State of Oregon
Department of Environmental Quality Memorandum

Date: January 5, 2015

To: Swan Island Upland Facility File ECSI #271

Through: Keith Johnson, NWR Cleanup and Site Assessment Manager

From: David Lacey, Project Manager
NWR Cleanup Section

Subject: Operable Unit 4- Swan Island Upland Facility File ECSI #271
Proposed Source Control Decision

1.0 Introduction

This report presents the basis for the Oregon Department of Environmental Quality's source control decision at the Operable Unit 4- Swan Island Upland Facility site, ECSI #271, located at 5225 N Channel Avenue in Portland and is adjacent to the Portland Harbor Superfund sediment study area. To prepare this source control decision, DEQ reviewed reports and other supporting documents prepared by the Port of Portland (Port) as part of the voluntary agreement between the Port and DEQ, signed July 24, 2006.

The Operable Unit 4 (OU4) source control evaluation (Ash Creek 2012) was completed in accordance with the 2005 EPA/DEQ Portland Harbor Joint Source Control Strategy, also known as the JSCS. The Port is not the current operator of OU4. Therefore the source control evaluation is limited to evaluation of historical releases and does not include evaluation of the stormwater pathway. The stormwater pathway is being evaluated separately by the current operator.

DEQ's proposed source control decision is that contaminant transport pathways from the site do not pose a significant current or likely future threat to the Willamette River.

2.0 Site Description and History

A detailed summary of site history, previous environmental investigations, and source control evaluation can be found in the following documents:

- *Risk Assessment, Feasibility Study, and Source Control Evaluation Operable Unit 4 Swan Island Upland Facility* (RA/FS/SCE Report) (Ash Creek 2012)
- *Supplemental Preliminary Assessment Swan Island Upland Facility* (Ash Creek, 2006) and
- *Remedial Investigation/Feasibility Study Work Plan for the Portland Shipyard* (Bridgewater Group, 2000)

2.1 Site Description

Figures showing the location of the Swan Island Facility and the layout of OU4 are presented in Attachment 1. The property covers approximately 7.8 acres on the northwest end of Swan Island. OU4 consists of the upland property currently operated by Vigor Industrial, LLC, referred to as the Cascade General Ship Repair Yard, and formerly known as the Portland Shipyard.

The bulk of the property consists of a paved parking lot with landscaped islands. None of OU4 is adjacent to the bank of the Willamette River. OU4 is relatively flat with land surface elevations generally ranging between 30 and 34 feet (NGVD 29 with the 1947 adjustment).

2.2 Regulatory Framework

OU4 was evaluated under an agreement between the Port and DEQ – Voluntary Agreement for Remedial Investigation, Source Control Measures, and Feasibility Study – dated July 24, 2006. For the purposes of the work conducted under this agreement, the Swan Island Upland Facility has been divided into five operable units designated as follows:

- OU1- Approximately 57 acres of upland property owned by Shipyard Commerce Center, LLC (formerly Cascade General, and operated as the Vigor Marine (Vigor) Ship Repair Yard and formerly known as the Portland Shipyard.
- OU2-Approximately 19 acres of upland property owned by the Port south of North Channel Avenue. Currently there are two lease holds: 1) the Cemex concrete batch plant and 2) the Daimler temporary truck staging area.
- OU3-Approximately 2.5 acres of upland property owned by the Port on North Lagoon Avenue that includes the property at 5420 North Lagoon Avenue and the adjacent property to the north that provides access to Berths 308 and 309.
- OU4-Approximately 7.8 acres of upland property between OU1 and OU2. Until 2008, OU4 was part of OU2, but was designated a separate OU to facilitate the sale of the property from the Port to Shipyard Commerce Center LLC.
- OU5- Approximately 5 acres of upland property that includes the riverbank adjacent to OU2 and OU4. Until 2014, OU5 was part of OU2, but was designated a separate OU to facility the potential sale of the OU2 property.

2.3 Site History

The *Supplemental Preliminary Assessment Swan Island Upland Facility* (Ash Creek, 2006) presents a description of operations and associated potential areas of concern for all five operable units of the Swan Island Upland Facility. A summary of OU4 information was presented in the *Risk Assessment, Feasibility Study, and Source Control Evaluation-SIUF OU4* and is presented below.

OU4 was developed in the 1920's, and has been used for a variety of light industrial uses since, including;

- 1923 to 1931 – Development of Swan Island;

- 1931 to 1941 – Portland Airport;
- 1942 to 1949 – Storage area/support services for Military-era ship building and related industries;
- 1950 to 1977 – Material storage; and
- 1977 to Present – Paved parking lot.

Figures identifying historical features relevant to potential contamination at OU4 are presented in Attachment 1.

The Port acquired Swan Island, including the area now occupied by OU4, from the Swan Island Real Estate Company on January 3, 1922.

The Port developed Swan Island beginning in 1923, when the main navigation channel of the Willamette River was relocated to the west side of the island. River sediments dredged as part of the project were deposited on Swan Island to raise the surface elevation and construct a causeway connecting the island to the eastern shore of the river. This filling prepared the island for development into the first Portland airport. Airport construction was completed and operations started in 1931. The airport operated until 1941, when it was relocated to northeast Portland. Based on historical research conducted by the Port, airport facilities that were located on OU4 were a paved runway and cinder taxiways.

Between 1942 and 1949, the United States used OU4 to support military-era ship building and related industries. Electrical substations that may have contained equipment with polychlorinated biphenyls (PCBs) were installed during this period. One substation, designated substation R, was located on OU4. A second substation (substation A) was located immediately adjacent to OU4 on OU5. As shown in the figures presented in Attachment 1, all or part of four buildings were located on OU4, including the mold loft (Building #3), oxygen house (Building #5), machine shop (Building #9) and boiler erection building (Building #21). The mold loft was a 45,500-square-foot, two story building with rail service and loading dock that was used as a template layout area for patterns for shaping steel. The oxygen house was a small structure where oxygen was stored. The machine shop was a 37,000-square-foot, one-story structure with a concrete floor and spur track where tools and parts were machined. The boiler erection building was a two-story structure where vessel boilers were constructed. Most of the mold loft and machine shop were located on adjacent parcels of property to the north of OU4. In addition to the building, steel plate and shaped steel pieces were stored on OU4. Multiple rail spur tracks crossed OU4.

Between 1950 and 1977, OU4 was primarily open, graded soil with railroad spurs used for material receiving and storage. The main parking lot was constructed in 1977. It has been used as a parking lot for shipyard workers since 1977. The only additional use was the temporary staging of new trucks and trailers by Daimler AG Trucks on a portion of the parking lot. (Ash Creek 2012)

2.4 Potential Sources of Contamination

The historical research conducted for the RI/FS Work Plan and supplemental PA identified past activities and features that may be areas of concern as contaminant source on OU4. No reports of releases or mishandling of materials associated with the site's operational history have been identified by the Port. Potential sources of contamination include:

- Historical airport runway;
- Military-era electrical substation A and R;
- General light industrial use of OU4
- Fill material used across the site.

2.5 Chemicals of Interest

The Port identified chemicals of interest (COIs) for the source control evaluation considering near shore sediment data and upland potential sources.

Near shore Sediment Data Screening. As part of the OU4 source control evaluation the Port identified constitutes detected in near shore sediment samples that exceeded JSCS screening level values (SLVs). Table D-1 through D-6 in Attachment 6 list the nearshore sediment data together with the JSCS screening levels. Chemicals detected in sediments above SLVs are summarized as follows:

- The total PCB concentration exceeded the JSCS bioaccumulation SLV of 0.39 μg/kg at 6 of the 8 locations.

- The TBT concentration exceeded the JSCS SLV of 2.3 μg/kg at 2 of the 2 locations.

Sediment river sample locations are shown in Attachment 7.

Soil, Groundwater, and Storm Water Solids Data. COIs for OU4 were developed based on the historical research conducted by the Port for the RI/FS Work Plan and Supplemental Preliminary Assessment. The investigations described below in Section 5.0 included analyses for each of these COI, summarized as follows:

- Soil: Upland soils were analyzed for metals, TPH, VOCs, PCBs, PAHs phthalates, SVOCs, and butyltins. VOCs, PCBs, phthalates, SVOCs, and TBT were not detected. Metals, TPH, PAHs, dibutyltin, and butyltin were detected in soil.

- Groundwater: Groundwater samples collected on OU4 were analyzed for metals, TPH, VOCs, PCBs, PAHs, phthalates, SVOCs and butyltins. Except for metals and PAHs, none of these compounds were detected in groundwater.

Summary of Chemicals of Interest. Based on the nearshore sediment, soil, and groundwater data, COIs identified by the Port are:

- Metals;

- TPH;

- PAHs;

- PCBs;
- Phthalates; and
- Butyltins

3.0 Identification of Contaminant Transport Pathways

Potential contaminant transport pathways evaluated at OU4 include releases during overwater activities, stormwater, stormwater conveyance as a preferential groundwater migration pathway, riverbank erosion and groundwater migration.

Overwater Activities - There were/are no over water activities at OU4, so this pathway is not considered complete.

Stormwater Pathway – OU4 is a paved parking lot with multiple catch basins that discharge to outfall WR-399. The stormwater pathway is being evaluated by the current operator, Vigor Industrial LLC under a separate agreement with DEQ.

Storm Water Conveyances as Preferential Groundwater Migration Pathway – Based on the depth of groundwater at the site this pathway is incomplete. The depth to groundwater ranges from 18 to 31 feet below ground surface. Active and inactive stormwater pipes are or where located at shallower depths. Active outfall WR-399 is located approximately 5 to 10 feet below the top of the riverbank.

Riverbank Erosion Pathway – OU4 is not adjacent to the river and has no riverbank. Therefore, this pathway is not considered complete.

Groundwater Pathway - Groundwater monitoring performed as part of the remedial investigation determined that groundwater beneath OU4 flows to the Willamette River. Constituents present in groundwater have the potential to migrate to the river. This pathway was carried forward by the Port for further evaluation.

3.0 Regulatory History

A preliminary assessment for the Portland Swan Island Shipyard was conducted by DEQ in 1990. The Port submitted a *Remedial Investigation/Feasibly Study Work Plan* (Bridgewater Group, 2000) for the Portland Shipyard in 2000. Implementation of the work plan proceeded through 2006, when the Port and DEQ agreed to split the shipyard into two separate components: 1) the upland portion above ordinary high water; and 2) the in-water portion of the site below ordinary high water and within the Portland Harbor Superfund in-water study area.

The Port entered into a voluntary agreement for remedial investigation, source control measures, and feasibility study with DEQ for the Swan Island Upland Facility on July 24, 2006. The agreement covers the upland portions of the site and divides the Swan Island Upland Facility into operable units. A *Supplemental Preliminary Assessment Swan Island Upland Facility* was conducted by the Port in 2006 and subsequent investigations have focused on the individual operable units.

In 2008 the Port submitted a No Further Action Determination Request for OU4 (Port, 2008). DEQ determined that additional evaluation of soil and groundwater was needed. DEQ requested additional surface soil samples be collected and that a source control evaluation be submitted.

As discussed below the surface soil investigation was completed in 2009 and a source control evaluation report was submitted in 2012.

3.1 Hazardous Waste Management

Records kept under the Resource Conservation and Recovery Act list the property as a large quantity generator. Hazardous waste management at the facility is handled under the current operator (Vigor Industrial LLC).

3.2 Permits

Stormwater discharged to the Willamette River is covered under a General 1200Z Industrial Stormwater permit that is implemented by the current operator (Vigor Industrial LLC).

4.0 Hazardous Substance Releases

Appendix F of the *Supplemental Preliminary Assessment Swan Island Facility* presents a list of known and potential releases that occurred across the entire Swan Island Upland Facility. It is included as Attachment 2 to this SCD. No spills or potential releases were identified in OU4. Specific sources of contamination are discussed in detail in the *Supplemental Preliminary Assessment Swan Island Facility* and summarized above in Section 2.4.

5.0 Previous Investigations

5.1 Upland Soil Investigations

The Port presented a summary of soil and groundwater investigations in the *RA/FS/SCE Report OU4*. This information is presented below. Since 2000, the Port has completed RI activities throughout the five operable units of the Swan Island Upland Facility, including Phase I RI soil and groundwater investigations. Phase II RI groundwater monitoring well installation, four quarters of groundwater sampling, and five years of annual groundwater sampling. The Port and others also performed OU-specific investigation activities. Shipyard Commerce LLC performed sampling of soil and groundwater on OU4 prior to purchase of the property from the Port. The Port completed surface soil sampling at the former substations and at locations sampled by Shipyard Commerce LLC. (Ash Creek 2012)

The following sections summarize the previous investigation for OU4. Attachment 3 presents a comprehensive sample location plan, and analytical data are listed in Attachment 4.

5.1.1 Pre-RI Investigation

In 1998, surface (0 to 2 feet below the ground surface [bgs]) and subsurface (between 14 and 22 feet bgs) soil samples were on the Swan Island Upland Facility to establish baseline conditions prior to the sale of the shipyard to Shipyard Commerce Center LLC. One boring (designated Boring 7) was located on OU4. In addition, Boring 1 was located immediately adjacent to OU4. The soil samples were analyzed for petroleum hydrocarbons, PCBs, and metals. The results of

the assessment are summarized in the RI/FS work plan (Bridgewater Group, 2000). A summary of the soil data is included in Table A-1 in Attachment 4. (Ash Creek 2012)

Cadmium, mercury, silver and selenium were not detected in any of the 0 to 2 feet bgs or 16 to 19 feet bgs samples. Arsenic concentrations ranged from 1.6 to 2.71 mg/kg, below DEQ regional background concentration of 8.8 mg/kg. Chromium concentrations ranged from not detected to 11.6 mg/kg, below DEQ's regional background concentration of 75.8 mg/kg. Lead concentrations ranged from not detected to 11.6 mg/kg, below DEQ's regional background concentration of 79 mg/kg. Barium concentrations ranged from 76.7 to 158 mg/kg, below DEQ's regional background concentration of 791 mg/kg.

Heavy oil range hydrocarbons were not detected in three of the of the four soil samples; they were detected in the 0 to 2 feet bgs sample collected at Boring 7 at a concentration of 146 mg/kg.

No PCBs were detected in any of the four soil samples.

5.1.2 Substation Sampling. Soil samples were collected from two former substation locations (Substation A and R) formerly located on or adjacent to OU4. Four surface soil samples were collected at the corners of a 30- by 30-foot grid at each former substation location. The soil samples were analyzed by the total petroleum hydrocarbons (TPH) identification method (NWTPH-HCID) and for PCBs. Results are presented in Tables A-2 and A-3 in Attachment 4.

No TPH or PCBs were detected in the soil samples.

5.1.3 2008 Due Diligence Investigation. As part of pre-acquisition due diligence, a subsurface investigation to assess the potential for environmental impacts to soil beneath OU4 was conducted. Shallow and deep borings were completed at eleven locations. Four soil samples were collected from each deep boring (nominally at 5, 50, 75, and 100 feet bgs) and three soil samples were collected from each shallow boring (nominally at 5 feet bgs, soil water interface and 40 feet bgs). The soil samples were analyzed for TPH, PCBs, PAHs, butyl tins, VOCs, SVOCs, and metals (including arsenic, barium, chromium, copper, lead, mercury, nickel, and zinc). The sample results are presented in Table A-4 of Attachment 4.

No VOCs, SVOCs, tributal tin or PCBs were detected.

Diesel or heavy oil range hydrocarbons were detected in three of the thirty six samples with concentrations ranging from 115 to 536 mg/kg.

PAHs were detected in six of the thirty six samples with individual PAH concentrations ranging from 0.0498 to 9.1 mg/kg.

The only metal to exceed DEQ regional background concentrations was mercury. Mercury was detected in three of the thirty six soil samples with concentrations greater than the DEQ regional background concentration of 0.23 mg/kg. The maximum detected concentration of mercury was 1.83 mg/kg.

5.1.4 2009 Surface Soil Sampling. At the request of DEQ, surface soil samples were collected at the location of eight of the 2008 boring locations. The soil samples were analyzed for TPH, metals and PAHs. A report documenting the investigation is included in Attachment 5. Results are presented in Tables A-5 through A-7 in Attachment 4.

