the financial assurance is a demonstration or guarantee under ¶ 94.e or 94.f, then EPA is entitled to demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Work to be performed. In particular, if the Account (in conjunction with the liquid FA instrument) contains insufficient funding to complete the work assumed by EPA, Respondents shall, within 30 days of such demand, pay the amount demanded as directed by EPA in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount so that EPA receives up to but does not exceed the estimated cost of completing the remaining Work, as determined by EPA.

d. Any amounts required to be paid under this ¶ 99 shall be, as directed by EPA: (i) paid to EPA in order to facilitate the completion of the Work by EPA or by another person; or (ii) deposited into an interest-bearing account, established at a duly chartered bank or trust company that is insured by the FDIC, in order to facilitate the completion of the Work by another person. If payment is made to EPA, EPA may deposit the payment into the EPA Hazardous Substance Superfund or into the Portland Harbor Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

e. All EPA Work Takeover costs not paid under this ¶ 99 must be reimbursed as EPA Future Response Costs under Section XIII (Payments for Response Costs).

100. **Modification of Amount, Form, or Terms of Financial Assurance.**

Respondents may submit, on any anniversary of the Effective Date or at any other time agreed to by the Parties, a request to reduce the amount, or change the form or terms, of the financial assurance mechanism. Any such request must be submitted to EPA in accordance with ¶ 95, and must include an estimate of the cost of the remaining Work, an explanation of the bases for the cost calculation, and a description of the proposed changes, if any, to the form or terms of the financial assurance. EPA will notify Respondents of its decision to approve or disapprove a requested reduction or change pursuant to this Paragraph. Respondents may reduce the amount of the financial assurance mechanism only in accordance with: (a) EPA's approval; or (b) if there is a dispute, the agreement or written decision resolving such dispute under Section XIV (Dispute Resolution). Respondents may change the form or terms of the financial assurance mechanism only in accordance with EPA's approval. Any decision made by EPA on a request submitted under this Paragraph to change the form or terms of a financial assurance mechanism shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement or in any other forum. Within 30 days after receipt of EPA's approval of, or the agreement or decision resolving a dispute relating to, the requested modifications pursuant to this Paragraph, Respondents shall submit to EPA documentation of the reduced, revised, or alternative financial assurance mechanism in accordance with ¶ 95**.**

101. **Release, Cancellation, or Discontinuation of Financial Assurance**. Respondents may release, cancel, or discontinue any financial assurance provided under this Section only as follows: (a) in accordance with EPA's approval of such release, cancellation, or discontinuation; or (b) if there is a dispute regarding the release, cancellation, or discontinuance of any financial assurance, in accordance with the agreement or final decision resolving such dispute under Section XIV (Dispute Resolution).

XXV. INTEGRATION/APPENDICES

102. This Settlement and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement. The Parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Settlement. Notwithstanding the two foregoing representations, the Port of Portland and Vigor have entered into two agreements, the 2000 Sale Agreement and the 2020 Letter Agreement, that relate to certain understandings and agreements embodied in Section XXI (Effect of Settlement/Contribution) of this Settlement. The following appendices are attached to and incorporated into this Settlement:

a. Appendix A is the SOW.

b. Appendix B is a map of the Swan Island Basin Project Area

XXVI. MODIFICATION

103. The EPA Project Coordinator may modify the SOW or related deliverables as provided in ¶ 19 (Modification of SOW or Related Deliverables). Any other requirements of this Settlement may be modified in writing by mutual agreement of the Parties.

104. If Respondents seek permission to deviate from any approved work plan, schedule, or SOW, Respondents' Project Coordinator shall submit a written request to EPA for approval outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from the EPA Project Coordinator pursuant to ¶ 103.

105. No informal advice, guidance, suggestion, or comment by the EPA Project Coordinator or other EPA representatives regarding any deliverable submitted by Respondents shall relieve Respondents of its obligation to obtain any formal approval required by this Settlement, or to comply with all requirements of this Settlement, unless it is formally modified.

XXVII. SETTLING PUBLIC ENTITY STATE OF OREGON

106. Notwithstanding anything in this Settlement to the contrary, nothing in this Settlement is to be construed to permit or require the State of Oregon to take any action that exceeds the scope of its authority, or to violate Article XI, § 7 of the Oregon Constitution or any other law regulating liabilities or monetary obligations.

XXVIII. NOTICE OF WORK COMPLETION

107. When EPA determines that all Work has been fully performed in accordance with this Settlement, with the exception of any continuing obligations as provided in ¶ 109, EPA will provide written notice to Respondents, SFAs, and Settling Public Entities. Respondents may request that EPA make this determination.

108. If EPA determines that any such Work has not been completed in accordance with this Settlement, EPA will notify Respondents, SFAs, Settling Public Entities, provide a list of the deficiencies, and require that Respondents modify the RD Work Plan if appropriate to correct such deficiencies. Respondents shall implement the modified and approved RD Work Plan and shall submit a modified Final RD Report for EPA approval in accordance with the EPA notice. If approved, EPA will issue the Notice of Work Completion.

109. Issuance of the Notice of Work Completion does not affect the following continuing obligations: (1) obligations under Sections IX (Property Requirements), (2) Section X (Access to Information), (3) Section XI (Record Retention); and (4) reimbursement of EPA Future Response Costs under Section XIII (Payment of Response Costs) of the Settlement.

XXIX. EFFECTIVE DATE

110. This Settlement shall be effective upon signature by the Superfund and Emergency Management Division, EPA Region 10.

IT IS SO AGREED AND ORDERED;

U.S. ENVIRONMENTAL PROTECTION AGENCY:

CALVIN TERADA Digitally signed by CALVIN TERADA
Date: 2021.01.20 13:02:37 -08'00'

_____ _____

Dated

Calvin J. Terada, Director
Superfund and Emergency Management Division
EPA Region 10

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Daimler Trucks North America LLC:

January 14, 2021
Dated

Jennifer E. Marsh
Associate General Counsel
Daimler Trucks North America LLC
4555 N. Channel Avenue, HQ637B-LGL
Portland, OR 97217

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Vigor Industrial LLC:

January 18, 2021
Dated

Tae Rhee
Manager and Secretary
Vigor Industrial LLC
5555 N. Channel Avenue
Portland, OR 97217

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Cascade General, Inc.:

January 18, 2021
Dated

Tae Rhee
Director and Secretary
Cascade General, Inc.
5555 N. Channel Avenue
Portland, OR 97217

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Shipyard Commerce Center LLC:

January 18, 2021
Dated

Tae Rhee
Manager and Secretary
Shipyard Commerce Center LLC
5555 N. Channel Avenue
Portland, OR 97217

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Settling Federal Agencies:

01/20/2021
Dated

Austin D. Saylor
United States Department of Justice
Environmental & Natural Resources Division
Environmental Defense Section
P.O. Box 7611
Washington, DC 20044

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR State of Oregon:

Vicki L. Walker, Director

Digitally signed by Vicki L. Walker, Director
Date: 2021.01.15 11:08:42 -08'00'

_____
Dated

Vicki L. Walker
Director
Oregon Department of State Lands
775 Summer St. NE
Salem, OR 97301-1279

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR City of Portland:

Michael Jordan

Digitally signed by Michael Jordan
Date: 2021.01.13 15:54:38 -08'00'

01/13/2021
Dated

Michael Jordan
Director
City of Portland
Bureau of Environmental Services
888 SW Fifth Avenue, Suite 400
Portland, Oregon 97204

DocuSign Envelope ID: DE35679A-8EED-4DA1-BBEA-3B1F4035E98B

Signature Page for Settlement regarding the Swan Island Project Area within the Portland Harbor Superfund Site

FOR Port of Portland:

1/14/2021
Dated

DocuSigned by:
Curtis Robinhold
444C02590B0B4AB...

Curtis Robinhold
Executive Director
Port of Portland
7200 NE Airport Way
Portland, OR 97218

Appendix A

Remedial Design Statement of Work

Portland Harbor Superfund Site

Swan Island Basin Project Area

City of Portland, Multnomah County, State of Oregon

U.S. EPA Region 10

REMEDIAL DESIGN STATEMENT OF WORK

PORTLAND HARBOR SUPERFUND SITE

Swan Island Basin Project Area

City of Portland, Multnomah County, State of Oregon

U.S. EPA Region 10

January 2021

TABLE OF CONTENTS

Attachments

1. INTRODUCTION

1.1 Purpose of the Statement of Work. The U.S. Environmental Protection Agency (EPA) signed a Record of Decision for the Portland Harbor Superfund Site (Site) on January 3, 2017 (ROD) that selected Remedial Actions (RA) for the in-river portion of the Site from approximately river miles (RMs) 1.9 to 11.8. The ROD provides information about how Site data will influence Remedial Design (RD), remedial construction, and future maintenance of remediated areas. The ROD states that the actual technologies assigned during RD will be dependent on a number of characteristics and environmental conditions to ensure that the final constructed remedy is appropriate for area-specific conditions, e.g., Sediment Management Areas (SMAs). The ROD also identifies post ROD / RD sampling activities that will support and refine the Site's Conceptual Site Model (CSM) to implement RD and RA. Any reference to the ROD in this SOW, also includes any future ROD amendments or Explanations of Significance Differences EPA may issue.

This Statement of Work (SOW) sets forth the procedures and requirements for implementing the RD Work at the Swan Island Basin Project Area (hereinafter identified as the Project Area), as defined in the Administrative Settlement Agreement and Order on Consent as "the active cleanup area designated on Figure 31d of the ROD between approximately River Mile 8.1 and River Mile 9.2 on the northeast side of the Willamette River, and more specifically depicted on the map attached as Appendix B to the Settlement. The Project Area is approximately 1.1 miles in length, 117 acres in size, and includes all riverbanks from top of the bank to the river."

As specified in Part 1: Declaration for the ROD (EPA, 2017), contaminated river banks will be addressed using the same remedial technologies that will be used for the adjacent contaminated sediment, if it is determined that those river banks should be remediated in conjunction with the sediment action. Riverbank soils/sediment will be evaluated to determine if there are recontamination concerns and design considerations associated with the river bank areas. Further upland source control assessments, if needed, will be addressed as upland source issues by the Oregon Department of Environmental Quality (DEQ) and individual property owners or as necessary through EPA's authorities.

1.2 Structure of the SOW

- Section 2 (Community Involvement) sets forth EPA's and Respondents' responsibilities for community involvement.
- Section 3 (Remedial Design) sets forth the process for developing the RD, which includes the submission of specified primary deliverables.
- Section 4 (Reporting) sets forth Respondents' reporting obligations.

- Section 5 (Deliverables) describes the content of the supporting deliverables and the general requirements regarding Respondents' submission of, and EPA's review of, approval of, comment on, and/or modification of, the deliverables.
- Section 6 (Schedules) sets forth the schedule for submitting the primary deliverables, specifies the supporting deliverables that must accompany each primary deliverable, and sets forth the schedule of milestones regarding the completion of the RD.
- Section 7 (State and Tribal Participation) addresses State and Tribal participation.
- Section 8 (References) provides a list of references, including Uniform Resource Locations (URLs).

1.3 The terms used in this SOW that are defined in CERCLA, in regulations promulgated under CERCLA, or in the Settlement, have the meanings assigned to them in CERCLA, in such regulations, or in the Settlement, except that the term "Paragraph" or "¶" means a paragraph of the SOW, and the term "Section" means a section of the SOW, unless otherwise stated.

1.4 A Remedial Design Guidelines and Considerations (RD Guide) document has been developed, consistent with the ROD, to facilitate efficient and timely design work throughout the Site. The RD Guide was developed in coordination and collaboration with designers already performing RD and the Portland Harbor Technical Coordinating Team (TCT). The RD Guide will be updated as needed through collaborative meetings and discussion with designers and the TCT. EPA-approved design deliverables will be developed consistent with the RD Guide to the extent possible. Section 1.4 of the RD Guide provides clarification on determination of SMAs, how buried contamination is considered in design, where data replacement might be considered during design, technology assignment, equivalence analysis, and how pentachlorodibenzo-p-dioxin (PeCDD) RALs will be addressed in design.

1.5 Based on the polychlorinated dibenzo-p-dioxins and furans (dioxins/furans) results from the 2018 Upriver Reach (RMs 16.6 to 28.4) surface sediment sampling conducted by the Pre-Remedial Design Group (Pre-RD Group), there is uncertainty as to whether the background-based ROD Table 17 river bank soil/sediment CULs for dioxins/furans are representative of background conditions. In the 2018 Pre-RD Group data, the 95% confidence intervals on the Upriver Reach surface area weighted average concentrations (SWACs) for dioxins/furans are greater than or overlap the ROD Table 17 river bank soil/sediment CULs, which are a 95% upper confidence limit on the Remedial Investigation/Feasibility Study (RI/FS) data detection limits. Based on the 2018 Upriver Reach data alone, it is uncertain as to whether the 95% confidence intervals on the SWACs are statistically different from the background-based ROD Table 17 riverbank soil/sediment CULs for dioxins/furans. To reduce the uncertainty in the dioxins/furans background dataset and to differentiate between Site releases, upstream source areas, and upstream concentrations not associated with localized upstream source areas, additional surface sediment sampling will be performed in the Upriver Reach. EPA will fund the investigation of dioxin/furan background levels and intends to coordinate implementation with ODEQ. The results of this investigation, along with the 2018 Pre-RD Group Upriver Reach data, will be used to update the Site-wide background-based CULs for dioxins/furans, if appropriate.

1.6 Section 14.2 of the ROD states that the pre-design elevation will be maintained in shallow and intermediate regions. EPA recognizes that based on robust remedial design evaluations of flood rise and habitat considerations, the placement of a cap without dredging may be allowed and desirable in order to minimize disruption or improve habitat while maintaining remedy effectiveness. The impacts to the floodway will be evaluated for each project area during remedial design and HEC-RAS modeling will be used to show that there will be no net rise due to the implementation of the Selected Remedy. If remedial design evaluations determine that there are no adverse impacts to habitat and the floodway due to capping in the shallow and intermediate regions, or if encroachments due to capping can be mitigated, then the elevation of the top of a cap may not need to be the same as the pre-design elevation. The responsiveness summary of the ROD and Feasibility Study Appendix L provide further discussion on habitat considerations and the ROD Updated Appendix P describes flood rise evaluations.

1.7 **Relationship to other work at the Portland Harbor Superfund Site.** While all approved data, including baseline data will be considered, all final decisions regarding RD at the Project Area, including delineation of SMAs, implementation of any sampling necessary for design, and application of the ROD's technology matrix, will be made under this Settlement and this SOW.

2. COMMUNITY INVOLVEMENT

2.1 Community Involvement (CI) Responsibilities

(a) EPA has the lead responsibility for developing and implementing CI activities at the Site. Previously (during the Remedial Investigation/Feasibility Study (RI/FS) phase), EPA developed a Community Involvement Plan (CIP) for the Site. Pursuant to 40 C.F.R. § 300.435(c), EPA shall review the existing CIP and determine whether it should be revised to describe further public involvement activities specific to the RD Work or the Project Area that are not already addressed or provided for in the existing CIP, including, if applicable, any Technical Assistance Grant (TAG), any use of the Technical Assistance Services for Communities (TASC) contract, and/or any Technical Assistance Plan (TAP).

(b) If requested by EPA, Respondents shall participate in CI activities, including participation in: (1) the preparation of information regarding the RD Work for dissemination to the public, with consideration given to including mass media and/or Internet notification; and (2) public meetings that may be held or sponsored by EPA to explain activities at or relating to the Site. Respondents' support of EPA's CI activities may include providing online access to initial submissions and updates of deliverables to: (1) any Community Advisory Groups, (2) any TAG recipients and their advisors; and (3) other entities to provide them with a reasonable opportunity for review and comment. EPA may describe in its CIP Respondents' responsibilities for CI activities. All CI activities conducted by Respondents at EPA's request are subject to EPA's oversight. Upon EPA's request, Respondents shall make Project Area-related data and information

available to the public. EPA plans to coordinate its community outreach efforts with DEQ.

(c) Respondents will explore the possibility of participating in EPA's Superfund Job Training Initiative Program (SuperJTI) as it may relate to the RD Work or the Project Area. This program provides job training to communities affected by Superfund sites.

(d) Respondents' CI Coordinator. If requested by EPA, Respondents shall, within 30 days, designate and notify EPA of Respondents' CI Coordinator. Respondents may hire a contractor for this purpose. Respondents' notice must include the name, title, and qualifications of the Respondents' CI Coordinator. Respondents' CI Coordinator is responsible for providing support regarding EPA's CI activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries about the RD Work or the Project Area.

3. REMEDIAL DESIGN

3.1 Sufficiency Assessment.

(a) The Portland Harbor ROD Section 14.2.11 states that implementation of the Selected Remedy may need to be conducted in phases and/or work sequenced based on consideration of a range of factors including source control actions and recontamination potential. To evaluate source control actions and recontamination potential, a Sufficiency Assessment Report shall be submitted to EPA for comment and approval.

The objective of the Sufficiency Assessment is to evaluate upland (direct discharges, groundwater, river bank, overwater) and in-water sources of contaminants to determine whether they have been adequately investigated and sufficiently controlled or considered such that the RA can proceed. The Sufficiency Assessment will consider whether upland (direct discharges, groundwater, river bank, overwater) and in-water sources will adversely impact the short- or long-term effectiveness of the proposed RA. The Sufficiency Assessment should be completed following the schedule deadlines in Section 6.2.

(b) The Sufficiency Assessment shall consider potential impacts from a range of potential sources, including but not limited to:

(1) Upland pathways (direct discharges, groundwater, river bank, and overwater);

(2) In-water sources of recontamination;

(3) Resuspension of sediments from natural and anthropogenic activities;

(4) Factors that may impact sediment cap effectiveness;

(5) Potential future use for near shore land and in-water uses; and

(6) Other future conditions (e.g., climate change impacts) that may impact recontamination potential.

(c) The components of the Sufficiency Assessment Report shall include:

(1) Description of the Project Area setting, the upland and in-water source addressed and could impact the RA; and identification of data gaps.

(2) A summary of in-water sources of COCs to the Project Area that may affect achieving any of the remedial action objectives. One line of evidence in this evaluation will be comparing to ROD Table 17 cleanup levels and Table 21 RALs and PTW Thresholds including a description of any proposed measures to address in-water sources including the timing and expected effectiveness of these measures.

(3) A summary of available information regarding the source control status of direct discharges, groundwater, river bank, and overwater sources of COCs into the Project Area that may affect achieving any of the remedial action objectives by comparing to ROD Table 17 cleanup levels and Table 21 RALs and PTW thresholds as one line of evidence; identification of any sources, COCs and pathways that have not been effectively addressed and could impact the RA; and identification of data gaps.

(4) A summary of in-water sources of COCs to the Project Area that may affect achieving any of the remedial action objectives. One line of evidence in this evaluation will be comparing to ROD Table 17 cleanup levels and Table 21 RALs and PTW Thresholds including a description of any proposed measures to address in-water sources including the timing and expected effectiveness of these measures.

(5) An assessment of the degree to which the proposed remedy will address upland (direct discharges, overwater, groundwater, and riverbank) and in-water sources of COCs to the Project Area.

(6) An assessment of the degree to which changed future conditions (e.g., changes in land and waterway use and climate change) may affect recontamination potential at the Project Area.

(7) The results of the Sufficiency Assessment that includes evaluation of the sufficiency of upland and in-water source controls to reduce the potential for recontaminating the selected remedy following implementation. The assessment will consider the general magnitude of any potential recontamination effects and discuss implications to the selected remedy for the Project Area. The discussion will also present the limitations of the assessment approaches and any remaining data gaps.

(8) A sufficiency assessment summary table of upland sources (direct discharges, overwater, river bank) that explicitly identifies the potential sources and pathways at the Project Area and categorizes the status of each source using the outcome categories: (A) sources are sufficiently controlled; (B) sources are conditionally controlled; and (C) sources are not sufficiently assessed or controlled. An example table is provided in Attachment 2 of the SOW. Completing the sufficiency assessment summary table is a valuable exercise to ensure that there is consensus on the status of potential sources at the Project Area. The goal of this table is to serve as the basis for EPA's sufficiency determination in informing respondents whether cleanup can go forward and, if potential sources remain, how those sources should be integrated into the in-water design. The sufficiency assessment summary table shall be updated and included in the Pre-Final (90%) RD as a final check to ensure remedial construction can commence.

(9) Description of how data gaps, if any, will be addressed.

(10) Conclusions and Recommendations. The Sufficiency Assessment Report shall present conclusions and recommendations. Recommendations will be expressed as one of three potential outcomes:

i. Sources are sufficiently controlled: the report recommends the specified area of sediment cleanup proceed based on reasonable confidence that the relevant recontamination potential is as minimal as possible.

ii. Sources are conditionally controlled: the report recommends the specified area of sediment cleanup proceed so long as certain additional controls or oversight are implemented in a reasonable timeframe or that any area information gaps are considered.

iii. Sources are not sufficiently assessed or controlled: the report recommends that specified area of sediment cleanup not proceed until additional controls have been implemented and assessed for effectiveness.

(11) References section listing each document cited in the report

(d) The Sufficiency Assessment does not itself satisfy the requirements of the federal Clean Water Act, CERCLA or other authorities. For example, a site or area that has been evaluated for source control sufficiency for the in-water RA may still be required to take additional measures to meet water quality permit or upland cleanup requirements.

Following remedy implementation, post-construction monitoring will be performed to evaluate remedy effectiveness. Post-construction monitoring will be designed to distinguish between recontamination and assessing whether the remedy is functioning as intended to demonstrate long-term performance of the remedy across appropriate temporal and spatial scales.

3.2 Pre-Design Investigation. The purpose of the Pre-Design Investigation (PDI) is to identify and address data gaps by conducting field investigations to develop the Basis of Design Report and RD Work Plan.

(a) PDI Work Plan. Respondents shall submit a PDI Work Plan (PDIWP) for EPA comment and approval. The PDIWP must include:

(1) An evaluation and summary of all available existing data, including baseline data within/near the Swan Island Basin Project Area, and description of data gaps for: preliminary SMA delineation consistent with EPA's June 6, 2017 Portland Harbor Superfund Site, Sampling Plan for Pre-Remedial Design, Baseline and Long-Term Monitoring; CSM refinement consistent with Section 14.2 (Post-ROD Data Gathering and Other Information Verification) of the ROD; and application of ROD Figure 28 (Technology Application Decision Tree). This includes additional field investigations, that must be completed to support RD and to refine the CSM. Data gap analysis will include:

(i) Surface and subsurface contaminant concentrations;

(ii) Surface water, sediment pore water and groundwater data;

(iii) Bathymetry;

(iv) Flood-rise analysis; and

(v) NAPL delineation, if applicable

(2) A Project Area Field Sampling Plan, as described in ¶ 5.6(c) (Supporting Deliverables) of this SOW. The plan includes the details of the media to be sampled, contaminants or parameters for which sampling will be conducted, location (areal extent and depths), number of samples, and a project schedule;

(3) A Project Area Quality Assurance Project Plan (QAPP) as described in ¶ 5.6(d) (Supporting Deliverables) of this SOW;

(4) A Project Area Health and Safety Plan (HASP), as described in ¶ 5.6(a) (Supporting Deliverables) of this SOW;

(5) A Project Area Emergency Response Plan as described in ¶ 5.6(b) (Supporting Deliverables) of this SOW; and

(6) A description of all necessary actions to ensure compliance with ¶ 3.13 (Off-Site Shipments) of this SOW.

(b) **PDI Evaluation Report.** Following implementation of the PDI scope in the approved PDIWP, Respondents shall submit a PDI Evaluation Report for EPA comment and approval. This report must include:

(1) Summary of the investigations performed;

(2) Summary of investigation results;

(3) Summary of validated data (i.e., tables and graphics);

(4) Data validation reports and laboratory data reports;

(5) Narrative interpretation of data and results;

(6) Results of statistical and modeling analyses, if applicable;

(7) Photographs documenting the work conducted; and

(8) Conclusions and recommendations on whether the data are sufficient to complete the BODR.

3.3 Basis of Design Report (BODR). The purpose of the BODR is to refine the SMA, update the CSM and refine the technology assignments to the SMA consistent with the Decision Tree in Figure 28 of the ROD. Respondents shall submit a BODR for EPA comment and approval. The BODR will:

(a) Summarize the results of the sufficiency assessment and whether potential sources of recontamination have been adequately investigated and controlled or considered such that the RA can proceed.

(b) Summarize existing site conditions and site factors which affect technology assignments including detailed reasonably anticipated future navigation and land use information and other data, as depicted in the Decision Tree, and refinement of the CSM pertaining to the Project Area;

(c) Summarize design criteria applicable to the Project Area as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995) and consistent with Section 14.2.9 (*Design Requirements*) and Section 14.2.10 (*Performance Standards*) of the ROD;

(d) Describe Decision Tree analysis and identify a preferred remedial approach, on consistency with the ROD for the Project Area;

(e) Present a conceptual design for the remedy based on the results of the Decision Tree analysis and supporting data and analyses;

(f) Identify long-term monitoring and maintenance considerations for the Project Area;

(g) Identify design studies for RD, if any, such as subsurface and surface sediment sampling and benthic toxicity testing that may be needed to evaluate attainment of applicable RAOs and address proposed remedial technology means and methods, and gather other information necessary for RD for the Project Area; and

(h) Describe a sequencing plan as well as an overall schedule to complete the design studies, RD and RA for the Project Area.

3.4 RD Work Plan (RDWP). Respondents shall submit a RDWP for EPA comment and approval. The RDWP must include:

(a) Plans for implementing all RD activities identified in this SOW, in the BODR, in the RDWP, or as required by EPA to be conducted to develop the RD for the Project Area;

(b) A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable;

(c) A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the RA as necessary to implement the Work;

(d) A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;

(e) Descriptions of any areas requiring clarification and/or anticipated problems, if any (e.g., data gaps);

(f) Description of studies and design phases for any on-site transload facility to be used to transload dredged materials from the Project Area or any other area of the Site;

(g) Description of any proposed supplemental PDI;

(h) Description of any proposed treatability study;

(i) Descriptions of any applicable permitting requirements and other regulatory requirements, if any;

(j) Description of plans for obtaining access in connection with the Work, such as access agreements, property acquisition, property leases, and/or easements; and

(k) Updates of all supporting deliverables required to accompany the PDIWP or supplemental PDIWP.

3.5 **Meetings.** Respondents shall meet regularly with EPA to discuss design issues as necessary, as directed or determined by EPA.

3.6 **Supplemental PDI.** The purpose of the Supplemental PDI is to address data gaps identified in the RDWP by conducting additional field investigations in the Project Area.

(a) **Supplemental PDI Work Plan**. If EPA requests, Respondents shall submit a Supplemental PDI Work Plan (SPDIWP) for EPA comment and approval. The SPDIWP must include all elements as described in ¶ 3.2(a).

(b) **Supplemental PDI Evaluation Report**. Following the Supplemental PDIWP, Respondents shall submit a Supplemental PDI Evaluation Report for EPA comment and approval. This report must include the same elements as described in ¶ 3.2(b).

3.7 **Treatability Study.** If necessary, Respondents shall perform a Treatability Study (TS) to evaluate the effectiveness of a remedial technology (e.g., reactive cap).

(a) Respondents shall submit a TS Work Plan (TSWP) for EPA comment and approval. Respondents shall prepare the TSWP in accordance with *EPA's Guide for Conducting Treatability Studies under CERCLA, Final* (Oct. 1992), as supplemented for RD by the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995).

(b) Following completion of the TS, Respondents shall submit a TS Evaluation Report for EPA comment and approval.

(c) EPA may require Respondents to supplement the TS Evaluation Report and/or to perform additional treatability studies.

3.8 **Draft RD (50%).** Respondents shall submit a Draft RD (50%) RD for the Swan Island Basin Project Area for EPA's comment. All information and activities to be performed under the Draft RD (50%) RD shall be included and updated, as needed, in subsequent RD submittals (i.e., 90%, and 100%). The Draft RD must include:

(a) A design criteria report, as described in the Remedial Design/Remedial Action Handbook, EPA 540/R-95/059 (June 1995**);**

(b) Preliminary drawings and specifications;

(c) Descriptions of permit requirements, if applicable;

(d) A description of how the RA will be implemented in a manner that minimizes environmental impacts in accordance with EPA's Principles for Greener Cleanups (Aug. 2009), and the information described in Appendix M of the Portland Harbor Feasibility Study (June 2016);

(e) A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, during the RA;

(f) Updates of all supporting deliverables required to accompany the RDWP and the following additional supporting deliverables described in ¶ 5.6 (Supporting Deliverables): Institutional Controls Implementation and Assurance Plan; Waste Designation Memo; Biological Assessment; Clean Water Act Analysis; Project Area Monitoring Plan; Construction Quality Assurance/Quality Control Plan; Transportation and Off-Site Disposal Plan; O&M Plan; and O&M Manual.

(g) Respondent must demonstrate that any transload facility it intends to use is appropriate for handling and transloading contaminated sediments and other materials that might be dredged by the Respondents. In the event the Respondents wish to use a transload facility within the site for transferring dredged materials from the Project Area. Respondents will provide the design specifications for that transload facility, whether prepared by the Respondents or another owner or operator. If necessary, EPA shall assist Respondent in obtaining the required design specifications from the transload facility owner or operator. Such specifications shall include information for any transload-specific Applicable or Relevant and Appropriate Requirements that must be complied with to build and operate the transload facility. In addition, the transload facility's design specifications must address the following: (1) location of transload operations; (2) identification of contaminated groundwater and soil within the foot print of the transload operations; and (3) plans to remove or remediate these contaminated media during construction of the transload facility, or an analysis of how the presence and operation of the transload facility will not inhibit or prevent implementation of ongoing source control measures and potential remedial measures identified in ODEQ's pending upland Record of Decision for the upland property, if applicable. If Respondent intends to use a transload facility outside of the Portland Harbor Superfund Site (see NCP definition of "on-site") for dredged materials from the Project Area, the design specifications provided by Respondent (which may be prepared by another owner or operator) must include Clean Water Act (CWA) Sections 404 and 401 permit application design information to minimize spillage, offsite tracking, worker exposure and ensure stormwater management for approval

before submittal to the United States Army Corps of Engineers and ODEQ, respectively.

(h) Respondent shall coordinate with and obtain necessary information from owners of riverbanks and/or submerged lands that are within the Project Area. Such information shall include, but not be limited to, the owner's future anticipated river use that should be considered in the decision tree process and design, shipping schedules, and known buried infrastructure. The RD shall document in writing the landowners that were contacted and the information received for all properties in the Project Area.

3.9 Pre-Final (90%) RD. Respondents shall submit the Pre-final (90%) RD for EPA's comment. The Pre-final RD must be a continuation and expansion of the previous design submittal and must address EPA's comments regarding the Intermediate RD. The Prefinal RD will serve as the approved Final (100%) RD if EPA approves the Pre-final RD without comments. The Pre-final RD must include:

(a) A complete set of construction drawings and specifications that are: (1) certified by a registered professional engineer; (2) suitable for procurement; and (3) follow the Construction Specifications Institute's Master Format 2016;

(b) Survey and engineering drawings showing existing Project Area features, such as elements, property borders, easements, and Project Area conditions;

(c) Pre-Final versions of the same elements and deliverables as are required for the Intermediate RD;

(d) A specification for photographic documentation of the RA; and

(e) Updates of all supporting deliverables required to accompany the Draft RD (50%) RD, including an updated sufficiency assessment summary table per ¶ 3.1(c)(8) as a final check to ensure remedial construction can commence.

3.10 Final (100%) RD. Respondents shall submit the Final (100%) RD for EPA approval. The Final RD must address EPA's comments on the Pre-final RD and must include final versions of all Pre-final deliverables.

3.11 Emergency Response and Reporting

(a) **Emergency Response and Reporting**. If any event occurs during performance of the RD Work that causes or threatens to cause a release of Waste Material on, at, or from the Site and that either constitutes an emergency situation or that may present an immediate threat to public health

or welfare or the environment, Respondents shall: (1) immediately take all appropriate action to prevent, abate, or minimize such release or threat of release; (2) immediately notify the authorized EPA officer (as specified in ¶ 3.12(c)) orally; and (3) take such actions in consultation with the authorized EPA officer and in accordance with all applicable provisions of the Health and Safety Plan, the Emergency Response Plan, and any other deliverable approved by EPA under the SOW.

(b) **Release Reporting**. Upon the occurrence of any event during performance of the RD Work that Respondents are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004, Respondents shall immediately notify the National Response Center (phone 1-800-424-8802) and authorized EPA officer orally.

