SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

T E C H N I C A L

M E M O R A N D U M

TO: Ms. Vicky Sutton, Washington State Department of Ecology

DATE: January 15, 2014

FROM: Thomas Cammarata, LG, LHG

SUBJECT: Updates to the Remedial Investigation/Feasibility Study Work Plan
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

SoundEarth Strategies, Inc. (SoundEarth) has prepared this Technical Memorandum to update the *Remedial Investigation/Feasibility Study Work Plan, Duwamish Marine Center, 6365 First Avenue South, Seattle, Washington,* prepared by SoundEarth and dated May 13, 2013 (Work Plan). This Technical Memorandum incorporates Washington State Department of Ecology (Ecology) comments from its review of the draft Work Plan dated June 8, 2012. Ecology comments were presented in a letter to Mr. Stephen Plowman, Attorney for the Duwamish Marine Center, dated May 2, 2013. The Ecology letter is presented in Attachment A. SoundEarth's response to Ecology's comments, dated October 2, 2013, is included as Attachment B. The relevant documents related to this Technical Memorandum include the following:

- *Remedial Investigation/Feasibility Study Work Plan, Duwamish Marine Center, 6365 First Avenue South, Seattle, Washington,* prepared by SoundEarth and dated May 13, 2013.
- *Sampling and Analysis Plan, Duwamish Marine Center, 6365 First Avenue South, Seattle, Washington,* prepared by SoundEarth and dated May 13, 2013 (SAP).
- *Quality Assurance Project Plan, 6365 First Avenue South, Seattle, Washington,* prepared by SoundEarth and dated May 13, 2013.

REMEDIAL INVESTIGATION COMPONENTS

This section provides a description of updated work elements for the remedial investigation (RI) to be conducted at the site. The RI will consist of the following work elements:

- Advancing 6 sediment cores and analyzing the samples for chemicals of potential concern (COPC).
- Advancing 9 direct-push borings and analyzing the samples for COPC.

- Advancing 15 hollow-stem auger borings, converting the borings to monitoring wells, collecting soil samples, and analyzing the samples for COPC.
- Collecting 2 rounds of groundwater samples from existing and newly installed groundwater monitoring wells and analyzing the samples for COPC.
- Collecting river bank samples from 6 locations and analyzing the samples for COPC.
- Collecting up to 3 seep samples from the river bank and analyzing the samples for COPC.
- Collecting 4 catch basin sediment samples and analyzing the samples for COPC.
- Collecting 5 rounds of stormwater samples and analyzing the samples for COPC.
- Conducting a tidal study for Shallow and Deep water-bearing zones.

UPDATED SAMPLING PROTOCOLS AND PROCEDURES

The following subsections update the sampling protocols and procedures presented in the Work Plan for the media of concern. Any deviations from the protocols and procedures presented below will be approved by Ecology and the project manager prior to implementation and will be discussed in the Remedial Investigation/Feasibility Study Report. A detailed discussion of onshore and offshore field sampling and handling procedures is presented in the SAP.

Updated Offshore Sampling Program

The offshore sampling program will include advancing sediment cores and collecting sediment samples. The proposed sediment core locations are shown on Figure 1. A detailed discussion of the offshore sampling program is presented below.

Sediment Sampling

Sediment core samples will be collected from six locations within the intertidal zone of the site. Sediment cores will be advanced up to 6 feet below the mudline. The sample stations are identified as SED01 through SED06 and are shown on Figure 1. Sediment core locations are as follows:

- Core SED01 is located at the south end of the site, proximate to the South Michigan Street Combined Sewer Outfall (Michigan Street CSO).
- Core SED02 is located adjacent to the former Outfall 3 (Out3).
- Core SED03 is located adjacent to Outfall 1 (Out1).
- Core SED04 is located adjacent to the Middle Dock.
- Core SED05 is located adjacent to the North Dock.
- Core SED06 is located offshore of Samson Tug and Barge in the vicinity of Seep 82 and former Outfall 2 (Out2).

Sediment core samples for both conventional and chemical analyses will be collected using a vibratory core device (vibracore). The vibracore uses a pneumatic system that vibrates and drives a length of 4-inch-outer-diameter aluminum tubing into the sediment. A butyrate or

polyethylene liner will be used in the vibracore. A continuous sediment sample is retained within the tubing with the aid of a stainless steel core catcher. A sediment recovery of approximately 70 percent is anticipated for the vibracore. Prior to sampling, the core liners will be decontaminated. During storage and transport, core liners will be capped at both ends to prevent contamination and will be stored upright. The proposed sample depth and chemical analyses for each sediment sample are presented in Table 1.

Vibracoring will be performed following the recommended steps listed below:

- The sampling station will be located with an appropriate field positioning system.
- The depth of the Duwamish Waterway at the sampling point will be measured relative to an established mudline.
- Core liners will be inserted in the core barrel and held in place by a cutting tip.
- The vibracore will be slowly suspended and lowered with an electric or hydraulic winch until the core contacts the bottom. A measuring tape attached to the top shackle of the vibracore will be used to calculate the penetration depth.
- The vibration head will be turned on and penetration will continue until the unit meets refusal or the core tube is fully buried, ensuring the core tube remains vertical.
- The vibration head will be turned off.
- The core tube will be slowly withdrawn by the winch, using the vibration only if extraction is difficult.
- Upon reaching the surface, the core tube will be kept in a vertical position.
- After removing the core catcher, a plastic cap will be placed on the lower end and taped in place.
- Using a weighed tape, the distance from the top of the sediment tube to the surface of the recovered sediment will be measured.
- A small hole will be drilled at the sediment-water interface to drain off the water that overlies the sample. This section will be cut off, and a cap will be placed on the top end and taped in place.
- The upper end of the core will be labeled with date, time, penetration depth, retention amount, recovery, and unique station number. The core will be processed on the boat or transferred ashore to an established processing location.
- The core will be protected from sunlight, heat, and physical disturbance as much as possible.

Due to the nature of the sediments, the recovery within the core tube may not be uniform throughout the core sample. Compaction of the sediment core can occur in cohesionless or saturated sediment. The friction within the core barrel increases with penetration and the length of the sample present in the core tube. Compaction causes the recovered sediments to

be under-represented in the recovered core sample. Care will be taken to note and identify areas where compaction may have occurred. Sediment collected from greater than 4 feet below mudline will be archived in accordance with Technical Holding Times for the chemicals of concern or up to 60 days from the date the samples were collected, whichever comes first.

Once sampling is complete, the station number, station coordinates, date and time of collection, field crew, and weather conditions will be recorded in the field log. If the cores are transported to remote facility for processing, they will be stored at 4 degrees Celsius (^{o}C).

Core Logging

Vibracores are planned for this sampling event; if cores are collected, each core section will be inspected and described prior to sampling and homogenizing. For each core sample, the following data shall be recorded on the core log:

- Core penetration
- Sample recovery
- Sample depth interval
- Physical soil description (including soil type, density/consistency of soil, and color) using the Unified Soil Classification System (USCS) description
- Odor (e.g., hydrogen sulfide, petroleum products)
- Visual stratification and lenses
- Vegetation
- Debris
- Biological activity (e.g., detritus, shells, tubes, bioturbation, live/dead organisms)
- Presence of oil sheen
- Any other distinguishing characteristics or features
- Sediment core coordinates (using a field hand-held GPS with accuracy within 2 meters)
- Water depth at each sampling station (the depth will be referenced to mean lower low water—MLLW NAD 1983), through the use of on-site tide gauge

Field Compositing

With the exception of volatile organic compounds (VOCs) and total sulfides, composites for each chemical and conventional analysis will be collected and homogenized in the field in decontaminated stainless steel bowls. Samples for chemical analysis for VOCs and total sulfides will be collected as discrete samples, and all other chemical and physical analyses will be collected as composites over the applicable sample depth interval. Sediment samples will be collected at sample depth intervals 0 to 2, 2 to 4, and 4 to 6 feet below the mudline. Only samples collected from 0 to 2 and 2 to 4 feet will be analyzed for COPCs. The sample collected from 4 to 6 feet will be frozen and archived at the laboratory. Sediment samples will be

transferred to preconditioned sterilized jars supplied by the laboratory, transferred to an ice chest, chilled, and transferred to the laboratory under standard chain-of-custody protocols. The proposed chemical analyses for each sediment sample are presented in Table 1. The proposed preservation and holding times for each analyte are presented in Table 1.

The procedure for homogenizing the composite samples is as follows: equal portions of each sample will be placed in a clean stainless steel bowl and mixed. After mixing, the sample will be placed on a clean surface and quartered. Equal material from two opposing quarters will be placed in a jar and the other two quarters in a second jar. At the laboratory, the sample to be analyzed should be mixed and placed on a clean surface and a pie-shaped segment should be selected for analysis. This assures that settling during shipment and storage does not affect the segment analyzed.

River Bank Sampling

River bank samples will be collected from six stations at the site at low tide. The samples will be identified as RB-6 through RB-11 (Figure 2). Up to two discrete river bank sediment samples will be collected from approximately the upper and lower parts of the river bank, as practicable. The upper river bank sample will be collected from near the top of the bank; the lower river bank sample will be collected between the top of the bank and mean higher high water level (MHHW, approximately 8 feet above the NAVD 1988). The location of a river bank sample may be modified in the field depending on access to the sampling location. A sample location may also be modified to collect a sample from apparent contamination in the bank.

The river banks sample locations will be as follows:

- River bank sample RB-6 will be located at the river bank down river and proximate to the South Michigan Street CSO and adjacent to Out3.
- River bank sample RB-7 will be located at the river bank proximate to the South Dock and Out1.
- River bank sample RB-8 will be located at river bank proximate to the Middle Dock.
- River bank sample RB-9 will be located between the Middle and North Dock.
- River bank sample RB-10 will be located adjacent to the North Dock.
- River bank sample RB-11 will be located in the parcel occupied by Samson Tug and Barge.

River bank sampling procedures are as follows:

- River bank samples will be collected at a depth of approximately 6 inches below the face of the bank.
- Information logged during river bank sampling will include at a minimum: sample depth, USCS description, estimated moisture content, and physical indications of contamination (e.g., odors, staining).

- The river bank samples will be transferred to preconditioned sterilized jars supplied by the laboratory, transferred to an ice chest, chilled, and transferred to the laboratory under standard chain-of-custody protocols. The proposed chemical analyses for each sediment sample are presented in Table 1.
- River bank samples will be labeled with the sample number, date, time of collection, and depth. The station number, station coordinates, date and time of collection, field crew identification, and weather conditions will be recorded in the field log.
- Sampling coordinates will be recorded in the field with a hand-held GPS with accuracy within 2 meters. Sample depths will be measured manually.

Seep Sampling

Seep samples will be collected at low tide. The frequency and location of seep samples will be based on the findings from a previous site reconnaissance and seep access. Seep sampling procedures are as follows:

- Seep samples will be collected using a funnel or a peristaltic pump with attached dedicated disposable tubing. The proposed chemical analyses for each seep sample are presented in Table 1.
- Field water quality parameters (temperature, conductivity, turbidity, dissolved oxygen, pH, salinity, and oxidation-reduction potential) will be collected, if possible, from the seep prior to collecting the sample. Water quality parameters will also be collected from the adjacent surface water at the time of sampling each seep.
- Samples will be placed into preconditioned sterilized jars and/or vials supplied by the laboratory, transferred to an ice chest, chilled, and transferred to the laboratory under standard chain-of-custody protocols for analysis. The proposed preservation and holding times for each analyte are presented in Table 1.
- Seep samples will be labeled with the station number, date, time of collection, and height collected above/or below MHHW. The station number, station coordinates, date and time of collection, field crew identification, and weather conditions will be recorded in the field log.
- Sampling coordinates at the proposed sampling areas will be recorded in the field with a hand-held GPS with accuracy within 2 meters. Sample depths will be measured manually.

Upland Sampling Program

The upland sampling program will include advancing borings, installing groundwater monitoring wells, and collecting soil, groundwater, and reconnaissance groundwater samples. The proposed sample locations are shown on Figure 2. A detailed discussion of the uplands sampling program is presented below.

Soil Borings

A total of 9 direct-push borings and 15 hollow-stem auger borings will be advanced at the site (Figure 2). The hollow-stem augers borings will be converted to groundwater monitoring wells: 12 Shallow Zone monitoring wells and 3 Deep Zone groundwater monitoring wells. The direct-push boring and monitoring well locations are shown on Figure 2. Soil and groundwater sampling procedures and the design and installation of groundwater monitoring wells are discussed below.

Soil Sampling

Prior to drilling, SoundEarth will contact the public utility location service and contract with a private utility location service to clear the proposed boring locations. The boring locations may be modified in the field based on the presence of existing structures, aboveground utilities, and subsurface utilities, as well as field observations made during drilling activities. Soil sampling procedures are as follows:

- Discrete soil samples will be collected from direct-push borings and hollow-stem auger borings on approximately 2.0-foot and 2.5-foot sample depth intervals, respectively. Three soil samples will be collected from each boring for chemical analyses. The proposed sample depths and chemical analyses for each soil sample are presented in Table 1.
- Soil will be logged under the supervision of a Washington State licensed geologist in accordance with the USCS, monitored for volatile organic vapor content using a photoionization detector, and observed for evidence of contamination (e.g., odor, sheen, staining).
- Soil samples will be transferred to preconditioned sterilized jars supplied by the laboratory, transferred to an ice chest, chilled, and transferred to the laboratory under standard chain-of-custody protocols. The proposed preservation and holding times for each analyte are presented in Table 1.
- Investigation-derived wastes will be placed into appropriately labeled 55-gallon drums approved by the U.S. Department of Transportation and temporarily stored on the site. Analytical results from the soil samples will be used to develop a waste profile for disposal of investigation-derived waste. Investigation-derived waste will be disposed of at a frequency of 90 days or less after the date the waste was generated.

The specific depth of samples collected for chemical analysis will be determined in the field and based on soil texture, the depth of the contact between the fill and native soil, depth to groundwater, and/or field screen measurements. The borings and monitoring wells will be located using a GPS and coordinates will be recorded with accuracy within 2 meters. All soil samples collected but not analyzed for chemicals of concern will be archived in accordance with Technical Holding Times for the chemicals of concern or for up to 60 days from the date the sample was collected, whichever comes first.

Groundwater Monitoring Well Installation

A total of 15 groundwater monitoring wells will be installed at the site (Figure 2) in accordance with the Chapter 173-160 Washington Administrative Code (WAC 173-160) guidance *Minimum Standards for Construction and Maintenance of Wells*. The Shallow and Deep Zone groundwater monitoring wells will be installed as follows:

- Shallow Zone and Deep Zone groundwater monitoring wells will be screened between approximately 5 and 15 feet bgs (MW5 to MW16) and 15 and 30 feet bgs (MW9D, MW10D, and MW12D), respectively. If a confining layer separates the Shallow and Deep Zone groundwater, the bottom of Shallow Zone groundwater monitoring well will be installed just above the confining layer. The top of the Deep Zone groundwater monitoring well screen should be below bottom of the confining layer.
- The monitoring wells will be constructed of schedule 40, 2-inch-diameter, PVC pipe with a 0.010-inch slotted well screen. The annular space around the well screens will be backfilled with pre-washed 2/12 silica sand. Bentonite chips will fill the annular space above the sand pack. Each monitoring well will be fitted with a steel, truck-rated, flush-mounted monument.
- Each monitoring well will be developed after stabilizing using a combination of surging and bailing until approximately 10 submerged casing volumes of water have been removed from the well, and/or the amount of fine-grained sediment in the extracted water has stabilized or the development water is visually clear, whichever comes first.
- The locations and elevations of the new and existing monitoring wells will be surveyed by a licensed surveyor.

Groundwater Sampling Procedures

Groundwater samples will be collected from existing and new Shallow Zone and Deep Zone groundwater monitoring wells. Sampling procedures for collecting performance and confirmation groundwater sampling activities will be as follows:

- The cap for each monitoring well will be removed 15 minutes prior to sampling to allow equilibration between the groundwater and the ambient air.
- The depth to the top of the groundwater table in each monitoring well will be measured to an accuracy of 0.01 feet using an electronic water level meter.
- The monitoring wells will be sampled using low-flow techniques to minimize volatilization of contaminants. A peristaltic pump or bladder pump with dedicated polyethylene tubing will be used to purge groundwater from each monitoring well at rates ranging from 100 to 500 milliliters per minute. Field analysis of pH, temperature, conductivity, dissolved oxygen, and oxidation-reduction potential will be monitored and recorded during purging to evaluate aquifer stabilization. The groundwater monitoring wells will be purged until water quality parameters indicate stability or 3 casing volumes of groundwater have been removed.

- The pump intake will be placed approximately at the middle of the monitoring well screen when the well screen is fully submerged. If the water level is below the screen top, the pump intake will be placed 2 to 3 feet below the water surface.
- Groundwater samples will be collected from the discharge tubing of each monitoring well and decanted directly into laboratory-prepared sample containers. Groundwater samples collected for dissolved metals will be collected using a 0.45 micron filter attached to end of the discharge tube.
- Groundwater samples will be labeled, placed on ice in a cooler, and submitted for chemical analyses to the analytical laboratory. Sample containers will be labeled with the following information: client, project name and number, date and time sampled, and sample identification. The proposed chemical analyses for each groundwater sample are presented in Table 1.
- Samples will be logged on a Sample Chain of Custody form and placed in a chilled cooler at less than or equal to 4 ^{o}C for transport to the laboratory while maintaining standard chain-of-custody protocols. The proposed preservation and holding times for each analyte are presented in Table 1.
- A duplicate groundwater sample will be used as field quality assurance/quality control (QA/QC) samples.

Groundwater samples will be collected at low tide. Groundwater samples will be collected from each groundwater monitoring well for up to two quarters. Additional groundwater sampling may be planned with consultation from Ecology.

Catch Basin Sampling

Sediment will be collected from stormwater catch basins CB03, CB04, CB05, and CB12 (Figure 2). Catch basin sampling procedures are as follows:

- The dimensions of the catch basin will be recorded; the inlet/outlet pipes in the catch basin, the source of inlet flow, and destination of the outlet flows will be diagramed.
- The presence of water, viable flows, signs of flooding, clogging, debris in and around the catch basin, blocked inlets/outlets, staining, odor, sheen, and discoloration will be recorded.
- The depth of sediments in the catch basin and the total depth of the catch basin will be recorded. A decontaminated pole or rod will be used to probe the total depth.
- A sample of the sediments will be collected using a decontaminated stainless steel spoon and/or stainless steel hand auger and the texture of the solid will be recorded using the USCS. Aliquots of sediment will be collected from the each corner and center of the basin. The proposed chemical analyses for each catch basin sample are presented in Table 1.
- With exception of volatile organics, which will be collected as discrete samples, aliquots of sediment will be composited in stainless steel bow. Samples will be

placed into precondition sterilized jars and/or vials supplied by the laboratory, placed on ice in a cooler, and transferred to the laboratory under standard chain-of-custody protocols for analysis. The proposed preservation and holding times for each analyte are presented in Table 1.

- The catch basin coordinates will be recorded with a hand-held GPS with accuracy within 2 meters.

Stormwater Sampling

Stormwater samples will be collected five times over the duration of the RI by Lean Environment. Untreated stormwater influent sample will be collected from the Stormwater Collection Sump (SWC1). A treated effluent sample will be collected from OUT1. Stormwater sampling procedures are as follows:

- A stormwater grab sample will be collected from SWC1. The grab sample will be collected by immersion of a 1-liter glass jar to a depth of at least 6 inches below the water surface of the sump and transferred to sample bottles by pouring directly into the appropriate laboratory-supplied container. Samples will be collected while trying to minimize disturbance of sediments that may be present in the sump. The 1-liter glass vessel may be attached to a sample pole or similar device to safely reach the water surface. The primary sample jar may be re-immersed, as necessary, until all required vessels are filled to the top, closed, and sealed. Samples for analysis of diesel-range petroleum hydrocarbons (DRPH), oil-range petroleum hydrocarbons (ORPH), and VOCs will be collected directly into the applicable laboratory-supplied bottles. The proposed chemical analyses for each stormwater sample are presented in Table 1.
- A stormwater grab sample will be collected from OUT1 by placing a 1-liter glass jar just below the outfall terminus on the river bank. Samples will be collected only when the surface of the river is a minimum of 1 foot below the bottom of the outfall pipe. The 1-liter glass vessel may be attached to a sample pole or similar device to safely reach the water discharge location. Procedures are then identical to the grab samples. Samples collected for analysis of DRPH, ORPH, and VOCs will be collected directly into the applicable laboratory-supplied bottles. The proposed chemical analyses for each stormwater sample are presented in Table 1.
- All samples will be transferred to the appropriate containers as quickly as possible, and labeled to include location, time, and approximate flow rate. Samples will then be transferred to an ice chest, chilled, and transferred to the laboratory under standard chain-of-custody protocols. The proposed preservation and holding times for each analyte are presented in Table 1.