Diesel or heavy oil range hydrocarbons were detected in two of the eight samples with concentrations ranging from 80.8 to 216 mg/kg.

PAHs were detected in eight of the eight samples with individual concentrations ranging from 0.0104 to 26.6 mg/kg.

The only metals to exceed DEQ regional background were arsenic and copper. Arsenic was detected in one of the eight surface soil samples with concentrations greater than the DEQ regional background concentration of 8.8 mg/kg. The maximum detected concentration of arsenic was 18.7 mg/kg. Copper was detected in one of the eight samples with concentrations greater than the DEQ regional background concentration of 34 mg/kg. The maximum detected concentration of copper was 76.3 mg/kg.

5.2 Groundwater Investigations

Grab groundwater samples were collected during the 2008 due diligence investigation. This work was done to facilitate the potential sale of Port property. The work plan and the work was not overseen by DEQ or conducted as part of the RI/FS process. The results of the investigation are presented as part of this SCD for completeness but the limitations associated with this data need to be taken into account during review. Specifically, groundwater samples collected from borings using temporary well screens potentially contain entrained sediment that can lead to elevated results for many constituent classes, particularly metals and those with high soil organic carbon partitioning coefficients. Additionally, because the temporary well points were not sealed off and developed like traditionally monitoring wells would be, there is the potential for contaminants to be dragged down during the drilling process. However, this data is useful in assessing what contaminants are potentially present in groundwater.

As part of the pre-acquisition due diligence investigation, grab groundwater samples were collected at the maximum depth of each of the eleven boring using a temporary well screen. Samples were collected from temporary well screens placed at 36 to 40 feet below ground surface at sample location; GP-01, GP-03, GP-04, GP-05, GP-07, GP-08, GP-10 and GP-11. Samples were collected from temporary wells screens placed at 106 to 110 feet below ground surface at sample locations GP-2, GP-6 and GP-9. The groundwater samples were analyzed for TPH, PCBs, PAHs, TBT, VOCs, SVOCs and metals. The sample results are presented in Table A-8 in Attachment 8.

No TPH, PCBs, TBT, VOCs, or SVOCs were detected.

PAHs were detected in five of the eleven groundwater grab samples.

Metals were detected in all eleven groundwater grab samples.

5.3 Near-shore Sediment Data

Extensive sampling of sediments has been completed at the shipyard and Swan Island Lagoon. The results of the sampling are evaluated in detail in the Portland Harbor Remedial Investigation Report (Integral Consulting, 2009).

As part of the OU4 source control evaluation the Port identified constitutes detected in near shore sediment samples that exceeded JSCS SLVs. Table D-1 through D-6 in Attachment 6 list

the nearshore sediment data together with the JSCS screening levels. Chemicals detected in sediments above SLVs are summarized as follows:

- The total PCB concentration exceeded the JSCS bioaccumulation SLV of 0.39 μg/kg at 6 of the 8 locations.
- The TBT concentration exceeded the JSCS SLV of 2.3 μg/kg at 2 of the 2 locations.

Sediment river sample locations are shown in Attachment 7.

6.0 Source Control Evaluation

As detailed above several investigations have occurred at OU4 as part of the RI/FS investigation and under the 2008 due diligence investigation. The site has had a long industrial use but no reported releases have been documented. Soil samples collected from the eleven boring locations and from eight locations within the footprint of the former substations did not indicate substantive releases that appear to pose a risk to the river. Groundwater samples from the eleven temporary wells support these results. Further, near shore sediment data do not suggest that the observed constituent detections in shallow soil or groundwater have impacted the river sediment.

6.1 Groundwater Pathway

The *RI/FS/SCE Report* presents an extensive screening of the soil and groundwater data as well as a weight-of-evidence evaluation for the groundwater pathway. A summary of the OU4 data results and weigh-of-evidence conclusions are presented below.

Surface Soil Samples: Surface soil samples were collected at nine locations across OU4 and at eight additional locates associated with two former electrical substations. Soil sample locations are shown in figures presented in Attachment 3. A summary of soil data results is included in Attachment 4.

Metals – Metals were analyzed at nine surface soil locations (B-7, OU4-1, OU4-2, OU-4-3, OU4-4, OU4-5, OU4-6, OU4-7 and OU4-8). Arsenic exceeded the DEQ regional background concentration of 8.8 mg/kg at one location (OU4-3) with a concentration of 18.7 mg/kg. Copper exceeded the DEQ regional background concentration of 34 mg/kg at one location (OU4-1) with a concentration of 76.3 mg/kg.

PAHs – PAHs were analyzed at eight locations (OU4-1, OU4-2, OU-4-3, OU4-4, OU4-5, OU4-6, OU4-7 and OU4-8). PAHs were detected in eight of the eight samples with concentrations ranging from .0104 to 26.6 mg/kg. The highest concentrations were observed at OU4-1, OU4-2 and OU4-5, which are located toward the center of OU4.

TPH – TPH was analyzed at seventeen locations (B-7, OU4-1, OU4-2, OU-4-3, OU4-4, OU4-5, OU4-6, OU4-7, OU4-8, Sub A-N-1, Sub A-E-1, Sub A-S-1, Sub A-W-1, Sub R-N-1, Sub R-E-1, Sub A-R-1, and Sub A-R-1). Diesel or heavy oil range hydrocarbons were detected at three locations (B-7, OU4-2 and OU4-5) with detected concentrations ranging from 80.8 to 216 mg/kg. The highest detected was at OU4-5.

PCBs – PCBs were analyzed at nine locations (B-7, Sub A-N-1, Sub A-E-1, Sub A-S-1, Sub A-W-1, Sub R-N-1, Sub R-E-1, Sub A-R-1, and Sub A-R-1). PCBs were not detected in any surface soil sample.

Subsurface Soil Samples: Subsurface Soil Samples were collected at twelve locations within the footprint of OU4. A total of 37 samples were collected from various depths. Soil sample locations are shown in figures presented in Attachment 3. A summary of soil data results is included in Attachment 4.

Metals – Metals were analyzed in all thirty seven samples. Mercury was the only metal that exceeded the DEQ regional background level. Mercury exceeded its background level of 0.23 mg/kg at three locations (GP-01 4-8 ft bgs, GP-11 3-4 ft bgs and GP-11 18-20 ft bgs) with concentrations ranging from 0.409 to 1.83 mg/kg.

PAHs – PAHs were analyzed in thirty six samples. PAHs were detected in 6 of the thirty six samples with concentrations ranging from 0.0498 to 9.1 mg/kg. The highest detections were observed in GP-1 4-8 ft bgs, GP-04 4-8 ft bgs and GP-06 5-10 ft bgs.

TPH – TPH was analyzed in all thirty seven samples. Diesel or heavy oil range hydrocarbons were detected in three (GP-6 5-10 ft bgs, GP-07 18-22 ft bgs and GP-09 5-8 ft bgs) of the thirty seven samples with concentrations ranging from 115 to 536 mg/kg.

PCBs - PCBs were analyzed in all thirty seven samples. PCBs were not detected in any samples.

VOC – VOCs were analyzed in thirty six samples. VOCs were not detected in any samples.

SVOCs – SVOCs were analyzed in thirty six samples. SVOCs were not detected in any samples.

To further evaluate the groundwater pathway, DEQ focused our review on the nine subsurface samples collected at the groundwater soil interface where constituents were detected. Recorded groundwater depths range from 18 to 31 feet below ground surface. A review of these nineteen sample results indicates the following.

Metals – Metals were analyzed in all eight samples. Mercury was the only metal that exceeded the DEQ regional background level. Mercury exceeded its background level of 0.23 mg/kg at one location; GP-11 18-20 bgs with concentration of 1.83 mg/kg.

PAHs - PAHs were analyzed in eight of the samples. PAHs were detected in 2 (GP-05 18-22 bgs and GP-11 18-20 bgs) of the eight samples with concentrations ranging from 0.0082 to 0.187 mg/kg.

TPH – TPH was analyzed in all eight samples. Heavy oil range hydrocarbons were detected in one (GP-07 18-22 ft bgs) of the eight samples with a concentration of 115 mg/kg.

Groundwater Samples: Groundwater samples were collected from eleven temporary well point locations. Temporary well point sample locations are shown in figures presented in Attachment 3. A summary of groundwater data results is included in Attachment 4. Temporary well point groundwater sample results were screened against JSCS SLVs, which are included in Appendix

4, and were originally presented by the Port as Table A-8 in the *RI/FS/SCE OU4*. A table with detection limits is also shown, originally presented by the Port as Table 1 in their Oct 8, 2012 letter Ash Creek 2012 to DEQ. A summary of results is discussed below:

Metals – Metals were detected in all eight temporary well point groundwater samples.

PAHs - PAHs were detected in five of the eight temporary well point groundwater samples

TPH - Diesel or heavy oil range hydrocarbons were not detected in any of the eight temporary well point groundwater samples.

PCBs – PCBs were not detected in any of the eight temporary well point groundwater samples.

VOCs – VOCs were not detected in any of the eight temporary well point groundwater samples

SVOCs – SVOCs were not detected in any of the eight temporary well point groundwater samples.

6.2 Source Control Evaluation Conclusions

Evaluation of the potentially complete groundwater discharge to the river pathway was presented in *RI/FS/SCE Report*. The Port's evaluation screened the available temporary well groundwater sample results against SLVs and screened soil results against SLVs and background metal concentrations. The evaluation presents a weight-of-evidence evaluation that concluded the groundwater pathway to the river is not a pathway of concern. DEQ concurs with the Port's conclusions based on the following:

- Soil and groundwater sample results for VOCs, SVOCs, butyl tins, phthalates, and PCBs do not suggest significant releases of any these constituents occurred.
- Metals, TPH and PAHs results in surface soil show releases of these constituents occurred but subsurface and groundwater data do not suggest these releases are likely to impact the river for the following reasons:
    - TPH was not detected in any of the temporary well point groundwater samples or in substantial concentrations in soil samples.
    - Surface and subsurface soil results do not suggest significant releases of metals have occurred. Groundwater samples analyzed for metals were conducted on groundwater samples collected from temporary wells points, which likely resulted in detected concentrations that are biased high due to presence of entrained soil particles.
    - PAHs were only detected in two of the eight subsurface samples collected at the groundwater interface and the detected concentrations do not suggest a substantial threat to groundwater. Groundwater samples analyzed for PAHs were conducted on groundwater samples collected form temporary well points, which likely resulted in detected concentrations that are biased high due to presents of

entrained soil particles. PAHs were detected above SLVs only in interior groundwater samples. Additionally, groundwater samples collected from the four locations nearest the river were below detection limits except for naphthalene detected in one sample at less than half the SLV.

- The metals and PAHs detected in groundwater and soil samples do not correlate with chemicals detected at elevated concentrations in nearby river sediments.

DEQ concurs with the Port in that the available data suggest the groundwater pathway to the river is not currently complete and does not pose an unacceptable risk to the Willamette River.

Further, DEQ's position that the observed detections of metals, TPH and PAHs in surface soil do not require a source control action because of the anticipated remedial actions associated with the RI/FS process. As presented in the *RI/FS/SCE Report*, anticipated remedial actions include implementing institutional controls that utilize the existing asphalt concrete parking lot as a cap to address potential risk to occupation workers and implementation of a soil and cap management plan to manage PAH (BaP) and arsenic affected soil in the event it is disturbed.

7.0 Summary of Source Control Decision

The Swan Island Upland Facility-Operable Unit 4 site has been adequately characterized. The sources, nature, and extent of contamination are understood. The Source Control Evaluation prepared by Ash Creek Associates on behalf of the Port presents an acceptable evaluation generally following the JSCS that allows DEQ to make this source control decision.

The Source Control Decision review of migration pathways to the Willamette River identified the groundwater migration pathway as the only potentially complete pathway to the river for historical contamination at the site. DEQ's proposed source control decision is that this contaminant transport pathway does not pose a significant current or likely future threat to the Willamette River.

As noted above, the Port is not the current operator of OU4 and this proposed source control decision is limited to contamination associated with historical releases at OU4 and does not include evaluation of the stormwater pathway. The stormwater pathway is being evaluated separately by the current operator, Vigor Industrial LLC.

References:

Bridgewater Group, 2000. *Remedial Investigation/Feasibility Study Work Plan for the Portland Shipyard*, prepared for the Port of Portland. November 2, 2000.

Ash Creek, 2006. *Draft Supplemental Preliminary Assessment, Swan Island Upland Facility*, prepared for the Port of Portland, December 2006.

Ash Creek 2007, Letter from M Pickering/Ash Creek to N. LaFranchise/Port regarding former substation sampling results, Swan Island Upland Facility. July 24, 2007.

Ash Creek, 2012. *Risk Assessment, Feasibility Study, and Source Control Evaluation Operable Unit 4 Swan Island Upland Facility*, prepared for the Port of Portland. April 23, 2012.

Port, 2008. Letter to DEQ, Swan Island Upland Facility, Operable Unit (OU) 4 – No Further Action Determination Request. July 11, 2008.

Integral Consulting, 2009. *Portland Harbor RI/FS Draft Remedial Investigation Report*. Prepared for the Lower Willamette Group, October 27, 2009.

Attachments: Attachment 1: Location Map, Facility Plan, Historical Site Layout
Attachment 2: Summary of Known and Potential Releases
Attachment 3: Upland Sample Location Plan
Attachment 4: Upland Soil and Groundwater Sample Analytical Data
Attachment 5: Surface Soil Data Report
Attachment 6: River Sediment Sample Screening Results
Attachment 7: River Sediment Sample Locations
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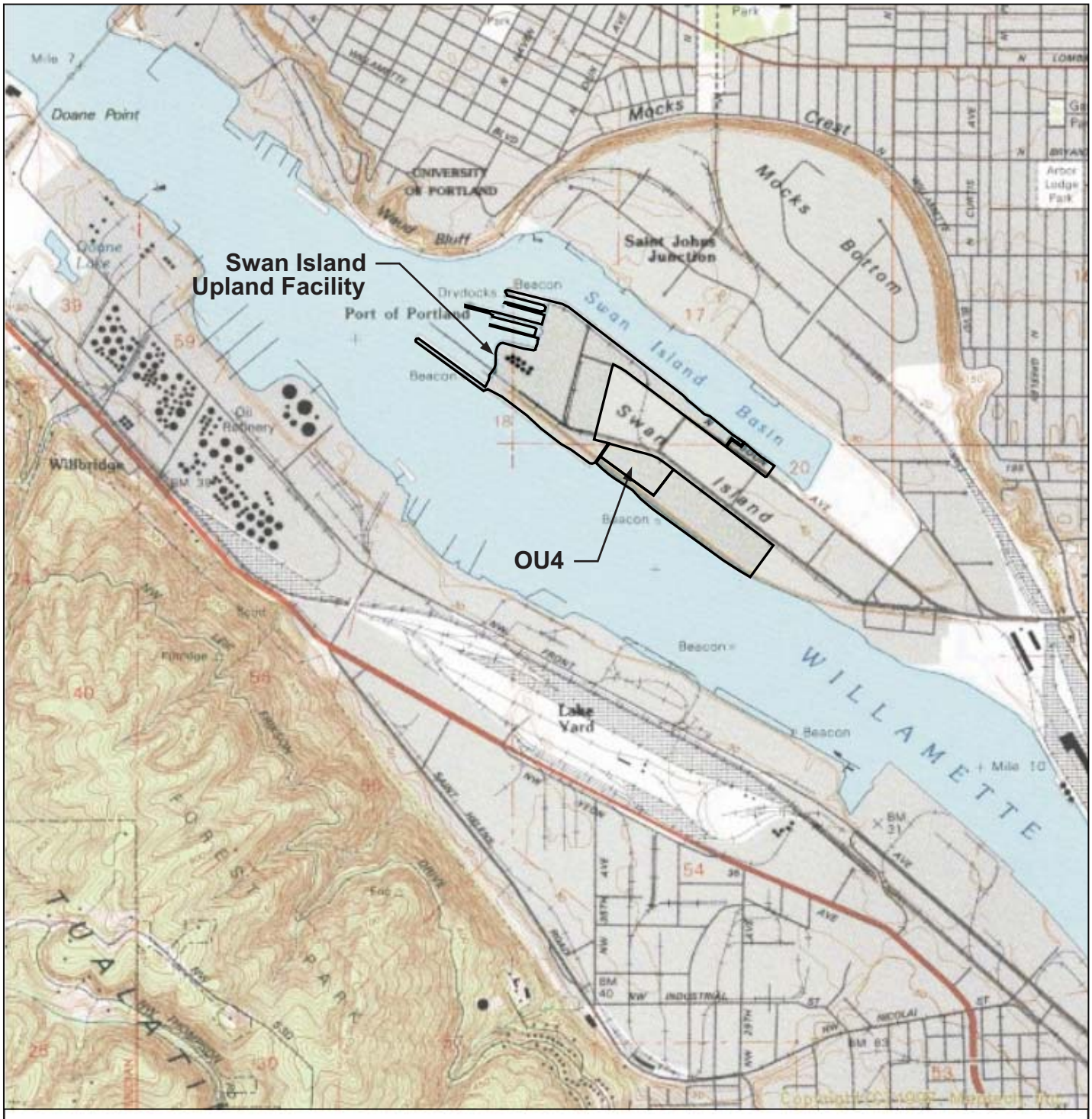
Attachment 1