(c) The "authorized EPA officer" for purposes of immediate oral notifications and consultations under ¶ 3.12(a) and ¶ 3.12(b) is the EPA Project Coordinator, the EPA Alternate Project Coordinator (if the EPA Project Coordinator is unavailable), or the EPA Emergency Response Unit, Region 10 (if neither EPA Project Coordinator is available).

(d) For any event covered by ¶ 3.12(a) and ¶ 3.12(b), Respondents shall: (1) within 14 days after the onset of such event, submit a report to EPA describing the actions or events that occurred and the measures taken, and to be taken, in response thereto; and (2) within 30 days after the conclusion of such event, submit a report to EPA describing all actions taken in response to such event.

(e) The reporting requirements under ¶ 3.12 are in addition to the reporting required by CERCLA § 103 or EPCRA § 304.

3.12 Off-Site Shipments

(a) Respondents may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Respondents obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b).

(b) Respondents may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement will not apply to any

off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. Respondents also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Respondents shall provide the notice as soon as practicable after the award of the contract and before the Waste Material is shipped.

(c) Respondents may ship Investigation Derived Waste (IDW) from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, EPA's *Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992), and any IDW specific requirements contained in the ROD. Wastes Shipped off-Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from FCRA under 40 CFR § 261.4(e) shipped offsite for treatability studies, are not subject to 40 C.F.R § 300.440.

4. REPORTING

4.1 Progress Reports. Commencing with the quarter following the Effective Date of the Settlement and until issuance of Notice of Work Completion pursuant to Section XXVII of the Settlement, Respondents shall submit progress reports to EPA on a quarterly basis, or as otherwise requested by EPA. The reports must cover all activities that took place during the prior reporting period, including:

(a) The actions that have been taken toward achieving compliance with the Settlement;

(b) A summary of all results of validated sampling, tests, and all other data received or generated by Respondents;

(c) A list of all deliverables that Respondents submitted to EPA;

(d) A list of all activities scheduled for the next quarter;

(e) Information regarding percentage of completion, unresolved delays encountered or anticipated that may affect the future schedule for implementation of the RD Work, and a description of efforts made to mitigate those delays or anticipated delays;

(f) A list of any modifications to the work plans or other schedules that Respondents have proposed or that have been approved by EPA; and

(g) A list of all activities undertaken in support of the CIP during the reporting period and those to be undertaken in the next quarter.

4.2 Notice of Progress Report Schedule Changes. If the schedule for any activity described in the Progress Reports, including activities required to be described under ¶ 4.1(d), changes, Respondents shall notify EPA of such change at least seven days before performance of the activity.

5. DELIVERABLES

5.1 Applicability. Respondents shall submit all deliverables for EPA approval or for EPA comment as specified in the SOW. If neither is specified, the deliverable does not require EPA's approval or comment. ¶ 5.2 (In Writing) through 5.4 (Formatting Specifications) apply to all deliverables. ¶ 5.5 (Approval of Deliverables) applies to any deliverable that is required to be submitted for EPA approval.

5.2 In Writing. All deliverables under this SOW must be in writing unless otherwise specified.

5.3 General Requirements for Deliverables:

(a) Except as otherwise provided in this SOW, Respondents shall direct all deliverables required by this SOW to the EPA Project Coordinator: Elisabeth Novak, Remedial Project Manager, Superfund and Emergency Management Division, U.S. Environmental Protection Agency, 805 SW Broadway, Ste. 500, Portland, Oregon 97205, phone (503) 326-3277, email novak.elisabeth@epa.gov.

(b) All deliverables provided to the State and Tribal representatives in accordance with ¶ 7 (State and Tribal Participation) shall be directed to

- David Lacey and Sarah Greenfield, Department of Environmental Quality, Northwest Region Portland Office, 700 NE Multnomah St. Ste 600, Portland, OR 97232-4100, (503) 229-5354 (David Lacey), david.j.lacey@state.or.us, (503) 229-5445 (Sarah Greenfield), sarah.greenfield@state.or.us

- The Five Tribes (individual tribal contacts may be updated as necessary):
  - c/o Gail French Fricano, IEc, Industrial Economics, Incorporated, 2067 Massachusetts Ave., Cambridge, MA 02140, (617) 354-0074, GFricano@indecon.com
  - c/o Courtney Johnson (for Nez Perce Tribe), Crag Law Center, 917 SW Oak, Suite 417, Portland, OR 97205, (503) 525-2728, courtney@crag.org

- Laura Shira, Yakama Nation Fisheries, Post Office Box 151, Toppenish, WA 98948, (509) 985-3561, shil@yakamafish-nsn.gov.

(c) All deliverables must be submitted by the deadlines in the RD Schedule and RDWP, as applicable. Respondents shall submit all deliverables to EPA in electronic form, e.g. email pdfs and/or maintain file transfer protocol (ftp) sites as requested by EPA. Formatting specifications for sampling and monitoring data and spatial data are addressed in ¶ 5.4. All other deliverables shall be submitted to EPA in the electronic form specified by the EPA Project Coordinator. If any deliverable includes maps, drawings, or other exhibits that are larger than 11" by 17", Respondents shall also provide EPA with paper copies of such exhibits.

5.4 Formatting Specifications

(a) Sampling and monitoring data should be submitted in standard regional Electronic Data Deliverable (EDD) format (Attachment 1 of the SOW). Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes. All data must be formatted such that they can be easily uploaded to the Portland Harbor Superfund Site database (e.g., Scribe). Reports shall be submitted in a format approved by EPA, such as in pdf format with all metadata inserted, 508 tagging done to the extent practicable, in one file per deliverable (versus many), and include bookmarks to the extent practicable to enhance readability.

(b) Spatial data, including spatially-referenced data and geospatial data, shall be submitted: (1) in the ESRI File Geodatabase format; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum, consistent with the format used for such submissions in the RI/FS for the Portland Harbor Superfund Site or as approved by EPA. If applicable, submissions shall include the collection method(s). Projected coordinates may optionally be included but must be documented (four aspects include projection, zone, datum, and units). Spatial data shall be accompanied by metadata, and such metadata shall be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at https://www.epa.gov/geospatial/epa-metadataeditor. Respondents are required to upload data collected to EPA's Scribe environmental data management tool or other tool as prescribed by EPA.

(c) Each file must include an attribute name for each Project Area unit or sub-unit submitted. Consult https://www.epa.gov/geospatial/geospatial-policies-and standards for any further available guidance on attribute identification and naming.

(d) Spatial data submitted by Respondents does not, and is not intended to, define the boundaries of the Project Area.

5.5 Approval of Deliverables

(a) **Initial Submissions**

(1) After review of any deliverable that is required to be submitted for EPA approval under the SOW, EPA shall: (i) approve, in whole or in part, the submission; (ii) approve the submission upon specified conditions; (iii) disapprove, in whole or in part, the submission; or (iv) any combination of the foregoing.

(2) EPA also may modify the initial submission to cure deficiencies in the submission if: (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the RD Work; or (ii) previous submission(s) have been disapproved due to material defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

(b) **Resubmissions**. Upon receipt of a notice of disapproval under ¶ 5.5(a) (Initial Submissions), or if required by a notice of approval upon specified conditions under ¶ 5.5(a) Respondents shall, within 45 days or such longer time as specified by EPA in such notice, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may: (1) approve, in whole or in part, the resubmission; (2) approve the resubmission upon specified conditions; (3) modify the resubmission; (4) disapprove, in whole or in part, the resubmission, requiring Respondents to correct the deficiencies; or (5) any combination of the foregoing.

(c) **Implementation**. Upon approval, approval upon conditions, or modification by EPA under ¶ 5.5(a) (Initial Submissions) or ¶ 5.5(b) (Resubmissions), of any deliverable, or any portion thereof: (1) such deliverable, or portion thereof, will be incorporated into and enforceable under the Settlement; and (2) Respondents shall take any action required by such deliverable, or portion thereof. The implementation of any non-deficient portion of a deliverable

submitted or resubmitted under ¶ 5.5(a) or ¶ 5.5(b) does not relieve Respondents of any liability for stipulated penalties under Section XVI (Stipulated Penalties) of the Settlement.

5.6 Supporting Deliverables. Respondents shall submit each of the following supporting deliverables for EPA comment and approval, except as specifically provided. Respondents shall develop the deliverables in accordance with all applicable regulations, guidance, and policies (see ¶ 8 (References)). Respondents shall update each of these supporting deliverables as necessary or appropriate during the RD Work, and/or as requested by EPA. Supporting deliverables to each deliverable are specified in the schedule of ¶ 6.2.

(a) **Health and Safety Plan**. The Health and Safety Plan (HASP) describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by implementing the RD Work. Respondents shall develop the HASP in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 C.F.R. §§ 1910 and 1926. The HASP required by this RD SOW should cover RD activities and should be, as appropriate, updated to cover activities during the RA and updated to cover activities after RA completion. (Updates may be needed for RA activities and after RA completion.) EPA does not approve the HASP but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.

(b) **Emergency Response Plan**. The Emergency Response Plan (ERP) must describe procedures to be used in the event of an accident or emergency at the Project Area (for example, power outages, water impoundment failure, treatment plant failure, slope failure, etc.). The ERP must include:

(1) Name of the person or entity responsible for responding in the event of an emergency incident;

(2) Plan and date(s) for meeting(s) with the local community, including local, State, and federal agencies involved in the cleanup, as well as local emergency squads and hospitals;

(3) Spill Prevention, Control, and Countermeasures (SPCC) Plan (if applicable), consistent with the regulations under 40 C.F.R. Part 112, describing measures to prevent, and contingency plans for, spills and discharges;

(4) Notification activities in accordance with ¶ 3.12(b) (Release Reporting) in the event of a release of hazardous substances requiring reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act (EPCRA), 42 U.S.C. § 11004; and

(5) A description of all necessary actions to ensure compliance with ¶ 3.12a (Emergency Response and Reporting) of the SOW in the event of an occurrence during the performance of the RD Work that causes or threatens a release of Waste Material from the Site that constitutes an emergency or may present an immediate threat to public health or welfare or the environment.

(c) **Field Sampling Plan**. The Field Sampling Plan (FSP) addresses all sample collection activities. The FSP must be written so that a field sampling team unfamiliar with the project would be able to gather the samples and field information required. Respondents shall develop the FSP in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies*, EPA/540/G 89/004 (Oct. 1988). The description of data gaps as required in ¶ 3.2(a)(1) will serve as the basis for the sample collection activities in the FSP. The lateral and vertical extent of contamination exceeding RALs and PTW thresholds will be delineated based on 150 by 150-foot core spacing density and will start from the SMAs identified in the evaluation and summary of all existing data set forth in ¶ 3.2(a)(1) and extend as needed to delineate the full extent of area exceeding RALs and/or PTW thresholds. The lateral and vertical extent of contamination into the navigation channel is not bound by the Project Area boundary on that side, but rather must be delineated also based on 150 by 150-foot core spacing density but to no more than half the distance across the channel, and will start from the SMAs identified in the evaluation and summary of all existing data set forth in ¶ 3.2(a)(1).

(d) **Quality Assurance Project Plan**. The Quality Assurance Project Plan (QAPP) augments the FSP and addresses sample analysis and data handling regarding the RD Work. The QAPP must include a detailed explanation of Respondents' quality assurance, quality control, and chain of custody procedures for all investigations, treatability, design, compliance, and monitoring samples. Respondents shall develop the QAPP in accordance with *EPA Requirements for Quality Assurance Project Plans*, QA/R- 5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006); *Guidance for Quality Assurance Project Plans*, QA/G-5, EPA/240/R-02/009 (Dec. 2002); and *Uniform Federal Policy for Quality Assurance Project Plans*, Parts 1-3, EPA/505/B- 04/900A through 900C (Mar. 2005). The QAPP also must include procedures:

(1) To ensure that EPA and its authorized representative have reasonable access to laboratories used by Respondents in implementing the Settlement (Respondents' Labs);

(2) To ensure that Respondents' Labs analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring;

(3) To ensure that Respondents' Labs perform all analyses using EPA-accepted methods (i.e., the methods documented in *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*, ILM05.4 (Dec. 2006); *USEPA Contract Laboratory Program Statement of Work for Organic Analysis*, SOM01.2 (amended Apr. 2007); and *USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration)*, ISM01.2 (Jan. 2010) or other methods acceptable to EPA; To ensure that Respondents' Labs participate in an EPA-accepted QA/QC program or other QA/QC program acceptable to EPA;

(4) For Respondents to provide EPA with notice at least 28 days prior to any sample collection activity;

(5) For Respondents to provide split samples and/or duplicate samples to EPA upon request;

(6) For EPA to take any additional samples that it deems necessary;

(7) For EPA to provide to Respondents, upon request, split samples and/or duplicate samples in connection with EPA's oversight sampling;

(8) For Respondents to submit to EPA all sampling and tests results and other data in connection with the implementation of the Settlement.

(e) **Institutional Controls Implementation and Assurance Plan.** Institutional controls (ICs) at the Site will be implemented to: (1) protect human health and the environment by limiting exposure to contamination left in place; and (2) protect the long-term integrity of the engineered components of the Selected Remedy. The City of Portland and State of Oregon will develop a site-wide Institutional Control Implementation and Assurance Plan (ICIAP). Respondents will develop a Project Area-specific ICIAP during RD which will, at a minimum, identify the specific and necessary Project Area ICs that will be implemented; plans to implement, maintain, and enforce the ICs; and the parties responsible for implementing and monitoring each IC necessary at the Project Area, consistent with Section 14.2.6. (*Institutional Controls*) of

the ROD. Upon approval by EPA, Respondents will provide its Project Area ICIAP to the City and State for incorporation into the site-wide ICIAP. The ICIAP shall be developed in accordance with *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites,* OSWER 9355.0-89, and EPA/540/R-09/001 (Dec. 2012) and *Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites*, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012) or as amended or superseded. The ICIAP must include the following additional requirements:

(1) Locations of recorded real property interests (e.g., easements, liens) and resource interests in the property that may affect ICs (e.g., surface, mineral, and water rights) including accurate mapping and geographic information system (GIS) coordinates of such interests; and

(2) Legal descriptions and survey maps that are prepared according to current American Land Title Association (ALTA) Survey guidelines and certified by a licensed surveyor.

Among others, three types of ICs have been proposed for the Site that may be used at the Project Area: (1) Fish Advisories and Educational Outreach; (2) Waterway Use Restrictions or Regulated Navigation Areas (RNAs); and (3) Land Use/Access Restrictions.

(f) **Waste Designation Memo**. The waste designation memo, if appropriate, will describe the characterization of any RCRA wastes (evaluated as part of the RD) and present the data needs necessary to arrange for the offsite disposal of the wastes at an appropriate facility.

(g) **Biological Assessment (BA)**. The Respondents shall include a Project Area BA or a supplement to EPA's programmatic Site-wide BA for the preferred alternative as needed to help facilitate National Oceanic and Atmospheric Administration (NOAA) consultation on substantive requirements for the project, as well as a Clean Water Act (CWA) memorandum, to include time for EPA reviews and any necessary revision. The BA shall identify the presence of threatened, endangered, and proposed or candidate species, or their habitat, within the vicinity of the Project Area and shall comply with the substantive requirements of the Endangered Species Act. The BA shall characterize baseline conditions of existing habitat; address potential project impacts that the remedy may have on these species, their habitat, and their food stocks; and describe best management practices and conservation measures designed to avoid or minimize any negative impacts.

(h) **Clean Water Act Analysis**. Respondents shall submit a memorandum that provides sufficient information to demonstrate compliance of the proposed RA at the Project Area with the substantive requirements of Section 404(b)(1) and other applicable sections of the CWA. The memorandum shall supplement the information gathered from the Feasibility Study regarding, long- and short-term impacts from the RA at the Project Area, minimization of adverse effects, compliance with the ROD, and an analysis of the need for any mitigation.

(i) **Project Area Monitoring Plan**. The purpose of the Project Area Monitoring Plan (PAMP) is to obtain baseline information regarding the extent of contamination in affected media at the Project Area; to obtain information, through short- and long- term monitoring, about the movement of and changes in contamination throughout the Project Area, before and during implementation of the RA; to obtain information regarding contamination levels to determine whether Performance Standards (PS) are achieved; and to obtain information to determine whether to perform additional actions, including further Project Area monitoring. As appropriate, approved data from Project Area Pre-RD and RD sampling and Site-wide baseline data may be used in the PAMP. The PAMP must include:

(1) Description of the environmental media to be monitored;

(2) Description of the data collection parameters, including existing and proposed monitoring devices and locations, schedule and frequency of monitoring, analytical parameters to be monitored, and analytical methods employed;

(3) Description of how performance data will be analyzed, interpreted, and reported, and/or other Project Area-related requirements;

(4) Description of verification sampling procedures;

(5) Description of deliverables that will be generated in connection with monitoring, including sampling schedules, laboratory records, monitoring reports, and monthly and annual reports to EPA and State agencies; and

(6) Description of proposed additional monitoring and data collection actions (such as increases in frequency of monitoring, and/or installation of additional monitoring devices in the affected areas) in the event that results from monitoring devices indicate changed conditions (such as higher than expected concentrations of the contaminants of concern or groundwater contaminant plume movement).

(j) **Construction Quality Assurance/Quality Control Plan (CQA/QCP)**. The purpose of the Construction Quality Assurance/Quality Control Plan (CQA/QCP) is to describe planned and systemic activities that provide confidence and that verify that the RA construction will and do satisfy all plans, specifications, and related requirements, including quality objectives. The CQA/QCP must:

(1) Identify, and describe the responsibilities of, the organizations and personnel implementing the CQA/QCP;

(2) Describe the PS required to be met to achieve Completion of the RA;

(3) Describe the activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;

(4) Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/QCP;

(5) Describe industry standards and technical specifications used in implementing the CQA/QCP;

(6) Describe procedures for tracking construction deficiencies from identification through corrective action;

(7) Describe procedures for documenting all CQA/QCP activities; and

(8) Describe procedures for retention of documents and for final storage of documents.

(k) **Transportation and Off-Site Disposal Plan.** The Transportation and Off-Site Disposal Plan (TODP) describes plans to ensure compliance with ¶ 3.13 (Off-Site Shipments). The TODP must include:

(1) Proposed routes for off-site shipment of Waste Material;

(2) Identification of communities affected by shipment of Waste Material; and

(3) Description of plans to minimize impacts on affected communities.

(l) **O&M Plan.** The O&M Plan describes the requirements for inspecting, operating, and maintaining the RA. Respondents shall develop the O&M Plan in accordance with Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017). The O&M Plan must include the following additional requirements:

(1) Description of PS required to be met to implement the ROD;

(2) Description of activities to be performed: (i) to provide confidence that PS will be met; and (ii) to determine whether PS have been met;

(3) **O&M Reporting**. Description of records and reports that will be generated during O&M, such as daily operating logs, laboratory records, records of operating costs, reports regarding emergencies, personnel and maintenance records, monitoring reports, and monthly and annual reports to EPA and State agencies;

(4) Description of corrective action in case of systems failure, including: (i) alternative procedures to prevent the release or threatened release of Waste Material which may endanger public health and the environment or may cause a failure to achieve PS; (ii) analysis of vulnerability and additional resource requirements should a failure occur; (iii) notification and reporting requirements should O&M systems fail or be in danger of imminent failure; and (iv) community notification requirements; and

(5) Description of corrective action to be implemented in the event that PS are not achieved; and a schedule for implementing these corrective actions.

(m) **O&M Manual**. The O&M Manual serves as a guide to the purpose and function of the equipment and systems that make up the remedy. Respondents shall develop the O&M Manual in accordance with *Guidance for Management of Superfund Remedies in Post Construction*, OLEM 9200.3-105 (Feb. 2017).

6. SCHEDULES

6.1 Applicability and Revisions. All deliverables and tasks required under this SOW must be submitted or completed by the deadlines or within the time durations listed in the schedule set forth below. The schedule identifies deliverables that can be developed concurrently for efficiency. EPA's expectations are an optimized RD timeline as presented in **Figure 1**. Respondents may submit proposed revised schedules for EPA approval. Upon EPA's approval, the revised schedules supersede the schedule set forth below, and any previously approved schedule.

6.2 Schedule

	Description of Deliverable	**Included Supporting Deliverable**	**Ref.**	**Deadline**
	Notification of Respondents' CI Coordinator		2.1(d)	30 days after Effective Date of the Settlement

1a	Draft Sufficiency Assessment Report		3.1	120 days after Effective Date of the Settlement[1]
1b	Final Sufficiency Report		3.1	45 days after EPA's comments on the Draft Sufficiency Assessment Report[1]
2a	Draft PDI Work Plan	FSP, QAPP, HASP, ERP	3.2(a)	120 days after the Effective Date of the Settlement,
2b	Final PDI Work Plan	Same as above	3.2(a)	45 days after EPA's comments on the Draft PDI Work Plan[1]
3a	Draft PDI Evaluation Report		3.2(b)	As set forth in the approved PDI Work Plan[1]
3b	Final PDI Evaluation Report		3.2(b)	30 days after receiving EPA's comments on the Draft PDI Evaluation Report[1]
4a	Draft BODR		3.3	90 days after EPA approval of the Final PDI Evaluation Report[1]
4b	Final BODR	Same as above	3.3	45 days after EPA's comments on the Draft BODR[1]
5a	Draft RDWP	Updates to FSP, QAPP, HASP, ERP	3.4	90 days after EPA's approval on the Final BODR[1]
5b	Final RDWP	Same as above	3.4	45 days after EPA's comments on the Draft RDWP[1]
6a	Draft Supplemental PDI Work Plan (if needed)		3.6(a)	As set forth in the draft RDWP[1]
6b	Final Supplemental PDI Work Plan (if needed)	Same as above	3.6(a)	As set forth in the draft RDWP[1]
7a	Draft Supplemental PDI Evaluation Report (if needed)		3.6(b)	As set forth in the approved Final RDWP[1]
7b	Final Supplemental PDI Evaluation Report (if needed)		3.6(b)	As set forth in the approved Final RDWP[1]
8a	Draft Treatability Study Work Plan (if required)		3.7(a)	As set forth in the draft RDWP[1]
8b	Final Treatability Study Work Plan (if required)		3.7(a)	As set forth in the draft RDWP[1]
9a	Draft Treatability Study Evaluation Report (if required)		3.7(b)	As set forth in the approved Final RDWP[1]
9b	Final Treatability Study Evaluation Report (if required)		3.7(b)	As set forth in the approved Final Treatability Study Work Plan[11]
10	Draft (50%) RD	All supporting deliverables described in 5.6	3.8	270 days after EPA approves the Final RDWP. The 50% design will begin prior to finalization of the PDI Reports but will not be completed until after the PDI Reports are

				completed. As set forth in the approved Final RDWP[1]
11	Pre-final (90%) RD	Same as above	3.10	As set forth in the approved Final RDWP[1]
12	Final (100%) RD	Same as above	3.11	As set forth in the approved Final RDWP[1]
13	Progress Reports		4.1	Quarterly[1]

[1] Notes: Preparation of these deliverables can occur concurrently for an efficient RD schedule. An example showing EPA's expectations for an optimized RD timeline is shown in Figure 1.

7. STATE AND TRIBAL PARTICIPATION

7.1 **Copies.** Respondents shall, at any time they send a deliverable to EPA, send a copy of such deliverable to DEQ and Tribal Governments identified in the Settlement. EPA shall be responsible for coordinating comments with the State and Tribes to meet the review schedule. Written comments on the deliverables provided to EPA from the State or Tribes shall be provided to the Respondents when EPA provides comments to Respondents. Respondents shall copy other agency Memorandum of Understanding partners (Oregon Department of Fish and Wildlife, NOAA, and U.S. Department of the Interior). EPA shall, at any time it sends a notice, authorization, approval, disapproval, or certification to Respondents, send a copy of such document to the State and Tribes and the agency partners.

7.2 **Review and Comment.** The State and Tribes will have a reasonable opportunity for review and comment prior to:

(a) Any EPA approval or disapproval under ¶ 5.5 (Approval of Deliverables) of any deliverables that are required to be submitted for EPA approval, and

(b) Any disapproval of, or Notice of Work Completion under Section XXVII of the Settlement (Notice of Work Completion).

(c) Any modifications of this SOW or related deliverables under ¶ 18 and Section XXVI of the Settlement.

8. REFERENCES

8.1 The following regulations and guidance documents, among others, apply to the Work. Any item for which a specific URL is not provided below is available on one of the two EPA Web pages listed in ¶ 8.2:

(a) Guidance for Conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, EPA/540/G 89/004 (Oct. 1988).

(b) A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).

(c) CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).

(d) CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).

(e) Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G- 90/001 (Apr. 1990).

(f) Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).

(g) Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).

(h) Permits and Permit "Equivalency" Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).

(i) Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.310, EPA/540/R 92/071A (Nov. 1992).

(j) National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).

(k) Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R- 95/025 (Mar. 1995). Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).

(l) EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).

(m) Operation and Maintenance in the Superfund Program, OSWER 9200.1-37FS, EPA/540/F-01/004 (May 2001).

(n) Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).

(o) Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).

(p) Quality Systems for Environmental Data and Technology Programs -- Requirements with Guidance for Use, ANSI/ASQ E4-2004 (2004).

(q) Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A though 900C (Mar. 2005).

(r) Superfund Community Involvement Handbook, EPA/540/K-05/003 (Apr. 2005).

(s) EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).

(t) EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B01/003 (Mar. 2001, reissued May 2006).

(u) EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).

(v) USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4 (Dec. 2006).

(w) USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2 (amended Apr. 2007).

(x) EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), available at https://www.epa.gov/geospatial/geospatial-policies-andstandards and https://www.epa.gov/geospatial/epa-national-geospatial-datapolicy.

(y) Principles for Greener Cleanups (Aug. 2009), available at https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups.

(z) USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM01.2 (Jan. 2010).

(aa) Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230), (July 2010), https://www.epa.gov/cwa-404/section-404b1-guidelines-40-cfr-230.

(bb) Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance," OSWER 9355.7-18 (Sep. 2011).

(cc) Construction Specifications Institute's MasterFormat 2016, available from the Construction Specifications Institute, https://www.csiresources.org/practice/standards/masterformat.

(dd) Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach, OSWER 9200.2-125 (Sep. 2012)

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

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

(gg) EPA's Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), http://www.epaosc.org/_HealthSafetyManual/manual- index.htm

(hh) Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).

(ii) Guidance for Management of Superfund Remedies in Post Construction, OLEM 9200.3-105 (Feb. 2017).

(jj) USEPA Portland Harbor Superfund Site, Sampling Plan for Pre-Remedial Design, Baseline and Long-Term Monitoring (June. 2017).

8.2 A more complete list may be found on the following EPA Web pages:

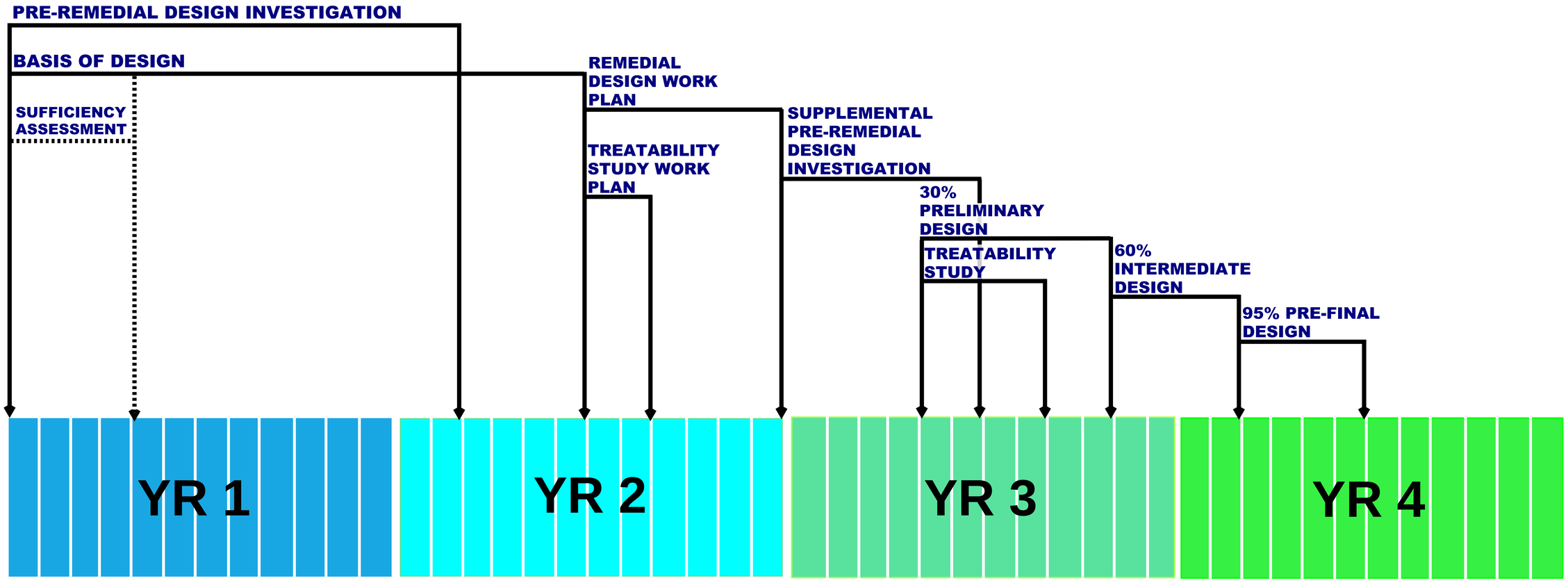
Laws, Policy, and Guidance https://www.epa.gov/superfund/superfund-policy-guidanceand-laws

Test Methods Collections https://www.epa.gov/measurements/collection-methods

8.3 For any regulation or guidance referenced in the Settlement or SOW, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the Work only after Respondents receive notification from EPA of the modification, amendment, or replacement

Figure 1

Optimized Remedial Design Timeline



* Current schedule allows 2.5 months for PRPs to create initial draft of RDWP and 30% RD along with 3.5 months for EPA/partner review and comments.
The 3.5 months includes a review/comment cycle of the initial draft document by EPA and TCT, development of the draft final document by PRP, and a final review by EPA. This review process will be shortened for the 60% RD and 95% RD as EPA expects the PRPs to have incorporated EPA comments from the 30% RD.

FIGURE 1. OPTIMIZED REMEDIAL DESIGN TIMELINE

Attachment 1

Program Data Management Plan for Portland Harbor

Program Data Management Plan

Portland Harbor Remedial Design Investigation – Portland Harbor Superfund Site

Prepared by

U.S. Environmental Protection Agency Region 10

August 2020

TABLE OF CONTENTS

Figures

Attachments

Definitions and Acronyms

ASAOC	Administrative Settlement Agreement and Order on Consent
cPAH	carcinogenic polycyclic aromatic hydrocarbon
DBA	database administrator
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DDx	dichlorodiphenyltrichloroethane and its derivatives
DMP	data management plan
US EPA	U.S. Environmental Protection Agency
EDD	electronic data deliverable
FS	feasibility study
HPAH	high-molecular-weight polycyclic aromatic hydrocarbon
ID	identifier
LPAH	low-molecular-weight polycyclic aromatic hydrocarbon
PAH	polycyclic aromatic hydrocarbon
BPDE	polybrominated diphenyl ether
PCB	polychlorinated biphenyl
PCDD/F	polychlorinated dibenzo-p-dioxin and furan
PDI	pre-design investigation
PEF	potency equivalent factor
PHIDB	Portland Harbor Interim Database
PP	performing party
RD	remedial design
RM	river mile
RPM	Remedial Project Manager (US EPA Region 10)
Scribe	US EPA data management application
Scribe.NET	web-based portal for archiving Scribe project files and data
SOW	statement of work
SQL	Structured Query Language
TCDD	tetrachlorodibenzo-p-dioxin
TCT	technical coordinating team
TEF	toxic equivalency factor
TEQ	toxic equivalent
WHO	World Health Organization

1.0 Introduction

To ensure that environmental data collected at the Portland Harbor Superfund Site during remedial design adhere to certain standards and practices, a programmatic level data management plan (DMP) was developed that provides overall guidance and data requirements for the various Performing Parties (PPs) who conduct sampling under the pre-design investigation (PDI). This document presents an update to the existing DMP dated August 2018, and attached to Administrative Settlement Agreement and Order on Consent (ASAOC) statements of work (SOWs) for the following remedial design (RD) areas:

- B1a
- B1 Navigation Channel
- U.S. Moorings
- Gasco
- River Mile (RM) 7W
- Willbridge Cove
- RM 9W
- RM 10W
- RM 11E
- RM 10E
- Willamette Cove
- Terminal 4
- RM 3.5E
- RM 2E

While this DMP is a standalone document, it is to be used in concert with the PDI work plan, including all supplements or change requests to the PDI work plan, Region 10 DMP, and the respective quality management plans developed for each performing party (PP) sampling effort. Implementation of this programmatic data management plan will allow all remedial design data to be housed in a single data base that we are calling the Portland Harbor Interim Database (PHIDB). We do not anticipate pulling the RI/FS data into the PHIDB at this time.