Tidal Influence Study

The objective of the proposed tidal influence study is to evaluate the effects of tidal fluctuations on groundwater flow within Shallow Zone and Deep Zone groundwater. Tidal fluctuations influence near-shore groundwater elevations, thereby affecting groundwater flow directions throughout the tidal cycle. The results of the tidal influence study will also be used to evaluate

tidal lag times across the site, thereby identifying the time period for sampling individual wells with respect to rising tide and falling tide groundwater elevations. In addition, gaining an understanding of groundwater elevations during high tides will assist with evaluating any potential water quality impacts with respect to the existing stormwater collection and conveyance system and associated catch-basins.

The tidal influence study will be completed over a 72-hour period that includes larger tidal fluctuations of at least 10 feet. Downhole pressure transducers/data loggers will be used to record water levels in selected wells and in a temporary Duwamish River stilling well. Pressure transducers/data loggers will be placed in a total of 12 monitoring wells completed in the two water-bearing zones as listed below:

- Shallow Zone Wells: MW2, MW5, MW7, MW10, MW12, MW13
- Deep Zone Wells: MW-1D, MW-2D, MW-3D, MW-4D, MW10D, MW12D

The wells listed above were selected to provide an array of locations across the site at varying distances from the shoreline. Obtaining information from the newly proposed borings and monitoring wells might result in the need to adjust the list of wells for the tidal influence study. In addition, some modifications to the array might be needed due to site operations resulting in either well access issues or imposing unacceptable risks to the data logger equipment during the tidal study. Any modifications to the well array will be done in consultation with Ecology prior to starting the tidal study.

A pressure transducer/data logger will be placed in a temporary stilling well that will be attached at a suitable location along one of the existing docks to measure the Duwamish River tide levels. A reference elevation for the stilling well location will be included in the survey for the proposed wells. A barometric sensor will also be placed at a secure location on the site to measure and record barometric fluctuations during the tidal study. All of the data loggers will be programmed to record pressure readings (water levels) at 15-minute intervals during the 72-hour study period.

Manual water levels will be measured in the wells at the beginning and end of the 72-hour study to convert the pressure transducer readings to groundwater elevations, and to confirm that each transducer remained at a fixed depth in the well. Manual water levels will be measured in all of the remaining monitoring wells to provide two complete sets of synoptic groundwater elevations at the beginning and end of the tidal study.

SAMPLE DESIGNATION

Each sample collected during the RI will be assigned a unique sample identifier and number. The sample identifier and number will be filled out in indelible ink on the sample labels and the labels affixed to appropriate containers immediately prior to sample collection. In addition to the sample identifier and number, the sample labels will include the following information: client name, project name and number, and date and time of sample collection. A Sample Summary form will be maintained as each sample is collected; the form will include the sample location and depth, sample number and identifier, and other observations regarding the sample. The sample designation procedures for groundwater

samples collected during the cleanup action are detailed below. The Sample Summary Form is included in Appendix A of the SAP.

River Bank Samples

River bank samples will be assigned a unique sample identifier that will include the components listed below:

- The river bank identification (e.g., RB1)
- Height above MHHW
- Date sample collected September 10, 2013 (e.g., 20130910)

For example, river bank sample RB1 collected at a depth of 6 feet above MHHW on September 10, 2013, would be labeled "RB1-06-20130910." The sample identification will be recorded on the sample label, Field Report, Sample Summary form, Riverbank Sample form, and Sample Chain of Custody forms.

Seep Samples

Seep samples will be assigned a unique sample identifier that will include the components listed below:

- The seep sample identification (e.g., SEEP02)
- Height above mudline in feet (e.g., 06)
- Date sample collected (e.g., 20130910)

For example, seep sample SEEP02 collected 6 feet above mudline on September 10, 2013, would be labeled "SEEP02-06-20130910." The sample identification will be recorded on the sample label, Field Report, Sample Summary form, Seep Sample form, and Sample Chain of Custody forms.

Sediment Samples

Two samples will be collected from each core for chemical and conventional analysis. Sample identification shall use the following convention:

- The core identification (e.g., SED01)
- The depth range of the sample below mudline (e.g., 2-4)
- The sample date collected (e.g., 20130910)

For example, sediment sample SED01 collected at a depth of between 2 to 4 feet below mudline on July 10, 2012, would be labeled "SED01-2-4-20130910". The sample identification will be recorded on the sample label, Field Report, Sample Summary form, Sediment Core Processing Log, Sediment Core Collection Log, and Sample Chain of Custody forms.

Soil Boring Samples

Soil samples collected from the borings will be assigned a unique sample identifier that will include the components listed below:

- The boring identification (e.g., SB01)

- The depth in feet bgs (e.g., 06)
- Date sample collected (e.g., 20130910)

For example, a soil sample collected from the boring SB01 at a depth of 6 feet bgs on September 10, 2013, would be labeled "SB01-06-20130910." The sample identification will be recorded on the sample label, Field Report, Sample Summary form, Boring Log, and Sample Chain of Custody forms.

Catch Basin Samples

Catch basin samples collected from the catch basin will be assigned a unique sample identifier that will include the components listed below:

- The catch basin identification (e.g., CB01)
- Date sample collected (e.g., 20130910)

For example, a catch basin sample collected from the boring CB01 on September 10, 2013, would be labeled "CB01-20130910." The sample identification will be recorded on the sample label, Field Report, Sample Summary form, Catch Basin Sample form, and Sample Chain of Custody forms.

Groundwater Samples

Groundwater well samples collected from the monitoring wells will be assigned a unique sample identifier that will include the components listed below:

- The well identification (e.g., MW-5D)
- Date sample collected (e.g., 20130910)

For example, a groundwater sample collected from the monitoring well MW-5D on September 10, 2013, would be labeled "MW-5D-20130910." The sample identification will be recorded on the sample label, Field Report, Sample Summary form, and Sample Chain of Custody forms. Duplicate samples will be identified by replacing the monitoring well ID with "FD" and noting duplicate sample information on the Groundwater Purge and Sample Form (e.g., FD-20130910). Groundwater samples collected for dissolved metals will be identified by adding "FF" to the sample ID, noting filtered sample information on the Groundwater and Purge and Sample Form (e.g., MW-5DFF-20130910).

Stormwater Samples

Stormwater samples will be assigned a unique sample identifier that will include the components listed below:

- The sample location identification (e.g., OUT1, SWC1)
- Estimated flow rate, in gallons per minute (gpm), during the sample event (e.g., 100 gpm)
- Date sample collected (e.g., 20130910)

For example, stormwater sampled at SWC1 collected at a flow rate of 100 gpm on September 10, 2013, would be labeled "SWC1-100gpm-20130910." The sample identification will be recorded on the sample label, Field Report, Stormwater Sample form, and Sample Chain of Custody forms.

DECONTAMINATION PROCEDURES

Decontamination procedures for field sampling equipment used onshore and offshore will include scrubbing the equipment with a brush and phosphate-free detergent solution (e.g., Alconox) with deionized water. Decontaminated sampling equipment used for offshore samples will be wrapped in aluminum foil or stored in sealed containers when not in use. Samples from each solid media of concern collected for chemical analyses will be collected away from the surfaces of the sampling device, thus minimizing the possibility of contaminating a sample with any residues left on the sampling device from earlier sampling.

LABORATORY ANALYSES

Friedman & Bruya, Inc. (F&B) of Seattle, Washington, has been selected as the laboratory to conduct the analysis of samples collected for the RI. F&B is certified by Ecology and meets the QA/QC requirements of Ecology and the U.S Environmental Protection Agency (EPA). A copy of the laboratory quality assurance manuals for F&B is on file at SoundEarth's offices for review and reference and will be followed throughout the cleanup action. Information relating to laboratory personnel and equipment and records pertaining to sample collection, transportation, and analysis are also available.

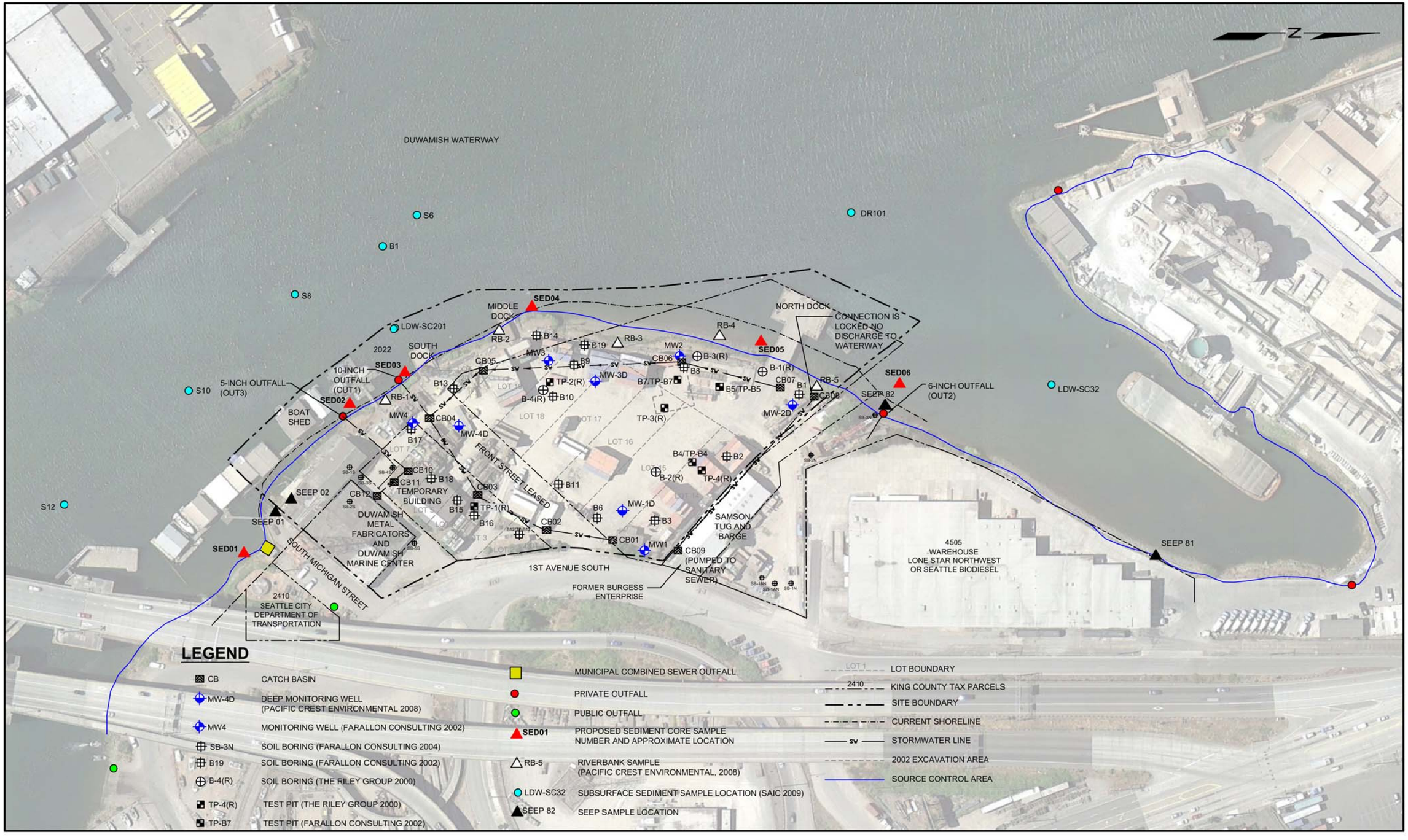
Laboratory testing for chemical analyses of soil and groundwater will be conducted in accordance with applicable EPA 2007 guidance *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (publication SW-846). Laboratory testing for river bank, catch basin, and sediment will include both chemical and conventional analyses and will be conducted in accordance with the *Sediment Evaluation Framework for the Pacific Northwest,* prepared by the Regional Sediment Evaluation Team and dated May 2009. The laboratory reporting limits for chemical analyses for the media of concern are presented in Tables 2 through 4. Laboratory control limits for the chemical analyses are presented in Table 5. Laboratory preservation types are outlined on Table 1.

Attachments: Figure 1, Map showing Proposed Sediment Sampling Locations
Figure 2, Map Showing Proposed Soil, Groundwater, Catch Basin, and River Bank Sample Locations
Table 1, Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Table 2, Laboratory Reporting Limits for Soil
Table 3, Laboratory Reporting Limits for Groundwater
Table 4, Laboratory Reporting Limits for Sediment
Table 5, Laboratory Control Limits
A, Draft Remedial Investigation/Feasibility Study Work Plan Comments from Washington State Department of Ecology, dated May 2, 2013
B, Response to Comments from Tom Cammarata to Victoria Sutton, dated October 2, 2013

cc: James Gilmur
Steve Plowman

JAB/TJC:dnm/amr

FIGURES



LEGEND

CB	CATCH BASIN
MW-4D	DEEP MONITORING WELL (PACIFIC CREST ENVIRONMENTAL 2008)
MW4	MONITORING WELL (FARALLON CONSULTING 2002)
SB-3N	SOIL BORING (FARALLON CONSULTING 2004)
B19	SOIL BORING (FARALLON CONSULTING 2002)
B-4(R)	SOIL BORING (THE RILEY GROUP 2000)
TP-4(R)	TEST PIT (THE RILEY GROUP 2000)
TP-B7	TEST PIT (FARALLON CONSULTING 2002)
	MUNICIPAL COMBINED SEWER OUTFALL
	PRIVATE OUTFALL
	PUBLIC OUTFALL
SED01	PROPOSED SEDIMENT CORE SAMPLE NUMBER AND APPROXIMATE LOCATION
RB-5	RIVERBANK SAMPLE (PACIFIC CREST ENVIRONMENTAL, 2008)
LDW-SC32	SUBSURFACE SEDIMENT SAMPLE LOCATION (SAIC 2009)
SEEP 82	SEEP SAMPLE LOCATION
LOT 1	LOT BOUNDARY
2410	KING COUNTY TAX PARCELS
	SITE BOUNDARY
	CURRENT SHORELINE
SV	STORMWATER LINE
	2002 EXCAVATION AREA
	SOURCE CONTROL AREA

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 05/07/12
DRAWN BY: BLR/JQC
CHECKED BY: CCC
CAD FILE: 0826-001_2013MEMO_SED-PSED

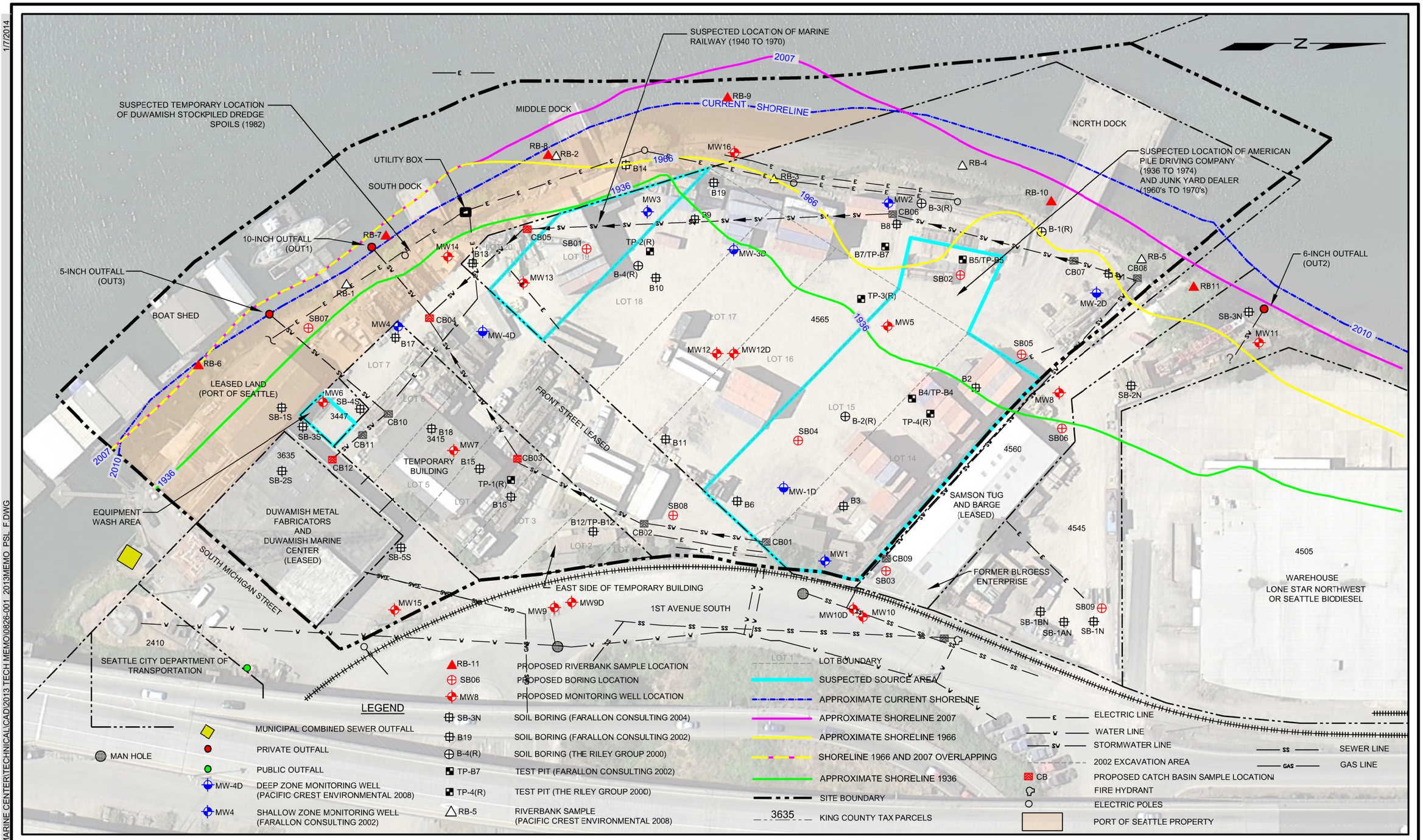
PROJECT NAME: DUWAMISH MARINE CENTER
PROJECT NUMBER: 0826-001-02
STREET ADDRESS: 6365 FIRST AVENUE SOUTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 65 130 260
APPROXIMATE SCALE IN FEET

FIGURE 1
MAP SHOWING PROPOSED SEDIMENT SAMPLING LOCATIONS

9/30/2013
P:\0826 DUWAMISH MARINE CENTER\TECHNICAL\CAD\2013 TECH MEMO\0826-001_2013MEMO_SED-PSED_F.DWG
WWW.SOUNDEARTHINC.COM



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 08/09/13
DRAWN BY: BLR/JQC
CHECKED BY: TC
CAD FILE: 0826-001_2013MEMO-PSL_F

PROJECT NAME: DUWAMISH MARINE CENTER
PROJECT NUMBER: 0826-001-02
STREET ADDRESS: 6365 FIRST AVENUE SOUTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 35 70 140
APPROXIMATE SCALE IN FEET