Location Map, Facility Plan, and Historical Site Layout



NOTE: Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000

Approximate Scale in Feet

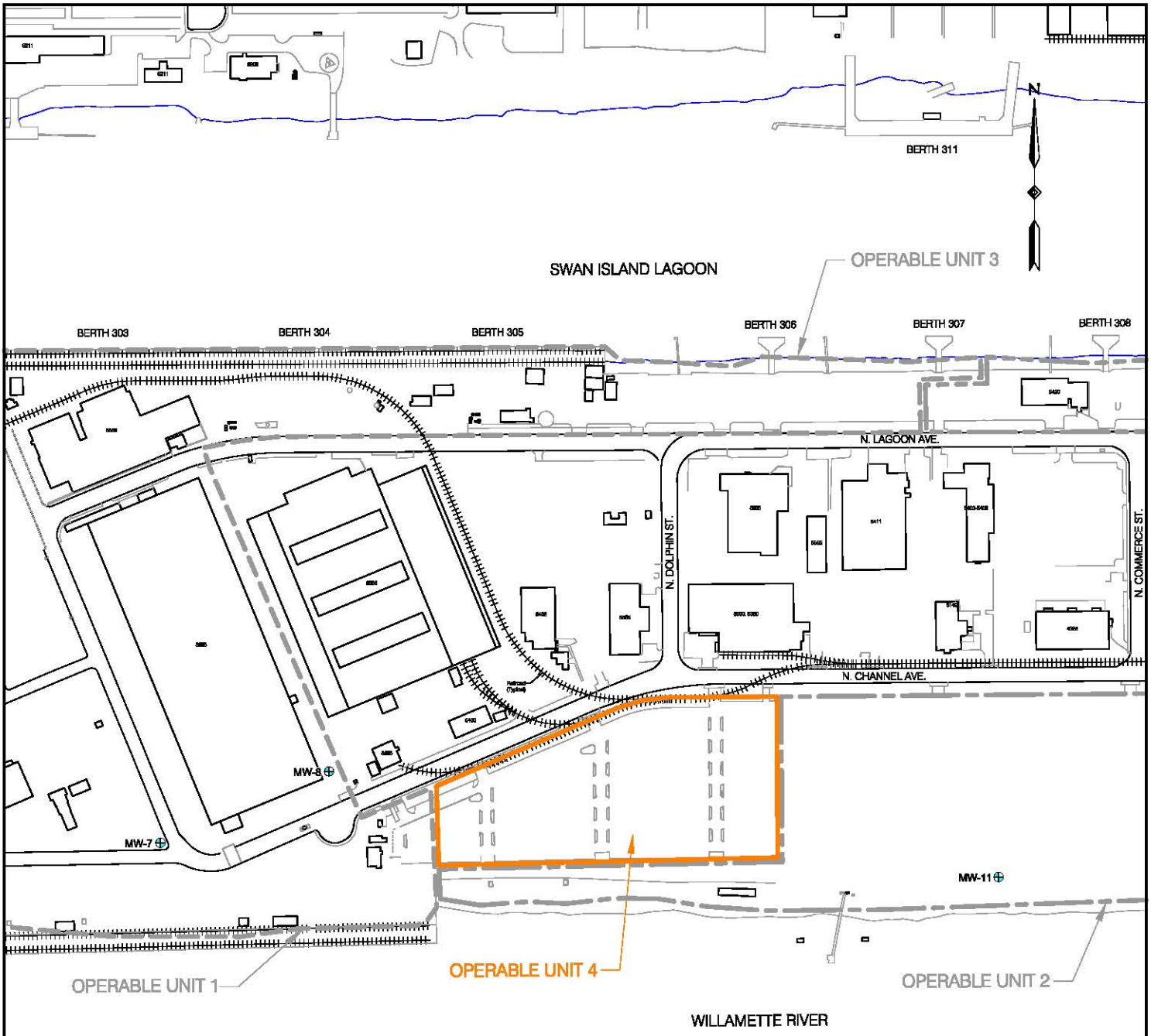
N

Facility Location Map

Risk Assessment, Feasibility Study, and Source Control Evaluation
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
November 2011		1



Legend:

- MW-11 ⊕ Monitoring Well Location
- Operable Unit 1 Boundary
- Operable Unit 2 Boundary
- Operable Unit 3 Boundary
- Operable Unit 4 Boundary

NOTE:
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

N

0 400 800

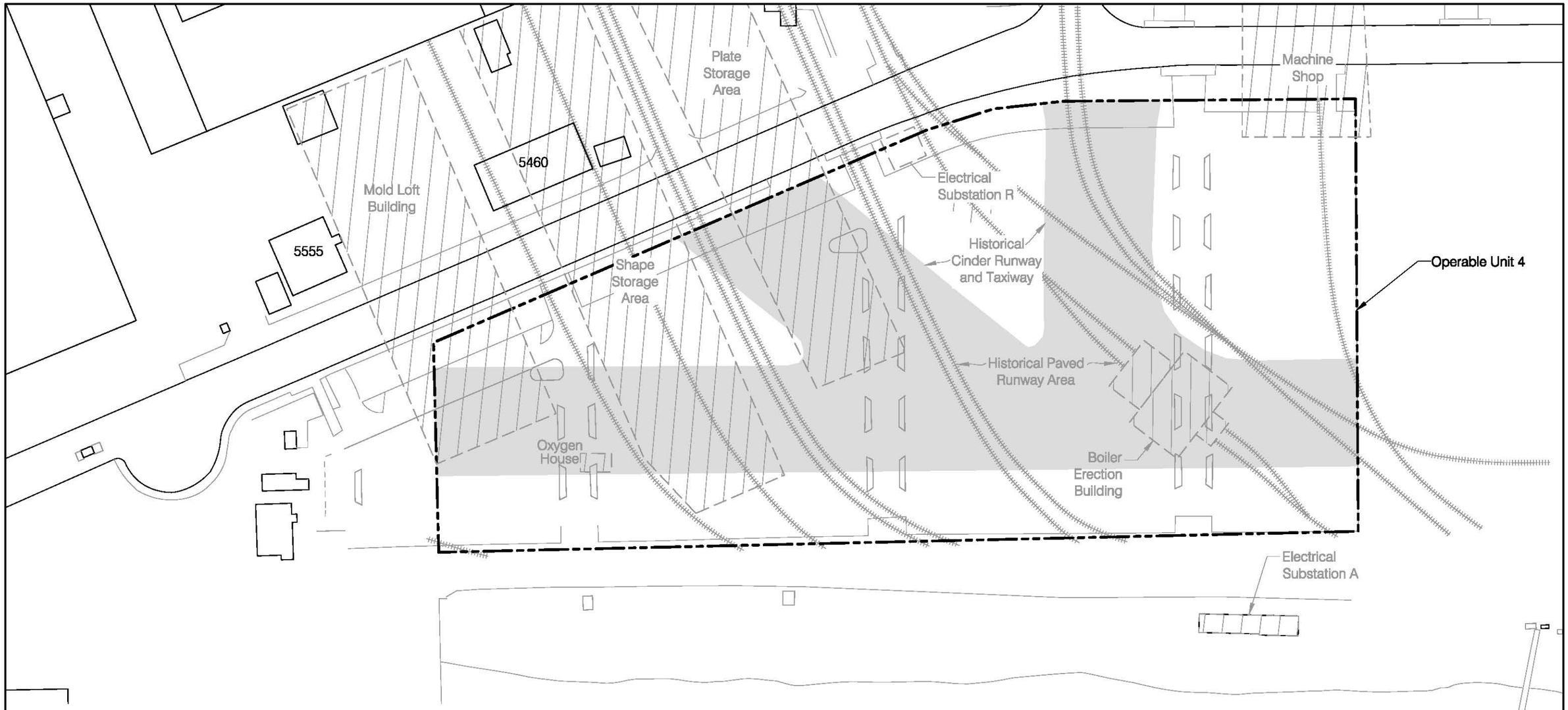
Scale in Feet

Facility Vicinity Plan

Risk Assessment, Feasibility Study, and Source Control Evaluation
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
November 2011		2



NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

2. Historical from: 1943 Aerial by Ackroyd Photography Photo 23344-7; Airport Layout from The Port of Portland, Portland Harbor Willamette River from South City Boundary to West Oregon Lumber Co's Mill, 1932; Underground System by Port of Portland, Drawing YA 1942 0503; Kaiser Shipyard Layout, 1945; and a Parking Lot Drawing, Existing Topography, YA 77-11 2/11, 1977.

Historical Features

Risk Assessment, Feasibility Study, and Source Control Evaluation
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
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Attachment 2

Summary of Known and Potential Releases

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APPENDIX F
SUMMARY OF KNOWN AND POTENTIAL RELEASES
SUPPLEMENTAL PRELIMINARY ASSESSMENT
PORT OF PORTLAND - SWAN ISLAND UPLAND FACILITY

Date	Event/Source	Location	Description	Responsible Party
1/16/1943	Unknown	Kaiser Shipyard	Deck and sides of the S.S. Schenectady, fractured just aft of the bridge superstructure while tied up at pier at PSY (releases unknown)	Kaiser Co., Inc.
4/22/1946	Release of oil	Swan Island Lagoon	Release of oil in Berthing Area B in Swan Island Lagoon from pumping out bilges of LST 761 (quantity not reported)	U.S. Navy
5/10/1946	Release of sludge	Swan Island Lagoon	Sludge observed in Swan Island Basin (lagoon), reportedly from dumping from moored ships (quantity not reported); Kaiser Co. also reported Navy personnel using dump adjacent to Naval barracks for deposit of sludge	Kaiser Co., Inc.
6/11/1946	Release of bilge waste	Deperming / degaussing station	Fire at Deperming Station; "indicates that the standing order forbidding pumping of oily bilges is being disobeyed"	U.S. Navy
3/16/1948	Burning of waste materials	Dry Dock 1	Letter from the City of Portland indicates that CBI was burning deck houses and other materials on the pavement near Dry Dock 1 and the outfitting dock in the area where ship dismantling and salvaging occurred.	Consolidated Builders, Inc. (CBI)
00/00/1952	Spill from overturned drum	East side of Building 60	Oblique photograph of construction of Pier C shows overturned drum with unknown substance pooled on the east side of Building 60	Not yet known
4/14/1961	Unknown	Building 2	Removal of "an old oil tank" at Building 2 necessary due to continual problems with pavement settling; tank to be filled with sand and left in place; no confirmation samples reported; may have been installed in 1951	Not yet known
10/31/1961	Dumping of waste material	Swan Island (river side)	"improper dumping of waste material on Swan Island"	Pacific Marine Services
10/10/1962	Unknown	Building 17	During removal of two fuel storage USTs at Building 17, a third UST (approximately 2,000-gallon, reportedly installed in 1954) was discovered and it was reported that it had been installed "when one of the two original tanks had failed"; the tank was badly damaged during removal activities; no confirmation samples reported	Not yet known
2/20/1970	Release of oil	Dry Dock 1 (Navy Dry Dock)	Aerial photographs show release of oil emanating from Dry Dock 1. A ship driving through the slick may have been trying to disperse the material.	Not yet known
4/8/1971	Release of oil	In water; specific location not reported	Oil slick observed at shipyard (quantity not reported)	Albina Engine & Machine Works

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PORT OF PORTLAND - SWAN ISLAND UPLAND FACILITY

Date	Event/Source	Location	Description	Responsible Party
5/2/1971	Release of oil	In water; specific location not reported	Oil slick associated with M/V LUMBER QUEEN observed at shipyard (quantity not reported)	Freighters, Inc., San Francisco
3/20/1973	Release of waste oil from tanker wash water area	Berth 310	Release of waste oil from tanker wash water tank area at PSY on 3/20/1973; oil, possibly aged Bunker C, was spilled and migrated to an 8 ft. tunnel below the storage tank area, the tunnel connected to a 10" outfall in the vicinity of Berth 310; approx. 200 sq. ft. slick observed in SW corner of small boat base; estimated 2-4 gals released to Willamette River from outfall	Port
10/15/1973	Release of debris and paint from sandblasting & painting	Berth 309	Release of debris and paint to Willamette River from sandblasting and painting work on PAC Barge 302-2 at Berth 309 (quantity not reported)	Pacific Marine Services
8/18/1974	Control house for Dry Dock 3 fell into the river causing release of oil and paint	Dry Dock 3	Release of a foam-like substance was observed adjacent to Dry Dock 3; control house for dry dock fell into the river, sinking with approximately 800 gallons of paint contained in 5-gal buckets, fuel lines, reinforcement rods, and power lines; the retaining bulkhead later collapsed, discharging dirt and asphalt to the Willamette River; a release of oil was also reported (quantity not specified); final estimate of 25 gallons of paint released	Port
5/25/1979	Release of paint thinner		Release of paint thinner (specific date and quantity not reported). Material was cleaned up and reportedly did not reach the river (specific date and quantity not reported)	Northwest Marine Iron Works
9/17/1979	Release of pyronol from transformers	Dry Dock 3	Release of Pyronol from transformers at Dry Dock 3 to Willamette River (quantity not reported)	Port
5/14/1980	Release of oil	Not Reported	Release of oil to Willamette River discharged from ship repair facility (responsible party and quantity not reported)	Not yet known
5/30/1980	Release of herbicide	5617 N. Basin	Release from dumping 5-7 barrels (225 gallons) of various chemical wastes (including herbicide 2,4-D) into manhole on Port property in Mock's Landing; material ultimately discharged to the Willamette River; penalty of $1,000 assessed to Cenex by DEQ	Pax Company (division of Cenex)
2/18/1982	Leaking PCB transformer	Substation No. 5	Leaking PCB transformer at Substation No. 5; media impacted listed as Willamette River (quantity not reported)	Not yet known