1.1 Site Background

The site is located along the lower reach of the Willamette River in Portland, Oregon, and extends from approximately RM 1.9 to RM 11.8. While the site is extensively industrialized, it is within a region characterized by commercial, residential, recreational, and agricultural uses. Land use along the lower Willamette River within the site includes marine terminals, manufacturing, other commercial operations, public facilities, parks, and open spaces. The State of Oregon owns certain submerged and submersible lands underlying navigable and tidally influenced waters. The ownership of submerged and submersible lands is complicated and has changed over time.

This lower reach was once a shallow, meandering portion of the Willamette River but has been redirected and channelized via filling and dredging. A federally maintained navigation channel, extending nearly bank-to-bank in some areas, doubles the natural depth of the river and allows transit of large ships into the active harbor. Much of the river bank contains overwater piers and berths, port terminals and slips, and other engineered features. While a series of dams in the upper

Willamette River watershed moderate's fluctuations of flow in the lower portions of the river, flooding still occurs approximately every 20 years, with the last occurring in 1996.

Armoring to stabilize banks covers approximately half of the harbor shoreline, which is integral to the operation of activities that characterize Portland Harbor. Riprap is the most common bank-stabilization measure. However, upland bulkheads and rubble piles are also used to stabilize the banks. Seawalls are used to control periodic flooding as most of the original wetlands bordering the Willamette in the Portland Harbor area have been filled. Some riverbank areas and adjacent parcels have been abandoned and allowed to revegetate, and beaches have formed along some modified shorelines because of relatively natural processes.

Development of the river has resulted in major modifications to the ecological function of the lower Willamette River. However, several species of invertebrates, fishes, birds, amphibians, and mammals, including some protected by the Endangered Species Act, use habitats that occur within and along the river. The river is also an important rearing site and pathway for migration of anadromous fishes, such as salmon and lamprey. Various recreational fisheries, including salmon, bass, sturgeon, crayfish, and others, are active within the lower Willamette River.

1.2 Objective and Scope

The objective of this DMP is to ensure that environmental data and supportive information are collected and documented in a consistent manner and managed in a manner that preserves, protects, and makes the information available to all stakeholders, PPs, and other affected groups. This DMP applies to data and information collected in support of the Portland Harbor Superfund Site by the PPs involved in RD sampling activities. While it does not cover all information (e.g., photos, field logs) that is managed for specific projects, it is intended to address those types of data deemed critical to overall decision-making and RD for the site. The subsections below identify the general data categories, PPs collecting environmental data, and major sampling activities.

1.2.1 Data Categories

This plan identifies standard data elements and data management processes for the following data categories:

- Project and sampling event identification information: details of the project, to include the name, site number, and U.S. Environmental Protection Agency (US EPA) region. Sampling event information will include the event identifier (ID) and event date.

- Environmental and biological sampling data: the data collected, to include field sample information, analyses performed on samples, and validated results.

- Locational data: locational data, to include geospatial information (latitude and longitude) related to sample collection efforts at specified locations, and basic well information such as screen depths and top of casing elevation.

The individual data elements for each of these categories represent the minimal amount of information needed for project-specific decision-making and data sharing among stakeholders and PPs. These are further identified in the Data Management section.

1.2.2 Major Stakeholder Groups, Performing Parties, and Community Groups

The major stakeholder groups such as the technical coordinating team (TCT), PPs, and community groups have been identified as those groups who are actively involved to various degree with site-wide planning, decision-making, environmental data collection, and subsequent data archiving for this site.

The TCT members are those who signed onto the Memorandum of Understanding for the Portland Harbor Superfund Site that intend to provide a framework for coordination and cooperation in the management of the site to optimize federal, state, and tribal expertise and available resources. The TCT members are:

- US EPA Region 10
- Oregon Department of Environmental Quality
- Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of the Grand Ronde Community of Oregon
- Confederated Tribes of Siletz Indians
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Nez Perce Tribe
- National Oceanic and Atmospheric Administration
- Oregon Department of Fish and Wildlife
- U.S. Department of the Interior

PPs are those that are actively involved in the RD as a part of a signed ASAOC.

Lastly, community groups are those that have a vested interest in the cleanup actions taken by US EPA and other parties associated with RD activities. Community group members include:

- Portland Harbor Community Advisory Group
- Willamette Riverkeeper
- Portland Harbor Community Coalition

1.2.3 Major Data Collection Activities

Each PP is to implement a RD investigation for their assigned ASAOC to support RD.

The following types of activities may be completed and will depend on the specific sampling identified in each respective US EPA-approved sampling plan submitted by each PP:

- Surface sediment sampling
- Biological tissue sampling
- Surface water sampling
- Sediment coring
- Groundwater sampling

- Riverbank soil sampling
- Downtown reach and upriver reach sampling
- Porewater sampling

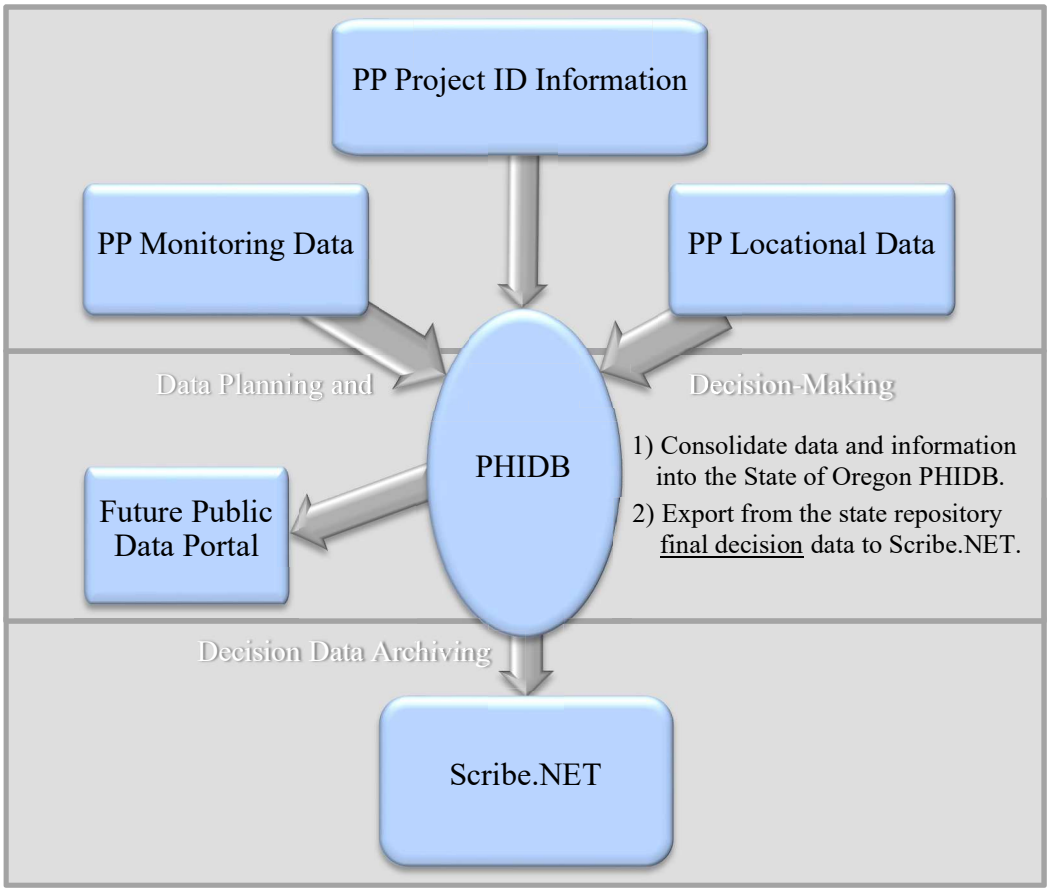
2.0 Data Management

Effective data management among the Portland Harbor PPs relies upon delivery of a specified amount of data to the Portland Harbor Interim Database (PHIDB) using a common data management platform. The central repository for data will be developed and maintained by the State of Oregon and its contractor (Cascadia/Integral). The PHIDB will be used to compile data from various sources as it moves through the review process. Finalized RD decision data will be migrated to the Scribe database. Decision data is defined as all analytical and geotechnical data gathered during remedial design. Data placed into Scribe from the state's data system will represent the data of record for Portland Harbor RD activities. The PHIDB being developed by the state will be separate from the Scribe.NET database. The name and project number for the Scribe.NET database will be provided at a later date. Figure 1 provides an overview of the data consolidation and archiving process for the PHIDB.

Data delivered by a PP will be loaded by the state into a staging database (see Figure 2). During the loading, the state will assess the technical aspects of the PP data deliverable and create a report that outlines whether the data meets requirements for upload. Resubmittal of the data may be required to correct technical issues. Whether the data meets the technical requirements for loading or not, US EPA will be provided notification by the state's contractors that lists the loading status.

A second, more extensive review process will be initiated for all submittals by US EPA or their contractor to assure data meets certain requirements outlined within the approved documents for an ASAOC. US EPA will then provide a report to the respective PP outlining issues identified by US EPA. This data review continues the existing level of review that data submittals receive.

This process will continue until the staged data is successfully loaded and meets all the upload requirements. Figure 2 describes this process workflow.



Data uploaded into the PHIDB must adhere to the data standards for this site. The data standards are identified in Attachment A: EDD Specifications for the Portland Harbor Interim Database (PHIDB).

Note: When the final data repository is built, the PHIDB will be integrated into that system. The state is committed to maintaining the PHIDB, but a determination on how the future final repository will be maintained has not been made.

Figure 1. Data Consolidation and archiving

2.1 Data Management Platforms

PHIDB

The purpose of the PHIDB is to provide a centralized and standardized repository for the environmental characterization data and related administrative data relevant to remedial activities at the PHSS. Essential capabilities of the database, and related tools, standards, and processes, will:

- Assist US EPA in ensuring that the data collected by various parties are consistent in structure, unambiguous in representation of information, and meet basic standards for data integrity. Data integrity is supported using primary keys, foreign keys, and check constraints within the database.
- Assist US EPA in ensuring that data are available to US EPA and PPs in a single system.
- Check that a standard set of rules is applied to summarize data and calculate derived quantities, such as total polychlorinated biphenyls (PCBs) and total dichlorodiphenyltrichloroethane and its derivatives (DDx).
- Allow export of data to a customized version of a Scribe database.

The data management platform selected for the interim database PHIDB is PostgreSQL. Postgres SQL is a free, open-source relational database platform. The PHIDB will be in a cloud environment managed by the State of Oregon and/or a subcontractor to the state.

EPA, DEQ and PPs will be provided read only access to the database via a database interface.

Scribe.NET

The purpose of Scribe.NET is to provide an official archive of decision data on an EPA controlled platform. Any trustee or interested party will be able to access the data through Scribe.

Scribe is a US EPA software tool that assists in the process of managing environmental data. Scribe captures sampling, observational, and monitoring data. Examples of Scribe data include air, biota, soil, and water sampling.

Please note that latitude and longitude data collected for any activity will conform to requirements outlined in the Environmental Data Standards Council (EDSC) LATITUDE/LONGITUDE DATA STANDARD, Standard No.: EX000017.2, January 6, 2006. Geospatial Policy and Guidance documents utilized by the US EPA can be found here: https://www.epa.gov/geospatial/geospatial-policies-and-standards.

Data will be translated and exported from the State of Oregon PHIDB to Scribe.

2.2 Roles and Responsibilities

The major roles and responsibilities for data management are identified for the PPs, in addition to the role of the data manager within each organization. Figure 2 provides an overview of the workflow between the State of Oregon, US EPA Region 10, and the PPs.

The PHIDB has an assigned database administrator (DBA), data manager, and data coordinator. A description of each of these roles follows:

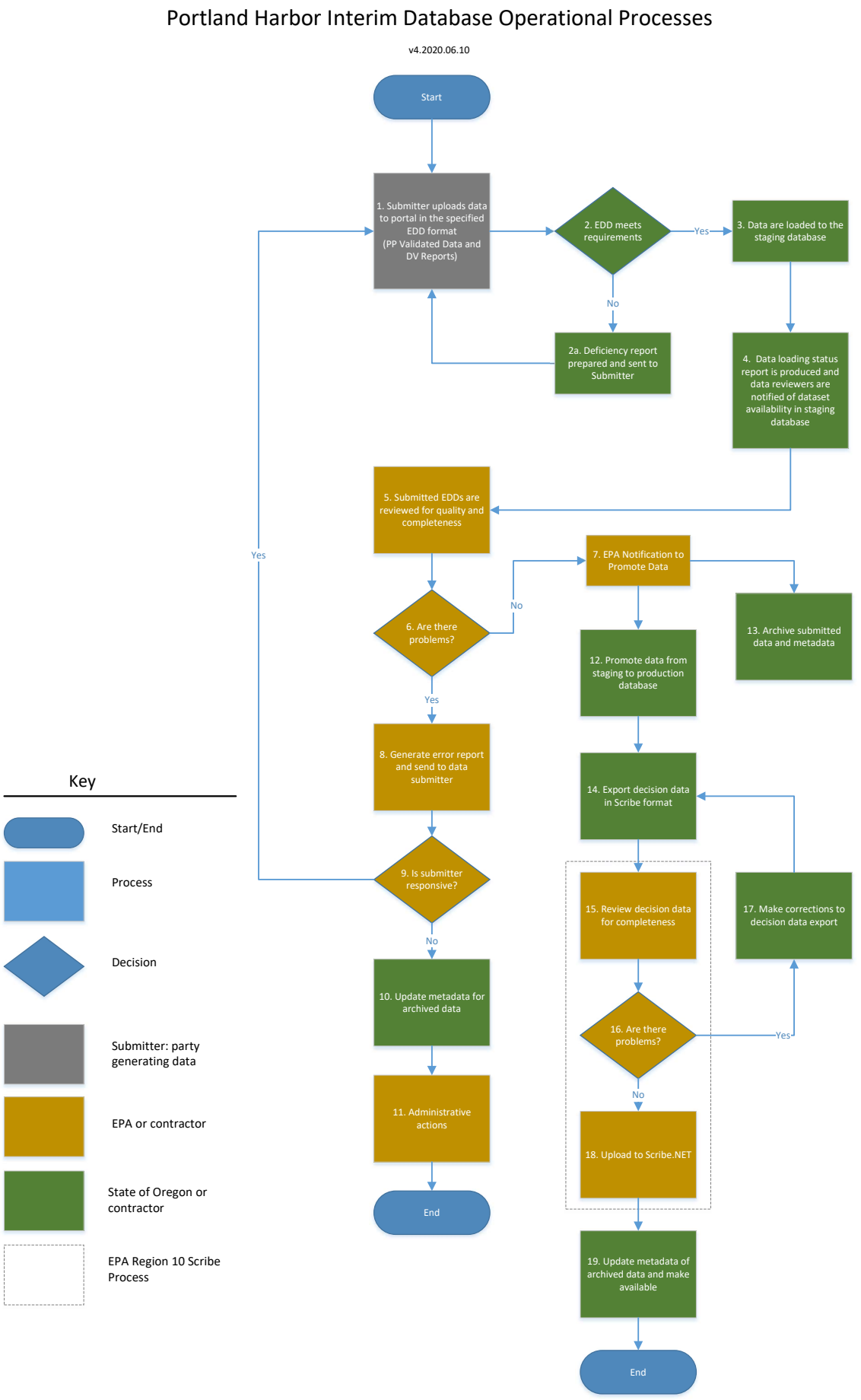
DBA – The PHIDB DBA is responsible for ensuring that the PHIDB is able to meet the demands for data storage, access, and efficiency. This includes the setup and maintenance of the database

hosting and database server resources, software upgrades, system logs, access permissions, and database backups.

Data Manager – The PHIDB data manager is responsible for ensuring that the PHIDB can accommodate Portland Harbor decision data and that PPs' data are expeditiously imported, checked, and made available to US EPA and others. This includes providing support to PPs regarding data submission requirements, working with PPs to resolve any data issues, making revisions the PHIDB design and submission requirements if and as necessary, developing and disseminating new valid values, and working with US EPA and its contractors to export data that are to be published to Scribe.NET.

Data Coordinator – The PHIDB data coordinator is responsible for managing the schedule and requirements associated with data submissions from the multiple PPs at the Portland Harbor Superfund site. This includes serving as the primary nexus for communication with PPs, US EPA and its contractors, and the State of Oregon regarding plans and status for the data management work; planning training on data submission for PPs; implementation of priorities when there are conflicting tasks or requirements; and allocation of State of Oregon resources necessary to keep work progressing in a timely manner.

Figure 2. Process Workflow



2.2.1 Performing Parties

US EPA Region 10 has the primary responsibility for oversight of all sampling and monitoring activities. US EPA has identified the minimal data elements and data delivery requirements that would allow it to achieve its oversight goals and share data among the other stakeholders, PPs, and community groups. Each of the PPs is responsible for collecting the necessary data elements covered under their respective sampling activity as approved by US EPA, and providing that information to US EPA via the State of Oregon PHIDB by submitting electronic data deliverables (EDDs) for upload to the state's centralized PHIDB. Coordination with US EPA will be essential to assure data requirements for a sampling event are met. To accomplish this task on a project-specific basis, the PP will need:

- A party- or project-specific DMP to cover their respective sampling activities.
- A data manager designated to complete the EDDs and coordinate with US EPA and the State of Oregon.
- Each individual ASAOC area will be granted up to 40 hours of technical support with the State's contractor to assist the PP with access to the PHIDB.

Details regarding the roles and responsibilities of the PPs' data manager are provided in the next section.

2.2.2 Performing Party Data Manager

We recommend that each of the PPs designate a data manager to create the EDD submittals and coordinate with the State of Oregon and the state's database contractor. Regardless of the data management system each PP utilizes, an EDD is required for submission to the PHIDB. The major responsibilities of the data manager are to:

- Create and manage all EDD submittals to the state's PHIDB
- Coordinate with US EPA and the State of Oregon regarding all data matters
- Participate in Portland Harbor management coordination calls for ongoing discussion, and updates or revision suggestions to this DMP. The exact timing and frequency of these calls will be determined as the work progresses.

Until a data manager is assigned, the PP Project Coordinator will be the point of contact for data issues.

2.2.3 US EPA Remedial Project Managers

Administration of US EPA's oversight of the PPs at the Portland Harbor site resides with the US EPA Superfund Remedial Project Manager (RPM). The RPM will work directly with the PPs on the direction and type of environmental sampling activities conducted. This includes data quality objective development; approval of sampling plans; and acceptance of sampling reports, assessments, and data for entry into the agency's administrative record. Central to this role is the identification of critical data needs on each approved sampling activity. RPMs will receive site DMP-suggested updates from the data managers and recommend updates to the Portland Harbor DMP as necessary.

2.2.4 US EPA Regional Portland Harbor Scribe.NET Data Coordinator

The US EPA Portland Harbor Scribe.NET data coordinator is the project's US EPA Scribe data management point of contact. The Scribe.NET data coordinator will communicate with State of Oregon PHIDB-designated data coordinator regarding the transfer of decision data to Scribe.NET.

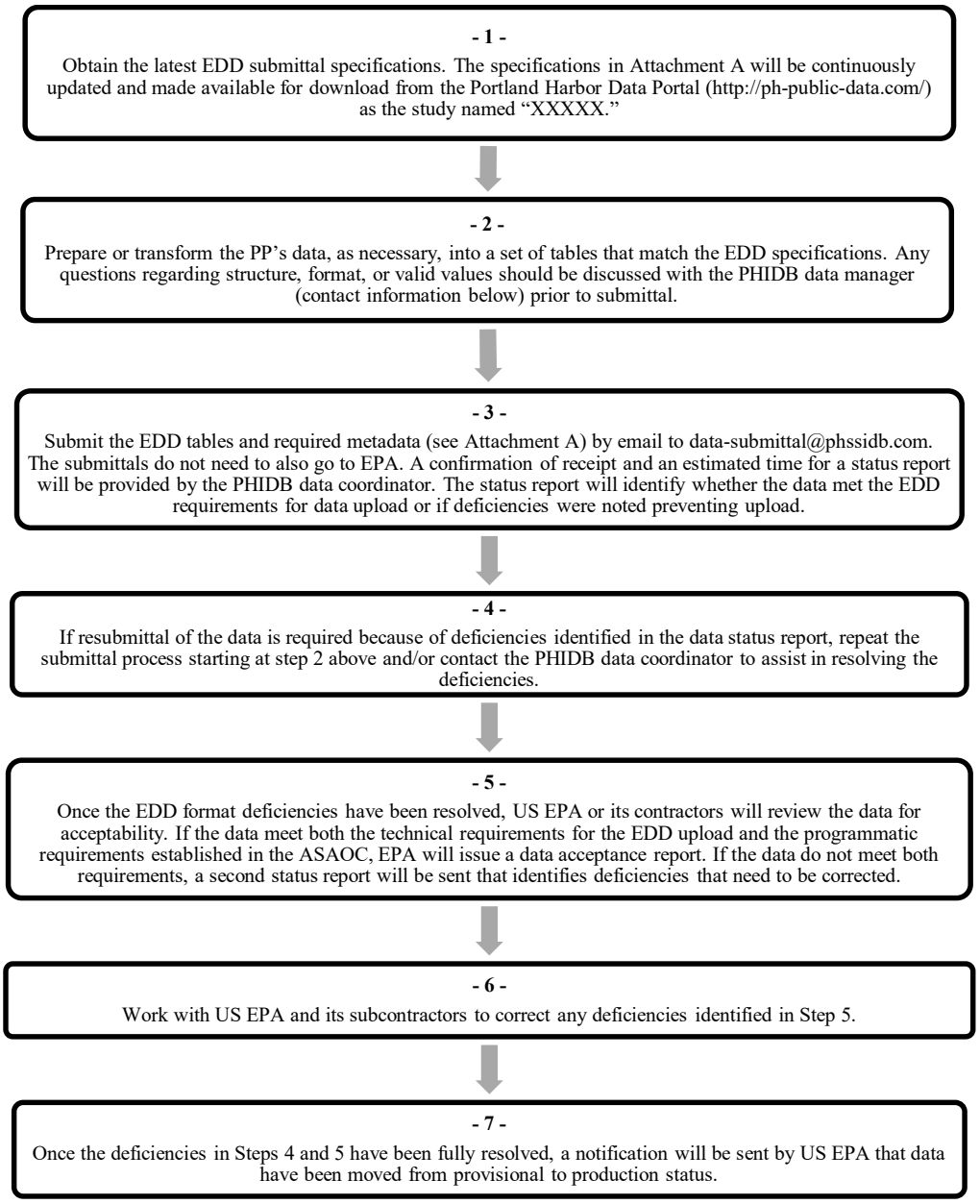
US EPA Region 10 Portland Harbor Scribe Contact: Rob Parsons, CDM Smith (Email: parsonsr@cdmsmith.com). (This point of contact is subject to change.) See section **5.1 Access** for full contact information.

3.0 Data Submittal

Specifications for submittal of PPs' RD data are described in Attachment A, *EDD Specifications for the Portland Harbor Interim Database (PHIDB)*. That document describes the format and requirements for completion of the EDD. If PPs believe a required valid value is missing from the EDD, they should email data-submittal@phssidb.com, and we will work to resolve the issue.

3.1 Submittal Process

The process that a PP's data manager should follow when submitting data to the PHIDB includes the following steps:



3.2 Contact Information

The email address to be used for data submittal and for other support requests regarding PHIDB is:

- data-submittal@phssidb.com– This email address should be for submittal of completed EDDs, associated metadata and other support and status requests.

Information sent to this email address will be routed to the appropriate individuals at US EPA, the State of Oregon, and their contractors. Follow-up to support requests will come from the PHIDB data coordinator or a data manager using their own individual business email address. For additional contact information see section **5.1 Access**.

4.0 Data Verification

PPs will not be required to initiate Scribe projects. A primary Scribe project will be initiated by US EPA Region 10 for the Portland Harbor Superfund Site and it will be the primary storage for all postprocessed PHIDB decision data. Coordination by US EPA with the PHIDB development team and the State of Oregon data coordinator will be ongoing to assure valid values and other project related information to be processed to Scribe is current.

5.0 Data Reporting

Final project information, monitoring, and locational data will be delivered to US EPA from the PHIDB data coordinator and published to Scribe.net. As a part of the ongoing transfer of data from the PHIDB to Scribe, the PH Scribe project will be available to stakeholders for download.

5.1 Access

EPA, DEQ and PPs will be provided read only access to the PHIDB internet accessible data portal and a subscription to Scribe.net. With respect to the Portland Harbor Scribe project file, each stakeholder, PP, or primary community group will have data access rights and can download the Scribe project file from Scribe. Any stakeholder, PP, or primary community group that reviews data and assesses any errors or issues with the PHIDB or Scribe data should coordinate with US EPA Region 10 or its database contractor.

State of Oregon PHIDB Database Contact:

Amanda Spencer, P.E., R.G.
Principal Hydrogeologist | Cascadia Associates, LLC
OFFICE 503-906-6577 ext. 107 | MOBILE 503-577-1535
5820 S Kelly Ave, Unit B
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US EPA Region 10 Scribe Database Contact:

Rob Parsons, GISP
Sr Spatial Data/Environmental Scientist
CDM Smith
555 17th Street, Suite 500
Denver, CO 80202
Phone/Fax: 720.264.1102 | Mobile: 303.921.1943
parsonsr@cdmsmith.com

6.0 Calculation of Analyte Totals

Calculation of analyte totals will generally follow the rules described in Appendix A of the *Portland Harbor RI/FS: Feasibility Study* (FS) (US EPA 2016). However, the DMP clarifies and supersedes the FS summing rules for use at the Portland Harbor Superfund Site during RD. The list of detected analytes

in the Portland Harbor RI/FS data for RD-specific media of interest are included in Attachment B. The Portland Harbor RI/FS databases are available on the Portland Harbor Environmental Data Portal.

6.1 General Summation Rules

The procedures for calculating analyte group totals are summarized below:

- Calculated totals for an analyte group are the sum of all detected results and the sum of all non-detected results at one half the value of the non-detect. This is applicable for analytes detected at least once in the Portland Harbor RI/FS dataset within a given medium.
  - $Analyte\ Group\ Total\ =\ \Sigma(detected\ result\ values) +\ 0.5 \times$ Σ(non-detected result values detected at least once in the medium)
- If none of the analytes within a group are detected for a given sample, then the highest non-detected result value is used for the summation. This is applicable for analytes detected at least once in the Portland Harbor RI/FS dataset within a given medium.
  - $Analyte\ Group\ Total\ =$ max(non-detected result values detected at least once in the given medium)
- Analytes within a group never detected within the Portland Harbor RI/FS dataset for a given medium are excluded from the totals (i.e., treated as zero).
  - $Analyte\ Group\ Total\ =\ 0$

The non-detect result value for a given analyte used in a summation can either be the reporting limit (i.e., project quantitation limit), method detection limit, or estimated detection limit based on the RD PP's quality assurance project plan, the analytical method performed, and the results of data validation. However, the non-detect limit should be less than the Portland Harbor ROD cleanup levels. Data validation will be completed following the applicable National Functional Guidelines for the analyte and/or analytical method.

6.2 Specific Analyte Group Totals

Additional clarifying information is provided in the sections below for specific analyte group totals for the summations that may be applicable during RD.

6.2.1 Polychlorinated Biphenyls

There are four different summations for PCBs that may be applicable during RD, as described below.

6.2.1.1 Total PCBs

Total PCBs can be calculated from either the sum of individual congeners or individual Aroclors. When both congener-based and Aroclor-based results are present for a given sample, total PCBs should be derived from the congener values. Total PCBs as congeners represents the sum of all reported individual congeners (up to 209) following the general summation rules. Total PCBs as Aroclors represents the sum of all reported Aroclors following the general summation rules.

PCB homolog totals (e.g., monochlorobiphenyl, dichlorobiphenyl) can be calculated as the sum of individual PCB congeners in a homolog group. The co-eluting congeners from specific analytical laboratories should be determined as part of the laboratory selection process such that co-eluting

congeners are constituents of the same homolog and do not affect multiple homolog groups. For completeness, decachlorobiphenyl, a single congener (PCB-209), should be reported as both its individual analyte result and as a homolog total.

6.2.1.2 Total Dioxin-Like PCB Congeners Toxic Equivalent

The dioxin-like PCB congeners and their toxic equivalency factors (TEFs) are published by the World Health Organization (WHO) for mammals (Van den Berg et al. 2006) and for fish and birds (Van den Berg et al. 1998). Reported concentrations of the dioxin-like PCB congeners are multiplied by their respective TEFs to estimate toxicity relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The resulting toxic equivalents (TEQs) for the individual congeners are summed to generate the total dioxin-like PCB congeners TEQ following the general summation rules.

6.2.1.3 Total Non-Dioxin-Like PCB Congeners

The dioxin-like PCB congeners are published by the WHO for mammals (Van den Berg et al. 2006) and for fish and birds (Van den Berg et al. 1998). For the remaining 197 PCB congeners that are non-dioxin like, the total non-dioxin-like PCB congeners is summed from the reported concentrations following the general summation rules.

6.2.2 Polychlorinated Dibenzo-p-Dioxins and Furans

There are two summations for polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs) that may be applicable during RD, as described below.

6.2.2.1 Total PCDD/Fs

Total PCDD/Fs are the sum of the tetra and higher PCDD/F congeners following the general summation rules. PCDD/F homolog totals (e.g., TCDDs, pentachlorodibenzo-p-dioxins) can be calculated as the sum of the individual PCDD/F congeners in a homolog group. For completeness, octachlorodibenzo-p-dioxin and octachlorodibenzofuran, which are individual PCDD/F congeners, should be reported as both their individual analyte results and as homolog totals.

6.2.2.2 Total PCDD/Fs TEQ (2,3,7,8-TCDD equivalent)

The TEFs for the PCDD/F congeners are published by the WHO for mammals (Van den Berg et al. 2006) and for fish and birds (Van den Berg et al. 1998). Reported concentrations of the PCDD/F congeners are multiplied by their respective TEFs to estimate toxicity relative to 2,3,7,8-TCDD. The resulting TEQs for the individual congeners are summed to generate the total PCDD/Fs TEQ, also known as the 2,3,7,8-TCDD equivalent, following the general summation rules.

6.2.3 Polycyclic Aromatic Hydrocarbons

There are four summations for polycyclic aromatic hydrocarbons (PAHs) that may be applicable during RD, as described below.

6.2.3.1 Total PAHs

There are 17 PAHs that are included in the total PAHs sum. These 17 PAHs are broken down into two groups based on their molecular weights, as follows:

- Low-molecular-weight polycyclic aromatic hydrocarbons (LPAHs): 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene

- High-molecular-weight polycyclic aromatic hydrocarbons (HPAHs): benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, and pyrene

Total PAHs are the sum of the 17 listed LPAHs and HPAHs following the general summation rules.

6.2.3.2 Total LPAHs

Total LPAHs is the sum of the seven listed LPAHs following the general summation rules.

6.2.3.3 Total HPAHs

Total HPAHs is the sum of the 10 listed HPAHs following the general summation rules.

6.2.3.4 Total Carcinogenic Polycyclic Aromatic Hydrocarbons

There are seven carcinogenic polycyclic aromatic hydrocarbons (cPAHs): benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. Potency equivalent factors (PEFs) are identified in EPA (1993). Reported concentrations of the individual cPAHs are multiplied by their respective PEFs to estimate toxicity relative to benzo(a)pyrene. The resulting TEQs for the individual cPAHs are summed to generate the total cPAHs TEQ, also known as the benzo(a)pyrene equivalent, following the general summation rules.

6.2.4 Dichlorodiphenyltrichloroethane and its Derivatives

There are four summations relating to DDx, as described below.

6.2.4.1 Total Dichlorodiphenyldichloroethane

Total dichlorodiphenyldichloroethane (DDD) is the sum of the isomers 2,4'-DDD and 4,4'-DDD, which are also known as o,p'-DDD and p,p'-DDD, respectively. The total DDD summation will follow the general summation rules.

6.2.4.2 Total Dichlorodiphenyldichloroethylene

Total dichlorodiphenyldichloroethylene (DDE) is the sum of the isomers 2,4'-DDE and 4,4'-DDE, which are also known as o,p'-DDE and p,p'-DDE, respectively. The total DDE summation will follow the general summation rules.