FIGURE 2
MAP SHOWING PROPOSED SOIL, GROUNDWATER, CATCH BASIN, AND RIVER BANK SAMPLE LOCATIONS

1/7/2014
P:\0826 DUWAMISH MARINE CENTER\TECHNICAL\CAD\2013 TECH MEMO\0826-001 2013MEMO PSL F.DWG
WWW.SOUNDEARTHINC.COM

TABLES

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Soil														
Direct-Push Borings	SB01	Shallow	SB01-vadose	Vadose Zone	20	Analyzed	Near suspected location of Marine Railway (1940–1970)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB01-interface	Soil-Water Interface		Analyzed								
			SB01-saturated	Saturated Zone		Analyzed								
	SB02	Shallow	SB02-vadose	Vadose Zone	20	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB02-interface	Soil-Water Interface		Analyzed								
			SB02-saturated	Saturated Zone		Analyzed								
	SB03	Shallow and Deep	SB03-vadose	Vadose Zone	30	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB03-interface	Soil-Water Interface		Analyzed								
			SB03-saturated	Saturated Zone		Analyzed								
	SB04	Shallow	SB04-vadose	Vadose Zone	20	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB04-interface	Soil-Water Interface		Analyzed								
			SB04-saturated	Saturated Zone		Analyzed								
	SB05	Shallow and Deep	SB05-vadose	Vadose Zone	30	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB05-interface	Soil-Water Interface		Analyzed								
			SB05-saturated	Saturated Zone		Analyzed								
	SB06	Shallow	SB06-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB06-interface	Soil-Water Interface		Analyzed								
			SB06-saturated	Saturated Zone		Analyzed								
	SB07	Shallow	SB07-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB07-interface	Soil-Water Interface		Analyzed								
			SB07-saturated	Saturated Zone		Analyzed								

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Soil (Continued)														
Direct-Push Borings (continued)	SB08	Shallow	SB08-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB08-interface	Soil-Water Interface		Analyzed								
			SB108-saturated	Saturated Zone		Analyzed								
	SB09	Shallow	SB09-vadose	Vadose Zone	20	Analyzed	Near Warehouse Lone Star Northwest or Seattle Biodiesel	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			SB09-interface	Soil-Water Interface		Analyzed								
			SB09-saturated	Saturated Zone		Analyzed								
Hollow-Stem Auger	MW5	Shallow and Deep	MW5-vadose	Vadose Zone	30	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW5-interface	Soil-Water Interface		Analyzed								
			MW5-saturated	Saturated Zone		Analyzed								
	MW6	Shallow	MW6-vadose	Vadose Zone	20	Analyzed	Near Equipment Wash Area	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW6-interface	Soil-Water Interface		Analyzed								
			MW6-saturated	Saturated Zone		Analyzed								
	MW7	Shallow	MW7-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW7-interface	Soil-Water Interface		Analyzed								
			MW7-saturated	Saturated Zone		Analyzed								
	MW8	Shallow	MW8-vadose	Vadose Zone	30	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW8-interface	Soil-Water Interface		Analyzed								
			MW8-saturated	Saturated Zone		Analyzed								
	MW9	Shallow	MW9-vadose	Vadose Zone	20	Analyzed	Near East Side of Temporary Building on 1st Avenue South	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW9-interface	Soil-Water Interface		Analyzed								
			MW9-saturated	Saturated Zone		Analyzed								
	MW9D	Deep	MW9D-vadose	Vadose Zone	30	Analyzed	Near East Side of Temporary Building on 1st Avenue South	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW9D-interface	Soil-Water Interface		Analyzed								
			MW9D-saturated	Saturated Zone		Analyzed								

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Soil (Continued)														
Hollow-Stem Auger (continued)	MW10	Shallow	MW10-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW10-interface	Soil-Water Interface		Analyzed								
			MW10-saturated	Saturated Zone		Analyzed								
	MW10D	Deep	MW10D-vadose	Vadose Zone	30	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW10D-interface	Soil-Water Interface		Analyzed								
			MW10D-saturated	Saturated Zone		Analyzed								
	MW11	Shallow	MW11-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW11-interface	Soil-Water Interface		Analyzed								
			MW11-saturated	Saturated Zone		Analyzed								
	MW12	Shallow	MW12-vadose	Vadose Zone	20	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW12-interface	Soil-Water Interface		Analyzed								
			MW12-saturated	Saturated Zone		Analyzed								
	MW12D	Deep	MW12D-vadose	Vadose Zone	20	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW12D-interface	Soil-Water Interface		Analyzed								
			MW12D-saturated	Saturated Zone		Analyzed								
	MW13	Shallow	MW13-vadose	Vadose Zone	20	Analyzed	Near suspected location of marine railway (1940–1970)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW13-interface	Soil-Water Interface		Analyzed								
			MW13-saturated	Saturated Zone		Analyzed								
	MW14	Shallow	MW14-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW14-interface	Soil-Water Interface		Analyzed								
			MW14-saturated	Saturated Zone		Analyzed								
	MW15	Shallow	MW15-vadose	Vadose Zone	20	Analyzed	Near Duwamish Metal Fabricators and Duwamish Marine Center (Leased)	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW15-interface	Soil-Water Interface		Analyzed								
			MW15-saturated	Saturated Zone		Analyzed								
	MW16	Shallow	MW16-vadose	Vadose Zone	20	Analyzed	Additional Characterization Required to Fill Data Gap	3	No	PCBs VOCs SVOCs Metals[1] DRPH & ORPH GRPH	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar Two 40 mL glass VOAs	4°C 4°C 4°C 4°C 4°C 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 14 days
			MW16-interface	Soil-Water Interface		Analyzed								
			MW16-saturated	Saturated Zone		Analyzed								

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
River Bank Sediment														
River Bank	RB6	NA	RB6-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB6-02	Between the top of the bank and MLLW										
	RB7	NA	RB7-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB7-02	Between the top of the bank and MLLW										
	RB8	NA	RB8-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB8-02	Between the top of the bank and MLLW										
	RB9	NA	RB9-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB9-02	Between the top of the bank and MLLW										
	RB10	NA	RB10-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB10-02	Between the top of the bank and MLLW										
	RB11	NA	RB11-01	Near top of the bank	TBD	Analyzed	Additional Characterization Required to Fill Data Gap	2	No	PCBs VOCs SVOCs Metals[(1)] DRPH & ORPH Total Organic Carbon	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8 /1631 8015M/NWTPH-Dx EPA 9060	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze	14 days 14 days 14 days 6 months, 28 days for Hg 14 days 6 months
			RB11-02	Between the top of the bank and MLLW										
Sediment														
Intertidal Zone	SED01	Shallow	SED01-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[(1)] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED01-04	4 feet below mudline		Analyzed								
			SED01-06	6 feet below mudline		Archived								
	SED02	Shallow	SED02-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[(1)] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED02-04	4 feet below mudline		Analyzed								
			SED02-06	6 feet below mudline		Archived								

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Sediment														
Intertidal Zone (continued)	SED03	Shallow	SED03-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[1] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED03-04	4 feet below mudline		Analyzed								
			SED03-06	6 feet below mudline		Archived								
	SED04	Shallow	SED04-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[1] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED04-04	4 feet below mudline		Analyzed								
			SED04-06	6 feet below mudline		Archived								
	SED05	Shallow	SED05-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[1] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED05-04	4 feet below mudline		Analyzed								
			SED05-06	6 feet below mudline		Archived								
	SED06	Shallow	SED06-02	2 feet below mudline	6	Analyzed	Sediments Not Previously Characterized	2	No	PCBs VOCs SVOCs Metals[1] Particle Size Total Volatile Solids Total Sulfides Total Organic Carbon Ammonia	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E ASTM D422 EPA 160.4 PSEP Sulfide EPA 9060 SM 4500-NH3E	4 oz glass jar Two 40 mL glass VOAs 4 oz glass jar 4 oz glass jar Three 8 oz glass jars 4 oz glass jar 2 oz glass with septum 4 oz glass jar 4 oz glass jar	4°C 4°C 4°C 4°C 4°C Freeze 4°C, Zinc Acetate Freeze 4°C	14 days 14 days 14 days 6 months, 28 days for Hg 28 Days 6 months 7 days 6 months 7 days
			SED06-04	4 feet below mudline		Analyzed								
			SED06-06	6 feet below mudline		Archived								

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Catch Basin Sediment														
Catch Basins	CB03	Surface	CB03	Ground Surface	0	Analyzed	Additional Characterization Required to Fill Data Gap	1	No	PCBs	EPA 8082	4 oz glass jar	4°C	14 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C	14 days
										SVOCs	EPA 8270D	4 oz glass jar	4°C	14 days
										Metals[1]	EPA 200.8/1631E	4 oz glass jar	4°C	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	4 oz glass jar	4°C	14 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C	14 days
										Particle Size	ASTM D422	Three 8 oz glass jars	4°C	28 Days
										Total Organic Carbon	EPA 9060	4 oz glass jar	Freeze	6 months
	CB04	Surface	CB04	Ground Surface	0	Analyzed	Additional Characterization Required to Fill Data Gap	1	No	PCBs	EPA 8082	4 oz glass jar	4°C	14 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C	14 days
										SVOCs	EPA 8270D	4 oz glass jar	4°C	14 days
										Metals[1]	EPA 200.8/1631E	4 oz glass jar	4°C	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	4 oz glass jar	4°C	14 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C	14 days
										Particle Size	ASTM D422	Three 8 oz glass jars	4°C	28 Days
										Total Organic Carbon	EPA 9060	4 oz glass jar	Freeze	6 months
	CB05	Surface	CB05	Ground Surface	0	Analyzed	Additional Characterization Required to Fill Data Gap	1	No	PCBs	EPA 8082	4 oz glass jar	4°C	14 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C	14 days
										SVOCs	EPA 8270D	4 oz glass jar	4°C	14 days
										Metals[1]	EPA 200.8/1631E	4 oz glass jar	4°C	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	4 oz glass jar	4°C	14 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C	14 days
										Particle Size	ASTM D422	Three 8 oz glass jars	4°C	28 Days
										Total Organic Carbon	EPA 9060	4 oz glass jar	Freeze	6 months
										TCDD, 2,3,7,8- (dioxin)	EPA 8290	4 oz glass jar	4°C	30 days; 1 year if frozen
	CB12	Surface	CB12	Ground Surface	0	Analyzed	Additional Characterization Required to Fill Data Gap	1	No	PCBs	EPA 8082	4 oz glass jar	4°C	14 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C	14 days
										SVOCs	EPA 8270D	4 oz glass jar	4°C	14 days
										Metals[1]	EPA 200.8/1631E	4 oz glass jar	4°C	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	4 oz glass jar	4°C	14 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C	14 days
										Particle Size	ASTM D422	Three 8 oz glass jars	4°C	28 Days
										Total Organic Carbon	EPA 9060	4 oz glass jar	Freeze	6 months
Seep Water														
Seep	SEEP01	Shallow	SEEP01	Ground Surface	0	Analyzed	Seeps Not Previously Characterized	1[2]	No	PCBs	EPA 8082	1 L glass amber	4°C	7 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C/none & HCl(3)	7 days
										SVOCs	EPA 8270D	1 L glass amber	4°C	7 days
										Total & Dissolved Metals[1]	EPA 200.8 /1631	500 mL Poly	4°C/HNO_3	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	500 mL glass amber	4°C	7 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C, HCl	14 days
										Chloride	EPA 325.3/SM4500CL	500 mL Poly	4°C	28 days
	SEEP02	Shallow	SEEP02	Ground Surface	0	Analyzed	Seeps Not Previously Characterized	1[2]	No	PCBs	EPA 8082	1 L glass amber	4°C	7 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C/none & HCl(3)	7 days
										SVOCs	EPA 8270D	1 L glass amber	4°C	7 days
										Total & Dissolved Metals[1]	EPA 200.8 /1631	500 mL Poly	4°C/HNO_3	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	500 mL glass amber	4°C	7 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C, HCl	14 days
										Chloride	EPA 325.3/SM4500CL	500 mL Poly	4°C	28 days
	SEEP82	Shallow	SEEP82	Ground Surface	0	Analyzed	Seeps Not Previously Characterized	1[2]	No	PCBs	EPA 8082	1 L glass amber	4°C	7 days
										VOCs	EPA 8260C/5035A	Two 40 mL glass VOAs	4°C/none & HCl(3)	7 days
										SVOCs	EPA 8270D	1 L glass amber	4°C	7 days
										Total & Dissolved Metals[1]	EPA 200.8 /1631	500 mL Poly	4°C/HNO_3	6 months, 28 days for Hg
										DRPH & ORPH	8015M/NWTPH-Dx	500 mL glass amber	4°C	7 days
										GRPH	8015M/NWTPH-Gx	Two 40 mL glass VOAs	4°C, HCl	14 days
										Chloride	EPA 325.3/SM4500CL	500 mL Poly	4°C	28 days

Table 1
Laboratory Summary Analysis, Analytical Methods, Container,
Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Stormwater														
OutFall	Storm Water Collection Sump	NA	SWC1	NA	NA	Analyzed	Additional Characterization Required to Fill Data Gap	5	No	PCBs VOCs SVOCs Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	7 days 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	Outfall 1	NA	OUT1	NA	NA	Analyzed	Additional Characterization Required to Fill Data Gap	5	No	PCBs VOCs SVOCs Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C/5035A EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	7 days 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
Groundwater														
Monitoring Wells	MW5	Shallow and Deep	MW5	Middle of well screen	30	Analyzed	Near suspected location of American Pile Driving Company (1936–1974) and Junk Yard Dealer (1960s–1970s)	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW6	Shallow	MW6	Middle of well screen	20	Analyzed	Near Equipment Wash Area	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days

Table 1
Laboratory Summary Analysis, Analytical Methods, Container, Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Groundwater														
Monitoring Wells (continued)	MW7	Shallow	MW7	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW8	Shallow	MW8	Middle of well screen	30	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW9	Shallow	MW9	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW9D	Deep	MW9D	Middle of well screen	30	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW10	Shallow	MW10	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW10D	Deep	MW10D	Middle of well screen	30	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW11	Shallow	MW11	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days

Table 1
Laboratory Summary Analysis, Analytical Methods, Container,
Preservation, and Holding Time Requirements
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Sample Type	Sample Location	Water-Bearing Zone	Sample Name (exact sample depths TBD in the field)	Approximate Sample Location	Sample Depth (feet bgs)	Sample to be Analyzed or Archived?	Potential Source or Data Gap Area and Rationale	Total # Samples to be Analyzed	Duplicate Sample	Analyte	Analytical Method	Sample Container	Temperature/ Preservation Material	Analytical Holding Time
Groundwater														
Monitoring Wells (continued)	MW12	Shallow	MW12	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW12D	Deep	MW12D	Middle of well screen	30	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW13	Shallow	MW13	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW14	Shallow	MW14	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW15	Shallow	MW15	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days
	MW16	Shallow	MW16	Middle of well screen	20	Analyzed	Additional Characterization Required to Fill Data Gap	1	Yes	PCBs VOCs SVOCs Total & Dissolved Metals[1] DRPH & ORPH GRPH Total Suspended Solids Chloride	EPA 8082 EPA 8260C EPA 8270D EPA 200.8/1631E 8015M/NWTPH-Dx 8015M/NWTPH-Gx EPA SM2540D EPA 325.3/SM4500CL	1 L glass amber Two 40 mL glass VOAs 1 L glass amber 500 mL Poly w/HNO_3 500 mL glass amber Two 40 mL glass VOAs 500 mL Poly 500 mL Poly	4°C 4°C/none & HCl(3) 4°C 4°C/HNO_3 4°C 4°C, HCl 4°C 4°C	No Holding Time 7 days 7 days 6 months, 28 days for Hg 7 days 14 days 7 days 28 days

NOTES:
[1] Metals include the 13 Priority Pollutant

[2]The actual number of seep samples to be collected is unknown at this time.

°C = degrees Celsius
ASTM = American Society for Testing and Materials
bgs = below ground surface
DRPH = diesel-range petroleum hydrocarbons
EPA = U.S. Environmental Protection Agency
GRPH = gasoline-range petroleum hydrocarbons
Hg = mercury
mL = milliliters
MLLW = Mean Lower Low Water
NWTPH = Northwest Total Petroleum Hydrocarbon
ORPH = oil-range petroleum hydrocarbons
oz - ounce(s)
PCB = polychlorinated biphenyl
PSEP = Puget Sound environmental protocols
SM = Standard Method
SVOC = semivolatile organic compound
TBD = to be determined
TCDD = tetrachlorodibenzodioxin
VOA = volatile organic analysis
VOC = volatile organic compound

SoundEarth Strategies

Table 2
Laboratory Reporting Limits for Soil
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Report Limit (mg/kg)
VOCs, SVOCs, and PCBs				
Acetone	EPA 8260C/5035A	510	0.105	0.5
Benzene	EPA 8260C/5035A	0.093	0.007	0.03
Bromobenzene	EPA 8260C/5035A	--	0.006	0.05
Bromodichloromethane	EPA 8260C/5035A	0.0886	0.012	0.05
Bromoform	EPA 8260C/5035A	0.918	0.017	0.05
Bromomethane	EPA 8260C/5035A	--	0.017	0.5
Butanone, 2- (methyl-ethyl ketone)	EPA 8260C/5035A	--	0.07	0.5
Butylbenzene, sec-	EPA 8260C/5035A	--	0.007	0.05
Butylbenzene, tert-	EPA 8260C/5035A	--	0.011	0.05
Carbon disulfide	EPA 8260C/5035A	75	N/A*	3
Carbon tetrachloride	EPA 8260C/5035A	0.021	0.013	0.05
Chlorobenzene	EPA 8260C/5035A	26	0.011	0.05
Chloroethane	EPA 8260C/5035A	280	0.012	0.5
Chloroform (Trichloromethane)	EPA 8260C/5035A	0.2	0.009	0.05
Chloromethane	EPA 8260C/5035A	0.09	0.013	0.5
Chlorotoluene, 2-	EPA 8260C/5035A	160	0.008	0.05
Chlorotoluene, 4-	EPA 8260C/5035A	400	0.009	0.05
Dibromo-3-chloropropane, 1,2-	EPA 8260C/5035A	--	0.04	0.5
Dibromochloromethane	EPA 8260C/5035A	--	0.013	0.05
Dibromoethane, 1,2- (EDB)	EPA 8260C/5035A	--	0.015	0.05
Dibromomethane	EPA 8260C/5035A	--	0.011	0.05
Dichlorobenzene, 1,2-	EPA 8260C/5035A	68	0.008	0.05
Dichlorobenzene, 1,3-	EPA 8260C/5035A	0.28	0.01	0.05
Dichlorobenzene, 1,4-	EPA 8260C/5035A	3.5	0.016	0.05
Dichlorodifluoromethane	EPA 8260C/5035A	--	0.01	0.5
Dichloroethane, 1,1-	EPA 8260C/5035A	0.71	0.008	0.05
Dichloroethane, 1,2- (EDC)	EPA 8260C/5035A	0.07	0.017	0.05
Dichloroethene, 1,1-	EPA 8260C/5035A	0.081	0.013	0.05
Dichloroethene, cis-1,2-	EPA 8260C/5035A	2.6	0.011	0.05
Dichloroethene, trans-1,2-	EPA 8260C/5035A	--	0.012	0.05
Dichloropropane, 1,2-	EPA 8260C/5035A	0.092	0.017	0.05
Dichloropropane, 1,3-	EPA 8260C/5035A	--	0.01	0.05
Dichloropropane, 2,2-	EPA 8260C/5035A	--	0.013	0.05
Dichloropropene, 1,1-	EPA 8260C/5035A	--	0.012	0.05
Dichloropropene, cis-1,3-	EPA 8260C/5035A	--	0.011	0.05
Dichloropropene, trans-1,3-	EPA 8260C/5035A	--	0.007	0.05
Ethylbenzene	EPA 8260C/5035A	0.23	0.007	0.05
Hexachlorobutadiene	EPA 8260C/5035A	0.475	0.02	0.25
Hexanone, 2- (Methyl butyl ketone)	EPA 8260C/5035A	--	0.048	0.5
Isopropylbenzene (Cumene)	EPA 8260C/5035A	--	0.01	0.05
Isopropyltoluene, p-	EPA 8260C/5035A	--	0.006	0.05
Methyl tertiary-butyl ether (MTBE)	EPA 8260C/5035A	--	0.006	0.05
Methyl-2-pentanone, 4- (Isobutyl methyl ketone)	EPA 8260C/5035A	171.2	0.07	0.5
Methylene chloride (dichloromethane)	EPA 8260C/5035A	2.44	0.041	0.5
Propylbenzene, n-	EPA 8260C/5035A	--	0.008	0.05
Styrene (phenylethylene)	EPA 8260C/5035A	300	0.011	0.05
Tetrachloroethane, 1,1,1,2-	EPA 8260C/5035A	--	0.014	0.05
Tetrachloroethane, 1,1,2,2-	EPA 8260C/5035A	0.013	0.018	0.05
Tetrachloroethene (PCE)	EPA 8260C/5035A	0.26	0.013	0.025