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2/18/1982	Leaking PCB transformer	Substation No. 5	Leaking PCB transformer at Substation No. 5 (quantity and impacted media not reported)	Not yet known
3/18/1982	Leaking PCB transformers	Substation No. 5	Three transformers at Substation 5 leaking PCB-contaminated oil over 3-month period; transformers located 30 feet from floor drain (quantity and affected media not reported)	Port
4/11/1982	Release of oil	In water; specific location not reported	Release of estimated 900 barrels of material from Tank 7 containing 50 mg/L suspended solids, 12.4 to 13.2 mg/L oil & pH 6.6	Not yet known
5/13/1982	Release of lube oil	Wet Berth	Tail shaft being pulled while ship was in wet berth in the shipyard at facility under operation by Northwest Marine Iron Works; the ship was boomed prior to spill; absorbent material used to clean up the remaining oil; estimated 2 gallons of lube oil released to Willamette River	Northwest Marine Iron Works
4/1/1983	Release from PCB transformer	Bay 1, Building 4	Release of PCB-contaminated oil from leaking valve on transformer at Bay 1 in Building 4; transformer was transported around on a trailer and tracked oil around a 400 sq. ft. concrete area; an estimated 3x10 ft. area of concrete was impacted by spill and required action; cleanup conducted by Chem-Security Systems, Inc. (quantity not reported)	Port
2/15/1984	Release from transformer	Dry Dock 1	Flood from a broken pipe in transformer storage area at Dry Dock 1; no PCBs found in water greater than 10 ppm	Not yet known
3/17/1986	Release from drum	5949 N. Basin	Fiberglass drum fell off a pallet from forklift while unloading; estimated 230 gals of dextrin (water soluble glue) released to soil; Portland Fire Dept. did initial cleanup	Milne Trucking Co.
4/23/1986	Release of oil in pipeline on ship in dry dock	Dry Dock 4	Discharge of pipeline/oil in line/discharging ballast at Dry Dock 4; boom put out, cleanup crew called; 10 x 50 sheen observed; estimated 1 cup Alaska North Slope crude oil released to Willamette River	T/V ARCO SAG RIVER
4/27/1986	Release of oil from ship repair	Dry Dock	Swan Island dry dock starboard side; tank ship placed back in water and noticed sheen; 10 x 10 sheen observed, estimated 1/2 cup crude oil released to Willamette River	Not yet known
6/18/1986	Release of hydraulic oil from ship repair	Dry Dock	Hydraulic line parted on the M/V CHEVRON LA; estimated less than 1 gallon hydraulic oil released to Willamette River	M/V CHEVRON LA
1/25/1987	Release of oil from a vessel	Pier 3	Lubricating oil in bilge from USNS WILKES (oceanographic vessel) overflowed into open seachest and discharged to water; estimated 1 gallon released to Willamette River	Dillingham Ship Repair

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6/11/1987	Release of diesel from vessel sinking	Swan Island	32' boat sank (unknown reason); estimated 20 gallons diesel fuel released to Willamette River	Not yet known
11/14/1987	Sheen observed around dry dock	Dry Dock	Estimated 50-100' oil slick observed flowing from drydock which was being flooded to lower the MARYLAND (formerly STUDEVANT) into the water; no additional information available	Not yet known
8/24/1988	Release of sandblast grit & paint chips	Berth 313	WSI sandblasting the Exxon LONG BEACH released sandblast grit and paint chips into the river	West State, Inc.
8/25/1988	Release of sandblast grit	Shipyard	DEQ observed Northwest Marine Iron Works dumping sandblast sand and wastewater over the side of a ship during a routine inspection	Northwest Marine Iron Works
8/26/1988	Release of oil	Swan Island Lagoon	Oil on river observed off Freightliner Corp.	Not yet known
10/19/1988	Release of sanblast grit	Berth 313	Complaint filed indicating Northwest Marine Iron Works dumped sandblast sand in the river at night	Northwest Marine Iron Works
7/19/1989	Release of hydraulic oil	Dry Dock 4	Estimated 1 quart of hydraulic oil was released to Willamette River due to equipment failure; a hydraulic hose on a man lift arm broke during a painting operation on the SS ATIGUN PASS. No oil was recovered. Port was fined $100 for violation of CWA.	Cascade General
8/22/1989	Smoke, soot & noise		Smoke, soot & noise observed from ATIGISON PASS (may have been blowing boil)	Not yet known
9/29/1989	Release of sandblast grit	5555 N. Channel	Incident occurred with U.S. Navy Barge 60, where a subcontractor allowed sandblast grit to enter the Willamette River	Cascade General & Blasco Inc.
12/28/1989	Release of oil during transfer operations	Swan Island Ship Yard	Dredge ESSAYONS (COE dredge), while transferring; approximate. 10' sheen observed; estimated 1 gallon motor oil released to Willamette River	U.S. Army Corps of Engineers
5/6/1990	Release of turbine oil	ARCO Module Fabrication Site	Spill occurred when valves were not closed properly on a gas turbine when the system was shut down; estimated 150 gallons of 10 wt. turbine oil released to ground surface; minimal soil impact reported; Chempro removed approx. 54 tons of contaminated material	Wright Schuchart Harbor Co.
9/23/1990	Release of hydraulic oil from a vessel	Berth 303	Hydraulic oil released from Dredge ESSAYONS due to equipment failure at Berth 303; approximet 6,000 sq. ft. sheen observed; estimated 10 gallons hydraulic oil released to Willamette River	U.S. Army Corps of Engineers

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10/7/1990	Release of oil, dust and paint from vessel cleaning operations	Berth 304	Lockwood using high power system to clean aft and midsection of SEA-LAND HAWAII (which was under contract w/ Northwest Marine); protective curtain was not in place, and material (oil, dust & paint) was washed into Willamette River; several sheens were observed; no additional information provided	Lockwood
11/9/1990	Release of Oil	44 NE Channel Ave	Diesel spill from storm drain	Not yet known
11/11/1990	Sheen observed around dry docks	Dry Docks	Heavy oil sheen reported around Dry Docks 3 & 4 in the area of the small boat basin; source not related to PSY or contractors; no additional information available	Not yet known
11/13/1990	Sheen observed on water	Berth 304 Bent 1 & 18	Oil sheen observed on water	Not yet known
12/7/1990	Release of oil	Berth 302	Bunker overflow at Berth 302	Not yet known
12/9/1990	Release of oil	Berth 305 Bents 116-?	Oil and debris observed in water	Not yet known
12/12/1990	Release of sanblast grit	PSY	Release of sandblast grit into Willamette River from sandblasting over water	Northwest Marine Iron Works
12/15/1990	Unknown release	PSY	Foamy material observed on water	Not yet known
12/23/1990	Unknown release	PSY	Release of foam into river from SEA-LAND NAVIGATOR	Cascade General
1/6/1991	Release of oil	Berth 302	Oil sheen observed on water	Not yet known
1/21/1991	n/a	BWTP	Noxious sulfur smell - no release reported	Not yet known
1/26/1991	Release of sanblast grit	Berth 314	Release of sandblast grit into river	Not yet known
2/9/1991	Release of sanblast grit	Berth 312	Release from shoveling sandblast sand into river	Not yet known
2/13/1991	Dredge Oregon	Navigation	Diesel spill - Booster P. Col	Port
2/17/1991	Release of paint	Berth 303	Paint spill in water	Not yet known
4/8/1991	Release of sandblast grit	PSY - wet berth	Sandblast sand washed into river	Not yet known
4/17/1991	Release of oil from dumping	Berth 314, Pier D (Northwest Marine facility)	Release of oil due to illegal dumping down storm drain by Northwest Marine Ironworks from EXXON BENICIA; appox. 30' wide x 300 ft to 1.5 mile long sheen; estimated 150-200 gallons lubricating oil released to Willamette River	Northwest Marine Iron Works
4/17/1991	Sludge spill on pier	Between Berth 109 & 110	While investigating source of above release, several barrels of sludge were identified between Berths 109 and 110, and spillage from the barrels was observed; quantity and affected media not reported	Northwest Marine Iron Works
4/27/1991	Hydraulic oil spill	Pier C	Hydraulic oil spill at Dry Dock	Not yet known
5/4/1991	Release of sandblast grit & paint chips	Berth 302-304	Release of sandblast grit & paint chips into river	Not yet known
5/4/1991	Release of sandblast grit	Berth 314	Release of sandblast grit into river	Not yet known
6/9/1991	Release of sandblast grit	Berth 311-312	Sandblast sand released to river	Not yet known

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6/25/1991	Release of oil	Berth 311	Oil sheen observed in water	Not yet known
7/18/1991	Release of oil during transfer operations	Rivermile 8.5	Waste oil tank overfilled while pumping the bilges of USS WILLIAM H. STANDLEY; estimated 3 gallons of waste oil/lubricants released to Willamette River	U.S. Navy
8/13/1991	Release of oil during transfer operations	Berth 302	Incorrect valve opened while pumping bilges on T/S DELAWARE TRADER; estimated 2 gallons of waste oil/lubricants released to Willamette River	American Trading Trans
8/20/1991	Unknown release	Dry Dock 4	Foamy material observed coming from a vessel	Not yet known
9/16/1991	Release of oil	Portland Ship Repair Yard	Sheen observed at Rivermile 8.5; estimated 35 gallons of waste oil/lubricants released to Willamette River	Northwest Marine Iron Works
10/2/1991	Release of sandblast sand	Dry Dock 4	Sandblast sand in water	Not yet known
10/9/1991	Release of gasoline from leaking fuel tank	River Mile 8.2	Leaking from USNS HASSAYAMPA due to structural failure of hull due to cracks in fuel tank; estimated 5 gallons of aviation gasoline (4.86G PB/gal) released to Willamette River	United States (federal govt)
10/12/1991	Release of diesel fuel	Dry Dock 4	Oil sheen (diesel) on water	Not yet known
11/6/1991	Release of oil	Berth 305-311	Oil slick observed on water	Not yet known
11/30/1991	Unknown release	PSY - Willamette River	Yellow sheen observed coming from storm drain	Not yet known
12/21/1991	Release of oil	Berth 304	Oil sheen observed on water	Not yet known
1/8/1992	Release of fuel oil due to overfilling	Berth 305	Release of No. 2-D fuel oil to water from M/V PACIFIC EXPLORER at Berth 305 due to overfilling; estimated 3 barrels released to Swan Island Lagoon	American Seafoods Inc.
1/11/1992	Release of oil	Berths 304-305	Oil sheen observed on water	Not yet known
2/2/1992	Release of oil	Berth 304	Oil sheen observed on water	Not yet known
2/21/1992	Release of oil	Berth 304	Oil sheen observed on water	Not yet known
3/19/1992	Unknown release	Pier A - Berth 303	Orange colored material observed	Not yet known
4/1/1992	Release of sandblast grit	Dry Dock 3 & Berth 313	Sandblast grit observed in water	Not yet known
4/2/1992	Unknown release	Berth 311 storm drain	Orange material observed discharged from storm drain into river	Not yet known
4/3/1992	Release of wastewater	Berth 314	Dirty water dumped into river	Not yet known
4/5/1992	Release of oil	Berths 313-314	Oil sheen observed in water	Not yet known
5/6/1992	Release of oil	Swan Island Lagoon	Oily sheen observed from runoff	Not yet known
5/12/1992	Release of oil	Berth 311	Oil sheen observed in water	Not yet known
5/17/1992	Release of dust to lagoon	Berth 304	Dust discharged from vessel Philadelphia at Berth 304 to the lagoon instead of a bag house. Reportedly due to mechanical failure.	West State, Inc.
7/9/1992	Release of hydraulic oil from leaking crane	Dry Dock 4	Crane for Dry Dock 4 was observed to have a hydraulic oil leak which had "contaminated the vessels port side".	Not yet known
10/8/1992	Sheen observed in Lagoon	Swan Island Lagoon	Sheen observed in lagoon; type of material, quantity and source not known	Not yet known

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10/28/1992	Release of diesel during transfer operations	Berth 313	Material was discovered to be leaking during transfer of diesel from T/B BMC-4 to tankser KEYSTONE CANYON Berth 313; amount released reported as unknown	Not yet known
1/26/1993	Release of oil	Berth 312, Pier D	Release of oil on pier from S/S AUSTRAL LIGHTNING	AUSTRAL LIGHTNING
3/15/1993	Release of oil during discharge operations	Berth 313	Release of Bunker C oil from gray water discharge line on T/S EXXON BENICIA at Berth 313; estimated 0.01 gallon released to Willamette River	Exxon Shipping Co.
4/16/1993	Release of heating oil	Central Utility Building	Release of #6 heating oil discovered from damaged fitting on oil return line for UST #2 which resulted in partial flooding of tank base vault; approx. 35 gallons of heating oil removed from vault; estimated 6.5 cubic yards of soil impacted (groundwater impacts not reported)	Not yet known
7/20/1993	Release of hydraulic oil from dock line	Not Reported	Release of hydraulic oil from hydraulic line on dock due to equipment failure; estimated 50 gallons hydraulic oil released to Willamette River; cleanup conducted by Riedel	Port of Portland
10/00/1993	Dumping of contaminated soil	Module Road	During a yard cleanup in October 1993, cadmium-contaminated soil was discovered upriver from Berth 314; soil was dumped by an unknown party; approx. 10 cubic yards of soil was removed from the module storage area	Not yet known
3/15/1994	Release of hydraulic oil	Berth 302	Release of hydraulic oil from bucket knocked over on F/T AMERICAN DYNASTY while at Berth 302; 10' x 10' sheen observed; estimated 0.5-1 cup hydraulic oil released to Willamette River	General Steamship Corp.
4/18/1994	Mercury contamination	Dry Dock 3 Control Room	Several mercury-containing, wall-mounted control gauges had broken seals and leaked mercury onto the control console and onto the Control Room floor; mercury contamination was cleaned up (surfaces and vapors tested)	Not yet known
7/6/1994	Release of turbine oil	Berth 314	Stern tube seal on M/V SEA RIVER NORTH SLOPE released while at Berth 314; estimated 2 gallons of turbine oil released to Willamette River	Cascade General
7/12/1994	Release of jet fuel	Berth 302	Release of jet fuel #5 (heavy kerosene) during removal of cargo hoses from USNS GUADALUPE at Berth 302 due to operator error; approx. 1.5' x 60' sheen observed; estimated 1 pint of juet fuel released to Willamette River	Cascade General

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PORT OF PORTLAND - SWAN ISLAND UPLAND FACILITY

Date	Event/Source	Location	Description	Responsible Party
9/24/1994	Release of hydraulic oil	Dry Dock 4	Release of hydraulic oil to water from M/V SEALIFT ANTARCTIC (possibly prop shaft); estimated 1 ounce hydraulic oil released to Willamette River	M/V SEALIFT ANTARCTIC
2/6/1995	Oil spill observed	Building 4, Bay 2	An oil spill was noted on the floor near a sheet metal cutting/bending machine; type of oil, quantity, and affected media not reported	West State, Inc.
5/25/1995	Release of oil	Tank Farm Street Sump	A small spill occurred in front of the ballast water treatment plant at the truck pumping double containment area due to employee error; no oil was discharged into the river; spill cleaned up	Not yet known
10/9/1995	Ballast water spill	Not Reported	Oil in lines used to release ballast water spilled during dry dockage	Cascade General
10/17/1995	Release of hydraulic oil from a vessel	Berth 315	Release of hydraulic oil due to equipment failure; hydraulic seal in a hose boom on steam tanker broke on KEYSTONE CANYON while at Berth 315; approx. 75' x 20' red sheen observed; estimated 1 gallon hydraulic oil released to Willamette River	Keystone Shipping Co.
4/9/1996	Release of unknown oil	Berth 302	Release of unknown oil from USS HIGGINS while at Berth 302 due to break in line in stern at bottom of vessel; approx. 50' x 3' black oil sheen observed; vessel was reportedly to be mothballed and quantity of oil on vessel was to be reported to DEQ; estimated 25 gallons of unknown oil released to Willamette River	Cascade General
6/25/1996	Release of oil	Swan Island Lagoon	Sheen observed in the lagoon	Not yet known
7/8/1996	Release of oil	5555 N. Channel Ave	While changing the ships ballast (Green Harbour) oil leaked out along the stern tube. USCG investigated and approved cleanup.	Green Harbour
8/14/1996	Release of glue-like substance	Swan Island Lagoon	A substance that appeared to be glue was found coming out of a storm dran, entering the lagoon at Cascade General/USCG area of the Swan Island Lagoon	Not yet known
8/29/1996	Release of oil	Berth 310	Hose broke on air compressor on crane barge SEA LION while at Berth 310; approx. 15' x 50' sheen observed; estimated 2 gallons of oil released to Willamette River	Hickey Marine
9/3/1996	Release of oil	Berth 314	Approximately 5-10 gallons of oil released to the river from a vessel at Berth 314. Absorbent pads and sweeps used and disposed of at an approved disposal facility.	Not yet known
9/16/1996	Release of oil	Cascade General Yard	Bulk carrier TAI SHING leaking oil from unknown source; unknown quantity released to Willamette River	General Steamship Corp.