6.2.4.3 Total Dichlorodiphenyltrichloroethane

Total dichlorodiphenyltrichloroethane (DDT) is the sum of the isomers 2.4'-DDT and 4.4'-DDT, which are also known as o,p'-DDT and p,p'-DDT, respectively. The total DDT summation will follow the general summation rules.

6.2.4.4 Total DDx

Total DDx is the sum of the six DDx isomers (2,4'-DDD; 4,4'-DDD; 2,4'-DDE; 4,4'-DDE; 2,4'-DDT; 4,4'-DDT) following the general summation rules.

6.2.5 Total Chlordanes

Total chlordanes is the sum of cis-chlordane (also known as alpha-chlordane), trans-chlordane (also known as gamma-chlordane), oxychlordane, cis-nonachlor, and trans-nonachlor, following the general summation rules.

6.2.6 Total Polybrominated Diphenyl Ethers

Total polybrominated diphenyl ethers (PBDEs) is the sum of the reported PBDE congeners, following the general summation rules. There are 209 possible PDBE congeners; however, the number of PDBE congeners in commercial PBDE mixtures and environmental media are typically only a subset of the 209 congeners (Agency for Toxic Substances and Disease Registry 2017). Analytical laboratories typically analyze and report a fraction of the 209 PDBE congeners; therefore, the PDBEs summation is expected to contain only those reported congeners.

6.2.7 Total Xylenes

Total xylenes is the sum of m,p-xylene and o-xylene, following the general summation rules.

6.2.8 Total Fines

Total fines are the sum of all silt and clay grain-size fractions passing U.S. standard sieve #230 (0.0625-millimeter openings). The general summation rules do not apply to total fines as this summation is not of chemical data.

6.3 Reportable Analyte Requirements for Totals

The expected number of analytes for certain totals is shown in the excerpted Table A-2 from FS Appendix A (Attachment C). If the number of analytes reported is limited, the total will be given an "A" qualifier. If the number of analytes reported is below the minimum number of reported analytes required for computing the summation, no summation will be calculated.

6.4 Definition and Propagation of Qualifiers

As in the FS database, the qualifier definitions shown in the excerpted Table A-3 from FS Appendix A (Attachment C) will be used in the remedial design databases. Additionally, as further discussed in RI Appendix A3 Section 1.1.2, the N-qualifier denotes that the identity of the analyte is presumptive and not definitive, generally as a result of the presence in the sample of an analytical interference, such as hydrocarbons, or in the case of pesticides, PCBs.

In cases where average concentrations are derived from results of replicates and splits, or where analyte group totals are calculated, validation qualifiers will be propagated as follows:

- J or N qualifiers used for any individual analyte used to calculate an analyte group total will be retained for qualifying the analyte group total.
- If one or more of the results are qualified as undetected and one or more of the other results included in a calculated analyte group total are detected and qualified as estimated, the calculated value will be qualified as estimated.
- If all of the included results are detected and one or more of the results are qualified as estimated, the calculated value will be qualified as estimated.
- The "Detect" field will be populated with a Y for detected values and an N for non-detects for all sample results and calculated values.
- Rejected values will not be used in averages or totals.

- A T qualifier will be added to all results that will be calculated (e.g., totals and averages of multiple results) and all results that are selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods).

7.0 References

Agency for Toxic Substances and Disease Registry. 2017. *Toxicological Profile for Polybrominated Diphenyl Ethers (PBDEs).* Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service.

US EPA. 2016. *Portland Harbor RI/FS: Feasibility Study.* U.S. Environmental Protection Agency Region 10, Seattle, Washington.

US EPA. 1993. *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, EPA/600/R-93/089*. U.S. Environmental Protection Agency, Washington, DC.

Van den Berg, M., L. Birnbaum, A.T. Bosveld, B. Brunström, P. Cook, M. Feeley, J.P Giesy, et al. 1998. "Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife." *Environmental Health Perspectives* 106(12), 775–792. https://doi.org/10.1289/ehp.98106775

Van den Berg, M., L.S. Birnbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, et al. 2006. "The 2005 World Health Organization reevaluation of human and Mammalian toxic equivalency factors for dioxins and dioxin-like compounds." *Toxicological Sciences* 93(2), 223–241. Available at https://doi.org/10.1093/toxsci/kfl055.

Attachment A – EDD Specifications for the Portland Harbor Interim Database (PHIDB)

EDD SPECIFICATIONS FOR THE PORTLAND HARBOR INTERIM DATABASE (PHIDB)

Prepared for

State of Oregon - Department of State Lands

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Prepared by

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August 6, 2020

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TABLES

FIGURES

APPENDIX

1.0 INTRODUCTION

The Portland Harbor Interim Database (PHIDB) is designed specifically to store environmental characterization data that is collected under a U.S. Environmental Protection Agency (EPA) consent order during remedial design (RD) sampling in the Portland Harbor Superfund Site (PHSS). Compilation of data from multiple RD studies into a single system will establish consistency in data structure and encoding, and thereby facilitate consistency in data interpretation and presentation.

Because data will be collected by numerous parties, all of whom may manage data in different systems and structures, a key step to establish consistency within the PHIDB is for parties to submit their data in a standard digital format, or electronic data deliverable (EDD). This document describes the PHIDB EDD format for data submission. This document is organized by the following sections:

- **Data Structure (Section 2) –** This section provides background on the typical scope, complexity, and organization of environmental investigations and how the PHIDB system integrates this complexity. The location identifier and coordinates, collections and samples, quality control (QC) samples and splits, and use of multiple sample identifiers are presented in Section 2.

- **EDD Specifications (Section 3) –** The EDD Specifications describes the data dictionary for the EDD tables and the valid values and metadata for the PHIDB.

- **Data Submittal and Review (Section 4) –** The data submittal section describes the process for data submittal and review.

An electronic template for the EDD tables is available to assist with the preparation and submission of RD data. It is recognized that the EDD templates and valid values will be reviewed and updated throughout the life of the PHSS cleanup. The most up-to-date templates and valid value lists can be downloaded from the Portland Harbor Environmental Data Portal as part of the Portland Harbor Remedial Design Programmatic Data Management Plan.

2.0 DATA STRUCTURE

Environmental sampling programs often incorporate resampling, field replication, subsampling, compositing, and sample splitting for QC purposes. Different investigators and different investigations commonly use different conventions for naming locations and samples, and to represent the relationships between samples, subsamples, composites, and splits. Software used to manage environmental data may also enforce conventions or establish constraints on how information is represented. Because the PHIDB system integrates data from multiple investigations, those different conventions must be unified in a consistent manner.

Two elements of sampling complexity that are addressed by the PHIDB structure, and therefore are represented in the EDD, are:

- Subsampling of collected material. The most common example of this in sediment sampling programs is the collection of a core that is then subsampled at different depths. Each sample that represents a core horizon must be distinguished from all other such samples, but must also be unambiguously related to all other samples from the same core. Sampling programs frequently use sample identifier schemes in which one field within the sample identifier is common among all samples from a core. A database system such as the PHIDB cannot feasibly be designed to interpret fields within sample identifiers, particularly when sample identifier designs differ between investigations. These relationships are therefore represented by the data structure design rather than by the sample identifier design to enforce data integrity.
- Splitting of samples for QC purposes. Ordinarily five percent of samples collected for chemical analyses are homogenized and split in the field prior to submission to a laboratory. These splits, or duplicates, must be distinguished from one another but must both be linked so that they are identifiable as representative of the same portion of the environment that will be used for characterization and assessment. As with subsamples, the relationships between splits are represented by data structure rather than by the content of sample identifiers.

The following sections describe the way that the PHIDB system represents some of the complexity of sampling data structure. The EDD format is a simplified representation of this structure.

2.1 LOCATION IDENTIFIERS AND COORDINATES

The EDD format includes a single table for location information in which event location identifiers and target coordinates[1] are required. Target coordinates represent intended sampling locations and are commonly included in Field Sampling Plans (Table 3 – Location Table).

The actual sample location coordinates (e.g., collected with a Differential Global Positioning System) at which each sample is collected are also recorded in the EDD in Table 5 (Sample Table) with the sampling information. Both target and actual coordinates are required entries and can be the same when the sample is collected as planned. Whereas target coordinates are always represented as a single geographic point, actual sampling locations can be represented as the center of one or more points (e.g., composite sample), a line midpoint (e.g., transect), or area centroids (e.g., test pit). All coordinate data should be submitted in one coordinate system as decimal degrees in the WGS84 (World Geodetic System 1984) coordinate system and horizontal datum. Vertical datum elevations may be submitted in the North American Vertical Datum of 1988 (NAVD88) or the National Geodetic Vertical Datum of 1929 (NGVD29).

2.2 COLLECTIONS AND SAMPLES

When a sediment core is collected and subsampled into separate horizons, the core as a whole is referred to as a *collection.* The individual horizons are referred to as *samples* or *interpretive samples*[2]. Therefore, one core *collection* has a one-to-many relationship to the many *interpretive samples* within the core. The same terminology (*collection* and *sample*) is used for soil borings or sediment cores. The same terminology is also used in other cases where material is subsampled, such as when a fish is subdivided into fillet and carcass subsamples. A single fish *collection* has a one-to-many relationship to the subdivided fillet and/or carcass *interpretive samples*. For uniformity of data representation within the PHIDB, the same terminology is also used for single samples, such as surface sediment grab samples—in those cases the collection and the sample are the same.

Interpretive samples can themselves be further subdivided into *analytical samples*. An interpretive sample may be split into multiple analytical samples as part of a QC program in which (typically) five percent of the interpretive samples are split and the two resulting analytical samples are submitted independently to the laboratory for "parent" and "duplicate" analysis. Interpretive samples may also be split into multiple analytical samples if material is to

[1] The terms "target coordinates", "canonical coordinates", and "design coordinates" all refer to the coordinates at which samples are intended to be collected. These are the coordinates that are ordinarily listed in a field sampling plan.

[2] The phrase "interpretive sample" indicates that this is the material that will be used for interpretation of environmental conditions.

be sent to different laboratories, or if different types of containers or preservatives must be used for different analyses.

The three levels of this sampling hierarchy—collections, interpretive samples, and analytical samples—is used for the samples in the PHIDB. The application of this hierarchy to both grab and core samples is shown on Figure 1. For surface sediment grab samples, the *collection* and the *interpretive sample* are the same thing (e.g., one collection to one interpretive sample with the same identifiers), and if split there will be one or more analytical samples per interpretive sample (e.g., one interpretive sample to one or more analytical samples with different identifiers). For sediment cores, the collection represents the entire core, and there will be multiple interpretive samples for that collection (e.g., one core collection to many interpretive sample(s) with different identifiers). And, again, there could be one or more analytical samples per interpretive sample.

The EDD table for sampling information (Table 5) contains information to describe both collection identifiers (e.g., collection_id) and the sample identifiers (e.g., main_sample_id) derived from those collections. For collections that are subsampled, such as sediment cores, a single collection identifier should be assigned to all samples from that collection, and each of those samples must also be assigned its own unique identifier as shown on Figure 1.

When the collection and the sample are equivalent (e.g., for sediment grab samples), the collection and sample identifier should be the same (e.g., one-to-one relationship), as shown on Figure 1, and for convenience, only the collection identifier need be entered into the EDD sample table.

Separate upper and lower depths for collections and samples can be recorded in the EDD. The upper and lower depths for a core, for example, will not be the same as the upper and lower depths for any horizon from that core. The EDD sample table (Table 5) contains an upper collection depth column and a lower collection depth column to store the minimum and maximum core depth, and also contains an upper sample depth column and a lower sample depth column to store the sample specific depths.

Separate sample materials for collections and samples can be recorded in the EDD. For example, if a water sample is filtered in the field, the material for the collection would be whole water, whereas the samples would have materials of filtered water and filterable particulates.

2.3 QUALITY CONTROL SPLITS FOR CHEMISTRY ANALYSES

When a field interpretive sample is split to create duplicate samples that are to be analyzed separately as part of the QC program (i.e., *analytical samples*), the splits must have different sample identifiers assigned but must also share the same main sample identifier. The PHIDB refers to field duplicates and splits as *analytical samples* where the main sample identifier contains the parent (or natural) sample identification. Field sampling programs commonly

append a suffix such as "-D" to the main sample identifier to label one of the split or duplicate samples, using the main sample identifier for the other split sample, which is commonly referred to as a parent or natural sample. The PHIDB data structure enforces the duplicate or split relationship to parent sample by the data structure design rather than by the sample identifier design. Therefore, when a sample is split, each of the splits must be assigned both its own unique identifier and the identifier of the main sample, which is common between the two splits, as shown on Figure 1.

The EDD format includes separate tables for sampling information in the sample table (Table 5) and for analytical chemistry results for environmental samples in the lab table (Table 11). The main sample identifier appears in both tables and serves to link analytical results to interpretive and analytical (e.g., duplicate) samples. The analytical sample identifier appears only in the table of analytical chemistry results, where it distinguishes between results for different splits of the same interpretive sample.

2.4 USE OF MULTIPLE SAMPLE IDENTIFIERS

As described above, up to three sample identifiers are used in the PHIDB EDD format: the collection identifier, the main sample identifier (which corresponds to the interpretive sample), and the analytical sample identifier. For a core horizon that has been split, these three identifiers may all be different. For a surface sediment grab sample that has not been split, these identifiers will ordinarily all be the same (Figure 1).

Many environmental investigations use fields within a sample identifier to encode information that can be used to distinguish collections, interpretive samples, and analytical samples. For example, each sediment core may not be explicitly assigned a unique identifier, but a core (or location) identifier may be embedded within the main sample ID, so that all interpretive samples from that core have the same value within that field of the sample identifier. When data are prepared in the PHIDB EDD format, the preparer may need to create distinct identifiers to properly represent the relationships between collections, interpretive samples, and sample splits (e.g., *analytical sample*). For example, the field within the sample identifier that identifies the core may be adopted as the core (*collection*) identifier. To minimize the effort required by data preparers, the EDD allows the following simplifications (Figure 1):

- The collection and main sample identifiers are the same when there is one collection to one interpretive sample (e.g., as for a sediment grab sample); then only one identifier, the main sample identifier, need be provided.
- The main sample identifier and the analytical sample identifier are the same when there are no duplicates or splits; only the main sample identifier need be provided.

3.0 EDD SPECIFICATIONS

The EDD Specifications consist of a Data Dictionary, Valid Values, and Metadata. Each of these elements is described below.

3.1 DATA DICTIONARY

The PHIDB data dictionary is set of informational tables describing the contents, format, and structure of the database and the relationship between the elements of the database. The PHIDB data dictionary consists of up to 13 data tables, not all of which may be needed for every study. The tables are listed below, and Table 1 provides a brief description of each table.

- Field Event (Table 2)
- Location (Table 3)
- Well (Table 4)
- Sample (Table 5)
- Sample_composite (Table 6)
- Collection_measurement (Table 7)
- Sample_measurement (Table 8)
- Collection_observation (Table 9)
- Sample_observation (Table 10)
- Lab_result (Table 11)
- Tox_test_batch (Table 12)
- Tox_test_result (Table 13)
- Species_abundance (Table 14)

Descriptions of each EDD table (i.e., the data dictionary) are presented in the attached Tables 2 through 14. The EDD table descriptions specify the columns that are to be included in each table, the type of information that each column represents, the data type of each column, and constraints on each column. Constraints include (a) whether or not a value is required in the column; (b) whether or not each column makes up the primary key of a table, where the primary key must be unique across all rows; and (c) whether or not a column must be filled with one of a set of valid values.

Ordinarily, only four tables need to be populated for an environmental chemistry study, which are the event (Table 2), location (Table 3), sample (Table 5), and lab result (Table 11) tables. An Entity Relationship Diagram (ERD) of these four EDD tables is shown on Figure 2. Other tables

allow additional information to be provided on field measurements, sample compositing, toxicity test data, and species abundance data.

3.2 VALID VALUES

Lists of valid values are included as Appendix A. More detailed notes are provided for some entries to provide additional guidelines for populating the data columns. Data submitters are encouraged to translate related values when possible. For example, analyte names can be translated by matching Chemical Abstracts Service (CAS) numbers.

3.3 METADATA

A table of metadata should accompany each data submission. The metadata table should have two columns, titled "Metadata item" and "Description"; a template is provided in Table 15. The table should contain all of the following items:

- Submittal title: A name that uniquely identifies the data set that is being submitted. This may correspond to the name of a document such as a work plan or to an Administrative Settlement Agreement and Order on Consent (ASAOC) title. The submittal title should remain the same if subsequent versions of the data set are prepared and submitted.
- Submittal version: An integer that should be equal to 1 for the first submittal and that is incremented by 1 for each re-submittal of the same data set (if any).
- Data set date: The date and time, in ISO-8601 base or extended format, at which data were accessed or extracted for preparation of the EDD tables.
- Preparation date: The date and time, in ISO-8601 base or extended format, at which preparation of the EDD tables was completed. This must not be earlier than the data set date.
- Preparer: The name of the person who prepared the EDD tables, or to whom questions can be addressed.
- Preparer organization: The preparer's employer or other affiliation.
- Preparer email: The email address of the preparer.
- Preparer phone: A phone number for the preparer.
- Version revisions: Text describing changes to the data set or the EDD tables since the prior version of the same submittal, if any. This is required if the value of the *Submittal version* item is greater than 1.

- PHDP document: The title of a document on the Portland Harbor Environmental Data Portal that most accurately describes the scope or content of the submitted data set. This item is optional and need not be included if no relevant document exists.
- Comments: Any other description of the data set or the EDD that the submitter considers to be pertinent and valuable. This item is optional.

The metadata should be submitted in a digital form with the EDD tables, in a table named "Metadata".

4.0 DATA SUBMITTAL AND REVIEW

EDD tables should be prepared using the table and column names exactly as given in Tables 2 through 14.

EDD tables can be prepared and submitted in any of the following formats:

- Microsoft Access database file. A template Access file is available at the Portland Harbor Environmental Data Portal.
- Microsoft Excel workbook. Each worksheet should represent a single EDD table, and the worksheet name should match the corresponding EDD table name. The first row in each worksheet should contain column names, and all succeeding rows should contain data as specified in Tables 2 through 14. Comments and formatting should not be used to explicitly or implicitly convey any additional information.
- LibreOffice Calc workbook. This has the same requirements as an Excel workbook.
- CSV files. Each CSV file should represent a single EDD table, and the filename should match the corresponding EDD table name. The first row in each file should contain the column names, and all following rows should contain data as specified in Tables 2 through 14.

File names should all be prefixed with the date of submission, in YYYY-MM-DD format. If multiple versions are submitted on the same date, version indicators should be added (e.g., v1).

After each data set is submitted, it will be subjected to a series of checks to verify conformance with the EDD structure and other constraints. These checks will include, but not necessarily be limited to:

- Submission of a complete set of tables;
- Use of defined valid values;
- Valid primary keys for each table;
- All required data values are provided;
- Valid relationships between tables (e.g., all main sample identifier that are referenced in the *lab_result* table are present in the *sample* table);
- Internal consistency checks (e.g., no collection has different depths on different lines of the *sample* table); and
- Conformance checks: requirements of the relevant ASAOC are met (e.g., with respect to sampling locations and analytes).

If these checks result in the identification of problems or ambiguities, a report of the issues will be provided to the submitter, and resubmittal of the data will be requested.

TABLES

Table 1. EDD Table Summary

Table name	Table No.	Purpose	Required
field_event	2	Describes the study (field event) that was carried out. This table should contain only a single row for each data submission.	Always
location	3	Describes target locations for sampling, including coordinates and event-specific location identifiers.	Always
well	4	Describes wells that are sampled for groundwater	
sample	5	Describes the environmental samples collected in terms of both collections and main samples, as described in the text of the EDD specification document.	Always
sample_composite	6	Describes how individual environmental samples were composited.	Only when samples are composited in the field
collection_measurement	7	Contains quantitative field measurements that were made on a collection or at the time that a collection was acquired.	Only when field measurements are made that are specific to a collection.
sample_measurement	8	Contains quantitative field measurements that were made on a sample--i.e., on a portion of a collection. If collections and samples are equivalent (e.g., for surface grab samples), then all field measurements should be recorded in the *collection_measurement* table.	Only when field measurements are made that are specific to a sample.
collection_observation	9	Contains categorical field observations that were made on a collection or at the time that a collection was acquired.	
sample_observation	10	Contains categorical field observations that were made on a sample. If collection and samples are equivalent, then all field observations should be recorded in the *collection_observation* table.	
lab_result	11	Contains analytical chemistry results for environmental samples. This includes both laboratory-reported results and calculated results such as sums. Results are reported only for environmental samples, including field splits (duplicates), but not any other field or laboratory quality control samples. Detail down to the level of laboratory replicate results should be included.	Only when analytical chemistry measurements have been made.
tox_test_batch	12	Describes the type(s) of toxicity tests run on environmental samples, and identifies each batch of tests that were conducted simultaneously.	Only when toxicity tests are conducted.
tox_test_result	13	Contains the results of toxicity tests on environmental samples.	Only when toxicity tests are conducted.
species_abundance	14	Contains measurements of species abundance (e.g., benthic infauna enumeration) made on each environmental sample.	Only when species abundance measurements have been made.

Table 2. The field_event table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
field_event	event_description	Description of the event. For example: Lower Burke Canyon Repository Predesign Investigation	Text	255	Yes	No	Yes	
	field_activity	The type of activity to be conducted (e.g., remedial design sampling, confirmation sampling, post-closure monitoring)	Text	35	Yes	Yes	No	l_field_activity
	asaoc_id	Identifier for the ASAOC that this field event is conducted to support	Text	50	Yes	No	No	
	event_status	Event completion status (e.g., pending, underway, completed)	Text	24	No	Yes	No	l_event_status
	spatial_extent	A polygon or multipolygon representation of the spatial extent of the event, in well-known text (WKT) format	Text	Unlimited	No	No	No	
	sponsor	Name of the organization on whose behalf the field event is undertaken	Text	200	No	No	No	
	sponsor_contact	Contact information for the field event sponsor	Text	255	No	No	No	
	contractor	Full name of the company contracted by the sponsor to conduct or manage the sampling	Text	200	Yes	No	No	
	qapp_approved	Indicates if the QAPP has been approved for the sampling effort	Boolean	0	Yes	No	No	
	qapp_approving_org	Identifies the agency or other organization that approved the QAPP for the sampling effort	Text	100	No	No	No	
	qapp_approved_other	Other information about approval of the QAPP	Text	150	No	No	No	

Table 3. The location table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
location	event_location_id	Investigation-specific location identifier	Text	50	Yes	No	**Yes**	
	location_description	Narrative description of the location	Text	255	Yes	No	No	
	other_location_id	The universal PHIDB location identifier, if known	Text	50	No	No	No	
	target_latitude_dd	The target latitude for this sampling location, in decimal degrees	Floating-point		Yes	No	Note 1	
	target_longitude_dd	The target longitude for this sampling location, in decimal degrees, with at least five decimal digits of precision	Floating-point		Yes	No	Note 1	
	target_srid	The spatial reference ID for the coordinates. This should be “4326”, representing WGS84	Text	8	Yes	No	No	
	country_code	Country code. This should be "USA".	Text	75	No	Yes	No	l_country_code
	county_fips_code	County code	Text	150	No	Yes	No	l_fips_code
	elev_datum	Datum used to determine the elevation measurement. (e.g., NAVD88; NGVD29)	Text	50	Note 2	Yes	No	l_elev_datum
	elev_method	Method used to determine the elevation measurement. (e.g., Altimetry; GPS; Interpolation; Survey)	Text	24	No	Yes	No	l_elev_method
	geo_method	Geopositioning method used to establish latitude and longitude coordinates (e.g., GPS; Interpolation; Survey)	Text	24	Yes	Yes	No	l_position_method
	huc_eight_digit_code	Eight digit USGS HUC code . equals Sub_Basin	Text	20	No	No	No	
	location_zone	Location categorization (e.g., subtidal, intertidal, upland, facility)	Text	24	No	Yes	No	l_zone_type
	river_mile	River mile, to at least tenths of a mile	Floating-point	0	No	No	No	
	river_bank	Code to specify whether the location is near a river bank or in the channel	Text	24	No	Yes	No	l_riverbank
	state_code	State code - 2 character state abbreviation	Text	2	No	Yes	No	l_state
	stream_or_creek_name	Name of the waterbody represented by this location	Text	200	No	No	No	
	surf_elev	The ground elevation of a geographic point where samples or field measurements are collected	Floating-point	0	No	No	No	
	surf_units	Surface elevation units (e.g., feet; meters)	Text	20	Note 2	Yes	No	l_unit
	usgs_station_id	USGS location identifier	Text	100	No	No	No	
	usgs_station_name	USGS location name	Text	255	No	No	No	

Notes

1 The combination of target latitude and longitude must be unique on every row.

2 Required if a value is provided for *surf_elev.*

Table 4. The well table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
well	well_id	Well identifier	Text	50	Yes	No	Yes	
	event_location_id	Investigation-specific location identifier	Text	50	Yes	No	No	location.event_location_id
	vertical_reference_point	The surface from which depths are measured (e.g., to of casing, well benchmark)	Text	24	Yes	Yes	No	l_vert_ref_pt
	well_hole_depth_measure	The maximum depth of the well	Floating point		No	No	No	
	well_hole_depth_measure_unit	The units for the well depth and screen depth measurements	Text	20	Yes	Yes	No	l_unit
	completion_date	The date on which the well was completed	Date/time					
	screen_upper_depth	The upper depth of the screened interval, or the upper depth of the shallowest screened interval	Floating point		No	No	No	
	screen_lower_depth	The lower depth of the screened interval, or the lower depth of the deepest screened interval	Floating point		No	No	No	
	well_use	The primary usage of the well	Text	24	No	Yes	No	l_well_use
	well_status	The current status of the well	Text	24	No	Yes	No	l_well_status
	well_status_date	The date on which the well status became applicable	Date/time		Note 1	No	No	

Table 5. The sample table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
sample	main_sample_id	Unique sample identifier for this interpretive sample	Text	50	Yes	No	**Yes**	
	collection_id	Unique collection identifier for each core, grab, or group of related field samples.	Text	50	Note 1	No	No	
	event_location_id	Investigation-specific location identifier	Text	50	Yes	No	No	location table
	sub_location	Narrative description of any systematic deviation or difference from the nominal location	Text	255	No	No	No	
	sample_date	Date and time of sample collection in ISO-8601 base or extended format	DateTime	0	Yes	No	No	
	event_element	Identifier for a subset of the sampling effort (e.g., Phase 1, Phase 2, background sampling, random grid sampling)	Text	50	No	No	No	
	collection_method	Sample collection method (e.g., grab, core)	Text	24	Yes	Yes	No	l_coll_method
	collection_design	Sample collection design or scheme (e.g., single-point grab, spatial composite, temporal composite, MIS)	Text	24	Yes	Yes	No	l_coll_design
	collection_depth_upper	Upper depth of the collection relative to the vertical reference point	Floating-point	0	Note 2	No	No	
	collection_depth_lower	Lower depth of the collection relative to the vertical reference point	Floating-point	0	Note 2	No	No	
	collection_depth_units	Units for the upper and lower collection depths	Text	20	Note 2	No	No	l_unit
	vertical_reference_point	The surface from which elevations or depths are measured (e.g., water surface, sediment surface, soil surface, well benchmark)	Text	50	Yes	Yes	No	l_vert_ref_pt
	vert_ref_pt_elev	The elevation of the surface reference point in the specified elevation datum	Floating-point		No	No	No	
	vert_ref_pt_elev_units	Units for the vertical reference point	Text	10	Note 3	Yes	No	l_unit
	elev_datum	The vertical datum for the vertical reference point elevation measurement. This should be either “NAVD88” or “NGVD29”	Text	50	Note 3			
	composite_type	The compositing method used for the collection (e.g., single, spatial, depth, temporal)	Text	24	Yes	Yes	No	l_composite_type
	composite_count	The number of other collections that were composited to create this collection. When individually identified samples are composited, those samples can be listed in the *sample_composite* table.	Integer	0	No	No	No	
	composite_period	The length of time over which a temporal composite was conducted	Floating-point	0	No	No	No	
	composite_period_units	The units for the composite period, for temporal composites.	Text	20	Note 4	Yes	No	l_unit
	sample_lat_centroid_dd	The latitude of the sampling point or of the centroid of the sampling line or area, in decimal degrees	Floating-point	0	Yes	Note 5	No	
	sample_lon_centroid_dd	The longitude of the sampling point or of the centroid of the sampling line or area, in decimal degrees	Floating-point	0	Yes	Note 5	No	
	sample_srid	The spatial reference ID for the sample centroid coordinates and for the collection coordinates. This should be “4326”, representing WGS84	Text	8	Yes	Note 5	No	
	coll_coords	Coordinates for the collection in well-known-text (WKT) format. This may represent one or more points, lines, or areas. If a value is provided, the centroid must match the provided sample centroid values	Text	Unlimited	No	Note 6	No	

Please refer to notes on last page of table.

Table 5. The sample table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
sample	geo_method	Geopositioning method used to establish coordinates for the collection.	Text	30	Yes	Yes	No	l_position_method
	horiz_accuracy_measure	Horizontal accuracy measurement – the radius of a circle around the measured point within which the true location occurs with a 95% probability	Floating-point	0	No	No	No	
	horiz_accuracy_measure_units	Horizontal accuracy measurement units	Text	20	Note 7	Yes	No	l_unit
	collection_material	The type of material collected	Text	24	Note 8	Yes	No	l_sample_material
	sample_material	The type of material sampled--this may differ from the collection material if any fractionation of the material has been performed in the field	Text	24	Yes	Yes	No	l_sample_material
	collection_part	The fraction of the collection represented by this sample (e.g., entire, vertical horizon, filtered fraction)	Text	24	Yes	Yes	No	l_subsample_type
	sample_depth_upper	Sample upper depth relative to the vertical reference point	Floating-point	0	Note 9	No	No	
	sample_depth_lower	Sample lower depth relative to the vertical reference point	Floating-point	0	Note 9	No	No	
	sample_depth_units	Sample depth units	Text	20	Note 10	Yes	No	l_unit
	taxon	Taxon code for organisms	Text	24	No	Yes	No	l_taxon
	field_prep_method	Sample preparation, fractionation, or treatment method carried out at the time of collection (e.g., filtering)	Text	24	No	Yes	No	l_prep_method
	sample_mass	The mass of this sample	Floating-point	0	No	No	No	
	sample_mass_units	The units for the sample mass	Text	20	Note 11	Yes	No	l_unit
	sample_mass_basis	"Wet" or "Dry" for sample masses	Text	10	No	Yes	No	l_meas_basis
	sample_volume	The volume of this sample	Floating-point	0	No	No	No	
	sample_volume_units	The units for the sample volume	Text	20	Note 12	Yes	No	l_unit
	sample_color	The color of the sample upon collection	Text	24	No	Yes	No	l_color
	sample_odor	The odor of the sample upon collection	Text	24	No	Yes	No	l_odor
	sampling_reasons	Description of the purpose for collection of this sample	Text	255	No	Yes	No	l_sample_reason – Note 13
	sampler_org	Name of organization that collected the sample	Text	100	Yes	No	No	
	sampler_person	Name of the person who collected the sample	Text	64	No	No	No	
	remarks	Comments on the sample	Text	255	No	No	No	

Notes

1 The collection ID must be provided if it is different from the main sample ID. If it is not provided, it will be set identical to the main sample ID during import of the EDD.
2 Collection depths are required if the collection and the sample are not identical, and the material collected is sediment, surface water, soil, or groundwater. If the collection and the sample are identical, collection depths should be omitted or equal to the sample depths. If depths are required, both depths must be provided.
3 Required if *vert_ref_pt_elev* is provided.
4 composite_type
5 Sample-specific actual coordinates are required. If there are multiple coordinates for a sample (as for a spatial composite), then those may be provided as WKT in the coll_coords column. However, the required centroid of the locations must be provided in the sample_lat_centroid_dd and sample_lon_centroid_dd columns.
6 See https://www.ogc.org/standards/wkt-crs
7 Required if *horiz_accuracy_measure* is provided.
8 Required if the collection material is different than the sample material.
9 Required if the sample material is sediment, surface water, soil, or groundwater. Both depths must be provided.
10 Required if *sample_depth_upper* and *sample_depth_lower* are provided.
11 Required if *sample_mass* is provided.
12 Required if *sample_volume* is provided.
13 The entry must be a comma-separated list of valid values.