SoundEarth Strategies

Table 2
Laboratory Reporting Limits for Soil
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Report Limit (mg/kg)
VOCs, SVOCs, and PCBs				
Toluene	EPA 8260C/5035A	101.6	0.008	0.05
Trichlorobenzene, 1,2,3-	EPA 8260C/5035A	--	0.009	0.25
Trichlorobenzene, 1,2,4-	EPA 8260C/5035A	0.08	0.018	0.25
Trichloroethane, 1,1,1-	EPA 8260C/5035A	1,896.8	0.011	0.05
Trichloroethane, 1,1,2-	EPA 8260C/5035A	0.075	0.007	0.05
Trichloroethene (TCE)	EPA 8260C/5035A	0.051	0.017	0.03
Trichlorofluoromethane	EPA 8260C/5035A	--	0.01	0.5
Trichloropropane, 1,2,3-	EPA 8260C/5035A	--	0.011	0.05
Trimethylbenzene, 1,2,4-	EPA 8260C/5035A	--	0.008	0.05
Trimethylbenzene, 1,3,5-	EPA 8260C/5035A	800	0.005	0.05
Vinyl Chloride (chloroethylene)	EPA 8260C/5035A	800	0.008	0.05
Xylenes (dimethylbenzenes)	EPA 8260C/5035A	202.7	0.032	0.15
Xylene, m- & p-	EPA 8260C/5035A	160	0.015	0.1
Xylene, o-	EPA 8260C/5035A	200	0.017	0.05
Naphthalene	EPA 8260C/5035A	1.5	0.012	0.05
Methylnaphthalene, 1-	EPA 8270D SIM	--	0.000088	0.03
Methylnaphthalene, 2-	EPA 8270D SIM	320	0.00013	0.03
Acenaphthene	EPA 8270D SIM	229	0.00007	0.03
Acenaphthylene	EPA 8270D SIM	4.4	0.000046	0.03
Anthracene	EPA 8270D SIM	1,555	0.000044	0.03
Benzo[g,h,i]perylene	EPA 8270D SIM	0.62	0.00017	0.03
Benzo[a]anthracene	EPA 8270D SIM	0.26	0.00009	0.03
Benzo[a]pyrene	EPA 8270D SIM	0.14	0.000111	0.03
Benzo[b]fluoranthene	EPA 8270D SIM	0.26	0.000091	0.03
Benzo[k]fluoranthene	EPA 8270D SIM	0.26	0.000175	0.03
Chrysene	EPA 8270D SIM	0.14	0.000095	0.03
Dibenzo[a,h]anthracene	EPA 8270D SIM	0.067	0.000171	0.03
Fluoranthene	EPA 8270D SIM	220	0.000138	0.03
Fluorene	EPA 8270D SIM	153.9	0.000138	0.03
Indeno[1,2,3-cd]pyrene	EPA 8270D SIM	0.067	0.00031	0.03
Phenanthrene	EPA 8270D SIM	2.02	0.000158	0.03
Pyrene	EPA 8270D SIM	236	0.000132	0.03
Carbazole	EPA 8270D	50	0.00102	0.03
Pentachlorophenol (PCP)	EPA 8270D	0.033	0.00312	0.3
Dibenzofuran	EPA 8270D	80	0.00051	0.03
bis (2-ethylhexyl) phthalate	EPA 8270D	56.6	0.00674	0.48
Butyl benzyl phthalate	EPA 8270D	1.7	0.00289	0.03
Di-butyl phthalate (di-n-butyl phthalate)	EPA 8270D	--	0.01001	0.05
PCB - Aroclor 1016	EPA 8082	0.005	0.0038	0.004
PCB - Aroclor 1221	EPA 8082	0.005	0.0038	0.004
PCB - Aroclor 1232	EPA 8082	0.005	0.0038	0.004
PCB - Aroclor 1242	EPA 8082	0.005	0.0038	0.004
PCB - Aroclor 1248	EPA 8082	0.22	0.0038	0.004
PCB - Aroclor 1254	EPA 8082	0.005	0.0038	0.004
PCB - Aroclor 1260	EPA 8082	0.0054	0.0038	0.004
PCB - Aroclor 1262	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1268	EPA 8082	--	0.0038	0.004
PCB mixtures	EPA 8082	0.005	0.0038	0.004

Table 2
Laboratory Reporting Limits for Soil
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Report Limit (mg/kg)
Metals				
Antimony	EPA 200.8	5	0.0367	1
Arsenic	EPA 200.8	7.3	0.000092	1
Beryllium	EPA 200.8	160	0.0373	1
Cadmium	EPA 200.8	1.3	0.0255	1
Chromium Total	EPA 200.8	42	0.1278	1
Copper	EPA 200.8	36.4	0.0319	1
Lead	EPA 200.8	220	0.0296	1
Mercury	EPA 1631	1.5	0.0021	0.02
Nickel	EPA 200.8	213	0.0578	1
Selenium	EPA 200.8	1.02	0.1636	1
Silver	EPA 200.8	176.1	0.0286	1
Thallium	EPA 200.8	0.669	0.0413	1
Zinc	EPA 200.8	85.1	0.4673	1
Petroleum Hydrocarbons				
Gasoline	8015M/NWTPH-Gx	1,000	0.098	2
Gasoline (with benzene)	8015M/NWTPH-Gx	30	0.098	2
TPH as Diesel (Low)	8015M/NWTPH-Dx	2,000	2.02	10
TPH as Diesel (High)	8015M/NWTPH-Dx	2,000	5.92	50
Heavy Oil (High)	8015M/NWTPH-Dx	2,000	10.5	250

NOTES:

Laboratory method reporting limits highlighted yellow are greater than the cleanup level for that specific analyte.

[1] Site cleanup levels: Draft Focused Feasibility Study, 8801 East Marginal Way prepared by AMEC Earth and Environmental, Inc dated April 2, 2013.

* - Compound reported using library search.

-- = not available/not applicable
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
NWTPH = Northwest Total Petroleum Hydrocarbon
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
VOC = volatile organic compound

Table 3
Laboratory Reporting Limits for Groundwater
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [(1)] Final Draft (µg/L)	Method Detection Limit (ug/L)	Method Reporting Limit (µg/L)
VOCs, SVOCs, and PCBs				
Acetone	EPA 8260C	110,000	1.289	10
Benzene	EPA 8260C	2	0.067	0.35
Bromobenzene	EPA 8260C	--	0.091	1
Bromodichloromethane	EPA 8260C	17	0.194	1
Bromoform	EPA 8260C	140	0.11	1
Bromomethane	EPA 8260C	--	0.103	1
Butanone, 2- (methyl-ethyl ketone)	EPA 8260C	--	0.47	10
Butylbenzene, sec-	EPA 8260C	--	0.062	1
Butylbenzene, tert-	EPA 8260C	--	0.076	1
Carbon Disulfide	EPA 8260C	3,900	N/A*	50
Carbon tetrachloride	EPA 8260C	0.46	0.124	0.248
Chlorobenzene	EPA 8260C	270	0.051	1
Chloroethane	EPA 8260C	21,000	0.092	1
Chloroform (trichloromethane)	EPA 8260C	9.3	0.122	1
Chloromethane	EPA 8260C	10.3	0.109	10
Chlorotoluene, 2-	EPA 8260C	--	0.066	1
Chlorotoluene, 4-	EPA 8260C	2,600	0.082	1
Dibromo-3-chloropropane, 1,2-	EPA 8260C	--	0.215	10
Dibromochloromethane	EPA 8260C	--	0.12	1
Dibromoethane, 1,2- (EDB)	EPA 8260C	--	0.119	1
Dibromomethane	EPA 8260C	--	0.141	1
Dichlorobenzene, 1,2-	EPA 8260C	436	0.067	1
Dichlorobenzene, 1,3-	EPA 8260C	960	0.077	1
Dichlorobenzene, 1,4-	EPA 8260C	1.7	0.047	1
Dichlorodifluoromethane	EPA 8260C	--	0.08	1
Dichloroethane, 1,1-	EPA 8260C	33.3	0.091	1
Dichloroethane, 1,2- (EDC)	EPA 8260C	3.6	0.053	1
Dichloroethene, 1,1-	EPA 8260C	3.2	0.094	1
Dichloroethene, cis-1,2-	EPA 8260C	130	0.116	1
Dichloroethene, trans-1,2-	EPA 8260C	--	0.117	1
Dichloropropane, 1,2-	EPA 8260C	3.7	0.162	1
Dichloropropane, 1,3-	EPA 8260C	--	0.101	1
Dichloropropane, 2,2-	EPA 8260C	--	0.147	1
Dichloropropene, 1,1-	EPA 8260C	--	0.094	1
Dichloropropene, cis-1,3-	EPA 8260C	--	0.099	1
Dichloropropene, trans-1,3-	EPA 8260C	--	0.168	1
Ethylbenzene	EPA 8260C	0.23	0.079	0.16
Hexachlorobutadiene	EPA 8260C	18	0.23	1
Hexanone, 2- (methyl butyl ketone)	EPA 8260C	--	0.521	10
isopropylbenzene (Cumene)	EPA 8260C	--	0.076	1
Isopropyltoluene, p-	EPA 8260C	--	0.076	1
Methyl tertiary-butyl ether (MTBE)	EPA 8260C	--	0.067	1
Methyl-2-pentanone, 4- (isobutyl methyl ketone)	EPA 8260C	19,000	0.654	10
Methylene chloride (dichloromethane)	EPA 8260C	230	1.521	5
Nitrobenzene	EPA 8260C	--	N/A*	1
Propylbenzene, n-	EPA 8260C	--	0.072	1
Styrene (phenylethylene)	EPA 8260C	77,000	0.105	1
Tetrachloroethane, 1,1,1,2-	EPA 8260C	--	0.159	1

SoundEarth Strategies

Table 3
Laboratory Reporting Limits for Groundwater
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [(1)] Final Draft (µg/L)	Method Detection Limit (ug/L)	Method Reporting Limit (µg/L)
VOCs, SVOCs, and PCBs				
Tetrachloroethane, 1,1,2,2-	EPA 8260C	0.33	0.117	0.234
Tetrachloroethene (PCE)	EPA 8260C	3.3	0.137	1
Toluene	EPA 8260C	1,294.1	0.065	1
Trichlorobenzene, 1,2,3-	EPA 8260C	--	0.188	1
trichlorobenzene, 1,2,4-	EPA 8260C	0.08	0.054	0.108
Trichloroethane, 1,1,1-	EPA 8260C	46,23.6	0.159	1
Trichloroethane, 1,1,2-	EPA 8260C	2.3	0.117	1
Trichloroethene (TCE)	EPA 8260C	1.4	0.087	1
Trichlorofluoromethane	EPA 8260C	--	0.086	1
Trichloropropane, 1,2,3-	EPA 8260C	--	0.14	1
trimethylbenzene, 1,2,4-	EPA 8260C	303	0.054	1
trimethylbenzene, 1,3,5-	EPA 8260C	303	0.091	1
Vinyl Chloride (chloroethylene)	EPA 8260C	0.53	0.067	0.2
Xylene, m & p	EPA 8260C	1,300	0.248	2
Xylene, o-	EPA 8260C	1,600	0.114	2
naphthalene	EPA 8260C	26	0.14	1
methylnaphthalene, 1-	EPA 8270D	--	0.00147	0.00295
methylnaphthalene, 2-	EPA 8270D	64	0.00193	0.00386
acenaphthene	EPA 8270D	115	0.00188	0.00375
acenaphthylene	EPA 8270D	10.8	0.00124	0.00248
anthracene	EPA 8270D	199	0.00136	0.00273
Benzo[g,h,i]perylene	EPA 8270D	0.001	0.00217	0.00434
benzo[a]anthracene	EPA 8270D	0.001	0.00205	0.0041
benzo[a]pyrene	EPA 8270D	0.001	0.00388	0.00776
benzo[b]fluoranthene	EPA 8270D	0.001	0.00264	0.00528
benzo[k]fluoranthene	EPA 8270D	0.001	0.00384	0.00769
chrysene	EPA 8270D	0.001	0.00191	0.00383
dibenzo[a,h]anthracene	EPA 8270D	0.001	0.00205	0.0041
fluoranthene	EPA 8270D	11	0.00232	0.00465
fluorene	EPA 8270D	45.2	0.00199	0.00398
indeno[1,2,3-cd]pyrene	EPA 8270D	0.0018	0.00349	0.00698
phenanthrene	EPA 8270D	4.8	0.00325	0.00651
pyrene	EPA 8270D	9.8	0.00184	0.00367
carbazole	EPA 8270D	--	0.024	1
pentachlorophenol (PCP)	EPA 8270D	1.47	0.159	1
dibenzofuran	EPA 8270D	1.3	0.017	1
PCB - Aroclor 1016	EPA 8082	0.001	0.0098	0.01**
PCB - Aroclor 1221	EPA 8082	0.014	0.0098	0.01**
PCB - Aroclor 1232	EPA 8082	0.014	0.0098	0.01**
PCB - Aroclor 1242	EPA 8082	0.001	0.0098	0.01**
PCB - Aroclor 1248	EPA 8082	0.001	0.0098	0.01**
PCB - Aroclor 1254	EPA 8082	0.001	0.0098	0.01**
PCB - Aroclor 1260	EPA 8082	0.001	0.0098	0.01**
PCB - Aroclor 1262	EPA 8082	--	0.0098	0.01**
PCB - Aroclor 1268	EPA 8082	--	0.0098	0.01**
PCB mixtures	EPA 8082	0.001	0.0098	0.01**

Table 3
Laboratory Reporting Limits for Groundwater
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [(1)] Final Draft (µg/L)	Method Detection Limit (ug/L)	Method Reporting Limit (µg/L)
Conventionals				
Chloride	EPA 300.0	--	--	500
Total suspended solids	EPA SM2540D	--	--	10,000
Metals				
Antimony	EPA 200.8	154.6	0.026	1
Arsenic	EPA 200.8	5	0.075	1
Beryllium	EPA 200.8	12	0.049	1
Cadmium	EPA 200.8	0.25	0.047	0.0948
Chromium (Total)	EPA 200.8	74	0.069	1
Copper	EPA 200.8	2.4	0.168	1
Lead	EPA 200.8	2.5	0.072	1
Mercury	EPA 1631	0.012	0.000077	0.0015
Nickel	EPA 200.8	8.2	0.228	1
Selenium	EPA 200.8	5	0.277	1
Silver	EPA 200.8	22	0.032	1
Thallium	EPA 200.8	0.47	0.037	0.0738
Zinc	EPA 200.8	56	0.302	1
Petroleum Hydrocarbons				
Gasoline	8015M/NWTPH-Gx	1,000	5.77	100
Gasoline (with benzene)	8015M/NWTPH-Gx	30	5.77	100
TPH as Diesel	8015M/NWTPH-Dx	500	3.5	50
Heavy Oil	8015M/NWTPH-Dx	500	25.9	250

NOTES:

Laboratory method reporting limits highlighted yellow are greater than the cleanup level for that specific analyte.

[(1)]Site Surface water cleanup levels: Draft Focused Feasibility Study, 8801 East Marginal Way prepared by AMEC Earth and Environmental, Inc dated April 2, 2013.

* - Reported using library search.

** - PCB RL at 0.01 ug/L reported with a j qualifier.

-- = not available/not applicable
µg/L = micrograms per Liter
EPA = U.S. Environmental Protection Agency
NWTPH = Northwest Total Petroleum Hydrocarbon
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
VOC = volatile organic compound

SoundEarth Strategies

Table 4
Laboratory Reporting Limits for Sediment
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Reporting Limit (mg/kg)
VOCs, SVOCs, and PCBs				
Acetone	EPA 8260C/5035A	--	0.105	0.5
Benzene	EPA 8260C/5035A	--	0.007	0.03
Bromobenzene	EPA 8260C/5035A	--	0.006	0.05
Bromodichloromethane	EPA 8260C/5035A	--	0.012	0.05
Bromoform	EPA 8260C/5035A	--	0.017	0.05
Bromomethane	EPA 8260C/5035A	--	0.017	0.5
Butanone, 2- (methyl-ethyl ketone)	EPA 8260C/5035A	--	0.07	0.5
Butylbenzene, sec-	EPA 8260C/5035A	--	0.007	0.05
Butylbenzene, tert-	EPA 8260C/5035A	--	0.011	0.05
Carbon disulfide	EPA 8260C/5035A	--	N/A*	3
Carbon tetrachloride	EPA 8260C/5035A	--	0.013	0.05
Chlorobenzene	EPA 8260C/5035A	--	0.011	0.05
Chloroethane	EPA 8260C/5035A	--	0.012	0.5
Chloroform (trichloromethane)	EPA 8260C/5035A	--	0.009	0.05
Chloromethane	EPA 8260C/5035A	--	0.013	0.5
Chlorotoluene, 2-	EPA 8260C/5035A	--	0.008	0.05
Chlorotoluene, 4-	EPA 8260C/5035A	--	0.009	0.05
Dibromo-3-chloropropane, 1,2-	EPA 8260C/5035A	--	0.04	0.5
Dibromochloromethane	EPA 8260C/5035A	--	0.013	0.05
Dibromoethane, 1,2- (EDB)	EPA 8260C/5035A	--	0.015	0.05
Dibromomethane	EPA 8260C/5035A	--	0.011	0.05
Dichlorobenzene, 1,2-	EPA 8260C/5035A	0.035[2]	0.008	0.05
Dichlorobenzene, 1,3-	EPA 8260C/5035A	--	0.01	0.05
Dichlorobenzene, 1,4-	EPA 8260C/5035A	0.110[2]	0.016	0.05
Dichlorodifluoromethane	EPA 8260C/5035A	--	0.01	0.5
Dichloroethane, 1,1-	EPA 8260C/5035A	--	0.008	0.05
Dichloroethane, 1,2- (EDC)	EPA 8260C/5035A	--	0.017	0.05
Dichloroethene, 1,1-	EPA 8260C/5035A	--	0.013	0.05
Dichloroethene, cis-1,2-	EPA 8260C/5035A	--	0.011	0.05
Dichloroethene, trans-1,2-	EPA 8260C/5035A	--	0.012	0.05
Dichloropropane, 1,2-	EPA 8260C/5035A	--	0.017	0.05
Dichloropropane, 1,3-	EPA 8260C/5035A	--	0.01	0.05
Dichloropropane, 2,2-	EPA 8260C/5035A	--	0.013	0.05
Dichloropropene, 1,1-	EPA 8260C/5035A	--	0.012	0.05
Dichloropropene, cis-1,3-	EPA 8260C/5035A	--	0.011	0.05
Dichloropropene, trans-1,3-	EPA 8260C/5035A	--	0.007	0.05
Ethylbenzene	EPA 8260C/5035A	--	0.007	0.05
Hexachlorobutadiene	EPA 8260C/5035A	0.03	0.02	0.25
Hexanone, 2- (methyl butyl ketone)	EPA 8260C/5035A	--	0.048	0.5
Isopropylbenzene (cumene)	EPA 8260C/5035A	--	0.01	0.05
Isopropyltoluene, p-	EPA 8260C/5035A	--	0.006	0.05
Methyl tertiary-butyl ether (MTBE)	EPA 8260C/5035A	--	0.006	0.05
Methyl-2-pentanone, 4- (Isobutyl methyl ketone)	EPA 8260C/5035A	--	0.07	0.5
methylene chloride (dichloromethane)	EPA 8260C/5035A	--	0.041	0.5
Propylbenzene, n-	EPA 8260C/5035A	--	0.008	0.05
Styrene (phenylethylene)	EPA 8260C/5035A	--	0.011	0.05
Tetrachloroethane, 1,1,1,2-	EPA 8260C/5035A	--	0.014	0.05
Tetrachloroethane, 1,1,2,2-	EPA 8260C/5035A	--	0.018	0.05
Tetrachloroethene (PCE)	EPA 8260C/5035A	--	0.013	0.025
Toluene	EPA 8260C/5035A	--	0.008	0.05
Trichlorobenzene, 1,2,3-	EPA 8260C/5035A	--	0.009	0.25
Trichlorobenzene, 1,2,4-	EPA 8260C/5035A	0.031[2]	0.018	0.25