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9/16/1996	Release of oil	Cascade General Yard	Unknown volume fuel/oil sheen	Cascade General
10/8/1996	Release of fuel	6767 N. Basin Avenue	During refueling a work boat from shoreside, the surge suppressor failed. No cleanup. Product dissipated.	Not yet known
4/18/1997	Release of wastewater	Dry Dock 4	Wastewater generated from cleaning a chain locker on a ship in dry dock was discharged to the river. The volume released is unknown. A boom was deployed and absorbent pads were used to absorb contained debris.	Not yet known
5/31/1997	Release of oil	Berth 312	Approx. 1/4 mile x 2000' rainbow-colored sheen observed; unknown quantity of unknown oil released	Not yet known
8/28/1997	Release of oil	Swan Island Lagoon	Approx. 100 yd x 200 yd black oil w/ gray sheen observed on Swan Island Lagoon; estimated 40 gallons of unknown oil released to lagoon; source not known	Not yet known
8/28/1997	Release of oil	Swan Island Lagoon	Black waste oil spill from unknown source coming from outfall. Estimated 25 gallons.	Pacific Detroit Diesel
9/27/1997	Release of diesel	Berth 305	Release of diesel from fuel tank on rolloff truck; truck struck piece of I-beam and damaged tank while at Berth 305; estimated 22 gallons of diesel released to Willamette River	Cascade General
9/27/1997	Release of diesel	Cascade General Yard	Approximately 50 gallons diesel released. 20 yards in storm drain	Cascade General
11/13/1997	Release of crude oil from pipeline	5555 N. Channel	Release of crude oil from oil transfer pipeline due to equipment failure; approx 50' x 500' sheen observed; estimated 100 gallons crude oil released to Willamette River	Cascade General
12/23/1997	Release of diesel	Cascade General Yard	Approximately 25-50 gallons diesel through the parking lot. Appeared to be related to vandalism. Puddles on the pavement but no impacts to the river or water. Sand/sorbent used for clean-up.	Cascade General
5/3/1998	Guts and grease	Cascade General Yard	Security guard at Cascade reported seeing guts and grease comming out of the storm drain at Linden farm chicken processor.	Linden Farms
9/15/1998	Release of oil	5555 N. Channel	Release of unknown oil from M/V CSO CONSTRUCT while undergoing repair at Cascade General; approx. 10 sq. meter sheen discovered around vessel, source unknown; unknown quantity released to Willamette River	M/V CSO CONSTRUCT
10/20/1998	Release of oil	Berth 312	Approximately 25 gallons from rented mobile generator- 5 gal reached river-creating 900' X 40' SHEEN- user discovered unplugged line on fuel tank.	Cascade General
11/9/1998	Release of oil	N. Basin Avenue	Sheen on river from outfall. USCG determined it to be unrecoverable.	Not yet known

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11/10/1998	Release of oil	Ensign Avenue	Oil coming from outfall M-1. BES boomed and was looking for source.	Not yet known
1/29/1999	Release of hydraulic oil	Dry Docks	Approximately 5 gallons of Hydraulic oil spilled onto dry dock and into the river.	Cascade General
3/10/1999	Release of oil	Swan Island Lagoon	Oil Sheen near Fred Divine outfall (outfall one mile) 400'X 1,000' - unrecoverable	Fred Devine Diving & Salvage
6/5/1999	Release of oil	Berth 314	Release of unknown oil from M/V DENALI; approx. 40' x 5' rainbow-colored sheen observed at Berth 314; unknown quantity of oil released to Willamette River	Alaska Tanker Company
12/21/1999	Release of oil	Pier	Sheen observed under pier	Cascade General
12/23/1999	Release of waste oil barge cleaning operations	5555 N. Channel	Connection to vacuum hose came loose while cleaning barge; approx. 50' x 50' rainbow-colored sheen observed; estimated 2-3 gallons of waste oil/bunker/diesel fuel released to Swan Island Lagoon of Willamette River. Spill location was within a preboomed area. Cleaned with pads.	West Coast Marine
3/21/2000	Release of diesel	Cascade General Yard	Fueling power barge - check ball valve failed with release of ~ 5 gal diesel into river - no drinking water intakes impacted	Not yet known
4/5/2000	Release of oil	Cascade General Yard	Approximately .5 gal released to water	Not yet known
4/9/2000	Release of hydraulic oil	Berth 302	M/V CHEVRON COLORADO controllable pitch/prop seal failed causing hydraulic oil release; approx. 5' x 10' sheen observed; unknown quantity of oil released to Willamette River	Chevron
5/2/2000	Release of diesel	6458 N. Basin Ave	MVA with 80 gallons of diesel going to a storm drain - semi leaking. Drain is 500 - 1000 yards fromt he river. Fire boat on scene; product not yet visible on river. BES enroute. USCG contacted.	Not yet known
5/14/2000	Release of crude oil	Berth 312	Release of crude oil from M/V ARCO SPIRIT at Berth 312; cause of release unknown; small sheen observed; unknown quantity of material released to Willamette River	ARCO
5/14/2000	Release of crude oil	Swan Island Dry Dock	Release of crude oil from 11,000 ft. tanker in layup (POLAR SPIRIT) leaking drops every few minutes into dry dock; unknown quantity of oil released to Willamette River. Residential oil is sea chest. Partside bubbles of crude on large leak. USCG, PDX Fire called by OERS will also call ODFW Clean Rivers and ship boomed	Polar Tankers
5/22/2000	Release of diesel	Cascade General Yard	Approximately 3 gallon fuel can of diesel got knocked over, was not on contained (oil/water separator) area of dock.	Cascade General

APPENDIX F
SUMMARY OF KNOWN AND POTENTIAL RELEASES
SUPPLEMENTAL PRELIMINARY ASSESSMENT
PORT OF PORTLAND - SWAN ISLAND UPLAND FACILITY

Date	Event/Source	Location	Description	Responsible Party
6/9/2000	Release of hydraulic oil	Berth 312	Material released while testing emergency fire pump on ARCO SPIRIT at Berth 312; estimated 1 barrel of hydraulic oil released to Willamette River	General Steamship Corp.
6/9/2000	Release of unknown oil	Cascade General Yard	Spill from M/V ALASKAN JEWEL while testing fire fighting system; unknown quantity of oil released to Willamette River	Danker Pacific
6/15/2000	Release of lubricating oil	Cascade General Yard	Ship crew over-pressurized stern tube causing release of lubricating oil from M/V TALL BUCK; estimated 1 gallon lubricating oil released to Swan Island Lagoon	M/V TALL BUCK
6/15/2000	Release of unknown oil	Swan Island Ship Repair Yard	Release of estimated 1-10 gallons of oil from MSC PAUL BUCK (USMM tanker) in shipyard; originated from overpressurized stern tube seal (propellor).	General Steamship Corp.
7/9/2000	Release of hydraulic oil	Cascade General Yard	Tanker Pacific Management - release from ALASKA JEWEL. Cowlitz Clean Sweep enroute. Testing fire pump, foam is mixed with hydraulic oil/discharge on deck & over the side.	Tanker Pacific Management
10/1/2000	Release of lubricating oil	5555 N. Channel	Heavy rains caused sump on M/V RIO DA LUZ to overflow; approx. 20' x 20' sheen observed; estimated 2 gallons of oil released to Willamette River	PG&E
10/4/2000	Release of lubricating oil from a pipeline	5555 N. Channel	Release of lubricating oil from 6-inch slop line during testing operations due to a cracked valve; approx. 40' x 3' rainbow-colored sheen observed; estimated 5 gallons of oil released to Willamette River	Cascade General
10/17/2000	Release of waste oil from a pipeline	5555 N. Channel	A gasket on 6-inch oil slop line failed causing waste oil to spill from the line into Swan Island Lagoon; approx. 15' x 3' sheen observed; estimated 2 gallons of bunker-like waste oil released to Willamette River	Cascade General
11/11/2000	Release of bilge waste	Berth 304	Vessel pumping slops to a pump truck and hose broke behind truck, releasing material onto dock; estimated 2 gallons of bilge slop released to Willamette River	American Classic Voyages
11/15/2000	Release of blast grit	6767 N. Basin Avenue	Unknown material resembling blast grit is "floating" near dock - sinks when touched	Not yet known
11/27/2000	Release of oil from hose	Dry Dock 1	Release of oil / Mobile L EAL 224H from a hose on a hydraulic unit bursting; approx. 30' x 30' sheen observed; estimated 3 gallons of oil released to Willamette River	Fred Devine Diving & Salvage
12/6/2000	Release of hydraulic oil from equipment	5555 N. Channel	Release of hydraulic oil from hose line on a piece of equipment being loaded onto a barge; approx. 15' x 3' rainbow-colored sheen observed; estimated 0.5 gallons hydraulic oil released to Willamette River	Cascade General

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Date	Event/Source	Location	Description	Responsible Party
12/7/2000	Chemical and oil spill	5400 N. Basin Avenue	Semi flipped over - one trailer contained 6,000 gallons 7% NaOH and activator in five totes, (2NaOH, 3 Activator) - one of five leaked. Second trailer contained 393# of class III fireworks on pallets - no spill. Some diesel spilled.	Not yet known
12/16/2000	Release of oil	Cascade General Yard	Residual oil spilled from equipment being loaded onto a barge - most contained on barge - .5 gal into Willamette River	Cascade General
12/19/2000	Release of hydraulic oil	Cascade General Yard	Release from repair on a hydraulic line on COE Dredge ESSAYONS; approx. 100' x 5' rainbow-colored sheen observed; estimated 2 gallons hydraulic oil released to Willamette River	Cascade General
1/12/2001	Release of oil	Dry Dock 4	Oil sheen released from Dry Dock 4 during the re-float of Navy ship "Tippecanoe"	Cascade General
1/19/2001	Release of hydraulic oil	Cascade General Yard	Release of hydraulic oil from GLOBAL SENTINEL due to a ruptured hose in the bow thruster; approx. 500' x 500' rainbow-colored sheen observed; estimated 0.5 gallons hydraulic oil released to Willamette River	Transoceanic Shipping Company
1/31/2001	Release of oil	Swan Island Lagoon	Light sheen discharge from outfall - 50'X50'	Not yet known
6/25/2001	Release of marine gas	Berth 313	Release of marine oil gas from a faulty cap on a sounding pipe on M/V DANSUS while on dry dock; approx. 20m x 4m bluish-colored sheen observed; estimated 1 gallon or 5 liters of marine gas oil released to Willamette River; also states release was automotive gasoline	Trans Marine Navigation Company
8/10/2001	Release of oil	Cascade General Yard	Slight sheen on Willamette.	Cascade General
9/23/2001	Release of unknown oil	Berth 103 (Berth 301?)	Approx. 10' x 3' rainbow-colored sheen observed on water; release of unknown quantity of oil to Willamette River from an unidentified source	Not yet known
10/18/2001	Release of unknown petroleum product	Berth 313	Approx. 100' x 15' sheen observed; estimated 2 pints of unknown petroleum product released to Willamette River from an unidentified source	Not yet known
10/18/2001	Release of unknown oil	Berth 313	Approx 100' x 15' rainbow-colored sheen observed on water; release of unknown quantity of unknown oil to Willamette River from an unidentified source	Cascade General
10/19/2001	Release of unknown oil	Berth 313	Release of unknown oil from S/R GALENA BAY; estimated 1 pint released to Willamette River	Seariver Maritime
10/19/2001	Release of lubricating oil	Berth 313	Leak in lube oil cooler in engine room of S/R GALENA BAY; approx. 10' x 10' rainbow-colored sheen observed; estimated 1 pint lubricating oil released to Willamette River	Seariver Maritime

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Date	Event/Source	Location	Description	Responsible Party
4/11/2002	Release of lube oil	Cascade General Yard	Release of 2 liters of oil into Willamette from ship at Berth 304; vessel - cargo oil - lube 1 gal surf	Cascade General
4/13/2002	Release of unknown oil	Berth 304	Release from TYCOM RELIANCE due to unknown cause; estimated 2 liters of unknown oil released to Willamette River	Transoceanic Shipping Company
4/18/2002	Release of unknown oil from a vessel	Berth 314	Sheen observed from port quarter of USNS YUKON between the USNS YUKON and the containment boom at berth 314; approx. 100' x 50' rainbow-colored sheen observed; unknown quantity of unidentified oil released to Willamette River	Cascade General / U.S. Navy
8/4/2002	Release of unknown oil	Berth 304	Sheen observed on water; release of unknown oil to Willamette River from an unknown source	Not yet known
8/9/2002	Unknown release	5885 N. Basin	Delivery truck at office depot hit a curb and damaged radiator.	Office Depot
11/9/2002	Release of oil	Cascade General Yard	Sheen on Willamette.	Cascade General
12/2/2002	Release of bilge waste	Cascade General Yard	Release of bilge waste during pumping of slop tank of USNS KISKA TAE 35 (tank was overfilled); unknown quantity of material released to Willamette River	Cascade General
3/28/2003	Release of oil	Cascade General Yard	A piece of metal fell into the work lagoon. Approximately 1 gallon of oil released to surface water	Cascade General
5/29/2003	Release of lubricating oil from a vessel	Cascade General Yard	Release of lubricating oil to water from a vessel	General Steamship Corp.
5/29/2003	Release of lubricating oil from a vessel	Berth 313	Release to river of approximately 55 gallons of lubricating oil from broken lube line on vessel UNIVERSE EXPLORER.	General Steamship Corp. (Jeff Doerfler)
6/2/2003	Release of oil	Cascade General Yard	Small 8' X 8' sheen out boom of UNIVERSE EXPLORER - believed to be from the VENETIA, a neighboring ship	VENETIA
6/29/2003	Release of hydraulic oil from a vessel	Berth 302/303	Release of hydraulic oil to water from a vessel at Berth 302/303. Fluid reportedly spilled in water at Swan Island while testing port hose that sprung a leak.	Chevron Texaco Shipping (Doug Lathrop)
8/22/2003	Release of hydraulic oil from a vessel	Cascade General Yard	Contractor working on the USNS SISLER at Cascade General spilled ~10 gallons of hydraulic fluid into the river. Boomed and cleanup in progress. USCG not responding due to reduced manning.	Ballard Diving & Salvage Inc. (Rick Benson)
11/25/2003	Release of lubricating oil from a vessel	Cascade General Yard	22-50 gallons of lubricating oil released during transfer to Navy vessel docked at Swan Island in Portland. ~15 gallons released to Willamette River. Absorbents and booms deployed & release was secured. OERS contacted USCG who is considering a response.	U.S. Navy (John Olmstead)