Table 6. The sample_composite table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
sample_composite	main_sample_id	Unique sample identifier for the interpretive sample that is a composite	Text	50	Yes	No	**Yes**	sample table
	subcomposite_sample_id	Unique sample identifier for one of the interpretive samples that makes up the composite	Text	50	Yes	No	**Yes**	sample table
	subcomposite_mass	The mass of this subcomposite sample used in the composite	Floating-point	0	No	No	No	
	subcomposite_mass_units	The units for the subcomposite mass	Text	20	Note 1	Yes	No	l_unit
	subcomposite_volume	The volume of this subcomposite used in the composite	Floating-point	0	No	No	No	
	subcomposite_volume_units	The units for the subcomposite volume	Text	20	Note 2	Yes	No	l_unit

Notes

1 Required if *subcomposite_mass* is provided.

2 Required if *subcomposite_volume* is provided.

Table 7. The collection_measurement table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
Collection_Measurement	collection_id	Unique collection identifier for each core, grab, or group of related field samples.	Text	50	Yes	No	**Yes**	sample.collection_id Note 1
	collection_measurement	The type of measurement made (e.g., tide height, cloud cover, number of grabs)	Text	24	Yes	Yes	**Yes**	l_measurement
	measurement_method	The method used to make the sample measurement	Text	24	Yes	Yes	**Yes**	l_meas_method
	replicate	Replicate identifier to distinguish multiple measurements (e.g., “1”, “2”)	Text	10	Yes	No	**Yes**	
	measured_value	The numerical result of the measurement	Floating-point	0	Yes	No	No	
	collection_measurement_units	Result unit of measurement	Text	20	Yes	Yes	No	l_unit
	qa_level	Level of data quality review used	Text	24	Yes	Yes	No	l_qa_level
	reportable	Flag to distinguish reportable and non-reportable results based on data quality review	Boolean	0	Yes	No	No	
	collection_measurement_comments	Comments on the measured value	Text	255	No	No	No	

Note

1 The sample table does not have a unique key on the *collection_id* column; however, the values used here must appear in that column.

Table 8. The sample_measurement table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
sample_measurement	main_sample_id	Unique sample identifier for this interpretive sample	Text	50	Yes	No	**Yes**	d_sample
	sample_measurement	The type of measurement made (e.g., mass, volume, temperature)	Text	24	Yes	Yes	**Yes**	l_measurement
	measurement_method	The method used to make the sample measurement	Text	24	Yes	Yes	**Yes**	l_meas_method
	replicate	Replicate identifier to distinguish multiple measurements (e.g., “1”, “2”)	Text	10	Yes	No	**Yes**	
	measured_value	The numerical result of the measurement	Floating-point	0	Yes	No	No	
	sample_measurement_units	Result unit of measurement	Text	20	Yes	Yes	No	l_unit
	qa_level	Level of data quality review used	Text	24	Yes	Yes	No	l_qa_level
	reportable	Flag to distinguish reportable and non-reportable results based on data quality review	Boolean	0	Yes	No	No	
	sample-measurement_comments	Comments on the measured value	Text	255	No	No	No	

Table 9. The collection_observation table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
Collection_Observation	collection_id	Unique collection identifier for each core, grab, or group of related field samples.	Text	50	Yes	No	Yes	sample.collection_id
	observation_type	The class of observation made	Text	24	Yes	Yes	Yes	l_observation
	observation	The observation made; one of the categorical values within the observation class	Text	24	Yes	Yes	Yes	l_observation
	collection_observation_comments	Comments on the observation	Text	255	No	No	No	

Table 10. The sample_observation table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
Sample_Observation	main_sample_id	Unique sample identifier for this interpretive sample	Text	50	Yes	No	Yes	sample.main_sample_id
	observation_type	The class of observation made	Text	24	Yes	Yes	Yes	l_observation
	observation	The observation made; one of the categorical values within the observation class	Text	24	Yes	Yes	Yes	l_observation
	sample_observation_comments	Comments on the observation	Text	255	No	No	No	

Table 11. The lab_result table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
lab_result	main_sample_id	Unique sample identifier for the interpretive sample	Text	50	Yes	No	**Yes**	sample
	analytical_sample_id	Unique sample identifier for each analytical sample	Text	50	Note 1	No	**Yes**; Note 1	
	lab_sdg	Laboratory Sample Delivery Group (batch) ID	Text	50	Yes	Note 2	**Yes**	
	analysis	Lab analysis (e.g., metals, VOCs)	Text	24	Yes	Yes	**Yes**	l_lab_analysis
	analyte	Analyte/parameter name (e.g., lead; arsenic; etc.)	Text	24	Yes	Yes	**Yes**	l_analyte
	preparation_method	Lab preparation method (e.g., extraction method)	Text	24	Yes	Yes	**Yes**	l_prep_method
	analytical_method	Lab analytical method (e.g., 8270M)	Text	24	Yes	Yes	**Yes**	l_anal_method
	material_analyzed	Material analyzed	Text	24	Yes	Yes	**Yes**	l_sample_material
	fraction_analyzed	Indicator of what fraction of the sample was analyzed (e.g., total, dissolved, leachate, sieved size interval)	Text	24	Yes	Yes	**Yes**	l_fractions
	lab_replicate	Laboratory replicate identifier	Text	20	Yes	No	**Yes**; Note 3	
	calculated	Is this a calculated result rather than a value reported by the laboratory?	Boolean	0	Yes	No	No	
	calculation_method	Standardized description of the calculation method used	Text	24	Note 4	Yes	No	l_calc_method
	result	Result (concentration or equivalent) reported by the lab. If the analyte was not detected, the sample-specific method detection limit should be used.	Floating-point	0	Yes	No	No	
	sig_figs	Significant digits of the result	Integer	0	Yes	No	No	
	result_units	Result unit of measurement	Text	20	Yes	Yes	No	l_unit
	basis	"Wet" for wet_weight basis reporting; "Dry" for dry_weight reporting.	Text	10	Yes	Yes	No	l_meas_basis
	lab_qualifiers	Qualifiers and flags assigned by the laboratory	Text	16	No	Yes	No	

Please refer to notes on last page of table.

Table 11. The lab_result table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
lab_result	tic	Is this a tentatively identified compound (TIC)?	Boolean	0	Yes	No	No	
	validated	Has this result been validated?	Boolean	0	Yes	No	No	
	validation_level	Stage of validation - electronic and manual	Text	24	Yes	Yes	No	l_validation_level
	result_qualifiers	Final validated result qualifiers/flags (e.g., J;U;ND;<;>)	Text	12	Note 5	Yes	No	
	undetected	Flag to distinguish detected and undetected results, based on lab or validation qualifiers	Boolean	0	Yes	No	No	
	estimated	Flag to distinguish estimated and non-estimated results, based on lab or validation qualifiers	Boolean	0	Yes	No	No	
	rejected	Flag to distinguish rejected and non-rejected results, based on lab or validation qualifiers	Boolean	0	Yes	No	No	
	reportable	Flag to distinguish reportable and non-reportable results, based on validation or data quality review	Boolean	0	Yes	No	No	
	validator	Validation company name	Text	100	No	No	No	
	validator_comments	Comment on the validation assessment for this result	Text	255	No	No	No	
	lab_result_comments	Comments on the results that do not pertain to either the validation results or data quality review results	Text	255	No	No	No	
	qa_comments	QA comment resulting from any data quality review conducted in addition to data validation. The name(s) of the data quality reviewer(s) should be included.	Text	255	No	No	No	

Please refer to notes on last page of table.

Table 11. The lab_result table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
lab_result	date_received	Date and time that the analysis was received by the lab in ISO-8601 basic or extended format	DateTime	0	No	No	No	
	date_extracted	Date and timethat the sample was extracted by the lab in ISO-8601 basic or extended format	DateTime	0	No	No	No	
	date_analyzed	Date and time that the analysis was performed by the lab in ISO-8601 basic or extended format	DateTime	0	No	No	No	
	dilution_factor	Effective test dilution factor.	Floating-point	0	Yes	No	No	
	lab_name	Laboratory that performed the analysis	Text	24	Yes	Yes	No	l_lab
	lab_sample_id	Sample identifier assigned by the laboratory	Text	50	No	No	No	
	original_lab_result	Original result reported by the laboratory, if data validation resulted in restatement of the value	Numeric	0	No	No	No	
	lab_cal_batch	The laboratory's calibration batch identifier	Text	50	No	No	No	
	lab_qc_batch	The laboratory's quality control batch identifier	Text	50	No	No	No	
	idl	Instrument Detection Limit (IDL)	Floating-point	0	No	No	No	
	idl_units	IDL units	Text	20	Note 6	Yes	No	l_unit
	mdl	Sample-specific Method Detection Limit (MDL). This should be the same as the *result* value for non-detects.	Floating-point	0	No	No	No	
	mdl_units	MDL units	Text	20	Note 7	Yes	No	l_unit
	quantitation_limit	Quantitation limit as determined by the lab.	Floating-point	0	No	No	No	

Please refer to notes on last page of table.

Table 11. The lab_result table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
lab_result	quantitation_limit_units	Quantitation limit units	Text	20	Note 8	Yes	No	l_unit
	reporting_limit	Reporting limit as determined by the lab.	Floating-point	0	No	No	No	
	reporting_limit_units	Reporting limit units	Text	20	Note 9	Yes	No	l_unit
	value_type	WQX result value type (e.g.., actual; estimated; calculated)	Text	24	No	Yes	No	l_result_value_type

Notes

1 The analytical sample ID must be provided if it is different from the main sample ID. If it is not provided, the analytical sample ID will be set identical to the main sample ID during import of the EDD.

2 If there are duplicate SDG IDs from different laboratories, prefix them with the laboratory name to eliminate these conflicts.

3 When samples are analyzed in duplicate, both results should be reported and distinguished by the laboratory replicate ID.

4 The *calculation_method* is required if the *calculated* value is set to True.

5 Final qualifiers should be reported if they have been assigned. This should include any laboratory qualifiers that are retained through the data validation process.

6 Required if *idl* is provided.

7 Required if *mdl* is provided.

8 Required if *quantitation_limit* is provided.

9 Required if *reporting_limit* is provided.

Table 12. The tox_test_batch table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
tox_test_batch	lab_name	Toxicity test laboratory	Text	24	Yes	No	**Yes**	l_lab
	tox_test_batch	Laboratory-specific toxicity test batch identifier	Text	50	Yes	No	**Yes**	
	tox_test_type	Type of toxicity test conducted (e.g., amphipod 10-day bioassay, echinoderm 72-hour bioassay)	Text	24	Yes	Yes	No	l_tox_test_type
	taxon	Taxon code for organism used for the toxicity test	Text	24	Yes	Yes	No	l_taxon
	life_stage	Life stage of organisms used for the toxicity test	Text	20	Yes	Yes	No	l_life_stage
	start_date	Starting date of the toxicity test, in ISO-8601 basic or extended format	DateTime	0	No	No	No	
	end_date	Ending date of the toxicity test, in ISO-601 basic or extended format	DateTime	0	No	No	No	
	qa_level	Level of data quality review used	Text	24	Yes	Yes	No	l_qa_level

Table 13. The tox_test_result table

Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
tox_test_result	main_sample_id	Unique sample identifier for an interpretive sample	Text	50	Yes	No	Yes	sample
	lab_name	Toxicity test laboratory	Text	50	Yes	No	Yes	l_lab
	tox_test_batch	Laboratory-specific toxicity test batch identifier	Text	50	Yes	No	Yes	tox_test_batch
	tox_test_variable	The variable in which results of the test are expressed (e.g., survival, growth, reproduction)	Text	24	Yes	Yes	Yes	l_tox_test_var
	tox_test_measurement	The type of measurement made (e.g., count of survivors, percent normal, change in mass)	Text	24	Yes	Yes	Yes	l_tox_test_meas
	replicate	Replicate identifier	Text	20	Yes	No	Yes	
	tox_test_result	The numeric result of the toxicity test	Numeric	0	Yes	No	No	
	tox_test_units	The units for the toxicity test result	Text	20	Yes	Yes	No	l_unit
	qa_level	Level of data quality review used	Text	24	Yes	Yes	No	l_qa_level
	tox_test_result-comments	Comments on this toxicity test result	Text	255	No	No	No	

Table 14. The species_abundance table

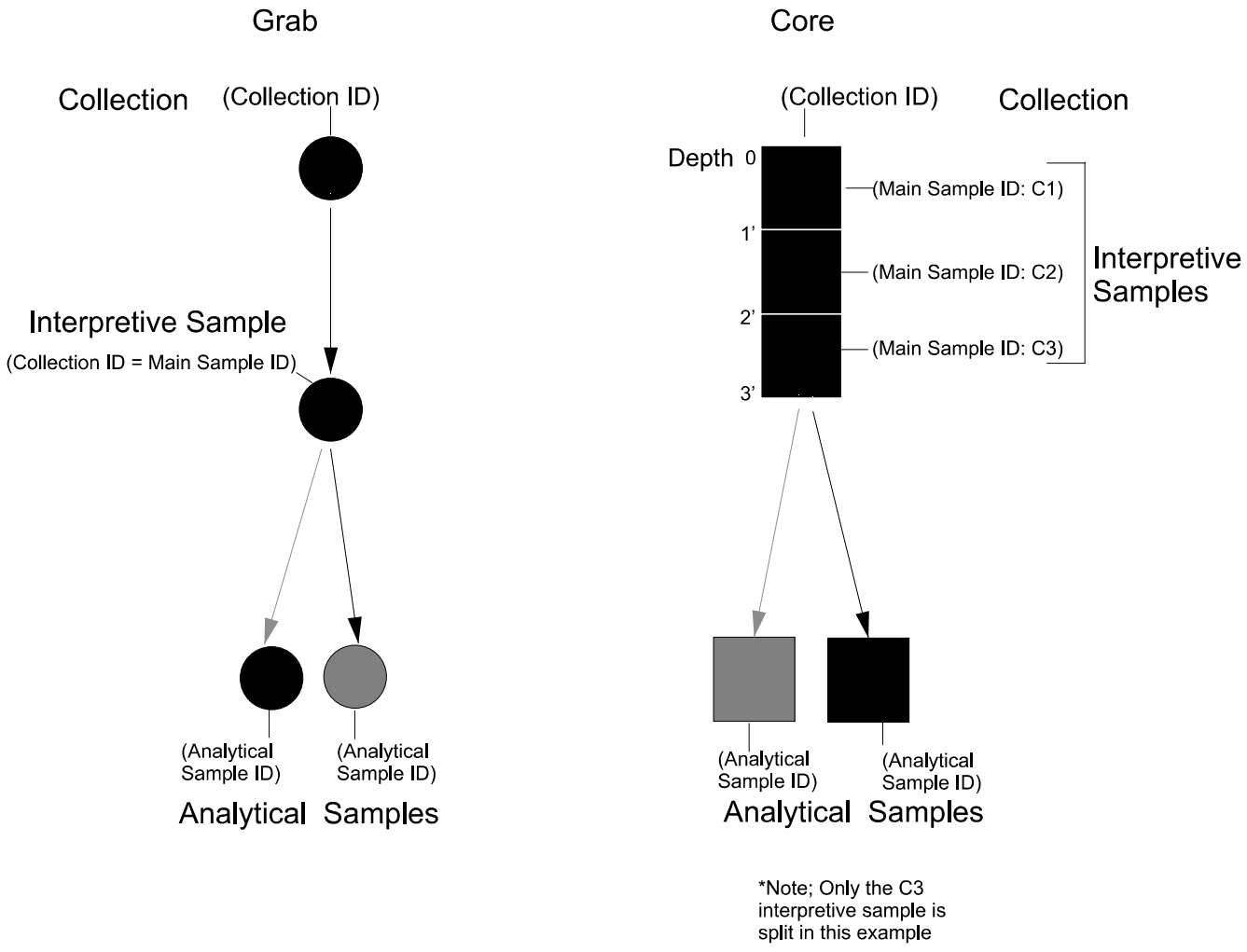
Table	Column	Description	Data Type	Size	Required	Valid Values	Primary Key	Foreign key to
species_abundance	main_sample_id	Unique sample identifier for an interpretive sample	Text	50	Yes	No	Yes	sample
	taxon	Taxon code for the organism for which abundance was measured	Text	24	Yes	Yes	Yes	l_taxon
	sex	Sex of organism	Text	1	Yes	Yes	Yes	l_sex
	life_stage	Life stage of organism	Text	24	Yes	Yes	Yes	l_life_stage
	abundance_measurement	Type of abundance measurement (e.g., count, concentration, density, spatial coverage)	Text	24	Yes	Yes	Yes	l_abund_meas
	replicate	Replicate identifier	Text	20	Yes	No	Yes	
	abundance	Abundance measurement	Floating-point	0	Yes	No	No	
	abunance_units	Abundance measurement units	Text	20	Yes	Yes	No	l_unit
	lab_name	Laboratory that measured the abundance	Text	24	No	Yes	No	l_lab
	species_abundance_comments	Comments on the species abundance measurement	Text	255	No	No	No	

Table 15. Metadata items for each submission

Metadata item	Description
Submittal title	
Submittal version	
Data set date	
Preparation date	
Preparer	
Preparer organization	
Preparer email	
Preparer phone	
Version revisions	
PHDP document	

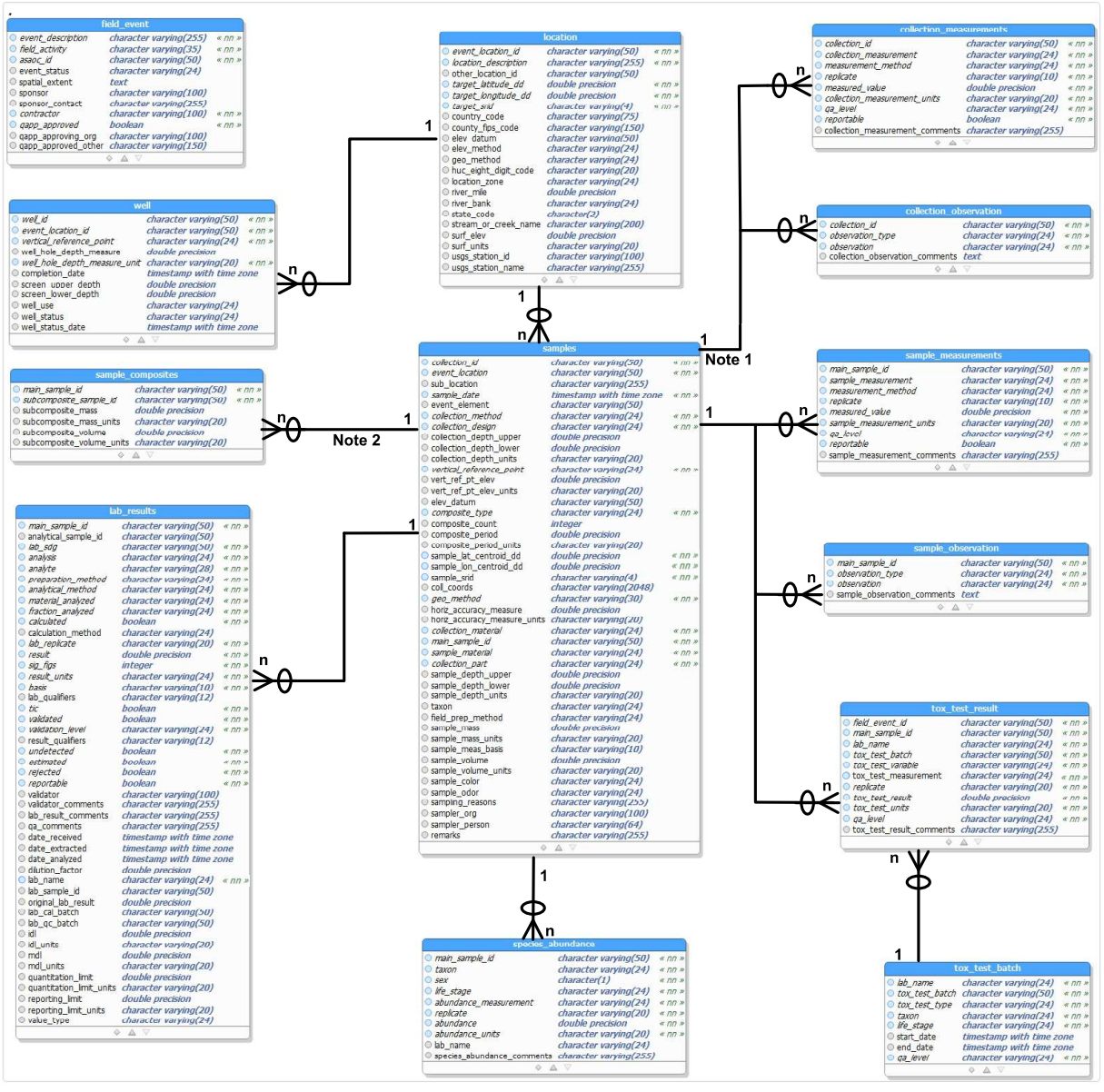
Comments

FIGURES



Common Structure for All Sampling Information

Figure **1**



EDD Tables - Entity Relationship Diagram

Figure **2**

Attachment B – Detected Analytes in Portland Harbor RI/FS Data for Remedial Design Media of Interest

Table 1
Sediment Analyte List

CAS Number	Analyte
GS_COLLOID	< 0.001 mm
GS_<0.075	< 0.075 mm
GS_>0.075	> 0.075 mm
GS_CLAY200	>= 0.001 to <0.005 mm
GS_FCLAY	>10 Phi clay
GS_MFCLAY	>9 Phi clay
630-20-6	1,1,1,2-Tetrachloroethane
71-55-6	1,1,1-Trichloroethane
79-34-5	1,1,2,2-Tetrachloroethane
79-00-5	1,1,2-Trichloroethane
75-34-3	1,1-Dichloroethane
75-35-4	1,1-Dichloroethene
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
96-18-4	1,2,3-Trichloropropane
120-82-1	1,2,4-Trichlorobenzene
95-63-6	1,2,4-Trimethylbenzene
95-50-1	1,2-Dichlorobenzene
107-06-2	1,2-Dichloroethane
78-87-5	1,2-Dichloropropane
108-67-8	1,3,5-Trimethylbenzene
541-73-1	1,3-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
110-57-6	1,4-Dichloro-trans-2-butene
2245-38-7	1,6,7-Trimethylnaphthalene
99-87-6	1-Methyl-4-isopropylbenzene
90-12-0	1-Methylnaphthalene
832-69-9	1-Methylphenanthrene
4901-51-3	2,3,4,5-Tetrachlorophenol
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
25167-83-3_3	2,3,4,6;2,3,5,6-Tetrachlorophenol coelution
58-90-2	2,3,4,6-Tetrachlorophenol
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
935-95-5	2,3,5,6-Tetrachlorophenol
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
93-76-5	2,4,5-T
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
94-75-7	2,4-D
94-82-6	2,4-DB
53-19-0	2,4'-DDD
3424-82-6	2,4'-DDE
789-02-6	2,4'-DDT
120-83-2	2,4-Dichlorophenol
105-67-9	2,4-Dimethylphenol
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
581-42-0	2,6-Dimethylnaphthalene
91-58-7	2-Chloronaphthalene
95-57-8	2-Chlorophenol
91-57-6	2-Methylnaphthalene
95-48-7	2-Methylphenol
C_3+4MPHN	3- and 4-Methylphenol Coelution
91-94-1	3,3'-Dichlorobenzidine
99-09-2	3-Nitroaniline
72-54-8	4,4'-DDD
72-55-9	4,4'-DDE
50-29-3	4,4'-DDT
59-50-7	4-Chloro-3-methylphenol
106-47-8	4-Chloroaniline
106-44-5	4-Methylphenol
100-01-6	4-Nitroaniline
100-02-7	4-Nitrophenol
GS_CCLAY	8-9 Phi clay
GS_MCLAY	9-10 Phi clay
83-32-9	Acenaphthene
208-96-8	Acenaphthylene

Table 1
Sediment Analyte List

CAS Number	Analyte
67-64-1	Acetone
AVS	Acid Volatile Sulfides
107-02-8	Acrolein
309-00-2	Aldrin
959-98-8	alpha-Endosulfan
319-84-6	alpha-Hexachlorocyclohexane
7429-90-5	Aluminum
7664-41-7	Ammonia
12172-73-5	Amosite
62-53-3	Aniline
120-12-7	Anthracene
7440-36-0	Antimony
12674-11-2	Aroclor 1016
11104-28-2	Aroclor 1221
11141-16-5	Aroclor 1232
53469-21-9	Aroclor 1242
12672-29-6	Aroclor 1248
11097-69-1	Aroclor 1254
11096-82-5	Aroclor 1260
37324-23-5	Aroclor 1262
11100-14-4	Aroclor 1268
12767-79-2	Aroclors
7440-38-2	Arsenic
17428-41-0	Arsenic pentavalent
22541-54-4	Arsenic trivalent
1332-21-4	Asbestos
103-33-3	Azobenzene
7440-39-3	Barium
71-43-2	Benzene
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
BKBFLANTH	Benzo(b+k)fluoranthene
192-97-2	Benzo(e)pyrene
191-24-2	Benzo(g,h,i)perylene
BKJFLANTH	Benzo(j+k)fluoranthene
207-08-9	Benzo(k)fluoranthene
56832-73-6	Benzofluoranthenes
65-85-0	Benzoic acid
100-51-6	Benzyl alcohol
7440-41-7	Beryllium
13966-02-4	Beryllium-7
33213-65-9	beta-Endosulfan
319-85-7	beta-Hexachlorocyclohexane
108-60-1	Bis(2-chloro-1-methylethyl) ether
111-91-1	Bis(2-chloroethoxy) methane
111-44-4	Bis(2-chloroethyl) ether
39638-32-9	Bis(2-chloroisopropyl) ether
117-81-7	Bis(2-ethylhexyl) phthalate
BTEX	BTEX
BULKDENSITY	Bulk density
85-68-7	Butylbenzyl phthalate
78763-54-9	Butyltin ion
C10-C12-ALIP	C10-C12 Aliphatics
C10-C12-AROM	C10-C12 Aromatics
C12-C16-ALIP	C12-C16 Aliphatics
C12-C16-AROM	C12-C16 Aromatics
C16-C21-ALIP	C16-C21 Aliphatics
C16-C21-AROM	C16-C21 Aromatics
C1_218-01-9	C1-Chrysene
C1_132-65-0	C1-Dibenzothiophene
C1_FLRANPYRN	C1-Fluoranthene/pyrene
C1_86-73-7	C1-Fluorene
C1_91-20-3	C1-Naphthalene
C1-Naphthalene (calc'd)	C1-Naphthalene (calc'd)
C1_PHANANTH	C1-Phenanthrene/anthracene
C21-C34-ALIP	C21-C34 Aliphatics
C21-C34-AROM	C21-C34 Aromatics
C2_218-01-9	C2-Chrysene
C2_132-65-0	C2-Dibenzothiophene
C2_FLRANPYRN	C2-Fluoranthene/pyrene
C2_86-73-7	C2-Fluorene
C2_91-20-3	C2-Naphthalene
C2_PHANANTH	C2-Phenanthrene/anthracene
C3_218-01-9	C3-Chrysene
C3_132-65-0	C3-Dibenzothiophene
C3_FLRANPYRN	C3-Fluoranthene/pyrene

Table 1
Sediment Analyte List

CAS Number	Analyte
C3_86-73-7	C3-Fluorene
C3_91-20-3	C3-Naphthalene
C3_PHANANTH	C3-Phenanthrene/anthracene
C4_218-01-9	C4-Chrysene
C4_132-65-0	C4-Dibenzothiophene
C4_91-20-3	C4-Naphthalene
C4_PHANANTH	C4-Phenanthrene/anthracene
C8-C10-ALIP	C8-C10 Aliphatics
C8-C10-AROM	C8-C10 Aromatics
7440-43-9	Cadmium
7440-70-2	Calcium
86-74-8	Carbazole
75-15-0	Carbon disulfide
10045-97-3	Cesium-137
57-74-9	Chlordane (cis & trans)
16887-00-6	Chloride
108-90-7	Chlorobenzene
124-48-1	Chlorodibromomethane
75-00-3	Chloroethane
67-66-3	Chloroform
74-87-3	Chloromethane
2921-88-2	Chlorpyrifos
7440-47-3	Chromium
18540-29-9	Chromium hexavalent
218-01-9	Chrysene
12001-29-5	Chrysotile
156-59-2	cis-1,2-Dichloroethene
5103-71-9	cis-Chlordane
5103-73-1	cis-Nonachlor
GS_CLAY	Clay
GS_CS	Coarse sand
GS_CSILT	Coarse silt
7440-48-4	Cobalt
7440-50-8	Copper
57-12-5	Cyanide
75-99-0	Dalapon
319-86-8	delta-Hexachlorocyclohexane
53-70-3	Dibenzo(a,h)anthracene
132-64-9	Dibenzofuran
132-65-0	Dibenzothiophene
84-74-2	Dibutyl phthalate
683-18-1	Dibutyltin dichloride
14488-53-0	Dibutyltin ion
1918-00-9	Dicamba
25512-42-9	Dichlorobiphenyl homologs
75-71-8	Dichlorodifluoromethane
120-36-5	Dichloroprop
60-57-1	Dieldrin
DRH	Diesel Range Hydrocarbons
DRH (SGT)	Diesel Range Hydrocarbons (silica gel treated)
84-66-2	Diethyl phthalate
131-11-3	Dimethyl phthalate
117-84-0	Di-n-octyl phthalate
Dioxin TEQ - Birds	Dioxin TEQ - Birds
Dioxin TEQ - Fish	Dioxin TEQ - Fish
Dioxin TEQ - Mammals	Dioxin TEQ - Mammals
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
92-52-4	Diphenyl
1031-07-8	Endosulfan sulfate
72-20-8	Endrin
7421-93-4	Endrin aldehyde
53494-70-5	Endrin ketone
100-41-4	Ethylbenzene
GS_FG	Fine gravel
GS_FS	Fine sand
GS_FSILT	Fine silt
GS_FINES	Fines
206-44-0	Fluoranthene
86-73-7	Fluorene
68476-30-2	Fuel oil no. 2
58-89-9	gamma-Hexachlorocyclohexane
GRH	Gasoline Range Hydrocarbons
GS_GRANULE	Granule
GS_GRAVEL	Gravel
GWC	Gravimetric water content
HORH	Heavy Oil Range Hydrocarbons

Table 1
Sediment Analyte List

CAS Number	Analyte
76-44-8	Heptachlor
1024-57-3	Heptachlor epoxide
28655-71-2	Heptachlorobiphenyl homologs
38998-75-3	Heptachlorodibenzofuran homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
118-74-1	Hexachlorobenzene
26601-64-9	Hexachlorobiphenyl homologs
87-68-3	Hexachlorobutadiene
55684-94-1	Hexachlorodibenzofuran homologs
34465-46-8	Hexachlorodibenzo-p-dioxin homologs
67-72-1	Hexachloroethane
HPAH	High Molecular Weight PAH
193-39-5	Indeno(1,2,3-cd)pyrene
7439-89-6	Iron
78-59-1	Isophorone
98-82-8	Isopropylbenzene
7439-92-1	Lead
14255-04-0	Lead-210
LIQUID-LIM	Liquid Limit
LPAH	Low Molecular Weight PAH
68782-97-8	Lube Oil
15831-10-4	m,p-Cresol
179601-23-1	m,p-Xylene
7439-95-4	Magnesium
7439-96-5	Manganese
94-74-6	MCPA
93-65-2	MCPP
GS_MEAN	Mean grain size
GS_MEDIAN	Median grain size
GS_MG	Medium gravel
GS_MS	Medium sand
GS_MSILT	Medium silt
GS_MFG	Medium-fine gravel
7439-97-6	Mercury
72-43-5	Methoxychlor
79-20-9	Methyl acetate
74-88-4	Methyl iodide
108-10-1	Methyl isobutyl ketone
591-78-6	Methyl n-butyl ketone
1634-04-4	Methyl tert-butyl ether
108-87-2	Methylcyclohexane
74-95-3	Methylene bromide
75-09-2	Methylene chloride
78-93-3	Methylethyl ketone
22967-92-6	Methylmercury
2385-85-5	Mirex
MOISTURE	Moisture
1118-46-3	Monobutyltin trichloride
27323-18-8	Monochlorobiphenyl homologs
M09800000	Motor oil
91-20-3	Naphthalene
104-51-8	n-Butylbenzene
7440-02-0	Nickel
14797-55-8	Nitrate
62-75-9	N-Nitrosodimethylamine
86-30-6	N-Nitrosodiphenylamine
621-64-7	N-Nitrosodipropylamine
53742-07-7	Nonachlorobiphenyl homologs
103-65-1	n-Propylbenzene
55722-26-4	Octachlorobiphenyl homologs
39001-02-0	Octachlorodibenzofuran
3268-87-9	Octachlorodibenzo-p-dioxin
ORP	Oxidation-Reduction Potential
27304-13-8	Oxychlordane
95-47-6	o-Xylene
PBDE028	PBDE028
PBDE047	PBDE047
PBDE099	PBDE099
PBDE100	PBDE100
PBDE153	PBDE153
PBDE154	PBDE154
PBDE183	PBDE183
1163-19-5	PBDE209
PCB TEQ - Birds	PCB TEQ - Birds
PCB TEQ - Fish	PCB TEQ - Fish
PCB TEQ - Mammals	PCB TEQ - Mammals
2051-60-7	PCB001