SoundEarth Strategies

Table 4
Laboratory Reporting Limits for Sediment
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Reporting Limit (mg/kg)
VOCs, SVOCs, and PCBs				
Trichloroethane, 1,1,1-	EPA 8260C/5035A	--	0.011	0.05
Trichloroethane, 1,1,2-	EPA 8260C/5035A	--	0.007	0.05
Trichloroethene (TCE)	EPA 8260C/5035A	--	0.017	0.03
Trichlorofluoromethane	EPA 8260C/5035A	--	0.01	0.5
Trichloropropane, 1,2,3-	EPA 8260C/5035A	--	0.011	0.05
Trimethylbenzene, 1,2,4-	EPA 8260C/5035A	--	0.008	0.05
Trimethylbenzene, 1,3,5-	EPA 8260C/5035A	--	0.005	0.05
Vinyl Chloride (chloroethylene)	EPA 8260C/5035A	--	0.008	0.05
Xylenes (dimethylbenzenes)	EPA 8260C/5035A	--	0.032	0.15
Xylene, m- & p-	EPA 8260C/5035A	--	0.015	0.10
Xylene, o-	EPA 8260C/5035A	--	0.017	0.05
Xylene, p-	EPA 8260C/5035A	--	--	0.10
Naphthalene	EPA 8260C/5035A	2.1[2]	0.012	0.05
Methylnaphthalene, 1-	EPA 8270D SIM	--	0.000088	0.03
Methylnaphthalene, 2-	EPA 8270D SIM	0.670[2]	0.00013	0.03
Acenaphthene	EPA 8270D SIM	0.500[2]	0.00007	0.03
Acenaphthylene	EPA 8270D SIM	1.30[2]	0.000046	0.03
Anthracene	EPA 8270D SIM	0.960[2]	0.000044	0.03
Benzo[g,h,i]perylene	EPA 8270D SIM	0.090	0.00017	0.03
Benzo[a]anthracene	EPA 8270D SIM	0.090	0.00009	0.03
Benzo[a]pyrene	EPA 8270D SIM	0.090	0.000111	0.03
Benzo[b]fluoranthene	EPA 8270D SIM	0.090	0.000091	0.03
Benzo[k]fluoranthene	EPA 8270D SIM	0.090	0.000175	0.03
Chrysene	EPA 8270D SIM	0.090	0.000095	0.03
Dibenzo[a,h]anthracene	EPA 8270D SIM	0.090	0.000171	0.03
Fluoranthene	EPA 8270D SIM	1.7[2]	0.000138	0.03
Fluorene	EPA 8270D SIM	0.540[2]	0.000138	0.03
Indeno[1,2,3-cd]pyrene	EPA 8270D SIM	0.090	0.00031	0.03
Phenanthrene	EPA 8270D SIM	1.5[2]	0.000158	0.03
Pyrene	EPA 8270D SIM	2.6[2]	0.000132	0.03
bis (2-chloroethoxy) methane	EPA 8270D	--	0.00072	0.03
Carbazole	EPA 8270D	--	0.00102	0.03
Hexachlorobenzene	EPA 8270D	0.022[2]	0.00051	0.03
Benzoic acid	EPA 8270D	0.65	0.02749	1.5
Benzyl alcohol	EPA 8270D	0.057	0.00254	0.3
Dimethylphenol, 2,4-	EPA 8270D	0.029	0.00931	0.3
Pentachlorophenol (PCP)	EPA 8270D	0.36	0.00312	0.3
Phenol	EPA 8270D	0.42	0.00269	0.3
Dibenzofuran	EPA 8270D	0.540[2]	0.00051	0.03
TCDD, 2,3,7,8- (dioxin)	EPA 8290	0.000002	--	0.0005
bis (2-ethylhexyl) phthalate	EPA 8270D	1.3[2]	0.00674	0.48
Butyl benzyl phthalate	EPA 8270D	0.063[2]	0.00289	0.03
Di-butyl phthalate (di-n-butyl phthalate)	EPA 8270D	--	0.01001	0.05
Dimethyl phthalate	EPA 8270D	0.071[2]	0.0006	0.03
PCB - Aroclor 1016	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1221	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1232	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1242	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1248	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1254	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1260	EPA 8082	--	0.0038	0.004
PCB - Aroclor 1262	EPA 8082	--	0.0038	0.004

SoundEarth Strategies

Table 4
Laboratory Reporting Limits for Sediment
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Chemical	Analytical Method	8801 Site Cleanup Levels [1] Final Draft (mg/kg)	Method Detection Limit (mg/kg)	Method Reporting Limit (mg/kg)
VOCs, SVOCs, and PCBs				
PCB - Aroclor 1268	EPA 8082	--	0.0038	0.004
PCB mixtures	EPA 8082	0.002	0.0038	0.004
Conventionals				
Total volatile solids	EPA 160.4	--	--	1
Total organic carbon	EPA 9060	--	--	0.05
Total sulfides	PSEP Sulfide	--	--	1
Ammonia	SM 4500 NH_3 E	--	--	0.05
Metals				
Antimony	EPA 200.8	--	0.0367	1
Arsenic	EPA 200.8	7.0	0.000092	1
Beryllium	EPA 200.8	--	0.0373	1
Cadmium	EPA 200.8	5.1	0.0255	1
Chromium Total	EPA 200.8	260.0	0.1278	1
Copper	EPA 200.8	390.0	0.0319	1
Lead	EPA 200.8	450.0	0.0296	1
Mercury	EPA 1631	0.41	0.0021	0.2
Nickel	EPA 200.8	--	0.0578	1
Selenium	EPA 200.8	--	0.1636	1
Silver	EPA 200.8	6.1	0.0286	1
Thallium	EPA 200.8	--	0.0413	1
Zinc	EPA 200.8	410.0	0.4673	1
Petroleum Hydrocarbons				
Gasoline	8015M/NWTPH-Gx	--	0.098	2
Gasoline (with benzene)	8015M/NWTPH-Gx	--	0.098	2
TPH as Diesel (Low)	8015M/NWTPH-Dx	--	2.02	10
TPH as Diesel (High)	8015M/NWTPH-Dx	--	5.92	50
Heavy Oil	8015M/NWTPH-Dx	--	10.5	250

NOTES:

Laboratory method reporting limits highlighted yellow are greater than the cleanup level for that specific analyte.

[1] Site cleanup levels: Draft Focused Feasibility Study, 8801 East Marginal Way prepared by AMEC Earth and Environmental, Inc. dated April 2, 2013.

[2] Not carbon normalized.

-- = not available/not applicable
EPA = U.S. Environmental Protection Agency
mg/kg = milligrams per kilogram
NWTPH = northwest total petroleum hydrocarbon
PCB = polychlorinated biphenyl
PSEP = Puget Sound environmental protocols
SM = Standard Method
SVOC = semi-volatile organic compound
TCDD = tetrachlorodibenzodioxin
VOC = volatile organic compound

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Groundwater and Stormwater (µg/L)									
8015M/NWTPH-Dx	Heavy Oil	--	--	--	70	130	50	150	20
8015M/NWTPH-Dx	TPH as Diesel	--	--	--	67	141	70	130	20
8015M/NWTPH-Dx	o-Terphenyl[(1)]	--	51	132	--	--	--	--	--
8015M/NWTPH-Gx	Gasoline	--	--	--	69	134	50	150	20
8015M/NWTPH-Gx	Gasoline (with benzene)	--	--	--	69	134	50	150	20
8015M/NWTPH-Gx	4-bromofluorobenzene[(1)]	--	52	124	--	--	--	--	--
EPA 1631	Mercury	7439-97-6	--	--	70	130	50	150	20
EPA 200.8	Antimony	7440-36-0	--	--	70	130	50	150	20
EPA 200.8	Arsenic	7440-38-2	--	--	70	130	50	150	20
EPA 200.8	Beryllium	7440-41-7	--	--	70	130	50	150	20
EPA 200.8	Cadmium	7440-43-9	--	--	70	130	50	150	20
EPA 200.8	Chromium	7440-47-3	--	--	70	130	50	150	20
EPA 200.8	Copper	7440-50-8	--	--	70	130	50	150	20
EPA 200.8	Lead	7439-92-1	--	--	70	130	50	150	20
EPA 200.8	Nickel	7440-02-0	--	--	70	130	50	150	20
EPA 200.8	Selenium	7782-49-2	--	--	70	130	50	150	20
EPA 200.8	Silver	7440-22-4	--	--	70	130	50	150	20
EPA 200.8	Thallium	7440-28-0	--	--	--	--	--	--	--
EPA 200.8	Zinc	7440-66-6	--	--	70	130	50	150	20
EPA 200.8	Holmium[(2)]	7440-60-0	70	130	--	--	--	--	--
EPA 300.0	Chloride	16887-00-6	--	--	90	110	80	120	20
EPA 8082	PCB - Aroclor 1016	1274-11-2	--	--	52	135	50	150	20
EPA 8082	PCB - Aroclor 1221	11104-28-2	--	--	52	135	50	150	20
EPA 8082	PCB - Aroclor 1232	11141-16-5	--	--	52	135	50	150	20
EPA 8082	PCB - Aroclor 1242	53469-21-9	--	--	60	128	50	150	20
EPA 8082	PCB - Aroclor 1248	12672-29-6	--	--	60	128	50	150	20
EPA 8082	PCB - Aroclor 1254	11097-69-1	--	--	60	128	50	150	20
EPA 8082	PCB - Aroclor 1260	11096-82-5	--	--	60	128	50	150	20
EPA 8082	PCB - Aroclor 1262	37324-23-5	--	--	60	128	50	150	20
EPA 8082	PCB - Aroclor 1268	11100-14-4	--	--	60	128	50	150	20
EPA 8082	PCB mixtures	--	--	--	--	--	--	--	20
EPA 8082	Tetrachlorometaxylene[(1)]	877-09-8	62	131	--	--	--	--	--
EPA 8260C	Acetone	67-64-1	--	--	44	145	68	125	20
EPA 8260C	Benzene	71-43-2	--	--	81	108	79	109	20
EPA 8260C	Bromobenzene	108-86-1	--	--	80	113	70	121	20
EPA 8260C	Bromodichloromethane	75-27-4	--	--	76	120	78	117	20
EPA 8260C	Bromoform	75-25-2	--	--	40	161	49	138	20
EPA 8260C	Bromomethane	74-83-9	--	--	69	123	66	129	20
EPA 8260C	Butanone, 2- (methyl-ethyl ketone)	78-93-3	--	--	53	140	69	123	20
EPA 8260C	Butylbenzene, sec-	98-06-6	--	--	83	116	77	118	20
EPA 8260C	Butylbenzene, tert-	135-98-8	--	--	81	119	81	116	20
EPA 8260C	Carbon Disulfide	75-15-0	--	--	70	130	50	150	20
EPA 8260C	Carbon tetrachloride	56-23-5	--	--	72	128	72	123	20
EPA 8260C	Chlorobenzene	108-90-7	--	--	84	108	75	115	20
EPA 8260C	Chloroethane	75-00-3	--	--	68	126	68	126	20
EPA 8260C	Chloroform (trichloromethane)	67-66-3	--	--	81	109	80	112	20
EPA 8260C	Chloromethane	74-87-3	--	--	67	133	67	131	20
EPA 8260C	Chlorotoluene, 2-	95-49-8	--	--	79	112	77	114	20
EPA 8260C	Chlorotoluene, 4-	106-43-4	--	--	81	113	81	109	20
EPA 8260C	Dibromo-3-chloropropane, 1,2-	96-12-8	--	--	62	133	69	129	20
EPA 8260C	Dibromochloromethane	124-48-1	--	--	63	140	55	144	20
EPA 8260C	Dibromoethane, 1,2- (EDB)	106-93-4	--	--	85	113	83	114	20
EPA 8260C	Dibromomethane	74-95-3	--	--	80	110	80	112	20

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Groundwater and Stormwater (µg/L)									
EPA 8260C	Dichlorobenzene, 1,2-	95-50-1	--	--	53	113	50	150	20
EPA 8260C	Dichlorobenzene, 1,3-	541-73-1	--	--	52	110	50	150	20
EPA 8260C	Dichlorobenzene, 1,4-	106-46-7	--	--	48	108	50	150	20
EPA 8260C	Dichlorodifluoromethane	75-71-8	--	--	34	149	55	144	20
EPA 8260C	Dichloroethane, 1,1-	75-34-3	--	--	80	116	79	43	20
EPA 8260C	Dichloroethane, 1,2- (EDC)	107-06-2	--	--	79	109	78	113	20
EPA 8260C	Dichloroethene, 1,1-	75-35-4	--	--	75	119	71	123	20
EPA 8260C	Dichloroethene, cis-1,2-	156-59-2	--	--	81	111	73	119	20
EPA 8260C	Dichloroethene, trans-1,2-	156-60-5	--	--	76	118	72	122	20
EPA 8260C	Dichloropropane, 1,2-	78-87-5	--	--	82	109	80	111	20
EPA 8260C	Dichloropropane, 1,3-	142-28-9	--	--	83	110	81	111	20
EPA 8260C	Dichloropropane, 2,2-	594-20-7	--	--	62	141	58	132	20
EPA 8260C	Dichloropropene, 1,1-	563-58-6	--	--	78	112	67	121	20
EPA 8260C	Dichloropropene, cis-1,3-	10061-01-5	--	--	76	128	76	120	20
EPA 8260C	Dichloropropene, trans-1,3-	10061-02-6	--	--	76	128	75	122	20
EPA 8260C	Ethylbenzene	100-41-4	--	--	84	110	71	120	20
EPA 8260C	Hexachlorobutadiene	87-68-3	--	--	37	120	50	150	20
EPA 8260C	Hexanone, 2- (methyl butyl ketone)	591-78-6	--	--	53	145	75	126	20
EPA 8260C	isopropylbenzene (Cumene)	98-82-8	--	--	81	122	76	118	20
EPA 8260C	Isopropyltoluene, 4-	99-87-6	--	--	82	119	64	132	20
EPA 8260C	Methyl tertiary-butyl ether (MTBE)	1634-04-4	--	--	70	122	68	125	20
EPA 8260C	Methyl-2-pentanone, 4- (isobutyl methyl ketone)	108-10-1	--	--	59	142	79	132	20
EPA 8260C	Methylene chloride (dichloromethane)	75-09-2	--	--	63	132	61	126	20
EPA 8260C	Naphthalene	91-20-3	--	--	57	109	50	150	20
EPA 8260C	Nitrobenzene	#N/A	--	--	57	108	50	150	20
EPA 8260C	Propylbenzene, n-	103-65-1	--	--	81	115	74	117	20
EPA 8260C	Styrene (phenylethylene)	100-42-5	--	--	84	116	70	122	20
EPA 8260C	Tetrachloroethane, 1,1,1,2-	630-20-6	--	--	79	118	78	122	20
EPA 8260C	Tetrachloroethane, 1,1,2,2-	79-34-5	--	--	79	118	79	120	20
EPA 8260C	Tetrachloroethene (PCE)	127-18-4	--	--	78	109	72	113	20
EPA 8260C	Toluene	108-88-3	--	--	83	108	73	117	20
EPA 8260C	Trichlorobenzene, 1,2,3-	87-61-6	--	--	82	115	79	115	20
EPA 8260C	Trichlorobenzene, 1,2,4-	120-82-1	--	--	53	107	67	115	20
EPA 8260C	Trichloroethane, 1,1,1-	71-55-6	--	--	80	116	79	116	20
EPA 8260C	Trichloroethane, 1,1,2-	79-00-5	--	--	82	110	81	111	20
EPA 8260C	Trichloroethene (TCE)	79-01-6	--	--	77	108	75	109	20
EPA 8260C	Trichlorofluoromethane	75-69-4	--	--	70	732	71	128	20
EPA 8260C	Trichloropropane, 1,2,3-	96-18-4	--	--	74	116	72	119	20
EPA 8260C	trimethylbenzene, 1,2,4-	95-63-6	--	--	83	116	74	118	20
EPA 8260C	trimethylbenzene, 1,3,5-	108-67-8	--	--	83	117	81	112	20
EPA 8260C	Vinyl Chloride (chloroethylene)	75-01-4	--	--	73	132	61	139	20
EPA 8260C	Xylene, m-	95-47-6	--	--	84	112	63	128	20
EPA 8260C	Xylene, o-	108-38-3	--	--	82	113	64	129	20
EPA 8260C	Xylene, p-	106-42-3	--	--	84	112	63	128	20
EPA 8260C	Xylenes (dimethylbenzenes)	1330-20-7	--	--	--	--	--	--	20
EPA 8260C	1,2-dichloroethane-d4[(1)]	17060-07-0	50	150	--	--	--	--	--
EPA 8260C	toluene-d8[(1)]	2037-26-5	50	150	--	--	--	--	--
EPA 8260C	4-bromofluorobenzene[(1)]	460-00-4	50	150	--	--	--	--	--
EPA 8270D	Carbazole	86-74-8	--	--	57	158	50	150	20
EPA 8270D	Dibenzofuran	132-64-9	--	--	50	131	50	150	20
EPA 8270D	Methylnaphthalene, 1-	90-12-0	--	--	70	130	50	150	20
EPA 8270D	Methylnaphthalene, 2-	91-57-6	--	--	48	128	50	150	20
EPA 8270D	Pentachlorophenol (PCP)	87-86-5	--	--	16	122	51	103	20