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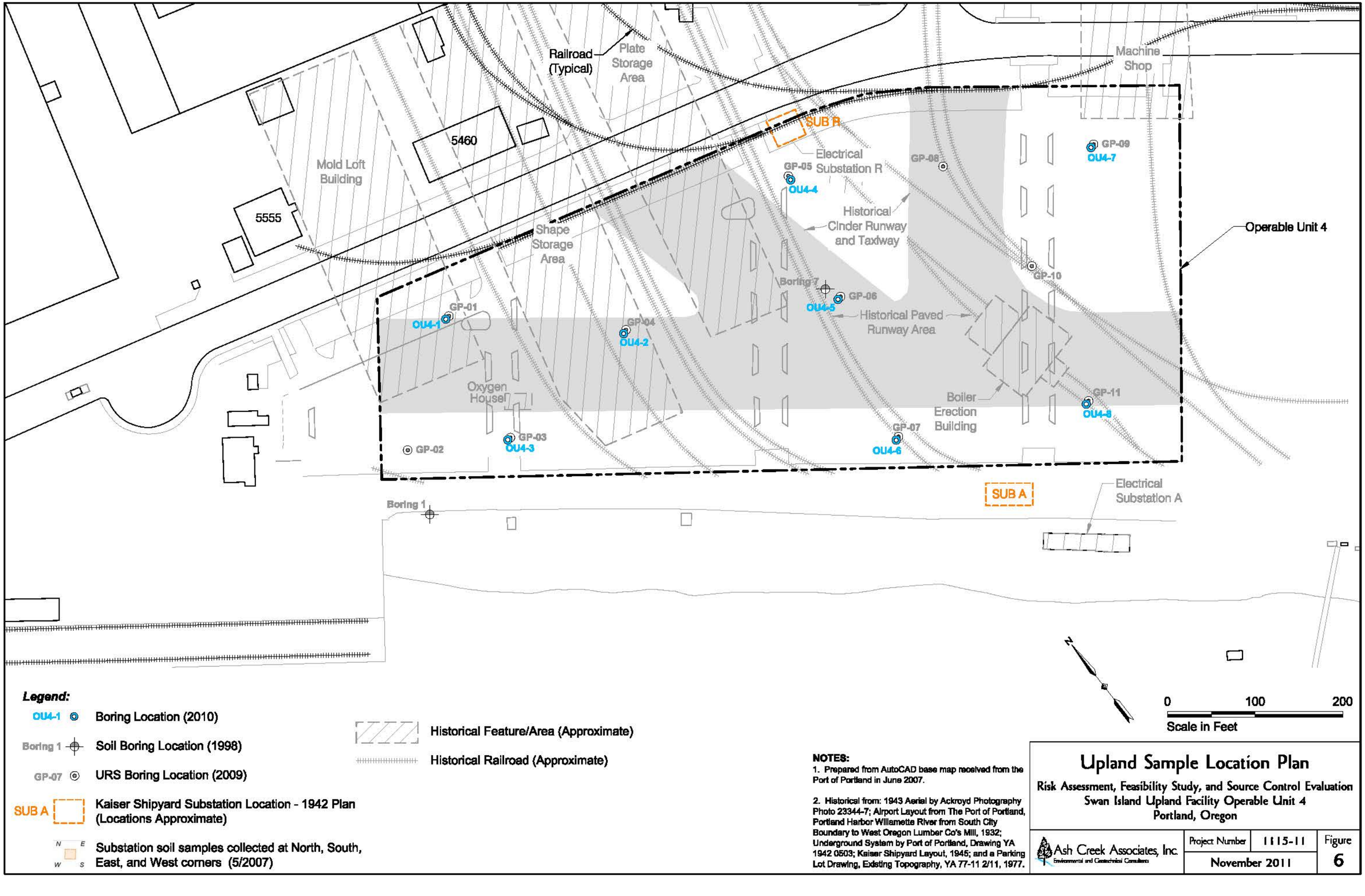
Date	Event/Source	Location	Description	Responsible Party
12/1/2004	Release of oil	Cascade General Yard	Doppler speed log was being replaced on the USNS HENRY K. KAISER when approximately 5 gallons of oil was released to the Willamette River	Military Sealift Command
2/17/2005	Release of oil	Cascade General Yard	Approximately 1 gallon of oil released from vessel to the Willamette River; cause unknown; booms applied and West Coast Marine hired to do cleanup	Cascade General
4/27/2005	Release of oil	Cascade General Yard	Sheen observed on Willamette River outboard of the M/V COLUMBIA; cause and quantity unknown	Cascade General

Attachment 3

Upland Sample Location Plan



Legend:

- OU4-1 — Boring Location (2010)
- Boring 1 — Soil Boring Location (1998)
- GP-07 — URS Boring Location (2009)
- SUB A — Kaiser Shipyard Substation Location - 1942 Plan (Locations Approximate)
- Substation soil samples collected at North, South, East, and West corners (5/2007)
- Historical Feature/Area (Approximate)
- Historical Railroad (Approximate)

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.
2. Historical from: 1943 Aerial by Ackroyd Photography Photo 23344-7; Airport Layout from The Port of Portland, Portland Harbor Willamette River from South City Boundary to West Oregon Lumber Co's Mill, 1932; Underground System by Port of Portland, Drawing YA 1942 0503; Kaiser Shipyard Layout, 1945; and a Parking Lot Drawing, Existing Topography, YA 77-11 2/11, 1977.

Upland Sample Location Plan

Risk Assessment, Feasibility Study, and Source Control Evaluation
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1115-11

November 2011

Figure 6

Attachment 4

Upland Soil Sample Analytical Data

TABLE A-1
Analytical Data Results—Main Parking Lot (Detected Constituents Only)

Boring No.	Sample Interval	Detected Analyte	Detection Limit (mg/kg)*	Reporting Limit (mg/kg)*	Sample Results (mg/kg)*
1	0 to 24 inches	Arsenic	0.250	0.500	2.71
		Barium	0.0545	5.00	81.3
		Chromium	0.0470	0.500	12.5
		Lead	0.320	5.00	11.6
	16 to 18 feet	Arsenic	0.250	0.500	1.60
		Barium	0.0545	5.00	84.1
		Chromium	0.0470	0.500	10.5
7	0 to 24 inches	Arsenic	0.250	0.500	2.45
		Barium	0.0545	5.00	158
		Chromium	0.0470	0.500	13.6
		Lead	0.320	5.00	7.00
		Heavy oil range hydrocarbons	13.0†	100†	451†
	16 to 18 feet	Arsenic	0.250	0.500	1.67
		Barium	0.545	5.00	76.7
		Chromium	0.0940	1.00	9.44

*All weights are mg/kg dry unless noted otherwise.
†mg/kg, not reported as "dry"

Table A-2
Soil Analytical Results: TPH
Swan Island Upland Facility
Portland, Oregon

Sample Number	Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
Sampling Interval (inches)	30 - 40	34 - 46	28 - 40	22 - 34	13 - 23	14 - 28	10 - 24	14 - 25
Sample Date	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
TPH-HCID	Concentrations in mg/kg (ppm)							
Gasoline-Range	<22	<22	<22	<24	<27	<24	<24	<27
Diesel-Range	<54	<54	<55	<59	<68	<59	<60	<66
Residual-Range	<110	<110	<110	<120	<140	<120	<120	<140

Notes:

1. TPH-HCID = Hydrocarbons identification by Northwest Method NWTPH-HCID.
2. mg/kg = milligram per kilogram (parts per million [ppm]).
3. < = Not detected above the method reporting limit.
4. Shading = Detected concentration.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.
   For example, Sub A-N-1 = Substation A, North corner, sample 1.

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Table A-3
Soil Analytical Results: PCBs
Swan Island Upland Facility
Portland, Oregon

Sample ID:	Sub A-N-1	Sub A-E-1	Sub A-S-1	Sub A-W-1	Sub R-N-1	Sub R-E-1	Sub R-S-1	Sub R-W-1
Sampling Interval (inches)	30 - 40	34 - 46	28 - 40	22 - 34	13 - 23	14 - 28	10 - 24	14 - 25
Sample Date:	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007	5/31/2007
PCBs								
Aroclor 1016	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1221	<20	<20	<20	<20	<20	<20	<20	<20
Aroclor 1232	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1242	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1248	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1254	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9
Aroclor 1260	<9.6	<9.6	<9.9	<10	<9.7	<9.8	<9.8	<9.9

Notes:

1. PCBs = Polychlorinated Biphenyls by EPA Method 8082.
2. µg/kg = micrograms per kilogram (parts per billion [ppb]).
3. < = Not detected above the method reporting limit.
4. Shading = Detected concentration.
5. Sample ID nomenclature is per the following: substation designation-geographic orientation-sample number.
   For example, Sub A-N-1 = Substation A, North corner, sample 1.

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Table A-4. URS Soil Analytical Results

Shipyard Commerce Center Parking Lot Purchase (units = mg/kg)

	Location	Sample ID	Sample Depth (ft)	Date	NWTPH-Dx[1] Diesel Range	NWTPH-Dx[1] Heavy Oil Range	NWTPH-Gx Gasoline Range	VOCs	SVOCs	PCBs	TBT Compounds: Tributyltin	TBT Compounds: Dibutyltin	TBT Compounds: Butyltin	Detected PAHs per EPA 8270-SIM: Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Detected Priority Pollutant Metals: Arsenic	Barium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
URS Soil Results	GP-01	GP01-05-080523	4-8	23-May-08	21.8U	43.7U	3.78U	< MRLs	< MRLs except PAHs[4]	< MRLs	0.0036U	**0.023**	**0.0075**	0.0521U	**0.135**	**0.237**	**0.332**[2]		**0.303**	**0.202**	**0.385**	**0.243**	0.0521U	**0.0779**	**0.536**	**2.19**	-	**9.52**	**10.6**	**2.27**	0.0857U	**11.6**	**30**
		GP01-20-080523	18-22	23-May-08	42.4U	84.9U	6.09U				0.0037U	0.0055U	0.0039U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	0.0495U	**3.61**	-	**19**	**20.3**	**3.81**	**0.563**	**22.3**	**55.6**
		GP01-40-080523	36-40	23-May-08	29.2U	58.5U	4.82U				0.0037U	0.0055U	0.0039U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	0.0428U	**2.65**	-	**12.7**	**14**	**2.23**	0.113U	**15.4**	**37.7**
	GP-02	GP02-5-080517	4-6	17-May-08	23.4U	46.9U	3.98U				0.0038U	0.0057U	0.0040U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	0.0349U	**1.71**	-	**12.7**	**11.5**	**1.94**	0.0963U	**15**	**38.5**
		GP02-50-080517	50-52	17-May-08	38U	75.9U	5.08U				0.0037U	0.0055U	0.0039U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	0.0488U	**1.76**	-	**18.9**	**16.8**	**2.82**	0.121U	**21**	**50.1**
		GP02-75-080517	73-75	17-May-08	28.3U	56.7U	4.83U				0.0038U	0.0057U	0.0040U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	0.0431U	**3.17**	-	**11.9**	**13.4**	**2.23**	0.114U	**17.8**	**40.6**
		GP02-110-080517	108-110	17-May-08	35.1U	70.2U	4.86U				0.0038U	**0.032**	**0.010**	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	0.0458U	**2.08**	-	**12.7**	**14.4**	**2.12**	0.112U	**18.8**	**41**
	GP-03	GP03-05-080523	4-8	23-May-08	35.8U	71.6U	4.94U				0.0036U	0.0054U	0.0038U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	0.0466U	**1.79**	-	**10.1**	**11.3**	**1.97**	0.11U	**13.1**	**36.8**
		GP03-20-080523	18-22	23-May-08	38.9U	77.8U	5.29U				0.0037U	**0.024**	**0.0062**	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	0.0439U	**2.82**	-	**19.5**	**18.1**	**3.35**	0.109U	**20.8**	**49.1**
		GP03-40-080523	36-40	23-May-08	35.2U	70.3U	4.93U				0.0038U	0.0057U	0.0040U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	0.0379U	**3.24**	-	**11.8**	**13.8**	**1.99**	0.122U	**15.2**	**37.5**
	GP-04	GP04-05-080522	4-8	22-May-08	32.8U	65.6U	4.63U				0.0038U	0.0058U	0.0041U	0.0724U	**0.144**	**0.283**	**0.37**[2]		**0.255**	**0.231**	**0.471**	**0.227**	0.0724U	**0.246**	**0.684**	**3.94**	-	**14**	**14.3**	**2.48**	0.096U	**16.8**	**41.4**
		GP04-20-080522	18-22	22-May-08	30U	59.9U	4.61U				0.0038U	**0.0072**	0.0040U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	0.0315U	**2.79**	-	**17.7**	**15.2**	**3.26**	0.106U	**18.9**	**43.8**
		GP04-40-080522	36-40	22-May-08	37.4U	74.8U	4.86U				0.0038U	**0.0086**	0.0040U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	0.0387U	**1.82**	-	**17.9**	**15.4**	**2.7**	0.115U	**15.7**	**41.9**
	GP-05	GP05-05-080522	4-8	22-May-08	34U	67.9U	4.93U				0.0038U	0.0057U	0.0040U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	0.0443U	**2.04**	-	**12.7**	**13.3**	**2.2**	0.111U	**16**	**39**
		GP05-20-080522	18-22	22-May-08	48.9U	97.8U	6.32U				0.0037U	**0.038**	**0.0082**	**0.0448**	**0.0873**	**0.0803**	**0.0956**[2]		0.0434U	**0.0984**	**0.187**	0.0434U	0.0434U	**0.139**	**0.235**	**2.89**	-	**15.1**	**16.6**	**3.03**	0.141U	**20.9**	**49**
		GP05-40-080522	36-40	22-May-08	32.8U	65.6U	4.19U				0.0037U	**0.0088**	0.0039U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	0.0346U	**1.59**	-	**10.1**	**12.1**	**1.72**	0.0883U	**12.6**	**32.4**
	GP-06	GP06-7.5-080516	5-10	16-May-08	**190**	**536**	4.72U				0.0037U	**0.028**	**0.0080**	0.938U	**2.94**	**5.88**	**7.38**[2]		**5.61**	**5.04**	**9.1**	**4.73**	0.938U	**3.56**	**13**	**2.09**	-	**12.7**	**13.4**	**2.82**	0.0955U	**16**	**41.4**
		GP06-50-080516	47-53	16-May-08	29.8U	59.6U	4.97U				0.0038U	0.0057U	0.0040U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	1.29U	-	**14.7**	**14.4**	**2.4**	0.103U	**18.4**	**46**
		GP06-75-080516	70-75	16-May-08	34.9U	69.8U	4.73U				0.0038U	0.0057U	0.0040U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	**1.58**	-	**13.5**	**12.7**	**2.06**	0.107U	**18.9**	**39.4**
		GP06-110-080516	105-110	16-May-08	33.3U	66.6U	5.00U				0.0038U	0.0057U	0.0040U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	**2.15**	-	**12.2**	**14.4**	**2.16**	0.0988U	**17.5**	**41.7**
	GP-07	GP07-05-080522	4-8	22-May-08	34U	68U	4.60U				0.0036U	**0.0073**	**0.0045**	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	0.0363U	**3.04**	-	**18**	**17.5**	**3.13**	0.107U	**20.3**	**47.5**
		GP07-20-080522	18-22	22-May-08	33.9U	**115**	4.67U				0.0037U	0.0055U	0.0039U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	0.338U	**3.04**	-	**19.4**	**20.2**	**5.19**	**0.116**	**21.3**	**54.6**
		GP07-40-080522	36-40	22-May-08	35.9U	71.7U	4.80U				0.0037U	0.0055U	0.0039U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	0.0413U	**4.34**	-	**12.2**	**13.6**	**2.81**	0.109U	**14.7**	**34.3**
	GP-08	GP08-05-080522	4-8	22-May-08	28.6U	57.1U	4.77U				0.0038U	**0.019**	0.0040U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	0.0393U	**2.79**	-	**21.4**	**16.7**	**3.47**	0.117U	**21.2**	**48.5**
		GP08-20-080522	18-22	22-May-08	32.2U	64.5U	4.72U				0.0038U	**0.0094**	0.0040U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	**2.07**	-	**12.4**	**13.4**	**2.25**	0.105U	**14.9**	**39.3**
		GP08-40-080522	36-40	22-May-08	29.5U	59U	4.78U				0.0037U	0.0055U	0.0039U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	0.0362U	**1.74**	-	**12.5**	**14.9**	**2.07**	0.116U	**15.1**	**39.2**
	GP-09	GP09-5-080518	5-8	18-May-08	24.3U	**411**	4.23U				0.0039U	0.0058U	0.0041U	0.207U	-	1.03U	0.207U	0.207U	1.03U	0.207U	0.207U	1.03U	0.207U	0.207U	0.207U	**2.38**	-	**14.1**	**12.8**	**2.56**	**0.117**	**15.1**	**43.5**
		GP09-50-080518	48-50	18-May-08	30.2U	60.4U	5.02U				0.0037U	0.0055U	0.0039U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	0.0441U	1.43U	-	**11.2**	**13.6**	**1.92**	0.115U	**15**	**39.3**
		GP09-75-080518	73-75	18-May-08	31.3U	62.6U	4.77U				0.0038U	**0.018**	**0.0047**	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	0.0434U	**1.41**	-	**10.4**	**12.3**	**1.89**	0.103U	**14**	**36.1**
		GP09-110-080518	108-110	18-May-08	27.6U	55.3U	4.99U				0.0038U	0.0057U	0.0040U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	0.0325U	**2.23**	-	**15.3**	**15.4**	**2.37**	0.104U	**24.5**	**46**
	GP-10	GP10-5-080518	3-5	18-May-08	38.2U	76.4U	5.60U				0.0036U	0.0054U	0.0038U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0508U	0.0509	0.0508U	0.0508U	0.0508U	**0.0624**	**2.97**	-	**30.6**	**25.5**	**5.63**	0.119U	**25.4**	**61.6**
		GP10-18-080518	17-19	18-May-08	36.4U	72.8U	5.30U				0.0036U	0.0054U	0.0038U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	0.0851U	**5.75**	-	**23.1**	**24**	**4.54**	**0.195**	**24.2**	**59.8**
		GP10-40-080518	38-40	18-May-08	30.7U	61.4U	5.41U				0.0036U	0.0054U	0.0038U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	**2.56**	-	**22.2**	**20.2**	**3.02**	0.0989U	**24.5**	**56.9**
	GP-11	GP11-5-080518	3-5	18-May-08	31U	62.1U	4.89U				0.0038U	0.0056U	0.0040U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	0.0455U	**3.47**	-	**31.6**	**26.8**	**5.01**	**0.409**	**26.3**	**61.6**
		GP11-20-080518	18-20	18-May-08	36.6U	73.3U	5.57U				0.0037U	0.0055U	0.0039U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	0.0461U	**0.0687**	0.0461U	**0.0498**	**0.0566**	**0.0777**	**4.37**	-	**35.1**	**51.7**	**28.1**	**1.83**	**27.1**	**88**
		GP11-40-080518	38-40	18-May-08	27.1U	54.2U	4.79U				0.0036U	0.0054U	0.0038U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	0.0365U	**2.07**	-	**23.5**	**20.5**	**2.96**	0.0959U	**21**	**50.8**
DEQ Default Background Concentrations for Metals[3]					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	42	36	17	0.07	38	86
JSCS Table 3-1: Upland Soil / Stormwater Sediment[5]					-	-	-	-	-	0.00039	0.0023	-	-	0.845	1.05	1.45	-	13	0.3	1.29	2.23	0.1	0.561	1.17	1.52	7	-	111	149	17	0.07	48.6	459

Notes:

mg/kg: milligrams per kilogram

VOCs : volatile organic compounds per EPA 8260B

SVOCs : semi volatile organic compounds per EPA 8270C

PCBs: polychlorinated biphenyls by EPA 8082

TBT: Tributyl Tins by EPA 8270D-Selected Ion Monitoring (SIM)

PAHs: polyaromatic hydrocarbons per EPA 8270-Selected Ion Monitoring (SIM)

Total Metals per EPA 6020

MRL: method reporting limit

U: less than the MRL

- : Data not analyzed or not applicable

Bold font = indicates detected concentrations above the MRL

Shaded values indicates an exceedance of the screening level value (SLV).