Table 1
Sediment Analyte List

CAS Number	Analyte
2051-61-8	PCB002
2051-62-9	PCB003
13029-08-8	PCB004
PCB004_010	PCB004 & 010
16605-91-7	PCB005
PCB005_008	PCB005 & 008
25569-80-6	PCB006
33284-50-3	PCB007
PCB007_009	PCB007 & 009
34883-43-7	PCB008
34883-39-1	PCB009
33146-45-1	PCB010
2050-67-1	PCB011
2974-92-7	PCB012
PCB012_013	PCB012 & 013
2974-90-5	PCB013
34883-41-5	PCB014
2050-68-2	PCB015
38444-78-9	PCB016
PCB016_032	PCB016 & 032
37680-66-3	PCB017
37680-65-2	PCB018
PCB018_030	PCB018 & 030
38444-73-4	PCB019
38444-84-7	PCB020
PCB020_021_033	PCB020 & 021 & 033
PCB020_028	PCB020 & 028
55702-46-0	PCB021
PCB021_033	PCB021 & 033
38444-85-8	PCB022
55720-44-0	PCB023
55702-45-9	PCB024
PCB024_027	PCB024 & 027
55712-37-3	PCB025
38444-81-4	PCB026
PCB026_029	PCB026 & 029
38444-76-7	PCB027
7012-37-5	PCB028
15862-07-4	PCB029
35693-92-6	PCB030
16606-02-3	PCB031
38444-77-8	PCB032
38444-86-9	PCB033
37680-68-5	PCB034
37680-69-6	PCB035
38444-87-0	PCB036
38444-90-5	PCB037
53555-66-1	PCB038
38444-88-1	PCB039
38444-93-8	PCB040
PCB040_041_071	PCB040 & 041 & 071
52663-59-9	PCB041
PCB041_064_071_	PCB041 & 064 & 071 & 072
36559-22-5	PCB042
PCB042_059	PCB042 & 059
70362-46-8	PCB043
PCB043_049	PCB043 & 049
PCB043_073	PCB043 & 073
41464-39-5	PCB044
PCB044_047_065	PCB044 & 047 & 065
70362-45-7	PCB045
PCB045_051	PCB045 & 051
41464-47-5	PCB046
2437-79-8	PCB047
70362-47-9	PCB048
PCB048_075	PCB048 & 075
41464-40-8	PCB049
PCB049_069	PCB049 & 069
62796-65-0	PCB050
PCB050_053	PCB050 & 053
68194-04-7	PCB051
35693-99-3	PCB052
PCB052_069	PCB052 & 069
41464-41-9	PCB053
15968-05-5	PCB054
74338-24-2	PCB055
41464-43-1	PCB056

Table 1
Sediment Analyte List

CAS Number	Analyte
PCB056_060	PCB056 & 060
70424-67-8	PCB057
41464-49-7	PCB058
PCB059_062_075	PCB059 & 062 & 075
33025-41-1	PCB060
33284-53-6	PCB061
PCB061_070	PCB061 & 070
PCB061_070_074_	PCB061 & 070 & 074 & 076
54230-22-7	PCB062
74472-34-7	PCB063
52663-58-8	PCB064
33284-54-7	PCB065
32598-10-0	PCB066
PCB066_076	PCB066 & 076
73575-53-8	PCB067
73575-52-7	PCB068
60233-24-1	PCB069
32598-11-1	PCB070
41464-46-4	PCB071
41464-42-0	PCB072
74338-23-1	PCB073
32690-93-0	PCB074
70362-48-0	PCB076
32598-13-3	PCB077
70362-49-1	PCB078
41464-48-6	PCB079
33284-52-5	PCB080
70362-50-4	PCB081
52663-62-4	PCB082
60145-20-2	PCB083
PCB083_099	PCB083 & 099
52663-60-2	PCB084
PCB084_092	PCB084 & 092
65510-45-4	PCB085
PCB085_116	PCB085 & 116
PCB085_116_117	PCB085 & 116 & 117
55312-69-1	PCB086
PCB086_087_097_	PCB086 & 087 & 097 & 108 & 119 & 125
PCB086_087_109_	PCB086 & 087 & 097 & 109 & 119 & 125
38380-02-8	PCB087
PCB087_117_125	PCB087 & 117 & 125
55215-17-3	PCB088
PCB088_091	PCB088 & 091
73575-57-2	PCB089
68194-07-0	PCB090
PCB090_101	PCB090 & 101
PCB090_101_113	PCB090 & 101 & 113
68194-05-8	PCB091
52663-61-3	PCB092
73575-56-1	PCB093
PCB093_095_098_	PCB093 & 095 & 098 & 100 & 102
PCB093_100	PCB093 & 100
73575-55-0	PCB094
38379-99-6	PCB095
PCB095_098_102	PCB095 & 098 & 102
73575-54-9	PCB096
41464-51-1	PCB097
60233-25-2	PCB098
PCB098_102	PCB098 & 102
38380-01-7	PCB099
39485-83-1	PCB100
37680-73-2	PCB101
68194-06-9	PCB102
60145-21-3	PCB103
56558-16-8	PCB104
32598-14-4	PCB105
70424-69-0	PCB106
PCB106_118	PCB106 & 118
70424-68-9	PCB107
PCB107_109	PCB107 & 109
PCB107_124	PCB107 & 124
PCB108_112	PCB108 & 112
PCB108_124	PCB108 & 124
74472-35-8	PCB109
38380-03-9	PCB110
PCB110_115	PCB110 & 115
39635-32-0	PCB111

Table 1
Sediment Analyte List

CAS Number	Analyte
PCB111_115	PCB111 & 115
74472-36-9	PCB112
68194-10-5	PCB113
74472-37-0	PCB114
74472-38-1	PCB115
18259-05-7	PCB116
68194-11-6	PCB117
31508-00-6	PCB118
56558-17-9	PCB119
68194-12-7	PCB120
56558-18-0	PCB121
76842-07-4	PCB122
65510-44-3	PCB123
70424-70-3	PCB124
74472-39-2	PCB125
57465-28-8	PCB126
39635-33-1	PCB127
38380-07-3	PCB128
PCB128_162	PCB128 & 162
PCB128_166	PCB128 & 166
55215-18-4	PCB129
PCB129_138_160_	PCB129 & 138 & 160 & 163
PCB129_138_163	PCB129 & 138 & 163
52663-66-8	PCB130
61798-70-7	PCB131
38380-05-1	PCB132
PCB132_161	PCB132 & 161
35694-04-3	PCB133
PCB133_142	PCB133 & 142
52704-70-8	PCB134
PCB134_143	PCB134 & 143
52744-13-5	PCB135
PCB135_151	PCB135 & 151
PCB135_151_154	PCB135 & 151 & 154
38411-22-2	PCB136
35694-06-5	PCB137
35065-28-2	PCB138
PCB138_163_164	PCB138 & 163 & 164
56030-56-9	PCB139
PCB139_140	PCB139 & 140
PCB139_149	PCB139 & 149
59291-64-4	PCB140
52712-04-6	PCB141
41411-61-4	PCB142
68194-15-0	PCB143
68194-14-9	PCB144
74472-40-5	PCB145
51908-16-8	PCB146
PCB146_165	PCB146 & 165
68194-13-8	PCB147
PCB147_149	PCB147 & 149
74472-41-6	PCB148
38380-04-0	PCB149
68194-08-1	PCB150
52663-63-5	PCB151
68194-09-2	PCB152
35065-27-1	PCB153
PCB153_168	PCB153 & 168
60145-22-4	PCB154
33979-03-2	PCB155
38380-08-4	PCB156
PCB156_157	PCB156 & 157
69782-90-7	PCB157
74472-42-7	PCB158
PCB158_160	PCB158 & 160
39635-35-3	PCB159
41411-62-5	PCB160
39635-34-2	PCB162
74472-44-9	PCB163
74472-45-0	PCB164
74472-46-1	PCB165
41411-63-6	PCB166
52663-72-6	PCB167
59291-65-5	PCB168
32774-16-6	PCB169
35065-30-6	PCB170
52663-71-5	PCB171

Table 1
Sediment Analyte List

CAS Number	Analyte
PCB171_173	PCB171 & 173
52663-74-8	PCB172
68194-16-1	PCB173
38411-25-5	PCB174
40186-70-7	PCB175
52663-65-7	PCB176
52663-70-4	PCB177
52663-67-9	PCB178
52663-64-6	PCB179
35065-29-3	PCB180
PCB180_193	PCB180 & 193
74472-47-2	PCB181
60145-23-5	PCB182
PCB182_187	PCB182 & 187
52663-69-1	PCB183
PCB183_185	PCB183 & 185
74472-48-3	PCB184
52712-05-7	PCB185
74472-49-4	PCB186
52663-68-0	PCB187
74487-85-7	PCB188
39635-31-9	PCB189
41411-64-7	PCB190
74472-50-7	PCB191
74472-51-8	PCB192
69782-91-8	PCB193
35694-08-7	PCB194
52663-78-2	PCB195
42740-50-1	PCB196
PCB196_203	PCB196 & 203
33091-17-7	PCB197
PCB197_200	PCB197 & 200
68194-17-2	PCB198
PCB198_199	PCB198 & 199
52663-75-9	PCB199
52663-73-7	PCB200
40186-71-8	PCB201
2136-99-4	PCB202
52663-76-0	PCB203
74472-52-9	PCB204
74472-53-0	PCB205
40186-72-9	PCB206
52663-79-3	PCB207
52663-77-1	PCB208
2051-24-3	PCB209
92062-34-5	Pencil pitch
25429-29-2	Pentachlorobiphenyl homologs
30402-15-4	Pentachlorodibenzofuran homologs
36088-22-9	Pentachlorodibenzo-p-dioxin homologs
87-86-5	Pentachlorophenol
Percent moisture (calc'd)	Percent moisture (calc'd)
14797-73-0	Perchlorate
198-55-0	Perylene
12408-02-5	pH
85-01-8	Phenanthrene
108-95-2	Phenol
7723-14-0	Phosphorus
638-36-8	Phytane
PLSTIC-LIM	Plastic Limit
PLSTIC-IDX	Plasticity Index
7440-09-7	Potassium
1921-70-6	Pristane
129-00-0	Pyrene
13982-63-3	Radium-226
RRH	Residual Range Hydrocarbons
RRH (SGT)	Residual Range Hydrocarbons (silica gel treated)
483-65-8	Retene
GS_SAND	Sand
135-98-8	Sec-butylbenzene
7782-49-2	Selenium
GS_SIEVE010	Sieve 10
GS_SIEVE100	Sieve 100
GS_SIEVE140	Sieve 140
GS_SIEVE020	Sieve 20
GS_SIEVE200	Sieve 200
GS_SILT200	Sieve 200 silt
GS_SIEVE230	Sieve 230

Table 1
Sediment Analyte List

CAS Number	Analyte
GS_SIEVE3/4	Sieve 3/4 inch
GS_SIEVE3/8	Sieve 3/8 inch
GS_SIEVE030	Sieve 30
GS_SIEVE004	Sieve 4
GS_SIEVE040	Sieve 40
GS_SIEVE060	Sieve 60
GS_SILT	Silt
7440-22-4	Silver
93-72-1	Silvex
7440-23-5	Sodium
SPEC_GRAV	Specific Gravity
100-42-5	Styrene
14808-79-8	Sulfate
18496-25-8	Sulfide
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
SumPAH_ESB34	Sum of 34 PAHs (ESB calc'd)
98-06-6	tert-Butylbenzene
1461-25-2	Tetrabutyltin
26914-33-0	Tetrachlorobiphenyl homologs
30402-14-3	Tetrachlorodibenzofuran homologs
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs
127-18-4	Tetrachloroethene
7440-28-0	Thallium
7440-31-5	Tin
7440-32-6	Titanium
108-88-3	Toluene
Total % Fines (calc'd)	Total % Fines (calc'd)
Total Aroclors (direct contact, industrial beach sediment)	Total Aroclors (direct contact, industrial beach sediment)
Total Aroclors (direct contact, in-water sediment)	Total Aroclors (direct contact, in-water sediment)
Total Aroclors (direct contact, recreational/transient beach sediment)	Total Aroclors (direct contact, recreational/transient beach sediment)
BAPEQ	Total BaPEq
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total Chlordane (calc'd)	Total Chlordane (calc'd)
TOTCHLDANE	Total Chlordanes
Total Chlordanes (direct contact, in-water sediment)	Total Chlordanes (direct contact, in-water sediment)
Total Chlordanes (direct contact, recreational/transient beach sediment)	Total Chlordanes (direct contact, recreational/transient beach sediment)
Total cPAH PEQ (direct contact, industrial beach sediment)	Total cPAH PEQ (direct contact, industrial beach sediment)
Total cPAH PEQ (direct contact, in-water sediment)	Total cPAH PEQ (direct contact, in-water sediment)
Total cPAH PEQ (direct contact, recreational/transient beach sediment)	Total cPAH PEQ (direct contact, recreational/transient beach sediment)
CPAH	Total cPAHs
Total cPAHs (calc'd)	Total cPAHs (calc'd)
Total DDD (direct contact, industrial beach sediment)	Total DDD (direct contact, industrial beach sediment)
Total DDD (direct contact, in-water sediment)	Total DDD (direct contact, in-water sediment)
Total DDD (direct contact, recreational/transient beach sediment)	Total DDD (direct contact, recreational/transient beach sediment)
Total DDE (direct contact, in-water sediment)	Total DDE (direct contact, in-water sediment)
Total DDE (direct contact, recreational/transient beach sediment)	Total DDE (direct contact, recreational/transient beach sediment)
Total DDT (direct contact, industrial beach sediment)	Total DDT (direct contact, industrial beach sediment)
Total DDT (direct contact, in-water sediment)	Total DDT (direct contact, in-water sediment)
Total DDT (direct contact, recreational/transient beach sediment)	Total DDT (direct contact, recreational/transient beach sediment)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total Diesel-Residual Hydrocarbons (calc'd)	Total Diesel-Residual Hydrocarbons (calc'd)
Total Dioxin/Furan TEQ (direct contact, industrial beach sediment)	Total Dioxin/Furan TEQ (direct contact, industrial beach sediment)
Total Dioxin/Furan TEQ (direct contact, in-water sediment)	Total Dioxin/Furan TEQ (direct contact, in-water sediment)
Total Dioxin/Furan TEQ (direct contact, recreational/transient beach sediment)	Total Dioxin/Furan TEQ (direct contact, recreational/transient beach sediment)
TOTENDOSLFN	Total Endosulfan
Total Endosulfan (calc'd)	Total Endosulfan (calc'd)
Total Endosulfan (direct contact, in-water sediment)	Total Endosulfan (direct contact, in-water sediment)
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
E17075011	Total of 2,4' and 4,4'-DDD
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E17075029	Total of 2,4' and 4,4'-DDE
E17075037	Total of 2,4' and 4,4'-DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
TOC	Total organic carbon
130498-29-2	Total PAHs
Total PAHs (calc'd)	Total PAHs (calc'd)
1336-36-3	Total PCB Congeners
Total PCB Congeners (calc'd)	Total PCB Congeners (calc'd)
Total PCB Congeners (direct contact, in-water sediment)	Total PCB Congeners (direct contact, in-water sediment)
Total PCB TEQ (direct contact, industrial beach sediment)	Total PCB TEQ (direct contact, industrial beach sediment)
Total PCB TEQ (direct contact, in-water sediment)	Total PCB TEQ (direct contact, in-water sediment)
TOTPCBS	Total PCBs
Total PCBs (calc'd)	Total PCBs (calc'd)
Total PCBs Aroclors (calc'd)	Total PCBs Aroclors (calc'd)

Table 1
Sediment Analyte List

CAS Number	Analyte
TOTPCDD_F	Total PCDD/F
TPH	Total Petroleum Hydrocarbons
Total Petroleum Hydrocarbons (calc'd)	Total Petroleum Hydrocarbons (calc'd)
TPH (SGT)	Total Petroleum Hydrocarbons (silica gel treated)
TSO	Total solids
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
Total TEQ - Birds	Total TEQ - Birds
Total TEQ - Fish	Total TEQ - Fish
Total TEQ - Mammals	Total TEQ - Mammals
Total Toxic Dioxin Furans (calc'd)	Total Toxic Dioxin Furans (calc'd)
TVS	Total volatile solids
Total Xylenes (calc'd)	Total Xylenes (calc'd)
Total Xylenes (direct contact, in-water sediment)	Total Xylenes (direct contact, in-water sediment)
8001-35-2	Toxaphene
156-60-5	trans-1,2-Dichloroethene
5103-74-2	trans-Chlordane
39765-80-5	trans-Nonachlor
688-73-3	Tributyltin
1461-22-9	Tributyltin chloride
36643-28-4	Tributyltin ion
25323-68-6	Trichlorobiphenyl homologs
79-01-6	Trichloroethene
7440-62-2	Vanadium
GS_VCS	Very coarse sand
GS_VFS	Very fine sand
GS_VFSILT	Very fine silt
75-01-4	Vinyl chloride
1330-20-7	Xylene
7440-66-6	Zinc

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
GS_<0.075	< 0.075 mm
GS_MFCLAY	>9 Phi clay
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
120-82-1	1,2,4-Trichlorobenzene
106-46-7	1,4-Dichlorobenzene
2245-38-7	1,6,7-Trimethylnaphthalene
90-12-0	1-Methylnaphthalene
832-69-9	1-Methylphenanthrene
4901-51-3	2,3,4,5-Tetrachlorophenol
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
935-95-5	2,3,5,6-Tetrachlorophenol
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
94-75-7	2,4-D
94-82-6	2,4-DB
53-19-0	2,4'-DDD
3424-82-6	2,4'-DDE
789-02-6	2,4'-DDT
581-42-0	2,6-Dimethylnaphthalene
91-57-6	2-Methylnaphthalene
95-48-7	2-Methylphenol
72-54-8	4,4'-DDD
72-55-9	4,4'-DDE
50-29-3	4,4'-DDT
106-44-5	4-Methylphenol
GS_CCLAY	8-9 Phi clay
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
67-64-1	Acetone
309-00-2	Aldrin
959-98-8	alpha-Endosulfan
7429-90-5	Aluminum
62-53-3	Aniline
120-12-7	Anthracene

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
7440-36-0	Antimony
11104-28-2	Aroclor 1221
53469-21-9	Aroclor 1242
12672-29-6	Aroclor 1248
11097-69-1	Aroclor 1254
11096-82-5	Aroclor 1260
12767-79-2	Aroclors
7440-38-2	Arsenic
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
BKBFLANTH	Benzo(b+k)fluoranthene
192-97-2	Benzo(e)pyrene
191-24-2	Benzo(g,h,i)perylene
207-08-9	Benzo(k)fluoranthene
65-85-0	Benzoic acid
100-51-6	Benzyl alcohol
33213-65-9	beta-Endosulfan
319-85-7	beta-Hexachlorocyclohexane
117-81-7	Bis(2-ethylhexyl) phthalate
BTEX	BTEX
85-68-7	Butylbenzyl phthalate
78763-54-9	Butyltin ion
C1_218-01-9	C1-Chrysene
C1_132-65-0	C1-Dibenzothiophene
C1_FLRANPYRN	C1-Fluoranthene/pyrene
C1_86-73-7	C1-Fluorene
C1_PHANANTH	C1-Phenanthrene/anthracene
C2_218-01-9	C2-Chrysene
C2_132-65-0	C2-Dibenzothiophene
C2_FLRANPYRN	C2-Fluoranthene/pyrene
C2_86-73-7	C2-Fluorene
C2_91-20-3	C2-Naphthalene
C2_PHANANTH	C2-Phenanthrene/anthracene
C3_218-01-9	C3-Chrysene
C3_132-65-0	C3-Dibenzothiophene
C3_FLRANPYRN	C3-Fluoranthene/pyrene
C3_86-73-7	C3-Fluorene
C3_91-20-3	C3-Naphthalene
C3_PHANANTH	C3-Phenanthrene/anthracene
C4_218-01-9	C4-Chrysene
C4_91-20-3	C4-Naphthalene
C4_PHANANTH	C4-Phenanthrene/anthracene
7440-43-9	Cadmium
86-74-8	Carbazole

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
108-90-7	Chlorobenzene
7440-47-3	Chromium
18540-29-9	Chromium hexavalent
218-01-9	Chrysene
5103-71-9	cis-Chlordane
5103-73-1	cis-Nonachlor
GS_CLAY	Clay
GS_CS	Coarse sand
GS_CSILT	Coarse silt
7440-50-8	Copper
319-86-8	delta-Hexachlorocyclohexane
53-70-3	Dibenzo(a,h)anthracene
132-64-9	Dibenzofuran
132-65-0	Dibenzothiophene
84-74-2	Dibutyl phthalate
14488-53-0	Dibutyltin ion
25512-42-9	Dichlorobiphenyl homologs
60-57-1	Dieldrin
DRH	Diesel Range Hydrocarbons
DRH (SGT)	Diesel Range Hydrocarbons (silica gel treated)
84-66-2	Diethyl phthalate
131-11-3	Dimethyl phthalate
117-84-0	Di-n-octyl phthalate
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
92-52-4	Diphenyl
1031-07-8	Endosulfan sulfate
72-20-8	Endrin
7421-93-4	Endrin aldehyde
100-41-4	Ethylbenzene
GS_FG	Fine gravel
GS_FS	Fine sand
GS_FSILT	Fine silt
GS_FINES	Fines
206-44-0	Fluoranthene
86-73-7	Fluorene
58-89-9	gamma-Hexachlorocyclohexane
GRH	Gasoline Range Hydrocarbons
76-44-8	Heptachlor
1024-57-3	Heptachlor epoxide
28655-71-2	Heptachlorobiphenyl homologs
38998-75-3	Heptachlorodibenzofuran homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
118-74-1	Hexachlorobenzene
26601-64-9	Hexachlorobiphenyl homologs

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
87-68-3	Hexachlorobutadiene
55684-94-1	Hexachlorodibenzofuran homologs
34465-46-8	Hexachlorodibenzo-p-dioxin homologs
67-72-1	Hexachloroethane
HPAH	High Molecular Weight PAH
193-39-5	Indeno(1,2,3-cd)pyrene
78-59-1	Isophorone
7439-92-1	Lead
LPAH	Low Molecular Weight PAH
179601-23-1	m,p-Xylene
GS_MG	Medium gravel
GS_MS	Medium sand
GS_MSILT	Medium silt
7439-97-6	Mercury
72-43-5	Methoxychlor
74-88-4	Methyl iodide
78-93-3	Methylethyl ketone
2385-85-5	Mirex
27323-18-8	Monochlorobiphenyl homologs
91-20-3	Naphthalene
7440-02-0	Nickel
53742-07-7	Nonachlorobiphenyl homologs
55722-26-4	Octachlorobiphenyl homologs
39001-02-0	Octachlorodibenzofuran
3268-87-9	Octachlorodibenzo-p-dioxin
27304-13-8	Oxychlordane
2051-60-7	PCB001
2051-61-8	PCB002
2051-62-9	PCB003
13029-08-8	PCB004
PCB004_010	PCB004 & 010
PCB005_008	PCB005 & 008
25569-80-6	PCB006
33284-50-3	PCB007
PCB007_009	PCB007 & 009
34883-43-7	PCB008
33146-45-1	PCB010
2050-67-1	PCB011
PCB012_013	PCB012 & 013
2050-68-2	PCB015
38444-78-9	PCB016
PCB016_032	PCB016 & 032
37680-66-3	PCB017
37680-65-2	PCB018
PCB018_030	PCB018 & 030

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
38444-73-4	PCB019
PCB020_021_033	PCB020 & 021 & 033
PCB020_028	PCB020 & 028
38444-85-8	PCB022
55720-44-0	PCB023
PCB024_027	PCB024 & 027
55712-37-3	PCB025
38444-81-4	PCB026
PCB026_029	PCB026 & 029
38444-76-7	PCB027
7012-37-5	PCB028
15862-07-4	PCB029
35693-92-6	PCB030
16606-02-3	PCB031
38444-77-8	PCB032
37680-68-5	PCB034
37680-69-6	PCB035
38444-90-5	PCB037
53555-66-1	PCB038
38444-93-8	PCB040
PCB040_041_071	PCB040 & 041 & 071
PCB041_064_071_	PCB041 & 064 & 071 & 072
36559-22-5	PCB042
PCB042_059	PCB042 & 059
PCB043_049	PCB043 & 049
PCB043_073	PCB043 & 073
41464-39-5	PCB044
PCB044_047_065	PCB044 & 047 & 065
70362-45-7	PCB045
PCB045_051	PCB045 & 051
41464-47-5	PCB046
2437-79-8	PCB047
70362-47-9	PCB048
PCB048_075	PCB048 & 075
PCB049_069	PCB049 & 069
62796-65-0	PCB050
PCB050_053	PCB050 & 053
68194-04-7	PCB051
35693-99-3	PCB052
PCB052_069	PCB052 & 069
41464-41-9	PCB053
15968-05-5	PCB054
74338-24-2	PCB055
41464-43-1	PCB056
PCB056_060	PCB056 & 060

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
70424-67-8	PCB057
41464-49-7	PCB058
PCB059_062_075	PCB059 & 062 & 075
33025-41-1	PCB060
PCB061_070	PCB061 & 070
PCB061_070_074_	PCB061 & 070 & 074 & 076
74472-34-7	PCB063
52663-58-8	PCB064
32598-10-0	PCB066
PCB066_076	PCB066 & 076
73575-53-8	PCB067
73575-52-7	PCB068
41464-42-0	PCB072
74338-23-1	PCB073
32690-93-0	PCB074
32598-13-3	PCB077
70362-49-1	PCB078
41464-48-6	PCB079
70362-50-4	PCB081
52663-62-4	PCB082
PCB083_099	PCB083 & 099
52663-60-2	PCB084
PCB084_092	PCB084 & 092
PCB085_116	PCB085 & 116
55312-69-1	PCB086
PCB086_087_109_	PCB086 & 087 & 097 & 109 & 119 & 125
PCB087_117_125	PCB087 & 117 & 125
PCB088_091	PCB088 & 091
73575-57-2	PCB089
PCB090_101	PCB090 & 101
PCB090_101_113	PCB090 & 101 & 113
52663-61-3	PCB092
73575-56-1	PCB093
PCB093_100	PCB093 & 100
73575-55-0	PCB094
38379-99-6	PCB095
PCB095_098_102	PCB095 & 098 & 102
73575-54-9	PCB096
41464-51-1	PCB097
PCB098_102	PCB098 & 102
38380-01-7	PCB099
39485-83-1	PCB100
60145-21-3	PCB103
56558-16-8	PCB104
32598-14-4	PCB105

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
PCB106_118	PCB106 & 118
70424-68-9	PCB107
PCB107_109	PCB107 & 109
PCB108_112	PCB108 & 112
PCB108_124	PCB108 & 124
38380-03-9	PCB110
PCB110_115	PCB110 & 115
39635-32-0	PCB111
PCB111_115	PCB111 & 115
68194-10-5	PCB113
74472-37-0	PCB114
68194-11-6	PCB117
31508-00-6	PCB118
56558-17-9	PCB119
68194-12-7	PCB120
56558-18-0	PCB121
76842-07-4	PCB122
65510-44-3	PCB123
70424-70-3	PCB124
57465-28-8	PCB126
PCB128_162	PCB128 & 162
PCB128_166	PCB128 & 166
55215-18-4	PCB129
PCB129_138_163	PCB129 & 138 & 163
52663-66-8	PCB130
61798-70-7	PCB131
38380-05-1	PCB132
PCB132_161	PCB132 & 161
35694-04-3	PCB133
PCB133_142	PCB133 & 142
52704-70-8	PCB134
PCB134_143	PCB134 & 143
52744-13-5	PCB135
PCB135_151	PCB135 & 151
38411-22-2	PCB136
35694-06-5	PCB137
PCB138_163_164	PCB138 & 163 & 164
PCB139_140	PCB139 & 140
PCB139_149	PCB139 & 149
59291-64-4	PCB140
52712-04-6	PCB141
68194-14-9	PCB144
74472-40-5	PCB145
51908-16-8	PCB146
PCB146_165	PCB146 & 165

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
68194-13-8	PCB147
PCB147_149	PCB147 & 149
74472-41-6	PCB148
68194-08-1	PCB150
52663-63-5	PCB151
68194-09-2	PCB152
35065-27-1	PCB153
PCB153_168	PCB153 & 168
60145-22-4	PCB154
33979-03-2	PCB155
38380-08-4	PCB156
PCB156_157	PCB156 & 157
69782-90-7	PCB157
74472-42-7	PCB158
PCB158_160	PCB158 & 160
39635-35-3	PCB159
39635-34-2	PCB162
74472-45-0	PCB164
74472-46-1	PCB165
41411-63-6	PCB166
52663-72-6	PCB167
59291-65-5	PCB168
32774-16-6	PCB169
35065-30-6	PCB170
52663-71-5	PCB171
PCB171_173	PCB171 & 173
52663-74-8	PCB172
68194-16-1	PCB173
38411-25-5	PCB174
40186-70-7	PCB175
52663-65-7	PCB176
52663-70-4	PCB177
52663-67-9	PCB178
52663-64-6	PCB179
35065-29-3	PCB180
PCB180_193	PCB180 & 193
74472-47-2	PCB181
60145-23-5	PCB182
PCB182_187	PCB182 & 187
52663-69-1	PCB183
74472-48-3	PCB184
52712-05-7	PCB185
52663-68-0	PCB187
74487-85-7	PCB188
39635-31-9	PCB189

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
41411-64-7	PCB190
74472-50-7	PCB191
74472-51-8	PCB192
69782-91-8	PCB193
35694-08-7	PCB194
52663-78-2	PCB195
42740-50-1	PCB196
PCB196_203	PCB196 & 203
33091-17-7	PCB197
68194-17-2	PCB198
PCB198_199	PCB198 & 199
52663-75-9	PCB199
52663-73-7	PCB200
40186-71-8	PCB201
2136-99-4	PCB202
52663-76-0	PCB203
74472-52-9	PCB204
74472-53-0	PCB205
40186-72-9	PCB206
52663-79-3	PCB207
52663-77-1	PCB208
2051-24-3	PCB209
25429-29-2	Pentachlorobiphenyl homologs
30402-15-4	Pentachlorodibenzofuran homologs
36088-22-9	Pentachlorodibenzo-p-dioxin homologs
87-86-5	Pentachlorophenol
198-55-0	Perylene
85-01-8	Phenanthrene
108-95-2	Phenol
129-00-0	Pyrene
RRH	Residual Range Hydrocarbons
RRH (SGT)	Residual Range Hydrocarbons (silica gel treated)
7782-49-2	Selenium
GS_SIEVE140	Sieve 140
GS_SIEVE020	Sieve 20
GS_SIEVE200	Sieve 200
GS_SIEVE040	Sieve 40
GS_SIEVE060	Sieve 60
GS_SILT	Silt
7440-22-4	Silver
93-72-1	Silvex
SPEC_GRAV	Specific Gravity
18496-25-8	Sulfide
26914-33-0	Tetrachlorobiphenyl homologs
30402-14-3	Tetrachlorodibenzofuran homologs

Table 2
Sediment Trap Analyte List

CAS Number	Analyte
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs
108-88-3	Toluene
BAPEQ	Total BaPEq
TOTCHLDANE	Total Chlordanes
CPAH	Total cPAHs
TOTENDOSLFN	Total Endosulfan
E17075011	Total of 2,4' and 4,4'-DDD
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E17075029	Total of 2,4' and 4,4'-DDE
E17075037	Total of 2,4' and 4,4'-DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
TOC	Total organic carbon
130498-29-2	Total PAHs
1336-36-3	Total PCB Congeners
TOTPCBS	Total PCBs
TOTPCDD_F	Total PCDD/F
TPH	Total Petroleum Hydrocarbons
TPH (SGT)	Total Petroleum Hydrocarbons (silica gel treated)
TSO	Total solids
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
5103-74-2	trans-Chlordane
39765-80-5	trans-Nonachlor
36643-28-4	Tributyltin ion
25323-68-6	Trichlorobiphenyl homologs
GS_VCS	Very coarse sand
GS_VFS	Very fine sand
GS_VFSILT	Very fine silt
1330-20-7	Xylene
7440-66-6	Zinc