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Groundwater and Stormwater (µg/L)									
EPA 8270D	Phenol-d6[1]	13127-88-3	10	63	--	--	--	--	--
EPA 8270D	Terphenyl-d14[1]	1718-51-0	34	129	--	--	--	--	--
EPA 8270D	2,4,6-Tribromophenol[1]	118-79-6	40	105	--	--	--	--	--
EPA 8270D	2-Fluorobiphenyl[1]	321-60-8	57	111	--	--	--	--	--
EPA 8270D	2-Fluorophenol[1]	367-12-4	23	77	--	--	--	--	--
EPA 8270D	Nitrobenzene-d5[1]	4165-60-0	58	113	--	--	--	--	--
EPA 8270D	Acenaphthene	83-32-9	--	--	26	127	53	111	20
EPA 8270D	Acenaphthylene	208-96-8	--	--	55	116	50	150	20
EPA 8270D	Anthracene	120-12-7	--	--	56	115	50	150	20
EPA 8270D	Benzo[a]anthracene	56-55-3	--	--	55	117	50	150	20
EPA 8270D	Benzo[a]pyrene	50-32-8	--	--	52	117	50	150	20
EPA 8270D	Benzo[b]fluoranthene	205-99-2	--	--	50	113	50	150	20
EPA 8270D	Benzo[g,h,i]perylene	191-24-2	--	--	48	143	50	150	20
EPA 8270D	Benzo[k]fluoranthene	207-08-9	--	--	57	133	50	150	20
EPA 8270D	Chrysene	218-01-9	--	--	39	125	50	150	20
EPA 8270D	Dibenzo[a,h]anthracene	53-70-3	--	--	46	135	50	150	20
EPA 8270D	Fluoranthene	206-44-0	--	--	56	113	50	150	20
EPA 8270D	Fluorene	86-73-7	--	--	57	119	50	150	20
EPA 8270D	Indeno[1,2,3-cd]pyrene	193-39-5	--	--	40	135	50	150	20
EPA 8270D	Phenanthrene	85-01-8	--	--	58	114	50	150	20
EPA 8270D	Pyrene	129-00-0	--	--	51	111	58	95	20
EPA 8270D	Anthracene-d10[1]	1719-06-8	50	150	--	--	--	--	--
EPA 8270D	Benzo(a)anthracene-d12[1]	1718-53-2	50	150	--	--	--	--	--
EPA SM2540D	Total suspended solids	--	--	--	61	131	--	--	20
Soil/Sediment (mg/kg)									
8015M/NWTPH-Dx	Heavy Oil	--	--	--	70	127	69	125	20
8015M/NWTPH-Dx	TPH as Diesel (High)	--	--	--	70	127	69	125	20
8015M/NWTPH-Dx	TPH as Diesel (Low)	--	--	--	70	127	69	125	20
8015M/NWTPH-Dx	o-Terphenyl[1]	84-15-1	67	127	--	--	--	--	--
8015M/NWTPH-Gx	Gasoline	--	--	--	50	150	69	134	20
8015M/NWTPH-Gx	Gasoline (with benzene)	--	--	--	50	150	69	134	20
8015M/NWTPH-Gx	4-bromofluorobenzene[1]	--	50	132	--	--	--	--	--
EPA 160.4	Total volatile solids	--	--	--	--	--	--	--	--
EPA 1631	Mercury	7439-97-6	--	--	70	130	50	150	20
EPA 200.8	Antimony	7440-36-0	--	--	70	130	50	150	20
EPA 200.8	Arsenic	7440-38-2	--	--	70	130	50	150	20
EPA 200.8	Beryllium	7440-41-7	--	--	70	130	50	150	20
EPA 200.8	Cadmium	7440-43-9	--	--	70	130	50	150	20
EPA 200.8	Chromium (III)	7440-47-3	--	--	70	130	50	150	20
EPA 200.8	Copper	7440-50-8	--	--	70	130	50	150	20
EPA 200.8	Lead	7439-92-1	--	--	70	130	50	150	20
EPA 200.8	Nickel	7440-02-0	--	--	70	130	50	150	20
EPA 200.8	Selenium	7782-49-2	--	--	70	130	50	150	20
EPA 200.8	Silver	7440-22-4	--	--	70	130	50	150	20
EPA 200.8	Thallium	7440-28-0	--	--	70	130	50	150	20
EPA 200.8	Zinc	7440-66-6	--	--	70	130	50	150	20
EPA 200.8	Holmium[2]	7440-60-0	60	125	--	--	--	--	--
EPA 8082	PCB - Aroclor 1016	1274-11-2	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1221	11104-28-2	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1232	11141-16-5	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1242	53469-21-9	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1248	12672-29-6	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1254	11097-69-1	--	--	70	130	50	150	20

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Soil/Sediment (mg/kg)									
EPA 8082	PCB - Aroclor 1260	11096-82-5	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1262	37324-23-5	--	--	70	130	50	150	20
EPA 8082	PCB - Aroclor 1268	11100-14-4	--	--	70	130	50	150	20
EPA 8082	PCB mixtures	--	--	--	--	--	--	--	20
EPA 8082	Tetrachlorometaxylene[(1)]	877-09-8	50	150	--	--	--	--	--
EPA 8260C/5035A	Acetone	67-64-1	--	--	52	141	10	163	20
EPA 8260C/5035A	Benzene	71-43-2	--	--	68	114	29	129	20
EPA 8260C/5035A	Bromobenzene	108-86-1	--	--	72	122	34	120	20
EPA 8260C/5035A	Bromodichloromethane	75-27-4	--	--	72	130	23	155	20
EPA 8260C/5035A	Bromoform	75-25-2	--	--	56	132	21	156	20
EPA 8260C/5035A	Bromomethane	74-83-9	--	--	38	114	10	163	20
EPA 8260C/5035A	Butanone, 2- (methyl-ethyl ketone)	78-93-3	--	--	57	123	19	147	20
EPA 8260C/5035A	Butylbenzene, sec-	98-06-6	--	--	71	130	23	145	20
EPA 8260C/5035A	Butylbenzene, tert-	135-98-8	--	--	73	130	30	133	20
EPA 8260C/5035A	Carbon disulfide	75-15-0	--	--	70	130	50	150	20
EPA 8260C/5035A	Carbon tetrachloride	56-23-5	--	--	60	139	9	164	20
EPA 8260C/5035A	Chlorobenzene	108-90-7	--	--	76	117	32	129	20
EPA 8260C/5035A	Chloroethane	75-00-3	--	--	10	169	10	176	20
EPA 8260C/5035A	Chloroform (trichloromethane)	67-66-3	--	--	66	120	21	145	20
EPA 8260C/5035A	Chloromethane	74-87-3	--	--	70	120	10	126	20
EPA 8260C/5035A	Chlorotoluene, 2-	95-49-8	--	--	74	121	31	134	20
EPA 8260C/5035A	Chlorotoluene, 4-	106-43-4	--	--	75	122	31	136	20
EPA 8260C/5035A	Dibromo-3-chloropropane, 1,2-	96-12-8	--	--	58	138	11	161	20
EPA 8260C/5035A	Dibromochloromethane	124-48-1	--	--	74	125	28	150	20
EPA 8260C/5035A	Dibromoethane, 1,2- (EDB)	106-93-4	--	--	74	132	28	142	20
EPA 8260C/5035A	Dibromomethane	74-95-3	--	--	70	120	23	145	20
EPA 8260C/5035A	Dichlorobenzene, 1,2-	95-50-1	--	--	53	114	50	150	20
EPA 8260C/5035A	Dichlorobenzene, 1,3-	541-73-1	--	--	50	111	50	150	20
EPA 8260C/5035A	Dichlorobenzene, 1,4-	106-46-7	--	--	47	113	18	122	20
EPA 8260C/5035A	Dichlorodifluoromethane	75-71-8	--	--	74	117	10	142	20
EPA 8260C/5035A	Dichloroethane, 1,1-	75-34-3	--	--	47	128	19	140	20
EPA 8260C/5035A	Dichloroethane, 1,2- (EDC)	107-06-2	--	--	56	135	12	160	20
EPA 8260C/5035A	Dichloroethene, 1,1-	75-35-4	--	--	47	128	19	140	20
EPA 8260C/5035A	Dichloroethene, cis-1,2-	156-59-2	--	--	72	113	25	135	20
EPA 8260C/5035A	Dichloroethene, trans-1,2-	156-60-5	--	--	67	127	14	137	20
EPA 8260C/5035A	Dichloropropane, 1,2-	78-87-5	--	--	72	127	30	135	20
EPA 8260C/5035A	Dichloropropane, 1,3-	142-28-9	--	--	72	130	31	137	20
EPA 8260C/5035A	Dichloropropane, 2,2-	594-20-7	--	--	52	170	10	158	20
EPA 8260C/5035A	Dichloropropene, 1,1-	563-58-6	--	--	69	128	17	140	20
EPA 8260C/5035A	Dichloropropene, cis-1,3-	10061-01-5	--	--	75	136	28	144	20
EPA 8260C/5035A	Dichloropropene, trans-1,3-	10061-02-6	--	--	72	132	26	149	20
EPA 8260C/5035A	Ethylbenzene	100-41-4	--	--	34	123	32	137	20
EPA 8260C/5035A	Hexachlorobutadiene	87-68-3	--	--	53	108	50	150	20
EPA 8260C/5035A	Hexanone, 2- (methyl butyl ketone)	591-78-6	--	--	57	123	15	166	20
EPA 8260C/5035A	Isopropylbenzene (cumene)	98-82-8	--	--	76	127	31	142	20
EPA 8260C/5035A	Isopropyltoluene, 4-	99-87-6	--	--	70	132	21	149	20
EPA 8260C/5035A	Methyl tertiary-butyl ether (MTBE)	1634-04-4	--	--	60	123	21	145	20
EPA 8260C/5035A	Methyl-2-pentanone, 4- (Isobutyl methyl ketone)	108-10-1	--	--	45	145	24	155	20
EPA 8260C/5035A	methylene chloride (dichloromethane)	75-09-2	--	--	42	132	10	156	20
EPA 8260C/5035A	Naphthalene	91-20-3	--	--	53	109	50	150	20
EPA 8260C/5035A	Propylbenzene, n-	103-65-1	--	--	74	134	23	146	20
EPA 8260C/5035A	Styrene (phenylethylene)	100-42-5	--	--	74	126	25	137	20
EPA 8260C/5035A	Tetrachloroethane, 1,1,1,2-	630-20-6	--	--	56	143	38	147	20

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Soil/Sediment (mg/kg)									
EPA 8260C/5035A	Tetrachloroethane, 1,1,2,2-	79-34-5	--	--	69	135	28	140	20
EPA 8260C/5035A	Tetrachloroethene (PCE)	127-18-4	--	--	72	114	20	133	20
EPA 8260C/5035A	Toluene	108-88-3	--	--	66	126	35	130	20
EPA 8260C/5035A	Trichlorobenzene, 1,2,3-	87-61-6	--	--	63	138	20	144	20
EPA 8260C/5035A	Trichlorobenzene, 1,2,4-	120-82-1	--	--	59	105	44	111	20
EPA 8260C/5035A	Trichloroethane, 1,1,1-	71-55-6	--	--	62	131	10	156	20
EPA 8260C/5035A	Trichloroethane, 1,1,2-	79-00-5	--	--	75	113	10	205	20
EPA 8260C/5035A	Trichloroethene (TCE)	79-01-6	--	--	64	117	21	139	20
EPA 8260C/5035A	Trichlorofluoromethane	75-69-4	--	--	10	196	10	176	20
EPA 8260C/5035A	Trichloropropane, 1,2,3-	96-18-4	--	--	61	137	25	144	20
EPA 8260C/5035A	Trimethylbenzene, 1,2,4-	95-63-6	--	--	76	125	10	182	20
EPA 8260C/5035A	Trimethylbenzene, 1,3,5-	108-67-8	--	--	76	126	18	149	20
EPA 8260C/5035A	Vinyl Chloride (chloroethylene)	75-01-4	--	--	22	139	10	138	20
EPA 8260C/5035A	Xylene, m-	95-47-6	--	--	78	122	34	136	20
EPA 8260C/5035A	Xylene, o-	108-38-3	--	--	77	124	33	134	78
EPA 8260C/5035A	Xylene, p-	106-42-3	--	--	78	182	34	136	20
EPA 8260C/5035A	Xylenes (dimethylbenzenes)	1330-20-7	--	--	--	--	--	--	20
EPA 8260C/5035A	Dichlorobenzene, 1,2-	95-50-1	--	--	53	113	50	150	20
EPA 8260C/5035A	Dichlorobenzene, 1,3-	541-73-1	--	--	52	110	50	150	20
EPA 8260C/5035A	Dichlorobenzene, 1,4-	106-46-7	--	--	48	108	50	150	20
EPA 8260C	1,2-dichloroethane-d4[(1)]	17060-07-0	50	150	--	--	--	--	--
EPA 8260C	toluene-d8[(1)]	2037-26-5	50	150	--	--	--	--	--
EPA 8260C	4-bromofluorobenzene[(1)]	460-00-4	50	150	--	--	--	--	--
EPA 8270D	Benzoic acid	65-85-0	--	--	48	132	50	150	20
EPA 8270D	Benzyl alcohol	100-51-6	--	--	54	121	50	150	20
EPA 8270D	Bis (2-chloroethoxy) methane	111-91-1	--	--	63	101	50	150	20
EPA 8270D	Bis (2-ethylhexyl) phthalate	117-81-7	--	--	59	116	50	150	20
EPA 8270D	Butyl benzyl phthalate	85-68-7	--	--	46	122	50	150	20
EPA 8270D	Carbazole	86-74-8	--	--	44	163	50	150	20
EPA 8270D	Dibenzofuran	132-64-9	--	--	46	135	50	150	20
EPA 8270D	Di-butyl phthalate (di-n-butyl phthalate)	84-74-2	--	--	53	117	50	150	20
EPA 8270D	Dimethyl phthalate	131-11-3	--	--	52	117	50	150	20
EPA 8270D	Dimethylphenol, 2,4-	105-67-9	--	--	40	96	50	150	20
EPA 8270D	Hexachlorobenzene	118-74-1	--	--	47	111	50	150	20
EPA 8270D	Pentachlorophenol (PCP)	87-86-5	--	--	32	130	31	121	20
EPA 8270D	Phenols (Total)	108-95-2	--	--	40	110	10	119	20
EPA 8270D	2,4,6-Tribromophenol[(1)]	118-79-6	39	106	--	--	--	--	--
EPA 8270D	2-Fluorobiphenyl[(1)]	321-60-8	50	118	--	--	--	--	--
EPA 8270D	2-Fluorophenol[(1)]	367-12-4	26	125	--	--	--	--	--
EPA 8270D	Phenol-d6[(1)]	13127-88-3	35	110	--	--	--	--	--
EPA 8270D	Nitrobenzene-d5[(1)]	4165-60-0	45	119	--	--	--	--	--
EPA 8270D	Terphenyl-d14[(1)]	1718-51-0	45	126	--	--	--	--	--
EPA 8270D	Acenaphthene	83-32-9	--	--	65	96	50	150	20
EPA 8270D	Acenaphthylene	208-96-8	--	--	67	97	50	150	20
EPA 8270D	Anthracene	120-12-7	--	--	66	96	50	150	20
EPA 8270D	Benzo[a]anthracene	56-55-3	--	--	60	93	50	150	20
EPA 8270D	Benzo[a]pyrene	50-32-8	--	--	57	104	50	150	20
EPA 8270D	Benzo[b]fluoranthene	205-99-2	--	--	67	110	50	150	20
EPA 8270D	Benzo[g,h,i]perylene	191-24-2	--	--	61	110	50	150	20
EPA 8270D	Benzo[k]fluoranthene	207-08-9	--	--	62	105	50	150	20
EPA 8270D	Chrysene	218-01-9	--	--	62	95	50	150	20
EPA 8270D	Dibenzo[a,h]anthracene	53-70-3	--	--	67	113	50	150	20
EPA 8270D	Fluoranthene	206-44-0	--	--	66	106	50	150	20

Table 5
Laboratory Control Limits
Duwamish Marine Center
6365 First Avenue South
Seattle, Washington

Analytical Method	Analyte	CAS Number	Surrogate Accuracy (% Recovery)		LCS Accuracy (% Recovery)		MS Accuracy (% Recovery)		Precision (RPD)
			Limit	Limit	Limit	Limit	Limit	Limit	
Soil/Sediment (mg/kg)									
EPA 8270D	Fluorene	86-73-7	--	--	63	99	50	150	20
EPA 8270D	Indeno[1,2,3-cd]pyrene	193-39-5	--	--	64	111	50	150	20
EPA 8270D	Methylnaphthalene, 1-	90-12-0	--	--	70	130	50	150	20
EPA 8270D	Methylnaphthalene, 2-	91-57-6	--	--	70	130	50	150	20
EPA 8270D	Phenanthrene	85-01-8	--	--	63	97	50	150	20
EPA 8270D	Pyrene	129-00-0	--	--	66	105	50	150	20
EPA 8270D	Anthracene-d10[(1)]	1719-06-8	50	150	--	--	--	--	--
EPA 8270D	Benzo(a)anthracene-d12[(1)]	1718-53-2	50	150	--	--	--	--	--
EPA 8290	TCDD, 2,3,7,8- (dioxin)	1746-01-6	--	--	67	158	40	135	20
EPA 8290	13C-2,3,7,8-TCDD[(1)]	--	40	135	--	--	--	--	--
EPA 9060	Total organic carbon	--	--	--	72	124	70	130	20
PSEP Sulfide	Total sulfides	--	--	--	56	153	58	141	20
SM 4500 NH_3 E	Ammonia	7664-41-7	--	--	85	122	52	145	20

NOTES:

[(1)]Surrogate compound.

[(2)]Internal standard compound.

µg/L = micrograms per liter

CAS = Chemical Abstracts Service

EPA = U.S. Enviornmental Protection Agency

LCS = laboratory control sample

mg/kg = milligrams per kilogram

MS = matrix spike

NWTPH = Northwest Total Petroleum Hydrocarbon

PCB = polychlorinated vinyl

RPD = relative percent difference

TPH = total petroleum hydrocarbon

ATTACHMENT A
DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN COMMENTS FROM WASHINGTON STATE DEPARTMENT OF ECOLOGY, DATED MAY 2, 2013

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

May 2, 2013

Mr. Stephen Plowman
Attorney, WSBA No. 21823
8048 NE 8th Street
Medina, WA 98039

Re: Draft Remedial Investigation/Feasibility Study Work Plan, Duwamish Marine Center Site, 6365 1st Ave. S., Seattle, WA, Agreed Order No. DE 8072

Dear Mr. Plowman:

Thank you for submitting the Draft Remedial Investigation/Feasibility Study (RI/FS) Work Plan (Plan) on June 8, 2012. The Washington State Department of Ecology (Ecology) has completed a review. This letter provides approval of the Plan contingent on incorporating the comments provided in this letter into the proposed subsequent Technical Memorandum. Field work may begin with Sections 9.1.1 and Section 9.2.1 Site Reconnaissance tasks, and including the modifications as necessary to incorporate the changes requested in this letter. Upon completion of the Site Reconnaissance tasks, the Technical Memorandum documenting the tasks and addressing these comments is to be submitted to Ecology for approval prior to conducting the remaining field work.

The Plan appropriately used screening levels to screen most of the data and showed exceedances of screening levels on the tables and figures. The purpose of screening the existing data was to assist in defining the nature and extent, both horizontal and vertical, of the site contaminants and, provide for an efficient sampling program. The sampling program proposed in the Plan focuses on collecting additional data in suspected source areas, however, the Plan must also include samples to fill data gaps observed in the existing data.

The figures, while containing information on the existing data, were less useful in visually depicting the knowledge of the location of contaminants on site, such as areas of "hot spots", areas where the horizontal and vertical extent of contamination is undefined, locations where clean samples are located, or locations which were never sampled for contaminants of potential concern.

For example, PCBs are shown to be in the groundwater at SB-3N, yet no further sampling is proposed in this area to investigate this contamination. In addition, site groundwater

contamination exceeding surface water quality standards may be discharging to the Duwamish River and Slip 2, however, no tidal study to investigate groundwater flow, quarterly groundwater monitoring, nor additional shoreline wells are proposed.

Comments regarding additional sampling contained in this review are an attempt to assure collection of a more complete data set at this stage. As the RI progresses, the data can be further evaluated for this information to prepare for completion of a sufficient RI and an additional phase of data collection may become necessary.

1. **General Comments**

   a. The location naming system which provides a different soil boring number and well number for each well is confusing.

      The location names for the soil borings and monitoring wells should be revised so that each well has only one number and name. Wells should be named with the well number only.

   b. Tables 24 of the Work Plan and Table 1 of the SAP do not provide a clear understanding of the rationale for the sampling plan for each location. Some areas are not scheduled to be analyzed for total petroleum hydrocarbons or volatile organics. For example, the four borings to assess the Pile Driving Company and junk dealer are not scheduled for analyses for TPH; however, the nearby sampling location B4/TP-B4 boring log noted a petroleum odor. No rationale for excluding these analyses is provided.

      All borings and wells should be analyzed for the same contaminants of potential concern unless a rationale for excluding certain analyses can be provided for approval.

   c. Section 4.2.1 discusses work performed by the Riley Group in 2000. Location TP-2 on Lot 18 showed PCBs detected in the soil at a depth of 4.5 feet. The Plan states that this test pit is located in the area of the former marine railway. However, Figure 2 shows that the marine railway was located on Lot 10, and two soil borings (SB01 and SB02) are planned on this lot to assess contamination from this potential source.

      Verify the location of the former marine railway during the site reconnaissance task using air photos or other sources of information and whether it extended into the sediments at the site. If needed, revise the sampling plan in the Technical Memorandum to assess the location of the railway in all media potentially affected.

2. Soil

a. The vertical extent of contamination at the site is not defined.

The soil sampling proposed should be re-evaluated to assure that the vertical extent will be defined where necessary and additional borings should be added if indicated. Samples to be collected from the 2.0 and 2.5 feet intervals should be archived in case analyses are needed to define the contamination. A rationale for triggering further sampling interval analyses should be clearly stated in the Technical Memorandum.

b. Areas of fill placed during 1936 -1966 and 1966 – 2007 need to be adequately characterized.