1: TPH-Dx = Diesel and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx.

2: Peak separation for Benzo(b) and Benzo(k)fluoranthenes does not meet method specified criteria. Reported result includes the combined area of the two isomers and should be considered the total of Benzo(b+k)Fluoranthene

3 Washington State Department of Ecology, 1994. Natural Background Soil Metals Concentrations in Washington State, Publication #94-115, October 1994. Statewide average.

4: SVOCs were below the MRLs except for some PAH compounds detected in samples: GP06-7.5-080516 & GP07-40-080522. Only PAH detections from the 8270-SIM analysis are reported above.

5: DEQ, 2007. Portland Harbor Joint Source Control Strategy (JSCS) Document. Table 3-1 (7/16/07 Revison). Most conservative screening level values (SLVs) for Upland Soil/Stormwater Sediment divided into human health and ecological SLVs. Additional bioaccumulative sediment ecological SLVs were used from DEQ, 2007. Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment. January 31.

Table A-5
Soil Analytical Results: TPH
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-2-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	18 - 22	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
NWTPH-HCID (mg/kg)									
Gasoline Range	--	--	ND	--	--	--	--	--	--
Diesel Range	--	--	DETECTED	--	--	--	--	--	--
Motor Oil Range	--	--	DETECTED	--	--	--	--	--	--
NWTPH-Dx (mg/kg)									
Diesel Range SG	<24.5	80.8	--	<28.1	<23.6	98.9	<25.5	<24.3	<23.7
Motor Oil Range SG	<98.2	166	--	<112	<94.5	216	<102	<97.2	<94.7

Notes:

1. NWTPH-Dx = Diesel and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx (with silica gel cleanup).
2. NWTPH-HCID = TPH hydrocarbon identification by Northwest Method NWTPH-HCID.
3. mg/kg (ppm) = milligrams per kilogram (parts per million).
4. < = Not detected above the method reporting limit (MRL).
5. ND = Not detected.
6. -- = Not analyzed.

Table A-6
Soil Analytical Results: Metals
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
Metals (mg/kg)								
Antimony	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Arsenic	4	2.5	18.7	3.1	2.2	3.2	3.1	3.2
Cadmium	<0.10	<0.081	<0.099	<0.089	<0.080	<0.087	<0.079	<0.085
Chromium	31.1	20.0	22.7	21.3	16.6	26.7	20.8	21.0
Copper	76.3	25.4	30.1	25.1	21.4	31.6	28.3	27.8
Lead	48.6	5.3	11.1	4.7	4.6	7.3	4.9	5.0
Nickel	43.3	25.9	28.4	26.6	23.9	28.6	26.1	23.1
Silver	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Zinc	101	52.4	84.4	63.4	60.7	69.3	61.2	62.9
Mercury	<0.11	0.098J	0.040J	0.094J	0.017J	0.041J	0.031J	<0.11

Notes:

1. Metals by EPA 6000/7000 Series Methods.
2. mg/kg (ppm) = milligrams per kilogram (parts per million).
3. < = Not detected above the method reporting limit (MRL).
4. J = Estimated concentration above the method detection limit and below the MRL.

Table A-7
Soil Analytical Results: PAHs
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
PAHs (ug/kg)								
1-Methylnaphthalene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
2-Methylnaphthalene	<44.8	45.0	<9.7	<8.6	52.1	<9.0	<8.8	<8.5
Acenaphthene	<44.8	68.1	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Acenaphthylene	439	868	<9.7	<8.6	1,150	<9.0	<8.8	<8.5
Anthracene	173	695	<9.7	<8.6	716	<9.0	<8.8	<8.5
Benzo(a)anthracene	1,560	4,030	25.9	14.3	6,500	16	<8.8	<8.5
Benzo(a)pyrene	2,850	7,220	26.8	15.3	10,100	24.6	9.7	<8.5
Benzo(b)fluoranthene	2,540	5,420	15.7	10.4	8,340	14.6	<8.8	<8.5
Benzo(g,h,i)perylene	3,430	7,050	14.6	11.4	11,300	16.6	8.9	<8.5
Benzo(k)fluoranthene	1,550	4,180	17.1	10.4	6,860	14.1	<8.8	<8.5
Chrysene	2,110	5,950	23.0	13.7	8,770	18.9	<8.8	<8.5
Dibenz(a,h)anthracene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Fluoranthene	4,370	16,200	36.0	26.9	21,700	22.6	12.3	11.2
Fluorene	49	277	<9.7	<8.6	191	<9.0	<8.8	<8.5
Indeno(1,2,3-cd)pyrene	2,310	5,080	11.8	<8.6	8,130	13.3	<8.8	<8.5
Naphthalene	51.2	131	14.6	<8.6	133	9.9	<8.8	<8.5
Phenanthrene	1,490	9,480	15.7	10	9,620	11.1	<8.8	<8.5
Pyrene	7,050	19,800	46.0	30.7	26,600	29.5	22.7	13.7

Notes:

1. PAHs = Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270M-SIM.
2. µg/kg (ppb) = Micrograms per kilogram (parts per billion).
3. < = Not detected above the method reporting limit (MRL).

Table A-8. URS Grab Groundwater Analytical Results

Shipyard Commerce Center Parking Lot Purchase (units = ug/L)

					NWTPH-Dx						Detected PAHs												Detected Priority Pollutant Total Metals							
	Location	Sample ID	Sample Depth (ft)	Date	Diesel Range	Heavy Oil Range	NWTPH-Gx Gasoline Range	VOCs	SVOCs	PCBs	TBT Compounds	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Antimony	Arsenic	Beryllium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
URS Groundwater Results	GP-01	GP01-GW40-080523	36-40	23-May-08	234U	467U	80.0U	< MRLs				**0.051**	**0.0646**	**0.100** [1]		**0.0625**	**0.0604**	**0.142**	**0.0545**	0.0381U	**0.0728**	**0.183**	1U	**3.74**	1U	**26.4**	**26.2**	**3.73**	0.1U	**62.7**	**48.7**
	GP-03	GP03-GW40-080523	36-40	23-May-08	238U	476U	80.0U					0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	1U	**9.6**	**1.09**	**77.7**	**54.8**	**8.76**	0.1U	**59.2**	**119**
	GP-04	GP04-GW40-080522	36-40	22-May-08	240U	481U	80.0U					**0.105**	**0.141**	**0.204** [1]		**0.153**	**0.154**	**0.422**	**0.128**	0.037U	**0.304**	**0.522**	1U	**8.97**	**1.66**	**101**	**75.9**	**12.5**	0.1U	**87.1**	**165**
	GP-05	GP05-GW40-080522	36-40	22-May-08	238U	476U	80.0U					**0.0778**	**0.104**	**0.150** [1]		**0.11**	**0.111**	**0.298**	**0.0919**	0.0381U	**0.202**	**0.367**	1U	**30.7**	**1.5**	**52.9**	**50**	**9.79**	0.1U	**53.1**	**110**
	GP-07	GP07-GW40-080522	36-40	22-May-08	253U	505U	80.0U					0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	0.0408U	1U	**6.38**	1U	**33.6**	**27.4**	**5.01**	0.1U	**36**	**67.2**
	GP-08	GP08-GW40-080522	36-40	22-May-08	234U	467U	80.0U					0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	0.0374U	1U	**26.1**	**1.3**	**55**	**52.3**	**9.96**	0.1U	**56.6**	**118**
	GP-10	GP10-GW40-080518	36-40	18-May-08	236U	472U	80.0U					0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	0.0392U	1U	**9.26**	**1.43**	**73.4**	**67.6**	**12.4**	0.1U	**79**	**249**
	GP-11	GP11-GW40-080518	36-40	18-May-08	236U	472U	80.0U					0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	0.0376U	1U	**13.6**	**1.07**	**53.5**	**45.5**	**8.24**	**0.112**	**51.3**	**108**
	GP-02	GP02-GW110-080517	106-110	17-May-08	236U	472U	80.0U					0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	0.0381U	**0.0929**	0.0381U	0.0381U	1U	**20.4**	1U	**37**	**40.4**	**7.42**	0.1U	**38.6**	**157**
	GP-06	GP06-GW110-080516	106-110	16-May-08	238U	476U	80.0U					0.0381U	**0.0381**	0.0762U[1]		**0.0392**	0.0381U	**0.074**	0.0381U	0.0381U	**0.0494**	**0.0954**	**1.49**	**33.8**	**2.59**	**221**	**303**	**22.3**	**0.212**	**167**	**3730**
	GP-09	GP09-GW110-080518	106-110	18-May-08	236U	472U	80.0U					0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	0.0375U	1U	**19.1**	1U	**45.2**	**43.2**	**5.13**	0.1U	**33.6**	**201**
JSCS SLV [2]					-	-	-	-	-	6.40E-05	0.072	0.0018	0.0018	0.0018	0.0018	0.2	0.0018	0.2	0.0018	0.2	0.2	0.2	6.0	0.045	-	100	2.7	0.54	0.77	16	36

Notes:

ug/L: micrograms per liter

VOCs : volatile organic compounds per EPA 8260B

SVOCs : semi volatile organic compounds per EPA 8270C

PCBs: polychlorinated biphenyls by EPA 8082

TBT: Tributyl Tins by EPA 8270D-Selected Ion Monitoring (SIM)

PAHs: polyaromatic hydrocarbons per EPA 8270-SIM

Total Metals per EPA 6020

MRL: method reporting limit

MRLs listed in laboratory data report attached to NFA request letter (Port, 2008).

U: less than the MRL

-: Not applicable or no SLV available

Bold font = indicates detected concentrations above the MRL

Shaded values indicates an exceedance of a screening level value (SLV)

1: Peak separation for Benzo(b) and Benzo(k)fluoranthenes does not meet method specified criteria. Reported result includes the combined area of the two isomers and should be considered the total of Benzo(b+k)Fluoranthene

2: DEQ, 2007. Portland Harbor Joint Source Control Strategy (JSCS) Document. Table 3-1 (7/16/07 Revison).

Table 1 - Analytical Detection Limits Summary - PCBs/Butyl Tins/SVOCs/VOCs
URS OU4, Swan Island Upland Facility
Portland, Oregon

Sample Number	Water	JSCS	Soil	RBC
Polychlorinated Biphenyls (PCBs) by EPA Method 8082				
	ug/L	ug/L	ug/kg	ug/kg
PCB-1016	<1	0.960	<33	560
PCB-1221	<1	0.034	<33	560
PCB-1232	<1	0.034	<33	560
PCB-1242	<1	0.034	<33	560
PCB-1248	<1	0.034	<33	560
PCB-1254	<1	0.033	<33	560
PCB-1260	<1	0.034	<33	560
Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270C				
	ug/L	ug/L	ug/kg	ug/kg
1,2,4-Trichlorobenzene	<5	8.2	<330 to <3300	--
1,2-Dichlorobenzene	<5	49	<330 to <3300	19,000,000
1,2-Diphenylhydrazine	<10	--	<330 to <3300	--
1,3-Dichlorobenzene	<5	14	<330 to <3300	--
1,4-Dichlorobenzene	<5	2.8	<330 to <3300	63,000
2,4,5-Trichlorophenol	<10	3,600	<800 to <8000	--
2,4,6-Trichlorophenol	<5	2.4	<330 to <3300	--
2,4-Dichlorophenol	<5	110	<330 to <3300	--
2,4-Dimethylphenol	<5	730	<330 to <3300	--
2,4-Dinitrophenol	<25	73	<800 to <8000	--
2,4-Dinitrotoluene	<5	3.4	<800 to <8000	--
2,6-Dinitrotoluene	<5	37	<330 to <3300	240,000
2-Chloronaphthalene	<5	490	<330 to <3300	--
2-Chlorophenol	<5	30	<330 to <3300	--
2-Methylnaphthalene	<5	0.2	<330 to <3300	--
2-Nitroaniline	<25	110	<800 to <8000	--
2-Nitrophenol	<5	150	<330 to <3300	--
3,3´-Dichlorobenzidine	<10	--	<330 to <3300	--
3-Nitroaniline	<25	3.2	<800 to <8000	--
4,6-Dinitro-2-methylphenol	<25	--	<800 to <8000	--
4-Bromophenyl phenyl ether	<5	--	<330 to <3300	--
4-Chloro-3-methylphenol	<5	--	<330 to <3300	--
4-Chloroaniline	<5	150	<330 to <3300	--
4-Chlorophenyl phenyl ether	<5	--	<330 to <3300	--
4-Nitroaniline	<25	3.2	<800 to <8000	--
4-Nitrophenol	<25	150	<800 to <8000	--
Acenaphthene	<5	0.2	<330 to <3300	19,000,000
Acenaphthylene	<5	0.2	<330 to <3300	--
Aniline	<5	12	<330 to <3300	--
Anthracene	<5	0.2	<330 to <3300	93,000,000
Benz(a)anthracene	<5	0.018	<330 to <3300	2,700
Benzo(a)pyrene	<5	0.018	<330 to <3300	270
Benzo(b)fluoranthene	<5	0.018	<330 to <3300	27,000
Benzo(g,h,i)perylene	<5	0.2	<330 to <3300	--
Benzo(k)fluoranthene	<5	0.018	<330 to <3300	27,000
Benzoic acid	<25	42	<1600 to <16000	--
Benzyl alcohol	<5	8.6	<330 to <3300	--
Bis(2-chloroethoxy)methane	<5	--	<330 to <3300	--
Bis(2-chloroethyl)ether	<5	--	<330 to <3300	--
Bis(2-chloroisopropyl)ether	< 5	--	<330 to <3300	--
Bis(2-ethylhexyl)phthalate	< 5	2.2	<330 to <3300	150,000
Butyl benzyl phthalate	< 5	3	<330 to <3300	--
Carbazole	< 5	3.4	<330 to <3300	--
Chrysene	< 5	0.018	<330 to <3300	250,000
Dibenz(a,h)anthracene	< 5	0.018	<330 to <3300	270
Dibenzofuran	< 5	3.7	<330 to <3300	--
Diethyl phthalate	< 5	3	<330 to <3300	--
Dimethyl phthalate	< 5	3	<330 to <3300	--
Di-n-butyl phthalate	< 5	3	<330 to <3300	--
Di-n-octyl phthalate	< 5	3	<330 to <3300	--
Fluoranthene	< 5	0.2	<330 to <3300	8,900,000
Fluorene	< 5	0.2	<330 to <3300	12,000,000
Hexachlorobenzene	< 5	0.00029	<330 to <3300	1,200
Hexachlorobutadiene	< 5	0.86	<330 to <3300	--
Hexachlorocyclopentadiene	< 5	5.2	<330 to <3300	--
Hexachloroethane	< 5	3.3	<330 to <3300	90,000
Indeno(1,2,3-cd)pyrene	< 5	0.018	<330 to <3300	2,700
Isophorone	< 5	71	<330 to <3300	--
Naphthalene	< 5	0.2	<330 to <3300	23,000
Nitrobenzene	< 5	3.4	<330 to <3300	--
N-Nitrosodi-n-propylamine	< 5	--	<330 to <3300	--
N-Nitrosodiphenylamine	< 5	6	<330 to <3300	--
Pentachlorophenol	< 25	0.56	<800 to <8000	3,900
Phenanthrene	< 5	0.2	<330 to <3300	--
Phenol	< 5	2,560	<330 to <3300	--
Pyrene	< 5	0.2	<330 to <3300	6,700,000
Pyridine	< 5	--	<330 to <3300	--
2-Methylphenol	< 5	--	<330 to <3300	--
3 & 4-Methylphenol	< 5	--	<330 to <3300	--