Table 3
Riverbank Soil Analyte List

CAS Number	Analyte
108-67-8	1,3,5-Trimethylbenzene
7440-36-0	Antimony
12672-29-6	Aroclor 1248
11097-69-1	Aroclor 1254
11096-82-5	Aroclor 1260
12767-79-2	Aroclors
7440-38-2	Arsenic
7440-39-3	Barium
7440-41-7	Beryllium
BTEX	BTEX
7440-43-9	Cadmium
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
57-12-5	Cyanide
DRH	Diesel Range Hydrocarbons
HORH	Heavy Oil Range Hydrocarbons
7439-89-6	Iron
7439-92-1	Lead
7439-96-5	Manganese
7439-97-6	Mercury
M09800000	Motor oil
7440-02-0	Nickel
7782-49-2	Selenium
7440-22-4	Silver
7440-32-6	Titanium
TOTPCBS	Total PCBs
TPH	Total Petroleum Hydrocarbons
TSO	Total solids
688-73-3	Tributyltin
7440-62-2	Vanadium
1330-20-7	Xylene
7440-66-6	Zinc

Table 4
Transition Zone Water Analyte List

CAS Number	Analyte
71-55-6	1,1,1-Trichloroethane
79-34-5	1,1,2,2-Tetrachloroethane
79-00-5	1,1,2-Trichloroethane
75-34-3	1,1-Dichloroethane
75-35-4	1,1-Dichloroethene
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
96-18-4	1,2,3-Trichloropropane
120-82-1	1,2,4-Trichlorobenzene
95-63-6	1,2,4-Trimethylbenzene
95-50-1	1,2-Dichlorobenzene
107-06-2	1,2-Dichloroethane
78-87-5	1,2-Dichloropropane
108-67-8	1,3,5-Trimethylbenzene
541-73-1	1,3-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
99-87-6	1-Methyl-4-isopropylbenzene
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
94-75-7	2,4-D
53-19-0	2,4'-DDD
789-02-6	2,4'-DDT
105-67-9	2,4-Dimethylphenol
91-57-6	2-Methylnaphthalene
95-48-7	2-Methylphenol
72-54-8	4,4'-DDD
72-55-9	4,4'-DDE
50-29-3	4,4'-DDT
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
67-64-1	Acetone
107-02-8	Acrolein
ALK	Alkalinity
7429-90-5	Aluminum
120-12-7	Anthracene
7440-36-0	Antimony
7440-38-2	Arsenic
7440-39-3	Barium
71-43-2	Benzene
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene

Table 4
Transition Zone Water Analyte List

CAS Number	Analyte
191-24-2	Benzo(g,h,i)perylene
207-08-9	Benzo(k)fluoranthene
7440-41-7	Beryllium
117-81-7	Bis(2-ethylhexyl) phthalate
74-97-5	Bromochloromethane
75-27-4	Bromodichloromethane
BTEX	BTEX
7440-43-9	Cadmium
7440-70-2	Calcium
471-34-1	Calcium carbonate
86-74-8	Carbazole
124-38-9	Carbon dioxide
75-15-0	Carbon disulfide
16887-00-6	Chloride
108-90-7	Chlorobenzene
75-00-3	Chloroethane
67-66-3	Chloroform
74-87-3	Chloromethane
7440-47-3	Chromium
218-01-9	Chrysene
156-59-2	cis-1,2-Dichloroethene
7440-48-4	Cobalt
E1640291	Conductivity
7440-50-8	Copper
57-12-5	Cyanide
57-12-5A	Cyanide amenable to chlorination
75-99-0	Dalapon
53-70-3	Dibenzo(a,h)anthracene
132-64-9	Dibenzofuran
84-74-2	Dibutyl phthalate
120-36-5	Dichloroprop
DRH	Diesel Range Hydrocarbons
131-11-3	Dimethyl phthalate
Dioxin TEQ - Birds	Dioxin TEQ - Birds
Dioxin TEQ - Fish	Dioxin TEQ - Fish
Dioxin TEQ - Mammals	Dioxin TEQ - Mammals
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
DOC	Dissolved organic carbon
DO	Dissolved oxygen
74-84-0	Ethane
100-41-4	Ethylbenzene
74-85-1	Ethylene
206-44-0	Fluoranthene
86-73-7	Fluorene
GRH_Aliph_C10-12_calc'd	Gasoline fraction (aliphatic): C10-C12 (calc'd)

Table 4
Transition Zone Water Analyte List

CAS Number	Analyte
GRH_Aliph_C4-C6_calc'd	Gasoline fraction (aliphatic): C4-C6 (calc'd)
GRH_Aliph_C6-C8_calc'd	Gasoline fraction (aliphatic): C6-C8 (calc'd)
GRH_Aliph_C8-C10_calc'd	Gasoline fraction (aliphatic): C8-C10 (calc'd)
GRH_Aro_Benzene_calc'd	Gasoline fraction (aromatic): Benzene (calc'd)
GRH_Aro_C10-C12_calc'd	Gasoline fraction (aromatic): C10-C12 (calc'd)
GRH_Aro_C8-C10_calc'd	Gasoline fraction (aromatic): C8-C10 (calc'd)
GRH_Aro_Toluene_calc'd	Gasoline fraction (aromatic): Toluene (calc'd)
GRH	Gasoline Range Hydrocarbons
38998-75-3	Heptachlorodibenzofuran homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
55684-94-1	Hexachlorodibenzofuran homologs
34465-46-8	Hexachlorodibenzo-p-dioxin homologs
HPAH	High Molecular Weight PAH
193-39-5	Indeno(1,2,3-cd)pyrene
7439-89-6	Iron
98-82-8	Isopropylbenzene
7439-92-1	Lead
LPAH	Low Molecular Weight PAH
68782-97-8	Lube Oil
179601-23-1	m,p-Xylene
7439-95-4	Magnesium
7439-96-5	Manganese
7439-97-6	Mercury
74-82-8	Methane
108-10-1	Methyl isobutyl ketone
591-78-6	Methyl n-butyl ketone
1634-04-4	Methyl tert-butyl ether
74-95-3	Methylene bromide
75-09-2	Methylene chloride
78-93-3	Methylethyl ketone
91-20-3	Naphthalene
104-51-8	n-Butylbenzene
7440-02-0	Nickel
14797-55-8	Nitrate
14797-65-0	Nitrite
103-65-1	n-Propylbenzene
ORP	Oxidation-Reduction Potential
95-47-6	o-Xylene
30402-15-4	Pentachlorodibenzofuran homologs
14797-73-0	Perchlorate
12408-02-5	pH
85-01-8	Phenanthrene
108-95-2	Phenol
7723-14-0	Phosphorus
7440-09-7	Potassium

Table 4
Transition Zone Water Analyte List

CAS Number	Analyte
129-00-0	Pyrene
RRH	Residual Range Hydrocarbons
135-98-8	Sec-butylbenzene
7782-49-2	Selenium
7440-22-4	Silver
93-72-1	Silvex
7440-23-5	Sodium
100-42-5	Styrene
14808-79-8	Sulfate
18496-25-8	Sulfide
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
TEMP	Temperature
98-06-6	tert-Butylbenzene
30402-14-3	Tetrachlorodibenzofuran homologs
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs
127-18-4	Tetrachloroethene
7440-28-0	Thallium
7440-32-6	Titanium
108-88-3	Toluene
BAPEQ	Total BaPEq
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total cPAH PEQ (shallow TZW screening)	Total cPAH PEQ (shallow TZW screening)
CPAH	Total cPAHs
Total cPAHs (calc'd)	Total cPAHs (calc'd)
Total DDD (shallow TZW screening)	Total DDD (shallow TZW screening)
Total DDE (shallow TZW screening)	Total DDE (shallow TZW screening)
Total DDT (shallow TZW screening)	Total DDT (shallow TZW screening)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total Diesel-Residual Hydrocarbons (calc'd)	Total Diesel-Residual Hydrocarbons (calc'd)
Total Dioxin/Furan TEQ (shallow TZW screening)	Total Dioxin/Furan TEQ (shallow TZW screening)
TDS	Total dissolved solids
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
E17075011	Total of 2,4' and 4,4'-DDD
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E17075029	Total of 2,4' and 4,4'-DDE
E17075037	Total of 2,4' and 4,4'-DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
TOC	Total organic carbon
130498-29-2	Total PAHs
Total PAHs (calc'd)	Total PAHs (calc'd)
TOTPCDD_F	Total PCDD/F
TPH	Total Petroleum Hydrocarbons

Table 4
Transition Zone Water Analyte List

CAS Number	Analyte
Total Petroleum Hydrocarbons (calc'd)	Total Petroleum Hydrocarbons (calc'd)
TSS	Total suspended solids
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
Total Toxic Dioxin Furans (calc'd)	Total Toxic Dioxin Furans (calc'd)
Total Xylenes (calc'd)	Total Xylenes (calc'd)
Total Xylenes (shallow TZW screening)	Total Xylenes (shallow TZW screening)
156-60-5	trans-1,2-Dichloroethene
79-01-6	Trichloroethene
TURBID	Turbidity
7440-62-2	Vanadium
108-05-4	Vinyl acetate
75-01-4	Vinyl chloride
1330-20-7	Xylene
7440-66-6	Zinc

Table 5
Stormwater Analyte List

CAS Number	Analyte
95-50-1	1,2-Dichlorobenzene
106-46-7	1,4-Dichlorobenzene
90-12-0	1-Methylnaphthalene
93-76-5	2,4,5-T
94-75-7	2,4-D
94-82-6	2,4-DB
53-19-0	2,4'-DDD
3424-82-6	2,4'-DDE
789-02-6	2,4'-DDT
120-83-2	2,4-Dichlorophenol
105-67-9	2,4-Dimethylphenol
91-57-6	2-Methylnaphthalene
95-48-7	2-Methylphenol
C_3+4MPHN	3- and 4-Methylphenol Coelution
72-54-8	4,4'-DDD
72-55-9	4,4'-DDE
50-29-3	4,4'-DDT
106-44-5	4-Methylphenol
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
67-64-1	Acetone
309-00-2	Aldrin
ALK	Alkalinity
959-98-8	alpha-Endosulfan
319-84-6	alpha-Hexachlorocyclohexane
7429-90-5	Aluminum
120-12-7	Anthracene
7440-36-0	Antimony
12674-11-2	Aroclor 1016
53469-21-9	Aroclor 1242
11097-69-1	Aroclor 1254
11096-82-5	Aroclor 1260
11100-14-4	Aroclor 1268
12767-79-2	Aroclors
7440-38-2	Arsenic
7440-39-3	Barium
71-43-2	Benzene
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
191-24-2	Benzo(g,h,i)perylene
207-08-9	Benzo(k)fluoranthene
56832-73-6	Benzofluoranthenes
65-85-0	Benzoic acid
7440-41-7	Beryllium
33213-65-9	beta-Endosulfan
319-85-7	beta-Hexachlorocyclohexane
117-81-7	Bis(2-ethylhexyl) phthalate
BTEX	BTEX

Table 5
Stormwater Analyte List

CAS Number	Analyte
85-68-7	Butylbenzyl phthalate
7440-43-9	Cadmium
7440-70-2	Calcium
86-74-8	Carbazole
16887-00-6	Chloride
108-90-7	Chlorobenzene
67-66-3	Chloroform
7440-47-3	Chromium
18540-29-9	Chromium hexavalent
218-01-9	Chrysene
5103-71-9	cis-Chlordane
5103-73-1	cis-Nonachlor
E1640291	Conductivity
7440-50-8	Copper
75-99-0	Dalapon
319-86-8	delta-Hexachlorocyclohexane
53-70-3	Dibenzo(a,h)anthracene
132-64-9	Dibenzofuran
84-74-2	Dibutyl phthalate
1918-00-9	Dicamba
25512-42-9	Dichlorobiphenyl homologs
120-36-5	Dichloroprop
60-57-1	Dieldrin
DRH	Diesel Range Hydrocarbons
84-66-2	Diethyl phthalate
131-11-3	Dimethyl phthalate
117-84-0	Di-n-octyl phthalate
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
DOC	Dissolved organic carbon
1031-07-8	Endosulfan sulfate
72-20-8	Endrin
7421-93-4	Endrin aldehyde
53494-70-5	Endrin ketone
100-41-4	Ethylbenzene
E1643212	Flow
206-44-0	Fluoranthene
86-73-7	Fluorene
58-89-9	gamma-Hexachlorocyclohexane
GRH	Gasoline Range Hydrocarbons
HARD	Hardness as CaCO3
HORH	Heavy Oil Range Hydrocarbons
76-44-8	Heptachlor
1024-57-3	Heptachlor epoxide
28655-71-2	Heptachlorobiphenyl homologs
118-74-1	Hexachlorobenzene
26601-64-9	Hexachlorobiphenyl homologs
87-68-3	Hexachlorobutadiene
67-72-1	Hexachloroethane

Table 5
Stormwater Analyte List

CAS Number	Analyte
HPAH	High Molecular Weight PAH
193-39-5	Indeno(1,2,3-cd)pyrene
7439-89-6	Iron
78-59-1	Isophorone
98-82-8	Isopropylbenzene
7439-92-1	Lead
LPAH	Low Molecular Weight PAH
7439-95-4	Magnesium
7439-96-5	Manganese
93-65-2	MCPP
7439-97-6	Mercury
72-43-5	Methoxychlor
75-09-2	Methylene chloride
2385-85-5	Mirex
27323-18-8	Monochlorobiphenyl homologs
91-20-3	Naphthalene
7440-02-0	Nickel
14797-55-8	Nitrate
53742-07-7	Nonachlorobiphenyl homologs
55722-26-4	Octachlorobiphenyl homologs
3268-87-9	Octachlorodibenzo-p-dioxin
OILGREASE	Oil And Grease
27304-13-8	Oxychlordane
2051-60-7	PCB001
2051-61-8	PCB002
2051-62-9	PCB003
13029-08-8	PCB004
PCB004_010	PCB004 & 010
PCB005_008	PCB005 & 008
25569-80-6	PCB006
PCB007_009	PCB007 & 009
34883-43-7	PCB008
2050-67-1	PCB011
PCB012_013	PCB012 & 013
34883-41-5	PCB014
2050-68-2	PCB015
38444-78-9	PCB016
PCB016_032	PCB016 & 032
37680-66-3	PCB017
37680-65-2	PCB018
PCB018_030	PCB018 & 030
38444-73-4	PCB019
PCB020_021_033	PCB020 & 021 & 033
PCB020_028	PCB020 & 028
PCB021_033	PCB021 & 033
38444-85-8	PCB022
55720-44-0	PCB023
PCB024_027	PCB024 & 027
55712-37-3	PCB025

Table 5
Stormwater Analyte List

CAS Number	Analyte
38444-81-4	PCB026
PCB026_029	PCB026 & 029
38444-76-7	PCB027
7012-37-5	PCB028
15862-07-4	PCB029
35693-92-6	PCB030
16606-02-3	PCB031
38444-77-8	PCB032
37680-68-5	PCB034
37680-69-6	PCB035
38444-87-0	PCB036
38444-90-5	PCB037
53555-66-1	PCB038
38444-88-1	PCB039
38444-93-8	PCB040
PCB040_041_071	PCB040 & 041 & 071
PCB041_064_071_	PCB041 & 064 & 071 & 072
36559-22-5	PCB042
PCB042_059	PCB042 & 059
70362-46-8	PCB043
PCB043_049	PCB043 & 049
41464-39-5	PCB044
PCB044_047_065	PCB044 & 047 & 065
70362-45-7	PCB045
PCB045_051	PCB045 & 051
41464-47-5	PCB046
2437-79-8	PCB047
70362-47-9	PCB048
PCB048_075	PCB048 & 075
PCB049_069	PCB049 & 069
62796-65-0	PCB050
PCB050_053	PCB050 & 053
68194-04-7	PCB051
35693-99-3	PCB052
PCB052_069	PCB052 & 069
41464-41-9	PCB053
15968-05-5	PCB054
74338-24-2	PCB055
41464-43-1	PCB056
PCB056_060	PCB056 & 060
70424-67-8	PCB057
41464-49-7	PCB058
PCB059_062_075	PCB059 & 062 & 075
33025-41-1	PCB060
PCB061_070	PCB061 & 070
PCB061_070_074_	PCB061 & 070 & 074 & 076
54230-22-7	PCB062
74472-34-7	PCB063
52663-58-8	PCB064

Table 5
Stormwater Analyte List

CAS Number	Analyte
33284-54-7	PCB065
32598-10-0	PCB066
PCB066_076	PCB066 & 076
73575-53-8	PCB067
73575-52-7	PCB068
74338-23-1	PCB073
32690-93-0	PCB074
32598-13-3	PCB077
70362-49-1	PCB078
41464-48-6	PCB079
70362-50-4	PCB081
52663-62-4	PCB082
60145-20-2	PCB083
PCB083_099	PCB083 & 099
52663-60-2	PCB084
PCB084_092	PCB084 & 092
PCB085_116	PCB085 & 116
PCB085_116_117	PCB085 & 116 & 117
55312-69-1	PCB086
PCB086_087_097_	PCB086 & 087 & 097 & 108 & 119 & 125
PCB087_117_125	PCB087 & 117 & 125
PCB088_091	PCB088 & 091
73575-57-2	PCB089
PCB090_101	PCB090 & 101
PCB090_101_113	PCB090 & 101 & 113
52663-61-3	PCB092
PCB093_095_098_	PCB093 & 095 & 098 & 100 & 102
73575-55-0	PCB094
PCB095_098_102	PCB095 & 098 & 102
73575-54-9	PCB096
41464-51-1	PCB097
38380-01-7	PCB099
39485-83-1	PCB100
60145-21-3	PCB103
32598-14-4	PCB105
PCB106_118	PCB106 & 118
PCB107_109	PCB107 & 109
PCB107_124	PCB107 & 124
PCB108_112	PCB108 & 112
74472-35-8	PCB109
38380-03-9	PCB110
PCB110_115	PCB110 & 115
PCB111_115	PCB111 & 115
68194-10-5	PCB113
74472-37-0	PCB114
31508-00-6	PCB118
56558-17-9	PCB119
68194-12-7	PCB120
76842-07-4	PCB122

Table 5
Stormwater Analyte List

CAS Number	Analyte
65510-44-3	PCB123
70424-70-3	PCB124
57465-28-8	PCB126
39635-33-1	PCB127
PCB128_162	PCB128 & 162
PCB128_166	PCB128 & 166
55215-18-4	PCB129
PCB129_138_160_	PCB129 & 138 & 160 & 163
52663-66-8	PCB130
61798-70-7	PCB131
38380-05-1	PCB132
PCB132_161	PCB132 & 161
35694-04-3	PCB133
PCB133_142	PCB133 & 142
PCB134_143	PCB134 & 143
52744-13-5	PCB135
PCB135_151_154	PCB135 & 151 & 154
38411-22-2	PCB136
35694-06-5	PCB137
PCB138_163_164	PCB138 & 163 & 164
PCB139_140	PCB139 & 140
PCB139_149	PCB139 & 149
59291-64-4	PCB140
52712-04-6	PCB141
68194-14-9	PCB144
74472-40-5	PCB145
51908-16-8	PCB146
PCB146_165	PCB146 & 165
68194-13-8	PCB147
PCB147_149	PCB147 & 149
74472-41-6	PCB148
68194-08-1	PCB150
52663-63-5	PCB151
68194-09-2	PCB152
35065-27-1	PCB153
PCB153_168	PCB153 & 168
60145-22-4	PCB154
38380-08-4	PCB156
PCB156_157	PCB156 & 157
69782-90-7	PCB157
74472-42-7	PCB158
PCB158_160	PCB158 & 160
39635-35-3	PCB159
39635-34-2	PCB162
74472-45-0	PCB164
41411-63-6	PCB166
52663-72-6	PCB167
59291-65-5	PCB168
32774-16-6	PCB169

Table 5
Stormwater Analyte List

CAS Number	Analyte
35065-30-6	PCB170
52663-71-5	PCB171
PCB171_173	PCB171 & 173
52663-74-8	PCB172
68194-16-1	PCB173
38411-25-5	PCB174
40186-70-7	PCB175
52663-65-7	PCB176
52663-70-4	PCB177
52663-67-9	PCB178
52663-64-6	PCB179
35065-29-3	PCB180
PCB180_193	PCB180 & 193
74472-47-2	PCB181
60145-23-5	PCB182
PCB182_187	PCB182 & 187
52663-69-1	PCB183
PCB183_185	PCB183 & 185
74472-48-3	PCB184
52712-05-7	PCB185
74472-49-4	PCB186
52663-68-0	PCB187
74487-85-7	PCB188
39635-31-9	PCB189
41411-64-7	PCB190
74472-50-7	PCB191
69782-91-8	PCB193
35694-08-7	PCB194
52663-78-2	PCB195
42740-50-1	PCB196
PCB196_203	PCB196 & 203
33091-17-7	PCB197
PCB197_200	PCB197 & 200
68194-17-2	PCB198
PCB198_199	PCB198 & 199
52663-75-9	PCB199
52663-73-7	PCB200
40186-71-8	PCB201
2136-99-4	PCB202
52663-76-0	PCB203
74472-52-9	PCB204
74472-53-0	PCB205
40186-72-9	PCB206
52663-79-3	PCB207
52663-77-1	PCB208
2051-24-3	PCB209
25429-29-2	Pentachlorobiphenyl homologs
87-86-5	Pentachlorophenol
14797-73-0	Perchlorate

Table 5
Stormwater Analyte List

CAS Number	Analyte
12408-02-5	pH
85-01-8	Phenanthrene
7723-14-0	Phosphorus
7440-09-7	Potassium
129-00-0	Pyrene
RRH	Residual Range Hydrocarbons
7782-49-2	Selenium
7440-22-4	Silver
7440-23-5	Sodium
14808-79-8	Sulfate
TEMP	Temperature
26914-33-0	Tetrachlorobiphenyl homologs
30402-14-3	Tetrachlorodibenzofuran homologs
127-18-4	Tetrachloroethene
7440-28-0	Thallium
7440-31-5	Tin
108-88-3	Toluene
BAPEQ	Total BaPEq
TOTCHLDANE	Total Chlordanes
CPAH	Total cPAHs
Total DDE (direct contact, groundwater seep)	Total DDE (direct contact, groundwater seep)
TDS	Total dissolved solids
TOTENDOSLFN	Total Endosulfan
E17075011	Total of 2,4' and 4,4'-DDD
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E17075029	Total of 2,4' and 4,4'-DDE
E17075037	Total of 2,4' and 4,4'-DDT
TOC	Total organic carbon
130498-29-2	Total PAHs
1336-36-3	Total PCB Congeners
TOTPCBS	Total PCBs
TOTPCDD_F	Total PCDD/F
TPH	Total Petroleum Hydrocarbons
TSS	Total suspended solids
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
8001-35-2	Toxaphene
5103-74-2	trans-Chlordane
39765-80-5	trans-Nonachlor
36643-28-4	Tributyltin ion
25323-68-6	Trichlorobiphenyl homologs
79-01-6	Trichloroethene
TURBID	Turbidity
7440-62-2	Vanadium
1330-20-7	Xylene
7440-66-6	Zinc

Table 6
Groundwater Seeps Analyte List

CAS Number	Analyte
83-32-9	Acenaphthene
120-12-7	Anthracene
7440-36-0	Antimony
11097-69-1	Aroclor 1254
12767-79-2	Aroclors
7440-38-2	Arsenic
7440-39-3	Barium
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
BKBFLANTH	Benzo(b+k)fluoranthene
117-81-7	Bis(2-ethylhexyl) phthalate
BTEX	BTEX
7440-43-9	Cadmium
7440-47-3	Chromium
218-01-9	Chrysene
7440-50-8	Copper
84-74-2	Dibutyl phthalate
DRH	Diesel Range Hydrocarbons
100-41-4	Ethylbenzene
206-44-0	Fluoranthene
86-73-7	Fluorene
HORH	Heavy Oil Range Hydrocarbons
HPAH	High Molecular Weight PAH
7439-92-1	Lead
LPAH	Low Molecular Weight PAH
179601-23-1	m,p-Xylene
7439-96-5	Manganese
7439-97-6	Mercury
7440-02-0	Nickel
OILGREASE	Oil And Grease
95-47-6	o-Xylene
85-01-8	Phenanthrene
129-00-0	Pyrene
BAPEQ	Total BaPEq
CPAH	Total cPAHs
130498-29-2	Total PAHs
TOTPCBS	Total PCBs
TPH	Total Petroleum Hydrocarbons
TSS	Total suspended solids
1330-20-7	Xylene
7440-66-6	Zinc

Table 7
Surface Water Analyte List

CAS Number	Analyte
75-35-4	1,1-Dichloroethene
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
95-63-6	1,2,4-Trimethylbenzene
108-67-8	1,3,5-Trimethylbenzene
106-46-7	1,4-Dichlorobenzene
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
94-75-7	2,4-D
94-82-6	2,4-DB
53-19-0	2,4'-DDD
53-19-0	2,4'-DDD
3424-82-6	2,4'-DDE
3424-82-6	2,4'-DDE
789-02-6	2,4'-DDT
789-02-6	2,4'-DDT
789-02-6	2,4'-DDT
91-57-6	2-Methylnaphthalene
91-57-6	2-Methylnaphthalene
91-57-6	2-Methylnaphthalene
72-54-8	4,4'-DDD
72-54-8	4,4'-DDD
72-54-8	4,4'-DDD
72-55-9	4,4'-DDE
72-55-9	4,4'-DDE
72-55-9	4,4'-DDE
50-29-3	4,4'-DDT
50-29-3	4,4'-DDT
50-29-3	4,4'-DDT
59-50-7	4-Chloro-3-methylphenol
106-47-8	4-Chloroaniline
83-32-9	Acenaphthene
83-32-9	Acenaphthene
83-32-9	Acenaphthene
208-96-8	Acenaphthylene
208-96-8	Acenaphthylene
208-96-8	Acenaphthylene
309-00-2	Aldrin
309-00-2	Aldrin
309-00-2	Aldrin
ALK	Alkalinity
959-98-8	alpha-Endosulfan
959-98-8	alpha-Endosulfan
959-98-8	alpha-Endosulfan
319-84-6	alpha-Hexachlorocyclohexane
319-84-6	alpha-Hexachlorocyclohexane
319-84-6	alpha-Hexachlorocyclohexane
7429-90-5	Aluminum
7664-41-7	Ammonia
62-53-3	Aniline

Table 7
Surface Water Analyte List

CAS Number	Analyte
120-12-7	Anthracene
120-12-7	Anthracene
120-12-7	Anthracene
7440-36-0	Antimony
12672-29-6	Aroclor 1248
11097-69-1	Aroclor 1254
11096-82-5	Aroclor 1260
12767-79-2	Aroclors
7440-38-2	Arsenic
71-43-2	Benzene
56-55-3	Benzo(a)anthracene
56-55-3	Benzo(a)anthracene
56-55-3	Benzo(a)anthracene
50-32-8	Benzo(a)pyrene
50-32-8	Benzo(a)pyrene
50-32-8	Benzo(a)pyrene
205-99-2	Benzo(b)fluoranthene
205-99-2	Benzo(b)fluoranthene
205-99-2	Benzo(b)fluoranthene
191-24-2	Benzo(g,h,i)perylene
191-24-2	Benzo(g,h,i)perylene
191-24-2	Benzo(g,h,i)perylene
BKJFLANTH	Benzo(j+k)fluoranthene
BKJFLANTH	Benzo(j+k)fluoranthene
207-08-9	Benzo(k)fluoranthene
65-85-0	Benzoic acid
33213-65-9	beta-Endosulfan
33213-65-9	beta-Endosulfan
33213-65-9	beta-Endosulfan
319-85-7	beta-Hexachlorocyclohexane
319-85-7	beta-Hexachlorocyclohexane
319-85-7	beta-Hexachlorocyclohexane
117-81-7	Bis(2-ethylhexyl) phthalate
117-81-7	Bis(2-ethylhexyl) phthalate
117-81-7	Bis(2-ethylhexyl) phthalate
BTEX	BTEX
85-68-7	Butylbenzyl phthalate
85-68-7	Butylbenzyl phthalate
85-68-7	Butylbenzyl phthalate
78763-54-9	Butyltin ion
7440-43-9	Cadmium
7440-70-2	Calcium
86-74-8	Carbazole
16887-00-6	Chloride
7440-47-3	Chromium
18540-29-9	Chromium hexavalent
218-01-9	Chrysene
218-01-9	Chrysene
218-01-9	Chrysene
156-59-2	cis-1,2-Dichloroethene
5103-71-9	cis-Chlordane
5103-71-9	cis-Chlordane
5103-71-9	cis-Chlordane
5103-73-1	cis-Nonachlor
5103-73-1	cis-Nonachlor
E1640291	Conductivity
7440-50-8	Copper
57-12-5	Cyanide
57-12-5A	Cyanide amenable to chlorination
75-99-0	Dalapon
319-86-8	delta-Hexachlorocyclohexane
319-86-8	delta-Hexachlorocyclohexane
319-86-8	delta-Hexachlorocyclohexane
DEPTH	Depth
53-70-3	Dibenzo(a,h)anthracene
53-70-3	Dibenzo(a,h)anthracene
53-70-3	Dibenzo(a,h)anthracene
132-64-9	Dibenzofuran
84-74-2	Dibutyl phthalate
84-74-2	Dibutyl phthalate
14488-53-0	Dibutyltin ion
25512-42-9	Dichlorobiphenyl homologs
25512-42-9	Dichlorobiphenyl homologs
60-57-1	Dieldrin
60-57-1	Dieldrin
60-57-1	Dieldrin
84-66-2	Diethyl phthalate

Table 7
Surface Water Analyte List

CAS Number	Analyte
84-66-2	Diethyl phthalate
131-11-3	Dimethyl phthalate
131-11-3	Dimethyl phthalate
117-84-0	Di-n-octyl phthalate
117-84-0	Di-n-octyl phthalate
Dioxin TEQ - Birds	Dioxin TEQ - Birds
Dioxin TEQ - Birds	Dioxin TEQ - Birds
Dioxin TEQ - Birds	Dioxin TEQ - Birds
Dioxin TEQ - Fish	Dioxin TEQ - Fish
Dioxin TEQ - Fish	Dioxin TEQ - Fish
Dioxin TEQ - Fish	Dioxin TEQ - Fish
Dioxin TEQ - Mammals	Dioxin TEQ - Mammals
Dioxin TEQ - Mammals	Dioxin TEQ - Mammals
Dioxin TEQ - Mammals	Dioxin TEQ - Mammals
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)
DOC	Dissolved organic carbon
DO	Dissolved oxygen
1031-07-8	Endosulfan sulfate
1031-07-8	Endosulfan sulfate
1031-07-8	Endosulfan sulfate
72-20-8	Endrin
72-20-8	Endrin
72-20-8	Endrin
7421-93-4	Endrin aldehyde
53494-70-5	Endrin ketone
53494-70-5	Endrin ketone
53494-70-5	Endrin ketone
100-41-4	Ethylbenzene
206-44-0	Fluoranthene
206-44-0	Fluoranthene
206-44-0	Fluoranthene
86-73-7	Fluorene
86-73-7	Fluorene
86-73-7	Fluorene
58-89-9	gamma-Hexachlorocyclohexane
58-89-9	gamma-Hexachlorocyclohexane
58-89-9	gamma-Hexachlorocyclohexane
HARD	Hardness as CaCO3
76-44-8	Heptachlor
76-44-8	Heptachlor
76-44-8	Heptachlor
1024-57-3	Heptachlor epoxide
1024-57-3	Heptachlor epoxide
1024-57-3	Heptachlor epoxide
28655-71-2	Heptachlorobiphenyl homologs
28655-71-2	Heptachlorobiphenyl homologs
38998-75-3	Heptachlorodibenzofuran homologs
38998-75-3	Heptachlorodibenzofuran homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
37871-00-4	Heptachlorodibenzo-p-dioxin homologs
118-74-1	Hexachlorobenzene
118-74-1	Hexachlorobenzene
118-74-1	Hexachlorobenzene
26601-64-9	Hexachlorobiphenyl homologs
26601-64-9	Hexachlorobiphenyl homologs
87-68-3	Hexachlorobutadiene
87-68-3	Hexachlorobutadiene
87-68-3	Hexachlorobutadiene
55684-94-1	Hexachlorodibenzofuran homologs
55684-94-1	Hexachlorodibenzofuran homologs
34465-46-8	Hexachlorodibenzo-p-dioxin homologs
34465-46-8	Hexachlorodibenzo-p-dioxin homologs
HPAH	High Molecular Weight PAH
HPAH	High Molecular Weight PAH
HPAH	High Molecular Weight PAH
193-39-5	Indeno(1,2,3-cd)pyrene
193-39-5	Indeno(1,2,3-cd)pyrene
193-39-5	Indeno(1,2,3-cd)pyrene
7439-89-6	Iron
78-59-1	Isophorone
7439-92-1	Lead