Additional sampling locations may need to be placed to obtain the samples necessary to characterize each fill event for contaminants of potential concern, including groundwater sheens noted in B3(R) and B1(R). Include a section discussing the sampling to be conducted in relation to existing data to assure that the fill will be addressed.

c. Contaminants of potential concern on Port of Seattle property where site operations may have impacted environment media must be assessed during the remedial investigation.

Include in the Technical Memorandum a discussion and sampling program to assure that the Port property is properly assessed.

d. The area between MW2 and MW2D has higher levels of soil contamination but no borings are proposed in the area.

Add some borings and/or wells to address this contamination, especially to determine the vertical extent.

3. Groundwater

a. PCBs and nickel were detected in the groundwater at SB-3N without additional sampling proposed.

A well should be added in this area for further soil and groundwater sampling.

b. Further information on groundwater flow is needed.

A tidal study or groundwater elevation monitoring tasks and/or a high high tide groundwater sampling event should be added to the work plan to characterize site hydrogeology.

c. No quarterly groundwater monitoring is proposed.

At least four quarters of groundwater monitoring for all wells must be conducted for the specified analyses. After two quarters, the analyses may be adjusted with Ecology approval to monitor for the contaminants of concern.

d. Sampling to determine groundwater and surface water interaction is not proposed.

The groundwater should be analyzed for chlorides and total suspended solids to provide information on groundwater and surface water interaction.

e. No wells are proposed in the interior of the site which lacks data.

One or two wells are needed in the interior portion of the site. SB16 could be converted into a monitoring well and an additional location for a well can be selected in the area.

4. Stormwater

a. Task 9.2.3 regarding Stormwater Sampling should include a task for assessing the stormwater system at the site that includes not only the proposed stormwater sheet flow evaluation.

The stormwater system should be mapped to confirm the configuration during the site reconnaissance. Add sampling for the stormwater in the stormwater system that is discharging from each outfall. At least five events during the remedial investigation are required to characterize the stormwater discharge from the site. After two sampling events, the contaminants analyzed may be adjusted with Ecology approval to continue monitoring only for the contaminants of concern.

b. All catch basins are not required to be sampled.

Select catch basins may be chosen from the stormwater system to be representative. Upon completion of the site reconnaissance to evaluate the stormwater system, certain catch basins may be selected for sampling and proposed in the Technical Memorandum.

c. Dioxins and furans are one of the main risk drivers for the LDW Superfund site and no samples are proposed to be analyzed for these potential contaminants.

At least one sample for dioxins and furans must be analyzed from the catch basin solids for source control information.

d. Seep 82 near Samson Tug and Barge was found to contain copper, lead, mercury, and zinc.

This seep should be included for sampling during the remedial investigation. See Section 2.3.3 of the Lower Duwamish Waterway RM 1.7 to 2.0 East and the Data Report: Survey and Sampling of Lower Duwamish Waterway Seeps Final, November 18, 2004 from Windward Environmental. Sampling should include chlorides and total suspended solids to determine the mixture of groundwater and surface water.

5. Bank

a. Composite sampling is proposed for the bank samples.

Bank samples should be discreet samples. Depending on the configuration of the bank and the sampling needs determined from the site reconnaissance, samples may be needed from the upper and lower bank in some areas, and one sample may be adequate in other areas. The final bank sampling locations may be determined upon completion of the site reconnaissance and proposed in the technical memorandum.

6. Sediments

a. Sediment core samples are scheduled to be collected at a maximum of four feet depth.

Assure that the sediment samples will be collected per the requirement in the Agreed Order Scope of Work to meet the protocol of the Ecology Sampling and Analysis Plan Appendix, February 2008.

Consider collecting samples below this depth for archiving and analysis should contaminants be found in the lower samples analyzed.

b. Sediment sample Sed2 is located away from a stormwater outfall.

Sediment sample Sed2 should be relocated to sample sediment below Outfall 3 to account for potential discharge of contaminants from the outfall as well as bank erosion and/or other sediment contamination in the area.

7. Sampling and Analysis Plan

a. Table 24 of the Work Plan shows that soil and groundwater samples in some areas will be sampled for volatile organic compounds. Table 1 of the SAP does not show VOCs and the associated information for any media samples. In addition, Table 1 of the SAP shows the total number of samples for analysis that appears

not to match with the number of samples of certain media to be collected. For example, Figure 26 shows that six sediment samples will be collected, with Table 1 indicating that ten samples will be analyzed for each method listed. Twelve catch basins are scheduled for sampling; however, Table 1 of the SAP shows that seven catch basin samples will be analyzed.

Include a table in the Technical Memorandum showing each sampling location name, total depth, potential source or data gap area, analytical tests to be conducted, sampling depths for analysis and archiving, and the rationale for the sampling location and analyses to be conducted.

b. Section 5.1.2.2.1 for Soil Sampling does not indicate if samples collected from the borings that are not selected for analysis will be archived. No rationale is provided for archived samples to be analyzed if needed to determine the vertical extent of contamination.

Revise the plan to show that samples will be collected both for analyses and archiving, and provide a rationale for analyzing archived samples.

c. The SAP does not include sampling methods for stormwater discharge.

Add the information for sampling the stormwater.

d. Table 1 appears to show the water samples for mercury are scheduled to be analyzed by Method 7471.

Method 1631 for mercury is required for the site water samples to obtain a lower detection limit.

e. Table 1 of the SAP is not clear whether groundwater samples will be analyzed for both total and dissolved metals.

Both analyses should be performed on the site groundwater samples.

f. The SAP Section 5.1.2.2.3 does not state if the groundwater will be sampled at low tide.

Groundwater samples should be collected during low tide conditions.

8. Quality Assurance Program Plan (QAPP)

a. Table 1 of the QAPP shows the list of practical quantitation levels and method detection limits. The list contains a partial set of the chemicals analyzed by the methods to be employed. It is not clear if Sound Earth intends to limit the

b. analytes to be reported by the laboratory to those shown on the list. All analytes for each method should be reported and documented for the remedial investigation.

   Please include in the Technical Memorandum a full list of the analytes for each method to be analyzed and the PQL and MDL for each. Upon collection of a sufficient amount of data for decision-making, the analyte list may be limited to certain chemicals in moving forward with the RI, however, no rationale for limiting the analyte list at the beginning of the investigation has been provided.

c. The PQLs should be below the attached Table 1. 8801 Site Cleanup Levels – Final Draft. These levels are in process to possibly be a set of cleanup levels to be applied at sites along the Duwamish River and may be adjusted for site specific conditions.

   PQLs should be evaluated to assure they will meet the draft final cleanup levels that could be applied as preliminary cleanup levels at the site.

Ecology appreciates the opportunity to review the Work Plan and looks forward to working with you on the remedial investigation. Upon receipt of the Technical Memorandum at the completion of the site reconnaissance and subsequent Ecology approval, the remaining field work for the remedial investigation may begin.

If you have any questions about this review or need any other information, please contact me at (425) 649-7219 or victoria.sutton@ecy.wa.gov.

Sincerely,

Victoria Sutton

Victoria Sutton
Toxics Cleanup Program

Enclosures

By certified mail: 7005 1820 0004 5364 5336

ecc: Louise Bardy, Ecology
Tom Cammerata, Sound Earth Strategies

Table 1. 8801 Site Cleanup Levels - FINAL DRAFT

Media	Soil	Regulatory Source	Surface Water	Regulatory Source	Sediment	Air	Regulatory Source
Units	mg/kg	----------	µg/L	----------	mg/kg-DW[2]	ppbv	----------
2,3,7,8-TCDD (Dioxin)	0.0000052	Background Concentration	0.0000005 [5.1x10-9]	PQL‡ [Marine-HH NRWQC for Consumption]	0.000002[Background-TEQ]	4.43E-09	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Acenaphthene	229	Protection of Surface Water from Vadose Soil	115	EPA R10 Tribal Consumption of Seafood	0.500 [16[OCN]]	--	
Acenaphthylene	4.4	Protection of Surface Water from Vadose Soil	10.8	Ecology Groundwater to Protect Sediment	1.30 [66[OCN]]	--	
Acetone	510	Protection of Surface Water from Vadose Soil	110000	EPA R10 Tribal Consumption of Seafood	--	590	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Aluminum	50	Ecological Exposure (MTCA)	87	Fresh-Chronic NRWQC	--	9062	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Anthracene	1555	Protection of Surface Water from Vadose Soil	199	EPA R10 Tribal Consumption of Seafood	0.960 [220[OCN]]	200	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Antimony	5	Ecological Exposure	154.6	EPA R10 Tribal Consumption of Seafood	--	0.018314908	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Arsenic (III)	7	Ecological Exposure (MTCA)	--		--	--	
Arsenic (total)	7.3	Puget Sound Background Concentration	5¯	Site-Specific Groundwater Background	7.0[Background]	0.000189608	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Arsenic (V)	10	Ecological Exposure (MTCA)	--		--	--	
Barium	102*	Protection of Surface Water from Vadose Soil	120*	EPA R10 Tribal Consumption of Seafood	--	0.040770771	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Benzene	0.093	Protection of Surface Water from Vadose Soil	2	EPA R10 Tribal Consumption of Seafood	--	0.100492318	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Benzo(g,h,i)perylene	0.62	Protection of Surface Water from Vadose Soil	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	--	
Benzo[a]anthracene	0.26	Background Concentration	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	21.41918528	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Benzo[a]pyrene	0.14	Direct Contact/Ingestion	0.001 [0.00018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	19.560000000	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Benzo[b]fluoranthene	0.26	Background Concentration	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	--	
Benzo[k]fluoranthene	0.26	Background Concentration	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	--	
Benzoic acid	9	Protection of Surface Water from Vadose Soil	2243	Ecology Groundwater to Protect Sediment	0.65	--	
Benzyl alcohol	24000	Direct Contact/Ingestion	182	Ecology Groundwater to Protect Sediment	0.057	--	
Beryllium	160	MTCA Direct Contact (CLARC)	12	EPA R10 Tribal Consumption of Seafood	--	0.000200869	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Bis(2-ethylhexyl) phthalate	56.6	Protection of Surface Water from Vadose Soil	1.2	EPA R10 Tribal Consumption of Seafood	1.3 [47[OCN]]	--	
Bromodichloromethane	0.0886	Protection of Surface Water from Vadose Soil	17	Marine-HH NRWQC for Consumption	--	--	
Bromoform	0.918	Protection of Surface Water from Vadose Soil	140	Marine-HH NRWQC for Consumption	--	222.4485759	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Butyl benzyl phthalate	1.7	Protection of Surface Water from Vadose Soil	0.41	EPA R10 Tribal Consumption of Seafood	0.063 [4.9[OCN]]	--	
Cadmium	1.3	Protection of Surface Water (NTR) from Vadose Soil	0.25	Fresh-Chronic NRWQC	5.1	1.087536696	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Carbazole	50	Direct Contact/Ingestion	--		--	--	
Carbon disulfide	75	Protection of Surface Water from Vadose Soil	3900	EPA R10 Tribal Consumption of Seafood	--	102759.4268	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Carbon tetrachloride	0.021	Protection of Surface Water from Vadose Soil	0.46	EPA R10 Tribal Consumption of Seafood	--	0.066291612	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Chlorobenzene	26	Protection of Surface Water from Vadose Soil	270	EPA R10 Tribal Consumption of Seafood	--	5	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Chloroethane	280	Protection of Surface Water from Vadose Soil	21000	EPA RSL Tap Water[3]	--	236.4	J&E (More Protective)
Chloroform (trichloromethane)	0.2	Protection of Surface Water from Vadose Soil	9.3	EPA R10 Tribal Consumption of Seafood	--	0.022320352	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Chloromethane	0.09	Protection of Surface Water from Vadose Soil	10.3	EPA R10 Tribal Consumption of Seafood	--	19.898910890	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Chlorotoluene; o-	160	Direct Contact/Ingestion	--		--	--	
Chlorotoluene;4-	400	Protection of Surface Water from Vadose Soil	2600	EPA RSL Tap Water[3]	--	--	
Chromium VI	3.84	Protection of Surface Water (NTR) from Vadose Soil	0.58	EPA R10 Tribal Consumption of Seafood	--	0.001721036	
Chromium, total (or III)	42	Background Concentration	74	Fresh-Chronic NRWQC	260.0	235.1142396	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Chrysene	0.14	Direct Contact/Ingestion	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	21.41918528	
Cobalt	2.3	EPA RSL[3]	4.8	MTCA B Groundwater	--	20.74495164	NIOSH PEL TWA
Copper	36.4	Puget Sound Background Concentration	2.4	NTR Marine-Chronic«	390.0	38.4736428	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Dibenz[a,h]anthracene	0.067	PQL‡	0.001 [0.0018]	PQL‡ [EPA R10 Tribal Consumption of Seafood]	0.090[Beach Play-TEQ]	17.56465517	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Dibenzofuran	80	Protection of Surface Water from Vadose Soil	1.3	Ecology Groundwater to Protect Sediment	0.540 [15[OCN]]	624	J&E (More Protective)
Dichlorobenzene, 1,2-	68	Protection of Surface Water from Vadose Soil	436	EPA R10 Tribal Consumption of Seafood	0.035 [2.3[OCN]]	15.20224490	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Dichlorobenzene, 1,3-	0.28	Protection of Surface Water (NRWQC) from Vadose Soil	960	Marine-HH NRWQC for Consumption	--	--	
Dichlorobenzene, 1,4-	3.5	Protection of Surface Water from Vadose Soil	1.7	EPA R10 Tribal Consumption of Seafood	0.110 [3.1[OCN]]	60.8755102	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Dichloroethane, 1,1-	0.71	Protection of Surface Water from Vadose Soil	33.3	EPA R10 Tribal Consumption of Seafood	--	29220	J&E (More Protective)
Dichloroethane, 1,2-	0.07	Protection of Surface Water from Vadose Soil	3.6	EPA R10 Tribal Consumption of Seafood	--	0.023758485	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Dichloroethylene, 1,1-	0.081	Protection of Surface Water from Vadose Soil	3.2	NTR - Organism Consumption	--	0.012616099	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Dichloroethylene;1,2-,cis	2.6	Protection of Surface Water from Vadose Soil	130	EPA R10 Tribal Consumption of Seafood	--	0.807430341	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)

Dichloropropane; 1,2-	0.092	Protection of Surface Water from Vadose Soil	3.7	EPA R10 Tribal Consumption of Seafood	--	389.5035	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Diesel	2000[†]	MTCA Method A (WAC 173-340-900)	500[†¥]	MTCA Method A (WAC 173-340-900)	--	--	
Diethyl phthalate	178	Protection of Surface Water from Vadose Soil	4236.7	MTCA Method B-Mod Surface Water	0.200 [61[OCN]]	550.68	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Dimethyl phthalate	0.071	SMS SQS (possible bank soil value)	1100000	Marine-Chronic NRWQC	0.071 [53[OCN]]	630.15	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Dimethylphenol, 2,4-	94	Protection of Surface Water from Vadose Soil	655	EPA R10 Tribal Consumption of Seafood	0.029	--	
Di-n-octyl phthalate	492	Protection of Surface Water from Vadose Soil	0.3	Ecology Groundwater to Protect Sediment	6.2 [58[OCN]]	--	
Ethylbenzene	0.23	Protection of Surface Water from Vadose Soil	1.7	EPA R10 Tribal Consumption of Seafood	--	36.85	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Ethylene glycol	160000	Direct Contact/Ingestion	--		--	--	
Fluoranthene	220	Protection of Surface Water from Vadose Soil	11	EPA R10 Tribal Consumption of Seafood	1.7 [160[OCN]]	--	
Fluorene	153.9	Protection of Surface Water from Vadose Soil	45.2	EPA R10 Tribal Consumption of Seafood	0.540 [23[OCN]]	--	
Gasoline	1000[†]	MTCA Method A (WAC 173-340-900)	1000[†¥]	MTCA Method A (WAC 173-340-900)	--	300000	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Gasoline (w/benzene)	30[†]	MTCA Method A (WAC 173-340-900)	30[†¥]	MTCA Method A (WAC 173-340-900)	--	--	
Heavy Oil	2000[†]	MTCA Method A (WAC 173-340-900)	500[†¥]	MTCA Method A (WAC 173-340-900)	--	--	
Hexachlorobenzene	0.67	PQL[‡]	0.00029	NTR - Organism Consumption	0.022 [0.38[OCN]]	0.000466164	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Hexachlorobutadiene	0.475	Protection of Surface Water (NRWQC) from Vadose Soil	18	Marine-HH NRWQC for Consumption	0.011 [3.9[OCN]]	0.0106875	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Hexane;n-	4800	MTCA Method B, Non-Carcinogen, Injestion Only (CLARC)	480	MTCA Method B Groundwater, N-C, (CLARC)	--	90792	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
HPAH	--		--		12 [960[OCN]]	--	
Indeno[1,2,3-cd]pyrene	0.067	PQL[‡]	0.0018	EPA R10 Tribal Consumption of Seafood	0.090[Beach Play-TEQ]	--	
Iron	59000	Puget Sound Background Concentration	1000	Fresh-Chronic NRWQC	--	437.803284	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Isopropyltoluene;4-	--		--		--		
Lead	220	Ecological Exposure (MTCA)	2.5	Fresh-Chronic NRWQC	450.0	0.002088668	NIOSH PEL STEL
LPAH	--		--		5.2 [370[OCN]]	--	
Manganese	1100	Ecological Exposure (MTCA)	2000 a*	LDW Area Groundwater Background	--	0.01019158	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Mercury (elemental)	1.5	Protection of Surface Water from Vadose Soil	0.012	Fresh-Chronic NTR	0.41	0.016698900	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Methyl isobutyl ketone (MIBK)	171.2	Protection of Surface Water from Vadose Soil	19000	EPA R10 Tribal Consumption of Seafood	--	31.73	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Methylene chloride	2.44	Protection of Surface Water from Vadose Soil	230	EPA R10 Tribal Consumption of Seafood	--	1.532084806	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Methylnaphthalene, 2-	320	Direct Contact/Ingestion	64	MTCA Method B Groundwater	0.670 [38[OCN]]	3015	J&E (More Protective)
Methylphenol, 2- (o-cresol)	256.5	Protection of Surface Water from Vadose Soil	3053.7	EPA R10 Tribal Consumption of Seafood	0.063	5000	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Methylphenol, 4- (p-cresol)	41.4	Protection of Surface Water from Vadose Soil	333.8	EPA R10 Tribal Consumption of Seafood	0.67	5000	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Molybdenum	2	Ecological Exposure (MTCA)	80	MTCA Method B Groundwater	--	1274.233896	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Naphthalene	1.5	SMS SQS (TMCL, based on 1.55% OC @ T-117)	26	EPA R10 TMCL (VOA Adjustment for GW)	2.1 [99[OCN]]	0.026128315	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Nickel	213	Protection of Surface Water (NTR) from Vadose Soil	8.2	Marine-Chronic NRWQC	--	0.043311191	Method C-HH, Carcinogen WAC 173-340-750(4)(b)(ii)(B)
Nitrosodiphenylamine, N-	204.082	Direct Contact/Ingestion	1.96	Ecology Groundwater to Protect Sediment	0.028 [11[OCN]]	--	
pcb - Aroclor 1016	0.005 [0.00072]	PQL[‡] [Protection of Surface Water from Vadose Soil]	0.001 [0.000023]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	--	--	
pcb - Aroclor 1221	0.005 [0.00014]	PQL[‡] [Protection of Surface Water (NTR) from Vadose Soil]	0.014	Fresh-Chronic NTR	--	--	
pcb - Aroclor 1232	0.005 [0.00014]	PQL[‡] [Protection of Surface Water (NTR) from Vadose Soil]	0.014	Fresh-Chronic NTR	--	--	
pcb - Aroclor 1242	0.005 [0.00072]	PQL[‡] [Protection of Surface Water from Vadose Soil]	0.001 [0.000023]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	--	--	
pcb - Aroclor 1248	0.22	EPA RSL	0.001 [0.000023]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	--	--	
pcb - Aroclor 1254	0.005 [0.00029]	PQL[‡] [Protection of Surface Water from Vadose Soil]	0.001 [0.0000055]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	--	--	
pcb - Aroclor 1260	0.0054	Protection of Surface Water from Vadose Soil	0.001 [0.000023]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	--	--	
pcb mixtures	0.005 [0.0018]	PQL[‡] [Protection of Surface Water from Vadose Soil]	0.001 [0.000023]	PQL[‡] [EPA R10 Tribal Consumption of Seafood]	0.002[Background]	0.00029733	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Pentachlorophenol	0.033	PQL[‡]	1.47	MTCA Method B Surface Water	0.36	45.88963964	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Phenanthrene	2.02	Protection of Surface Water from Vadose Soil	4.8	Ecology Groundwater to Protect Sediment	1.5 [100[OCN]]	200	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Phenol (total)	1953.3	Protection of Surface Water from Vadose Soil	40694.5	EPA R10 Tribal Consumption of Seafood	0.42	5000	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Pyrene	236	Protection of Surface Water from Vadose Soil	9.8	EPA R10 Tribal Consumption of Seafood	2.6 [1000[OCN]]	200	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Selenium	1.02	Protection of Surface Water from Vadose Soil	5	Fresh-Chronic NRWQC	--	61.93009119	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Silver	176.1	Protection of Surface Water from Vadose Soil	22	EPA R10 Tribal Consumption of Seafood	6.1	2.26665925	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Styrene (phenylethylene)	300	Ecological Exposure (MTCA)	77000	EPA R10 Tribal Consumption of Seafood	--	75.16	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Tetrachloroethane;1,1,2,2-	0.013	Protection of Surface Water from Vadose Soil	0.33	EPA R10 Tribal Consumption of Seafood	--	436.997319	ASTDR ACGIH TLV
Tetrachloroethylene (perc)	0.26	Protection of Surface Water from Vadose Soil	3.3	Marine-Chronic NRWQC	--	1.415681544	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Thallium	0.669	Protection of Surface Water from Vadose Soil	0.47	Marine-Chronic NRWQC	--	11.96301008	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Tin	50	Ecological Exposure (MTCA)	9600	MTCA Method B Groundwater	--	411.9976409	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA

Toluene	101.6	Protection of Surface Water from Vadose Soil	1294.1	EPA R10 Tribal Consumption of Seafood	--	34.5	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Total Petroleum Hydrocarbons	--		--		--	--	
Tributyltin	24	MTCA Method B - Direct Contact	0.01	Marine-Chronic NRWQC	0.05 (porewater)	100	L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA
Trichlorethane, 1,1,1-	1896.8	Protection of Surface Water from Vadose Soil	46023.6	EPA R10 Tribal Consumption of Seafood	--	586.5	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Trichlorethane, 1,1,2-	0.075	Protection of Surface Water from Vadose Soil	2.3	EPA R10 Tribal Consumption of Seafood	--	0.028592204	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Trichloro-1,2,2-trifluiroethane;1,1,2-	240000	Direct Contact/Ingestion	--		--	1826808.129	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Trichlorobenzene, 1,2,4-	0.08	Protection of Surface Water from Vadose Soil	1.13	EPA R10 Tribal Consumption of Seafood	0.031 [0.81^{OCN}]	2.16	Method B-HH, Non-Carcinogen WAC 173-340-750(3)(b)(ii)(A)
Trichloroethylene	0.051	Protection of Surface Water from Vadose Soil	1.4	EPA R10 Tribal Consumption of Seafood	--	0.068847032	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Trichlorophenol, 2,4,6-	0.0163	Protection of Surface Water from Vadose Soil	2.4	Marine-HH NRWQC for Consumption	--	0.099780759	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Trimethylbenzene, 1,3,5-	800	Direct Contact/Ingestion	303	MTCA Method B Surface Water	--	295.6	J&E (More Protective)
Trimethylbenzene;1,2,4-	800	Direct Contact/Ingestion (Surrogate)	303	MTCA Method B Surface Water	--	--	
Vanadium	2	Ecological Exposure (MTCA)	1.12	MTCA Method B Potable Groundwater	--	23.99811549	NIOSH PEL TWA
Vinyl chloride (chloroethylene)	0.00074	Protection of Surface Water from Vadose Soil	0.53	EPA R10 Tribal Consumption of Seafood	--	0.10953600	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Xylene (dimethylbenzene)	202.7	Protection of Surface Water from Vadose Soil	1578	EPA R10 Tribal Consumption of Seafood	--	10.59039548	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Xylene;m-	160	Protection of Surface Water from Vadose Soil	1300	EPA R10 Tribal Consumption of Seafood	--	10.59039548	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Xylene;o-	200	Protection of Surface Water from Vadose Soil	1600	EPA R10 Tribal Consumption of Seafood	--	10.59039548	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Xylene;p-	230	Protection of Surface Water from Vadose Soil	1600	EPA R10 Tribal Consumption of Seafood	--	10.59039548	Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)
Zinc	85.1	Puget Sound Background Concentration	56	EPA R10 Tribal Consumption of Seafood	410.0	--	

[1] Sourced from EPA TMCLs for Boeing Plant II

[2] DW [dry weight] except when OC-Normalized ("[OCN]")

[3] EPA Regional Screening Levels (RSL) were used as surrogate when other ARARs were not available

*-Boeing has proposed a change in TMCL to EPA that Ecology has not approved

† -Method A surrogate would not apply; Substitute Appropriate Method B values

‡ -PQL will likely change as information is obtained from laboratory

¥ - No product or sheen

« - Assumes regulatory value is ≥ natural background

~ - Background value can be adjusted to site-specific value

"EPA R10 Tribal Consumption of Seafood" is based on Boeing Plant 2 TMCLs incorporating 97.5 g/day ingestion rate specific to the LDW

"Protection of Surface Water from Vadose Zone" is the unsaturated soil (TMCL) value protective of the respective surface water CUL using MTCA Eq. 747-1

"Ecological Exposure" values from MTCA Terrestrial Ecological Evaluation Tables 749-(2-5)

ATTACHMENT B
RESPONSE TO COMMENTS FROM TOM CAMMARATA TO VICTORIA SUTTON, DATED OCTOBER 2, 2013

SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

October 3, 2013

Ms. Victoria Sutton
Washington State Department of Ecology
Toxics Cleanup Program
31900 160th Avenue South
Bellevue, Washington 98008

SUBJECT: RESPONSE TO COMMENTS
Duwamish Marine Center
6365 1st Avenue South, Seattle, Washington
Project Number: 0826-001-03

Dear Ms. Sutton:

Below are the SoundEarth Strategies, Inc. (SoundEarth) responses to Washington State Department of Ecology (Ecology) comments regarding the draft *Remedial Investigation/Feasibility Study Work Plan, Duwamish Marine Center Site, 6365 1st Avenue South, Seattle, Washington*, prepared by SoundEarth and dated June 8, 2012 (Work Plan). Ecology's comments were presented in a letter to Mr. Stephen Plowman, Attorney for the Duwamish Marine Center, dated May 2, 2013. SoundEarth's responses to comments have been incorporated in the final *Technical Memorandum: Updates to the Remedial Investigation/Feasibility Study Work Plan, Duwamish Marine Center Site, 6365 First Avenue South, Seattle, Washington*, prepared by SoundEarth and dated October 2, 2013 (Tech Memo). SoundEarth's responses to Ecology's comments on the Work Plan are as follows:

1. **General Ecology Comments**

    a. The location naming system which provides a different soil boring number and well number for each well is confusing.

    The location names for the soil borings and monitoring wells should be revised so that each well has only one number and name. Wells should be named with the well number only.

SoundEarth Response: *The location naming system for soil borings and monitoring wells has been changed for clarity. Soil borings converted to wells are now named with the well number only (see Figure 2 and Table 1 of the Tech Memo).*

    b. Tables 24 of the Work Plan and Table 1 of the SAP do not provide a clear understanding of the rationale for the sampling plan for each location. Some areas are not scheduled to be analyzed for total petroleum hydrocarbons or volatile organics. For example, the four borings to assess the Pile Driving Company and junk dealer are not scheduled for

analyses for TPH; however, the nearby sampling location B4/TP-B4 boring log noted a petroleum odor. No rationale for excluding these analyses is provided.

All borings and wells should be analyzed for the same contaminants of potential concern unless a rationale for excluding certain analyses can be provided for approval.

SoundEarth Response: *Table 1 of the Sampling and Analysis Plan now provides a rationale for each proposed sampling location. All soil samples collected from each boring will be analyzed for the same chemicals of potential concern unless otherwise noted (see Table 1 of Tech Memo).*

c. Section 4.2.1 discusses work performed by the Riley Group in 2000. Location TP-2 on Lot 18 showed PCBs detected in the soil at a depth of 4.5 feet. The Plan states that this test pit is located in the area of the former marine railway. However, Figure 2 shows that the marine railway was located on Lot 10, and two soil borings (SB01 and SB02) are planned on this lot to assess contamination from this potential source.

   Verify the location of the former marine railway during the site reconnaissance task using air photos or other sources of information and whether it extended into the sediments at the site. If needed, revise the sampling plan in the Technical Memorandum to assess the location of the railway in all media potentially affected.

SoundEarth Response: *The Marine Railway is located in Lot 19 adjacent to Riley test pit TP-2(R). Direct-push boring SB01 and monitoring well MW13 will be advanced in Lot 19. Boring SB02 will be advanced in Lot 15 (see Figure 2 of the Tech Memo).*

2. Soil

a. The vertical extent of contamination at the site is not defined.

   The soil sampling proposed should be re-evaluated to assure that the vertical extent will be defined where necessary and additional borings should be added if indicated. Samples to be collected from the 2.0 and 2.5 feet intervals should be archived in case analyses are needed to define the contamination. A rationale for triggering further sampling interval analyses should be clearly stated in the Technical Memorandum.

SoundEarth Response: *The vertical extent of contamination will be addressed with soil samples collected in the vadose and saturated zones. All soil samples collected but not analyzed will be archived in accordance with technical holding times or for up to 60 days, which comes first (see Figure 2 and page 7 of the Tech Memo).*

b. Areas of fill placed during 1936–1966 and 1966–2007 need to be adequately characterized.

   Additional sampling locations may need to be placed to obtain the samples necessary to characterize each fill event for contaminants of potential concern, including

groundwater sheens noted in B3(R) and B1(R). Include a section discussing the sampling to be conducted in relation to existing data to assure that the fill will be addressed.

SoundEarth Response: *New soil boring SB02 is located proximate to existing borings B-3(R) and B-1(R) to further characterize the fill in this area of the site (see Figure 2 of the Tech Memo).*

c. Contaminants of potential concern on Port of Seattle property where site operations may have impacted environment media must be assessed during the remedial investigation.

   Include in the Technical Memorandum a discussion and sampling program to assure that the Port property is properly assessed.

SoundEarth Response: *Borings SB07 to SB09 will be advanced on the Port of Seattle Property (see Figure 2 of the Tech Memo).*

d. The area between MW2 and MW2D has higher levels of soil contamination but no borings are proposed in the area.

   Add some borings and/or wells to address this contamination, especially to determine the vertical extent.

SoundEarth Response: *Direct-push boring SB02 will be advanced between monitoring wells MW2 and MW2D. A reconnaissance groundwater sample will be collected from boring SB02 (see Figure 2 and Table 1 of the Tech Memo).*

3. Groundwater

a. PCBs and nickel were detected in the groundwater at SB-3N without additional sampling proposed.

   A well should be added in this area for further soil and groundwater sampling.

SoundEarth Response: *Nickel will be added as an analyte for groundwater samples collected from monitoring well MW-11 (see Table 1 of the Tech Memo).*

b. Further information on groundwater flow is needed.

   A tidal study or groundwater elevation monitoring tasks and/or a high tide groundwater sampling event should be added to the work plan to characterize site hydrogeology.

SoundEarth Response: *A tidal study will be performed (see page 11 of the Tech Memo).*

c. No quarterly groundwater monitoring is proposed.

At least four quarters of groundwater monitoring for all wells must be conducted for the specified analyses. After two quarters, the analyses may be adjusted with Ecology approval to monitor for the contaminants of concern.

SoundEarth Response: *Two quarters of groundwater sampling will be conducted as stated on pages 9 and 10 of the Tech Memo. Subsequent additional groundwater sampling may be planned with consultation from Ecology.*

d. Sampling to determine groundwater and surface water interaction is not proposed.

The groundwater should be analyzed for chlorides and total suspended solids to provide information on groundwater and surface water interaction.

SoundEarth Response: *Groundwater samples collected from the monitoring wells will be analyzed for chloride and total suspended solids (see Table 1 of the Tech Memo).*

e. No wells are proposed in the interior of the site which lacks data.

One or two wells are needed in the interior portion of the site. SB16 could be converted into a monitoring well and an additional location for a well can be selected in the area.

SoundEarth Response: *Boring SB-16 will be converted to monitoring well MW12 located in the center of the site (see Figure 2 of the Tech Memo).*

4. Stormwater

a. Task 9.2.3 regarding Stormwater Sampling should include a task for assessing the stormwater system at the site that includes not only the proposed stormwater sheet flow evaluation.

The stormwater system should be mapped to confirm the configuration during the site reconnaissance. Add sampling for the stormwater in the stormwater system that is discharging from each outfall. At least five events during the remedial investigation are required to characterize the stormwater discharge from the site. After two sampling events, the contaminants analyzed may be adjusted with Ecology approval to continue monitoring only for the contaminants of concern.

SoundEarth Response: *Stormwater is included as a task on pages 10 and 11, and Table 1 of the Tech Memo.*

b. All catch basins are not required to be sampled.

Select catch basins may be chosen from the stormwater system to be representative. Upon completion of the site reconnaissance to evaluate the stormwater system, certain catch basins may be selected for sampling and proposed in the Technical Memorandum.

SoundEarth Response: *This comment is noted; see page 10 and Table 1 of the Tech Memo.*

c. Dioxins and furans are one of the main risk drivers for the LDW Superfund site and no samples are proposed to be analyzed for these potential contaminants.

   At least one sample for dioxins and furans must be analyzed from the catch basin solids for source control information.

SoundEarth Response: *This comment is noted; see Table 1 of the Tech Memo.*

d. Seep 82 near Samson Tug and Barge was found to contain copper, lead, mercury, and zinc.

   This seep should be included for sampling during the remedial investigation. See Section 2.3.3 of the Lower Duwamish Waterway RM 1.7 to 2.0 East and the Data Report: Survey and Sampling of Lower Duwamish Waterway Seeps Final, November 18, 2004 from Windward Environmental. Sampling should include chlorides and total suspended solids to determine the mixture of groundwater and surface water.

SoundEarth Response: *Seep 82 will be sampled if flowing at the time of the sampling program for seep is implemented. Up to three seep samples will be collected.*

5. Bank

a. Composite sampling is proposed for the bank samples.

   Bank samples should be discreet samples. Depending on the configuration of the bank and the sampling needs determined from the site reconnaissance, samples may be needed from the upper and lower bank in some areas, and one sample may be adequate in other areas. The final bank sampling locations may be determined upon completion of the site reconnaissance and proposed in the technical memorandum.

SoundEarth Response: *Up to two discrete river bank sediment samples will be collected from approximately the upper and lower parts of the river bank, as practicable (see page 5 of the Tech Memo).*

6. Sediments

a. Sediment core samples are scheduled to be collected at a maximum of four feet depth.

   Assure that the sediment samples will be collected per the requirement in the Agreed Order Scope of Work to meet the protocol of the Ecology Sampling and Analysis Plan Appendix, February 2008.

   Consider collecting samples below this depth for archiving and analysis should contaminants be found in the lower samples analyzed.

SoundEarth Response: *Sediment core samples collected deeper than 4 feet below mudline will be archived for up to 60 days (see page 4 of the Tech Memo).*

a. Sediment sample Sed2 is located away from a stormwater outfall. Sediment sample Sed2 should be relocated to sample sediment below Outfall 3 to account for potential discharge of contaminants from the outfall as well as bank erosion and/or other sediment contamination in the area.

SoundEarth Response: *This comment is noted for SED02; see Figure 1 of the Tech Memo.*

7. Sampling and Analysis Plan

a. Table 24 of the Work Plan shows that soil and groundwater samples in some areas will be sampled for volatile organic compounds. Table 1 of the SAP does not show VOCs and the associated information for any media samples. In addition, Table 1 of the SAP shows the total number of samples for analysis that appears not to match with the number of samples of certain media to be collected. For example, Figure 26 shows that six sediment samples will be collected, with Table 1 indicating that ten samples will be analyzed for each method listed. Twelve catch basins are scheduled for sampling; however, Table 1 of the SAP shows that seven catch basin samples will be analyzed.

   Include a table in the Technical Memorandum showing each sampling location name, total depth, potential source or data gap area, analytical tests to be conducted, sampling depths for analysis and archiving, and the rationale for the sampling location and analyses to be conducted.

SoundEarth Response: *Table 1 of the Tech Memo now includes volatile organic compounds. Table 1 also provides a rationale for the sample locations.*

b. Section 5.1.2.2.1 for Soil Sampling does not indicate if samples collected from the borings that are not selected for analysis will be archived. No rationale is provided for archived samples to be analyzed if needed to determine the vertical extent of contamination.

   Revise the plan to show that samples will be collected both for analyses and archiving, and provide a rationale for analyzing archived samples.

SoundEarth Response: *All samples for the media of concern are now identified for analysis or archive in Table 1 of the Tech Memo.*

c. The SAP does not include sampling methods for stormwater discharge.

   Add the information for sampling the stormwater.

SoundEarth Response: *The Tech Memo includes a section on Stormwater; see pages 10 and 11, and Table 1 of the Tech Memo.*

d. Table 1 appears to show the water samples for mercury are scheduled to be analyzed by Method 7471.

   Method 1631 for mercury is required for the site water samples to obtain a lower detection limit.

SoundEarth Response: *Method 1631 for mercury will be used for all the media of concern; see Table 1 of the Tech Memo.*

e. Table 1 of the SAP is not clear whether groundwater samples will be analyzed for both total and dissolved metals.

   Both analyses should be performed on the site groundwater samples.

SoundEarth Response: *Groundwater samples collected from monitoring wells will now be analyzed for both total and dissolved metals.*

f. The SAP Section 5.1.2.2.3 does not state if the groundwater will be sampled at low tide.

   Groundwater samples should be collected during low tide conditions.

SoundEarth Response: *Groundwater samples collected from the monitoring wells will be analyzed for both total and dissolved metals; see Table 1 of the Tech Memo.*

8. Quality Assurance Program Plan (QAPP)

a. Table 1 of the QAPP shows the list of practical quantitation levels and method detection limits. The list contains a partial set of the chemicals analyzed by the methods to be employed. It is not clear if Sound Earth intends to limit the analytes to be reported by the laboratory to those shown on the list. All analytes for each method should be reported and documented for the remedial investigation.

   Please include in the Technical Memorandum a full list of the analytes for each method to be analyzed and the PQL and MDL for each. Upon collection of a sufficient amount of data for decision-making, the analyte list may be limited to certain chemicals in moving forward with the RI, however, no rationale for limiting the analyte list at the beginning of the investigation has been provided.

SoundEarth Response: *MRLs (also known as PQLs) for all the analytes of concern are updated in accordance with the Ecology Table 1. 8801 Site Cleanup Levels - FINAL DRAFT; see Tables 2 to 5 in the Tech Memo.*

b. The PQLs should be below the attached Table 1. 8801 Site Cleanup Levels – Final Draft. These levels are in process to possibly be a set of cleanup levels to be applied at sites along the Duwamish River and may be adjusted for site specific conditions.

PQLs should be evaluated to assure they will meet the draft final cleanup levels that could be applied as preliminary cleanup levels at the site.

SoundEarth Response: *MRLs for all the analytes of concern will be updated in accordance with the Ecology Table 1. 8801 Site Cleanup Levels—FINAL DRAFT; see Tables 2 through 5 in the Tech Memo.*

Respectfully,

SoundEarth Strategies, Inc.

Thomas Cammarata
Senior Environmental Geochemist, LG, LHG

TJC:dnm