Table 7
Surface Water Analyte List

CAS Number	Analyte
LPAH	Low Molecular Weight PAH
LPAH	Low Molecular Weight PAH
LPAH	Low Molecular Weight PAH
179601-23-1	m,p-Xylene
7439-95-4	Magnesium
7439-96-5	Manganese
93-65-2	MCPP
7439-97-6	Mercury
72-43-5	Methoxychlor
72-43-5	Methoxychlor
72-43-5	Methoxychlor
27323-18-8	Monochlorobiphenyl homologs
27323-18-8	Monochlorobiphenyl homologs
91-20-3	Naphthalene
91-20-3	Naphthalene
91-20-3	Naphthalene
7440-02-0	Nickel
53742-07-7	Nonachlorobiphenyl homologs
53742-07-7	Nonachlorobiphenyl homologs
55722-26-4	Octachlorobiphenyl homologs
55722-26-4	Octachlorobiphenyl homologs
39001-02-0	Octachlorodibenzofuran
39001-02-0	Octachlorodibenzofuran
3268-87-9	Octachlorodibenzo-p-dioxin
3268-87-9	Octachlorodibenzo-p-dioxin
3268-87-9	Octachlorodibenzo-p-dioxin
ORP	Oxidation-Reduction Potential
27304-13-8	Oxychlordane
27304-13-8	Oxychlordane
95-47-6	o-Xylene
PCB TEQ - Birds	PCB TEQ - Birds
PCB TEQ - Birds	PCB TEQ - Birds
PCB TEQ - Birds	PCB TEQ - Birds
PCB TEQ - Fish	PCB TEQ - Fish
PCB TEQ - Fish	PCB TEQ - Fish
PCB TEQ - Fish	PCB TEQ - Fish
PCB TEQ - Mammals	PCB TEQ - Mammals
PCB TEQ - Mammals	PCB TEQ - Mammals
PCB TEQ - Mammals	PCB TEQ - Mammals
2051-60-7	PCB001
2051-60-7	PCB001
2051-61-8	PCB002
2051-61-8	PCB002
2051-62-9	PCB003
2051-62-9	PCB003
13029-08-8	PCB004
13029-08-8	PCB004
16605-91-7	PCB005
16605-91-7	PCB005
25569-80-6	PCB006
25569-80-6	PCB006
33284-50-3	PCB007
33284-50-3	PCB007
34883-43-7	PCB008
34883-43-7	PCB008
34883-39-1	PCB009
34883-39-1	PCB009
33146-45-1	PCB010
33146-45-1	PCB010
2050-67-1	PCB011
2050-67-1	PCB011
PCB012_013	PCB012 & 013
PCB012_013	PCB012 & 013
34883-41-5	PCB014
34883-41-5	PCB014
2050-68-2	PCB015
2050-68-2	PCB015
38444-78-9	PCB016
38444-78-9	PCB016
PCB016_032	PCB016 & 032
37680-66-3	PCB017
37680-66-3	PCB017
37680-66-3	PCB017
PCB018_030	PCB018 & 030
PCB018_030	PCB018 & 030
38444-73-4	PCB019
38444-73-4	PCB019

Table 7
Surface Water Analyte List

CAS Number	Analyte
38444-73-4	PCB019
PCB020_028	PCB020 & 028
PCB020_028	PCB020 & 028
PCB021_033	PCB021 & 033
PCB021_033	PCB021 & 033
38444-85-8	PCB022
38444-85-8	PCB022
55720-44-0	PCB023
55720-44-0	PCB023
55702-45-9	PCB024
55702-45-9	PCB024
55712-37-3	PCB025
55712-37-3	PCB025
PCB026_029	PCB026 & 029
PCB026_029	PCB026 & 029
38444-76-7	PCB027
38444-76-7	PCB027
7012-37-5	PCB028
16606-02-3	PCB031
16606-02-3	PCB031
16606-02-3	PCB031
38444-77-8	PCB032
38444-77-8	PCB032
37680-68-5	PCB034
37680-68-5	PCB034
37680-69-6	PCB035
37680-69-6	PCB035
38444-87-0	PCB036
38444-87-0	PCB036
38444-90-5	PCB037
38444-90-5	PCB037
38444-90-5	PCB037
53555-66-1	PCB038
53555-66-1	PCB038
38444-88-1	PCB039
38444-88-1	PCB039
PCB040_041_071	PCB040 & 041 & 071
PCB040_041_071	PCB040 & 041 & 071
PCB041_064_071_	PCB041 & 064 & 071 & 072
36559-22-5	PCB042
36559-22-5	PCB042
PCB042_059	PCB042 & 059
70362-46-8	PCB043
70362-46-8	PCB043
PCB043_049	PCB043 & 049
41464-39-5	PCB044
PCB044_047_065	PCB044 & 047 & 065
PCB044_047_065	PCB044 & 047 & 065
70362-45-7	PCB045
PCB045_051	PCB045 & 051
PCB045_051	PCB045 & 051
41464-47-5	PCB046
41464-47-5	PCB046
2437-79-8	PCB047
70362-47-9	PCB048
70362-47-9	PCB048
PCB049_069	PCB049 & 069
PCB049_069	PCB049 & 069
PCB050_053	PCB050 & 053
PCB050_053	PCB050 & 053
68194-04-7	PCB051
35693-99-3	PCB052
35693-99-3	PCB052
PCB052_069	PCB052 & 069
41464-41-9	PCB053
15968-05-5	PCB054
15968-05-5	PCB054
74338-24-2	PCB055
74338-24-2	PCB055
41464-43-1	PCB056
41464-43-1	PCB056
PCB056_060	PCB056 & 060
70424-67-8	PCB057
70424-67-8	PCB057
41464-49-7	PCB058
41464-49-7	PCB058
PCB059_062_075	PCB059 & 062 & 075

Table 7
Surface Water Analyte List

CAS Number	Analyte
PCB059_062_075	PCB059 & 062 & 075
33025-41-1	PCB060
33025-41-1	PCB060
PCB061_070	PCB061 & 070
PCB061_070_074_	PCB061 & 070 & 074 & 076
PCB061_070_074_	PCB061 & 070 & 074 & 076
74472-34-7	PCB063
74472-34-7	PCB063
52663-58-8	PCB064
52663-58-8	PCB064
32598-10-0	PCB066
32598-10-0	PCB066
PCB066_076	PCB066 & 076
73575-53-8	PCB067
73575-53-8	PCB067
73575-52-7	PCB068
73575-52-7	PCB068
41464-42-0	PCB072
41464-42-0	PCB072
74338-23-1	PCB073
74338-23-1	PCB073
32690-93-0	PCB074
32598-13-3	PCB077
32598-13-3	PCB077
70362-49-1	PCB078
41464-48-6	PCB079
41464-48-6	PCB079
33284-52-5	PCB080
70362-50-4	PCB081
70362-50-4	PCB081
52663-62-4	PCB082
52663-62-4	PCB082
PCB083_099	PCB083 & 099
PCB083_099	PCB083 & 099
52663-60-2	PCB084
52663-60-2	PCB084
PCB084_092	PCB084 & 092
PCB085_116_117	PCB085 & 116 & 117
PCB085_116_117	PCB085 & 116 & 117
PCB086_087_097_	PCB086 & 087 & 097 & 108 & 119 & 125
PCB086_087_097_	PCB086 & 087 & 097 & 108 & 119 & 125
PCB087_117_125	PCB087 & 117 & 125
PCB088_091	PCB088 & 091
PCB088_091	PCB088 & 091
73575-57-2	PCB089
73575-57-2	PCB089
PCB090_101	PCB090 & 101
PCB090_101_113	PCB090 & 101 & 113
PCB090_101_113	PCB090 & 101 & 113
52663-61-3	PCB092
52663-61-3	PCB092
PCB093_095_098_	PCB093 & 095 & 098 & 100 & 102
PCB093_095_098_	PCB093 & 095 & 098 & 100 & 102
73575-55-0	PCB094
73575-55-0	PCB094
PCB095_098_102	PCB095 & 098 & 102
73575-54-9	PCB096
73575-54-9	PCB096
41464-51-1	PCB097
38380-01-7	PCB099
60145-21-3	PCB103
60145-21-3	PCB103
56558-16-8	PCB104
56558-16-8	PCB104
32598-14-4	PCB105
32598-14-4	PCB105
32598-14-4	PCB105
70424-69-0	PCB106
70424-69-0	PCB106
PCB106_118	PCB106 & 118
PCB107_124	PCB107 & 124
PCB107_124	PCB107 & 124
74472-35-8	PCB109
74472-35-8	PCB109
38380-03-9	PCB110
PCB110_115	PCB110 & 115
PCB110_115	PCB110 & 115

Table 7
Surface Water Analyte List

CAS Number	Analyte
39635-32-0	PCB111
39635-32-0	PCB111
74472-36-9	PCB112
74472-36-9	PCB112
74472-37-0	PCB114
74472-37-0	PCB114
31508-00-6	PCB118
31508-00-6	PCB118
68194-12-7	PCB120
68194-12-7	PCB120
56558-18-0	PCB121
56558-18-0	PCB121
76842-07-4	PCB122
76842-07-4	PCB122
65510-44-3	PCB123
65510-44-3	PCB123
57465-28-8	PCB126
57465-28-8	PCB126
39635-33-1	PCB127
39635-33-1	PCB127
PCB128_166	PCB128 & 166
PCB128_166	PCB128 & 166
PCB129_138_160_	PCB129 & 138 & 160 & 163
PCB129_138_160_	PCB129 & 138 & 160 & 163
52663-66-8	PCB130
52663-66-8	PCB130
61798-70-7	PCB131
61798-70-7	PCB131
38380-05-1	PCB132
38380-05-1	PCB132
PCB132_161	PCB132 & 161
35694-04-3	PCB133
35694-04-3	PCB133
PCB134_143	PCB134 & 143
PCB134_143	PCB134 & 143
PCB135_151_154	PCB135 & 151 & 154
PCB135_151_154	PCB135 & 151 & 154
38411-22-2	PCB136
38411-22-2	PCB136
35694-06-5	PCB137
35694-06-5	PCB137
PCB138_163_164	PCB138 & 163 & 164
PCB139_140	PCB139 & 140
PCB139_140	PCB139 & 140
PCB139_149	PCB139 & 149
52712-04-6	PCB141
52712-04-6	PCB141
41411-61-4	PCB142
41411-61-4	PCB142
68194-14-9	PCB144
68194-14-9	PCB144
74472-40-5	PCB145
74472-40-5	PCB145
51908-16-8	PCB146
51908-16-8	PCB146
PCB147_149	PCB147 & 149
PCB147_149	PCB147 & 149
74472-41-6	PCB148
74472-41-6	PCB148
68194-08-1	PCB150
68194-08-1	PCB150
68194-09-2	PCB152
68194-09-2	PCB152
35065-27-1	PCB153
PCB153_168	PCB153 & 168
PCB153_168	PCB153 & 168
33979-03-2	PCB155
33979-03-2	PCB155
38380-08-4	PCB156
PCB156_157	PCB156 & 157
PCB156_157	PCB156 & 157
74472-42-7	PCB158
74472-42-7	PCB158
39635-35-3	PCB159
39635-35-3	PCB159
39635-34-2	PCB162
39635-34-2	PCB162

Table 7
Surface Water Analyte List

CAS Number	Analyte
74472-45-0	PCB164
74472-45-0	PCB164
74472-46-1	PCB165
74472-46-1	PCB165
52663-72-6	PCB167
52663-72-6	PCB167
32774-16-6	PCB169
32774-16-6	PCB169
35065-30-6	PCB170
35065-30-6	PCB170
PCB171_173	PCB171 & 173
PCB171_173	PCB171 & 173
52663-74-8	PCB172
52663-74-8	PCB172
38411-25-5	PCB174
38411-25-5	PCB174
38411-25-5	PCB174
40186-70-7	PCB175
40186-70-7	PCB175
52663-65-7	PCB176
52663-65-7	PCB176
52663-70-4	PCB177
52663-70-4	PCB177
52663-67-9	PCB178
52663-67-9	PCB178
52663-64-6	PCB179
52663-64-6	PCB179
35065-29-3	PCB180
PCB180_193	PCB180 & 193
PCB180_193	PCB180 & 193
74472-47-2	PCB181
74472-47-2	PCB181
60145-23-5	PCB182
60145-23-5	PCB182
PCB182_187	PCB182 & 187
PCB183_185	PCB183 & 185
PCB183_185	PCB183 & 185
74472-48-3	PCB184
74472-48-3	PCB184
74472-49-4	PCB186
74472-49-4	PCB186
52663-68-0	PCB187
52663-68-0	PCB187
74487-85-7	PCB188
74487-85-7	PCB188
39635-31-9	PCB189
39635-31-9	PCB189
41411-64-7	PCB190
41411-64-7	PCB190
74472-50-7	PCB191
74472-50-7	PCB191
74472-51-8	PCB192
74472-51-8	PCB192
35694-08-7	PCB194
35694-08-7	PCB194
52663-78-2	PCB195
52663-78-2	PCB195
42740-50-1	PCB196
42740-50-1	PCB196
PCB197_200	PCB197 & 200
PCB197_200	PCB197 & 200
PCB198_199	PCB198 & 199
PCB198_199	PCB198 & 199
40186-71-8	PCB201
40186-71-8	PCB201
2136-99-4	PCB202
2136-99-4	PCB202
52663-76-0	PCB203
52663-76-0	PCB203
74472-52-9	PCB204
74472-52-9	PCB204
74472-53-0	PCB205
74472-53-0	PCB205
40186-72-9	PCB206
40186-72-9	PCB206
52663-79-3	PCB207
52663-79-3	PCB207

Table 7
Surface Water Analyte List

CAS Number	Analyte
52663-77-1	PCB208
52663-77-1	PCB208
2051-24-3	PCB209
2051-24-3	PCB209
25429-29-2	Pentachlorobiphenyl homologs
25429-29-2	Pentachlorobiphenyl homologs
30402-15-4	Pentachlorodibenzofuran homologs
30402-15-4	Pentachlorodibenzofuran homologs
36088-22-9	Pentachlorodibenzo-p-dioxin homologs
36088-22-9	Pentachlorodibenzo-p-dioxin homologs
14797-73-0	Perchlorate
12408-02-5	pH
85-01-8	Phenanthrene
85-01-8	Phenanthrene
85-01-8	Phenanthrene
108-95-2	Phenol
7440-09-7	Potassium
129-00-0	Pyrene
129-00-0	Pyrene
129-00-0	Pyrene
135-98-8	Sec-butylbenzene
7782-49-2	Selenium
7440-22-4	Silver
7440-23-5	Sodium
14808-79-8	Sulfate
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDD (calc'd)	Sum DDD (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDE (calc'd)	Sum DDE (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
Sum DDT (calc'd)	Sum DDT (calc'd)
TEMP	Temperature
26914-33-0	Tetrachlorobiphenyl homologs
26914-33-0	Tetrachlorobiphenyl homologs
30402-14-3	Tetrachlorodibenzofuran homologs
30402-14-3	Tetrachlorodibenzofuran homologs
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs
41903-57-5	Tetrachlorodibenzo-p-dioxin homologs
7440-28-0	Thallium
108-88-3	Toluene
Total Aroclors (surface water bioaccum screening)	Total Aroclors (surface water bioaccum screening)
Total Aroclors (surface water: direct contact by diver)	Total Aroclors (surface water: direct contact by diver)
Total Aroclors (surface water: direct contact by trans/beach use, drink)	Total Aroclors (surface water: direct contact by trans/beach use, drink)
BAPEQ	Total BaPEq
BAPEQ	Total BaPEq
BAPEQ	Total BaPEq
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total Benzofluoranthenes (calc'd)	Total Benzofluoranthenes (calc'd)
Total Chlordane (calc'd)	Total Chlordane (calc'd)
Total Chlordane (calc'd)	Total Chlordane (calc'd)
Total Chlordane (calc'd)	Total Chlordane (calc'd)
Total Chlordane (calc'd)	Total Chlordane (calc'd)
TOTCHLDANE	Total Chlordanes
TOTCHLDANE	Total Chlordanes
TOTCHLDANE	Total Chlordanes
Total Chlordanes (surface water bioaccum screening)	Total Chlordanes (surface water bioaccum screening)
Total Chlordanes (surface water bioaccum screening)	Total Chlordanes (surface water bioaccum screening)
Total Chlordanes (surface water: direct contact by diver)	Total Chlordanes (surface water: direct contact by diver)
Total Chlordanes (surface water: direct contact by diver)	Total Chlordanes (surface water: direct contact by diver)
Total Chlordanes (surface water: direct contact by trans/beach use, drink)	Total Chlordanes (surface water: direct contact by trans/beach use, drink)
Total cPAH PEQ (surface water bioaccum screening)	Total cPAH PEQ (surface water bioaccum screening)
Total cPAH PEQ (surface water bioaccum screening)	Total cPAH PEQ (surface water bioaccum screening)
CPAH	Total cPAHs
CPAH	Total cPAHs
CPAH	Total cPAHs
Total cPAHs (calc'd)	Total cPAHs (calc'd)
Total cPAHs (calc'd)	Total cPAHs (calc'd)
Total cPAHs (calc'd)	Total cPAHs (calc'd)
Total cPAHs (calc'd)	Total cPAHs (calc'd)

Table 7
Surface Water Analyte List

CAS Number	Analyte
Total DDD (surface water bioaccum screening)	Total DDD (surface water bioaccum screening)
Total DDD (surface water bioaccum screening)	Total DDD (surface water bioaccum screening)
Total DDD (surface water: direct contact by diver)	Total DDD (surface water: direct contact by diver)
Total DDD (surface water: direct contact by diver)	Total DDD (surface water: direct contact by diver)
Total DDD (surface water: direct contact by trans/beach use, drink)	Total DDD (surface water: direct contact by trans/beach use, drink)
Total DDE (surface water bioaccum screening)	Total DDE (surface water bioaccum screening)
Total DDE (surface water bioaccum screening)	Total DDE (surface water bioaccum screening)
Total DDE (surface water: direct contact by diver)	Total DDE (surface water: direct contact by diver)
Total DDE (surface water: direct contact by diver)	Total DDE (surface water: direct contact by diver)
Total DDE (surface water: direct contact by trans/beach use, drink)	Total DDE (surface water: direct contact by trans/beach use, drink)
Total DDT (surface water bioaccum screening)	Total DDT (surface water bioaccum screening)
Total DDT (surface water bioaccum screening)	Total DDT (surface water bioaccum screening)
Total DDT (surface water: direct contact by diver)	Total DDT (surface water: direct contact by diver)
Total DDT (surface water: direct contact by diver)	Total DDT (surface water: direct contact by diver)
Total DDT (surface water: direct contact by trans/beach use, drink)	Total DDT (surface water: direct contact by trans/beach use, drink)
Total DDT (surface water: direct contact by trans/beach use, drink)	Total DDT (surface water: direct contact by trans/beach use, drink)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total DDTs (calc'd)	Total DDTs (calc'd)
Total Dioxin/Furan TEQ (surface water bioaccum screening)	Total Dioxin/Furan TEQ (surface water bioaccum screening)
Total Dioxin/Furan TEQ (surface water: direct contact by diver)	Total Dioxin/Furan TEQ (surface water: direct contact by diver)
Total Dioxin/Furan TEQ (surface water: direct contact by trans/beach use, drink)	Total Dioxin/Furan TEQ (surface water: direct contact by trans/beach use, drink)
TDS	Total dissolved solids
TOTENDOSLFN	Total Endosulfan
TOTENDOSLFN	Total Endosulfan
TOTENDOSLFN	Total Endosulfan
Total Endosulfan (calc'd)	Total Endosulfan (calc'd)
Total Endosulfan (calc'd)	Total Endosulfan (calc'd)
Total Endosulfan (calc'd)	Total Endosulfan (calc'd)
Total Endosulfan (calc'd)	Total Endosulfan (calc'd)
Total Endosulfan (surface water bioaccum screening)	Total Endosulfan (surface water bioaccum screening)
Total Endosulfan (surface water bioaccum screening)	Total Endosulfan (surface water bioaccum screening)
Total Endosulfan (surface water: direct contact by diver)	Total Endosulfan (surface water: direct contact by diver)
Total Endosulfan (surface water: direct contact by diver)	Total Endosulfan (surface water: direct contact by diver)
Total Endosulfan (surface water: direct contact by trans/beach use, drink)	Total Endosulfan (surface water: direct contact by trans/beach use, drink)
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total HPAHs (calc'd)	Total HPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
Total LPAHs (calc'd)	Total LPAHs (calc'd)
E17075011	Total of 2,4' and 4,4'-DDD
E17075011	Total of 2,4' and 4,4'-DDD
E17075011	Total of 2,4' and 4,4'-DDD
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E966176	Total of 2,4' and 4,4'-DDD, -DDE, -DDT
E17075029	Total of 2,4' and 4,4'-DDE
E17075029	Total of 2,4' and 4,4'-DDE
E17075029	Total of 2,4' and 4,4'-DDE
E17075037	Total of 2,4' and 4,4'-DDT
E17075037	Total of 2,4' and 4,4'-DDT
E17075037	Total of 2,4' and 4,4'-DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT
TOC	Total organic carbon
130498-29-2	Total PAHs
130498-29-2	Total PAHs
130498-29-2	Total PAHs
Total PAHs (calc'd)	Total PAHs (calc'd)
Total PAHs (calc'd)	Total PAHs (calc'd)
Total PAHs (calc'd)	Total PAHs (calc'd)
Total PAHs (calc'd)	Total PAHs (calc'd)
1336-36-3	Total PCB Congeners
1336-36-3	Total PCB Congeners
1336-36-3	Total PCB Congeners
Total PCB Congeners (calc'd)	Total PCB Congeners (calc'd)
Total PCB Congeners (calc'd)	Total PCB Congeners (calc'd)
Total PCB Congeners (calc'd)	Total PCB Congeners (calc'd)
Total PCB Congeners (surface water bioaccum screening)	Total PCB Congeners (surface water bioaccum screening)
Total PCB Congeners (surface water: direct contact by diver)	Total PCB Congeners (surface water: direct contact by diver)
Total PCB Congeners (surface water: direct contact by trans/beach use, drink)	Total PCB Congeners (surface water: direct contact by trans/beach use, drink)
Total PCB TEQ (surface water bioaccum screening)	Total PCB TEQ (surface water bioaccum screening)

Table 7
Surface Water Analyte List

CAS Number	Analyte
Total PCB TEQ (surface water: direct contact by diver)	Total PCB TEQ (surface water: direct contact by diver)
Total PCB TEQ (surface water: direct contact by trans/beach use, drink)	Total PCB TEQ (surface water: direct contact by trans/beach use, drink)
TOTPCBS	Total PCBs
TOTPCBS	Total PCBs
TOTPCBS	Total PCBs
Total PCBs (calc'd)	Total PCBs (calc'd)
Total PCBs (calc'd)	Total PCBs (calc'd)
Total PCBs (calc'd)	Total PCBs (calc'd)
Total PCBs (calc'd)	Total PCBs (calc'd)
Total PCBs Aroclors (calc'd)	Total PCBs Aroclors (calc'd)
TOTPCDD_F	Total PCDD/F
TOTPCDD_F	Total PCDD/F
TOTPCDD_F	Total PCDD/F
TSS	Total suspended solids
TSS 0.45	Total suspended solids w/0.45 um filter
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
TEQ_TOTAL.0	Total TCDD toxicity equivalent (ND = 0)
Total TEQ - Birds	Total TEQ - Birds
Total TEQ - Birds	Total TEQ - Birds
Total TEQ - Birds	Total TEQ - Birds
Total TEQ - Fish	Total TEQ - Fish
Total TEQ - Fish	Total TEQ - Fish
Total TEQ - Fish	Total TEQ - Fish
Total TEQ - Mammals	Total TEQ - Mammals
Total TEQ - Mammals	Total TEQ - Mammals
Total TEQ - Mammals	Total TEQ - Mammals
Total Toxic Dioxin Furans (calc'd)	Total Toxic Dioxin Furans (calc'd)
Total Toxic Dioxin Furans (calc'd)	Total Toxic Dioxin Furans (calc'd)
Total Toxic Dioxin Furans (calc'd)	Total Toxic Dioxin Furans (calc'd)
Total Xylenes (calc'd)	Total Xylenes (calc'd)
156-60-5	trans-1,2-Dichloroethene
5103-74-2	trans-Chlordane
5103-74-2	trans-Chlordane
5103-74-2	trans-Chlordane
39765-80-5	trans-Nonachlor
39765-80-5	trans-Nonachlor
36643-28-4	Tributyltin ion
25323-68-6	Trichlorobiphenyl homologs
25323-68-6	Trichlorobiphenyl homologs
79-01-6	Trichloroethene
TURBID	Turbidity
75-01-4	Vinyl chloride
1330-20-7	Xylene
7440-66-6	Zinc

Table 8
Porewater Analyte List

CAS Number	Analyte
120-12-7	Anthracene
129-00-0	Pyrene
130498-29-2	Total PAHs
132-64-9	Dibenzofuran
14488-53-0	Dibutyltin ion
1461-25-2	Tetrabutyltin
191-24-2	Benzo(g,h,i)perylene
193-39-5	Indeno(1,2,3-cd)pyrene
205-99-2	Benzo(b)fluoranthene
206-44-0	Fluoranthene
207-08-9	Benzo(k)fluoranthene
208-96-8	Acenaphthylene
218-01-9	Chrysene
36643-28-4	Tributyltin ion
483-65-8	Retene
50-32-8	Benzo(a)pyrene
53-70-3	Dibenzo(a,h)anthracene
56-55-3	Benzo(a)anthracene
7429-90-5	Aluminum
7439-89-6	Iron
7439-92-1	Lead
7439-95-4	Magnesium
7439-96-5	Manganese
7439-97-6	Mercury
7440-02-0	Nickel
7440-09-7	Potassium
7440-22-4	Silver
7440-23-5	Sodium
7440-38-2	Arsenic
7440-39-3	Barium
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
7440-62-2	Vanadium
7440-66-6	Zinc
7440-70-2	Calcium
7664-41-7	Ammonia
78763-54-9	Butyltin ion
83-32-9	Acenaphthene
85-01-8	Phenanthrene
86-73-7	Fluorene
87-86-5	Pentachlorophenol
90-12-0	1-Methylnaphthalene
91-20-3	Naphthalene
91-57-6	2-Methylnaphthalene

Table 8
Porewater Analyte List

CAS Number	Analyte
BAPEQ	Total BaPEq
CPAH	Total cPAHs
HPAH	High Molecular Weight PAH
LPAH	Low Molecular Weight PAH
SPEC_GRAV	Specific Gravity
TSO	Total solids

Attachment C – Relevant Excerpts from Portland Harbor FS Appendix A

Table A-2
Result Requirements for Generating Analyte Totals
Portland Harbor Superfund Site
Portland, Oregon

Chemical Name	Expected Analytes	'A' qualify (Limited)	Do Not Sum
Total PCBs Aroclors	7 or 9	<7	<2
Total PCDD/Fs	17	<17	<10
Total HPAHs	10	<10	<5
Total LPAHs	7	<7	<3
Total PAHs	17	<17	<10
Total PCB Congeners	209	<150	<100
Sum DDD	2	<2	
Sum DDE	2	<2	
Sum DDT	2	<2	
Total DDx	6	<6	
Total Chlordane	5	<5	
Total Endosulfan	3	<3	
Total Xylenes	2	<2	

Table A-3
Analytical Chemistry Qualifier Definitions
Portland Harbor Superfund Site
Portland, Oregon

Qualifier	Description
A	Summed value based on limited number of analytes.
J	Estimated value.
JA	Combined qualifier.
JT	Combined qualifier.
N	Presumptive evidence of a compound.
NJ	Combined qualifier.
NJT	Combined qualifier.
NT	Combined qualifier.
R	Rejected.
T	Result calculated or selected from >1 reported value.
U	Analyte was analyzed for but not detected.
UA	Combined qualifier.
UJ	Not detected. Sample detection limit is estimated.
UJA	Combined qualifier.
UJT	Combined qualifier.
UT	Combined qualifier.

Attachment 2

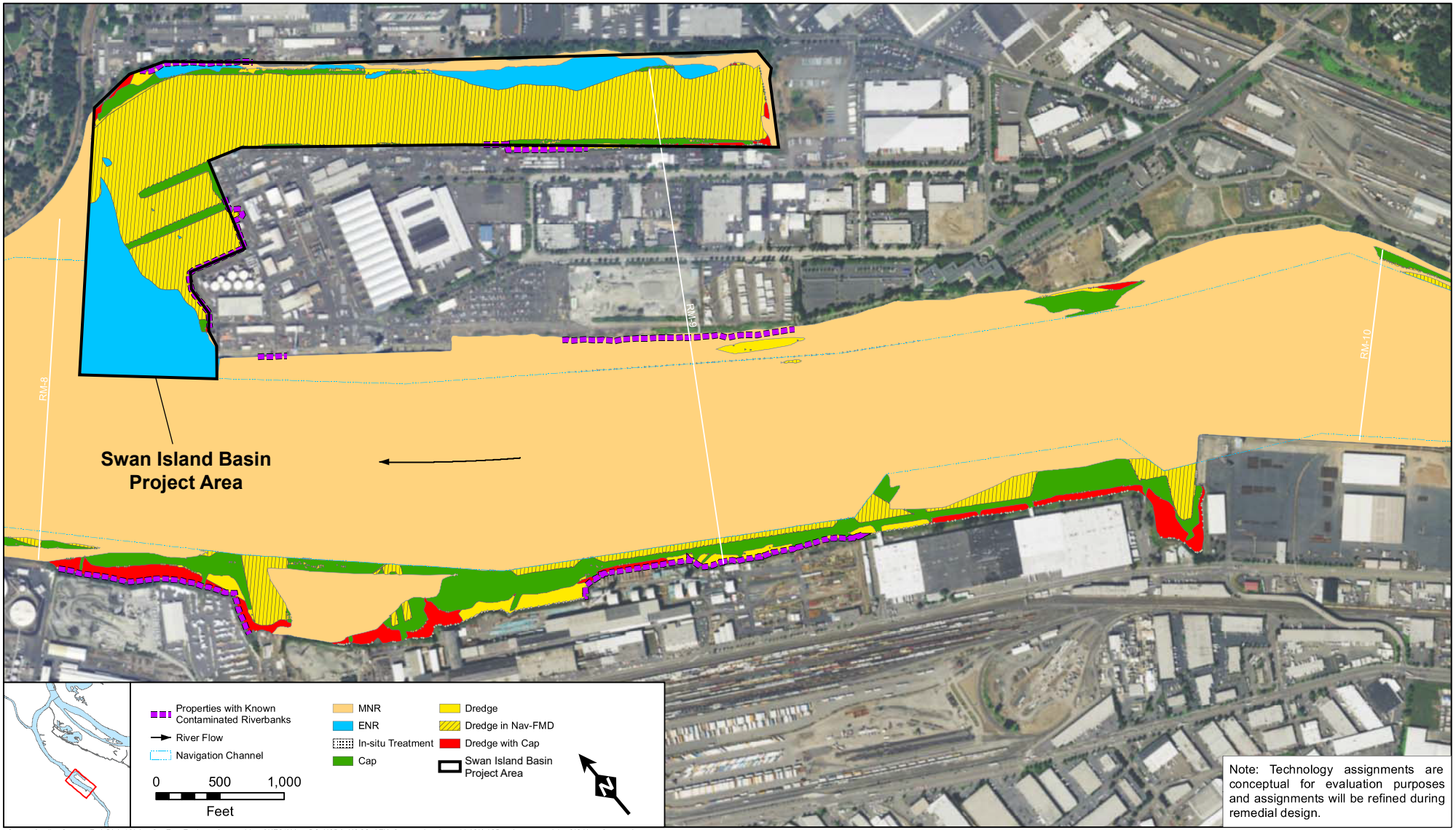
Example Sufficiency Assessment Summary Table

[Name] Project Area Sufficiency Assessment Summary
[date]

Site	**ECSI#**	**Pathway(s)**	**Status**	**Sufficiency Assessment Contaminants**	**Milestone Document**	**Remedial Design/Source Control Task**

Appendix B

Swan Island Basin Project Area



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Swan Island Basin Project Area

Portland Harbor Superfund Site

Path: E:\Projects\Portland Harbor\GIS\MapDocuments\Record of Decision\Fig_Technology-Assignments-by-Alt-RM.mxd, Created by: MLF

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