Sample Number	Water	JSCS	Soil	RBC
Volatile Organic Compounds (VOCs) by EPA Method 8260B				
	ug/L	ug/L	mg/kg	mg/kg
Acetone	<20.0	1,500	<0.944 to <1.52	--
Benzene	<0.250	1.2	<0.0118 to <0.0190	34.0
Bromobenzene	<0.500	--	<0.0236 to <0.0381	--
Bromochloromethane	<0.500	--	<0.0236 to <0.0381	--
Bromodichloromethane	<0.500	1.1	<0.0236 to <0.0381	15.0
Bromoform	<1.00	8.5	<0.0472 to <0.0761	240.0
Bromomethane	<5.00	8.7	<0.472 to <0.761	330
2-Butanone (MEK)	<10.0	--	<0.472 to <0.761	--
n-Butylbenzene	<1.00	--	<0.0236 to <0.0381	--
sec-Butylbenzene	<1.00	--	<0.0236 to <0.0381	--
tert-Butylbenzene	<0.500	--	<0.0236 to <0.0381	--
Carbon tetrachloride	<0.500	0.51	<0.0236 to <0.0381	31
Chlorobenzene	<0.500	50	<0.0236 to <0.0381	4,300
Chloroethane	<2.00	23	<0.472 to <0.761	>100,000
Chloroform	<2.00	0.17	<0.236 to <0.381	25
Chloromethane	<5.00	2.1	<0.236 to <0.381	25,000
2-Chlorotoluene	<0.500	--	<0.0236 to <0.0381	--
4-Chlorotoluene	<0.500	--	<0.0236 to <0.0381	--
1,2-Dibromo-3-chloropropane	<2.00	--	<0.0944 to <0.152	--
Dibromochloromethane	<0.500	0.79	<0.0472 to <0.0761	16
1,2-Dibromoethane (EDB)	<0.500	--	<0.0236 to <0.0381	0.68
Dibromomethane	<0.500	61	<0.0236 to <0.0381	--
1,2-Dichlorobenzene	<0.500	49	<0.0236 to <0.0381	19,000
1,3-Dichlorobenzene	<0.500	14	<0.0236 to <0.0381	--
1,4-Dichlorobenzene	<0.500	2.8	<0.0236 to <0.0381	63
Dichlorodifluoromethane	<1.00	390	<0.0472 to <0.0761	--
1,1-Dichloroethane	<0.500	--	<0.0236 to <0.0381	250
1,2-Dichloroethane (EDC)	<0.500	--	<0.0236 to <0.0381	15
1,1-Dichloroethene	<0.500		<0.0236 to <0.0381	12,000
cis-1,2-Dichloroethene	<0.500	--	<0.0236 to <0.0381	620
trans-1,2-Dichloroethene	<0.500	--	<0.0236 to <0.0381	4,500
1,2-Dichloropropane	<0.500	--	<0.0236 to <0.0381	--
1,3-Dichloropropane	<0.500	--	<0.0236 to <0.0381	--
2,2-Dichloropropane	<0.500	--	<0.0236 to <0.0381	--
1,1-Dichloropropene	<0.500	--	<0.0236 to <0.0381	--
cis-1,3-Dichloropropene	<0.500	0.055	<0.0472 to <0.0761	--
trans-1,3-Dichloropropene	<0.500	0.055	<0.0472 to <0.0761	--
Ethylbenzene	<0.500	7.3	<0.0236 to <0.0381	140
Hexachlorobutadiene	<2.00	0.86	<0.0944 to <0.152	--
2-Hexanone	<10.0	--	<0.472 to <0.761	--
Isopropylbenzene	<0.500	660	<0.0236 to <0.0381	24,000
4-Isopropyltoluene	<0.500	--	<0.0236 to <0.0381	--
4-Methyl-2-pentanone (MiBK)	<10.0	--	<0.472 to <0.761	--
Methyl tert-butyl ether (MTBE)	<0.500	37	<0.0472 to <0.0761	--
Methylene chloride	<5.00	8.9	<0.236 to <0.381	1,000
Napthalene	<5.00	0.2	<0.236 to <0.381	23
n-Propylbenzene	<0.500	--	<0.0236 to <0.0381	--
Styrene	<0.500	100	<0.0236 to <0.0381	51,000
1,1,1,2-Tetrachloroethane	<0.500	--	<0.0472 to <0.0761	--
1,1,2,2-Tetrachloroethane	<0.500	--	<0.0236 to <0.0381	--
Tetrachloroethene (PCE)	<0.500	0.12	<0.0236 to <0.0381	940
Toluene	<1.00	9.8	<0.0944 to <0.152	24,000
1,2,3-Trichlorobenzene	<2.00	--	<0.0944 to <0.152	--
1,2,4-Trichlorobenzene	<2.00	8.2	<0.0944 to <0.152	--
1,1,1-Trichloroethane	<0.500	--	<0.0472 to <0.0761	430,000
1,1,2-Trichloroethane	<0.500	--	<0.0236 to <0.0381	25
Trichloroethylene (TCE)	<0.500	0.17	<0.0236 to <0.0381	46
Trichlorofluoromethane	<1.00	1,300	<0.236 to <0.381	63,000
1,2,3,-Trichloropropane	<1.00	--	<0.0472 to <0.0761	--
1,2,4-Trimethylbenzene	<1.00	--	<0.0472 to <0.0761	2,000
1,3,5-Trimethylbenzene	<1.00	--	<0.0472 to <0.0761	3,100
Vinyl Chloride	<0.500	0.015	<0.0236 to <0.0381	4
m,p-Xylene	<1.00	1.8	<0.0472 to <0.0761	19,000
o-Xylene	<0.500	13	<0.0236 to <0.0381	19,000

Notes:

1. JSCS -- DEQ/EPA, 2005. Portland Harbor Joint Source Control Strategy – Final (Table 3-1 Updated July 16, 2007). December 2005.
2. RBC = DEQ risk-based concentration for lower of construction worker or occupational direct contact (June 2012 update). Value for PCBs is for total.
3. -- = Not applicable or not available.
4. µg/L = micrograms per liter.
5. µg/kg = micrograms per kilogram.

Attachment 5

Surface Soil Report

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

May 11, 2010

Mr. Kelly Madalinski
Port of Portland
P.O. Box 3529
Portland, Oregon 97208

Re: Surface Soil Sampling Results – Operable Unit 4
Swan Island Upland Facility
Portland, Oregon
ECSI No. 271
1115-11

Dear Mr. Madalinski:

This letter presents the results of surface soil sampling activities completed to support the No Further Action (NFA) request for Operable Unit 4 (the Facility or OU4) at the Swan Island Upland Facility (SIUF) in Portland, Oregon (Figures 1 and 2). The Port of Portland (Port) is under a Voluntary Cleanup Program (VCP) Agreement with the Oregon Department of Environmental Quality (DEQ) for Remedial Investigation (RI), Source Control Measures (SCMs), and Feasibility Study (FS) at the Facility (dated July 24, 2006). The DEQ approved the *Proposed Surface Soil Sampling - Operable Unit 4* (dated December 29, 2009) in a letter dated January 19, 2010. The methods, procedures, and results of the chemical analyses are presented in this letter.

BACKGROUND

The VCP Agreement divides the Upland Facility into three operable units, including:

- Operable Unit 1 (OU1) - Fifty-seven acres of the uplands owned by Vigor Marine (Cascade General);
- Operable Unit 2 (OU2) - Thirty-seven acres of uplands owned by the Port; and
- Operable Unit 3 (OU3) - Upland property owned by the Port at 5420 North Lagoon Avenue and the adjacent property to the north that provides access to Berths 307 and 308.

The Port requested that the DEQ create a new operable unit (OU4; formerly a part of OU2) related to the sale of the parking lot to Vigor. Vigor plans to use the parking lot to support its shipyard operations, including a materials lay down yard and a rail spur. The Port is currently pursuing an NFA determination from DEQ for OU4. The Port prepared a letter requesting that the DEQ issue an NFA for OU4 (dated July 11, 2008). The NFA request letter also presented chemical data collected by URS Corporation (on behalf of Vigor) as part of their due diligence activities. The DEQ provided comments in a letter (dated November 24, 2008) which requested additional sampling/risk evaluation and a Source Control Evaluation (SCE). These comments were discussed in a meeting between the Port

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and DEQ conducted on June 1, 2009. The DEQ indicated surface soil at OU4 had not been adequately characterized. The DEQ has requested that a limited surface soil sampling investigation be completed to support a subsequent Port NFA request package.

SAMPLING ACTIVITIES

Preparatory Activities

The following activities were completed in preparation for the field work:

- Health and Safety Plan (HASP). Ash Creek Associates, Inc. (ACA) prepared a HASP for its personnel involved with the project. The HASP was available to the subcontractors who supported the field activities.
- Utility Location. A private underground utility locate was completed prior to performing the subsurface work. A public utility locate request was also submitted to the Oregon Utility Notification Center.
- Facility Access. The work activities on OU4 were conducted in coordination with Vigor schedules.

Surface Soil Sampling

Eight direct-push explorations (OU4-1 through OU4-8) were completed at the locations shown on Figure 3. These locations were co-located with the historical URS borings and chosen to provide spatial coverage. Soil cores were obtained continuously from near the ground surface to 5 feet below the ground surface (bgs) per Standard Operating Procedure (SOP)-2.2 and 2.4 (Attachment A). Exploration logs are included in Attachment B. Sample were collected between 0.5 and 3 feet bgs based on the observed thickness of the asphalt-concrete and base gravel. The samples were field screened for volatile organic compounds (VOCs) using a photoionization detector (PID) and for the presence of petroleum hydrocarbons using a sheen test in accordance with SOP-2.1 (Attachment A). An approximately 2- to 4-inch thick gravel layer with an oil-like sheen was observed in borings OU4-1, OU4-2, and OU4-5. No other field indications of VOCs or petroleum hydrocarbons were observed.

After sampling activities were completed, each exploration was abandoned in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure consisted of filling the exploration with granular bentonite and hydrating the bentonite with water. The surface was finished to match the surrounding materials.

Investigation-derived wastes (IDW) consisted of direct-push soil cuttings, decontamination water, and purge water generated during the above activities. Soil cuttings and purge water were placed in labeled drums, U.S. Department of Transportation (DOT) approved for transporting hazardous waste. The drummed soil and water were stored on site in preparation for off-site recycling/disposal. Drums were labeled with the Facility name, generated contents, and date. Disposable items, such as gloves, pump tubing, paper towels, etc., were placed in plastic bags after use and deposited in trash receptacles for disposal. On March 23, 2010 the drummed soil was disposed of at the Waste Management Hillsboro Landfill and the drummed water taken to Oil Re-Refining of Portland, Oregon for recycling.

The sample locations were recorded using a high-accuracy, handheld global positioning system (GPS) device (Trimble© GeoXH™).

ANALYTICAL RESULTS

The soil samples collected from the above activities were submitted to Pace Analytical Services, Inc. in Seattle, Washington. Copies of the laboratory reports are included in Attachment C (in CD-ROM format due to the length of the Level III deliverable report). The samples were analyzed on a standard turnaround time (up to 10 business

days). A quality assurance review of the data was completed. No qualifiers were attached to the data as a result of the review.

The soil samples were submitted for the following chemical analyses:

- Diesel- and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx (with silica gel cleanup);
- Metals by EPA 6000/7000 Series Methods (including antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc); and
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270-SIM.

TPH. TPH as diesel and oil were detected in the soil samples from OU4-2 and OU4-5 (Table 1). A discrete sample (OU4-2-2) from the gravel layer observed in boring OU4-2 was analyzed for hydrocarbon identification by Northwest Method NWTPH-HCID. Diesel and oil-range TPH were detected. The laboratory indicated that the chromatogram (Attachment C) resembled creosote.

Metals. Arsenic, chromium, copper, lead, nickel, and zinc were detected above the method reporting limits (MRLs) from the soil samples. Mercury was detected in samples OU4-2 through OU4-7 at concentrations between the method detection limit (MDL) and the method reporting limit (MRL). The values are J-flagged indicating the concentrations are estimated.

PAHs. Up to 14 individual PAHs were detected in the soil samples. The highest relative concentrations were detected in samples from OU4-2 and OU4-5 (consistent with the TPH results).

CONCLUSIONS

These data will be incorporated in the NFA request package.

Sincerely,

Michael J. Pickering, R.G.
Senior Associate Hydrogeologist

REFERENCES

Ash Creek, 2009. Proposed Surface Soil Sampling - Operable Unit 4, Swan Island Upland Facility, Portland, Oregon. December 29, 2009.

DEQ, 2010. Letter Re: Proposed Surface Soil Sampling – Operable Unit 4, Swan Island Upland Facility, Portland Oregon, ECSI No. 271. January 19, 2010.

ATTACHMENTS

Table 1 – Soil Analytical Results: TPH
Table 2 – Soil Analytical Results: Metals
Table 3 – Soil Analytical Results: PAHs

Figure 1 – Facility Location Map
Figure 2 – Facility Vicinity Map
Figure 3 – Sampling Plan

Attachment A – Standard Operating Procedures 2.1, 2.2, and 2.4
Attachment B – Field Exploration Logs
Attachment C – Analytical Laboratory Report (contained on CD-ROM)

Table 1
Soil Analytical Results: TPH
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-2-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	18 - 22	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
NWTPH-HCID (mg/kg)									
Gasoline Range	--	--	ND	--	--	--	--	--	--
Diesel Range	--	--	DETECTED	--	--	--	--	--	--
Motor Oil Range	--	--	DETECTED	--	--	--	--	--	--
NWTPH-Dx (mg/kg)									
Diesel Range SG	<24.5	80.8	--	<28.1	<23.6	98.9	<25.5	<24.3	<23.7
Motor Oil Range SG	<98.2	166	--	<112	<94.5	216	<102	<97.2	<94.7

Notes:

1. NWTPH-Dx = Diesel and oil-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx (with silica gel cleanup).
2. NWTPH-HCID = TPH hydrocarbon identification by Northwest Method NWTPH-HCID.
3. mg/kg (ppm) = milligrams per kilogram (parts per million).
4. < = Not detected above the method reporting limit (MRL).
5. ND = Not detected.
6. -- = Not analyzed.

Table 2
Soil Analytical Results: Metals
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
Metals (mg/kg)								
Antimony	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Arsenic	4	2.5	18.7	3.1	2.2	3.2	3.1	3.2
Cadmium	<0.10	<0.081	<0.099	<0.089	<0.080	<0.087	<0.079	<0.085
Chromium	31.1	20.0	22.7	21.3	16.6	26.7	20.8	21.0
Copper	76.3	25.4	30.1	25.1	21.4	31.6	28.3	27.8
Lead	48.6	5.3	11.1	4.7	4.6	7.3	4.9	5.0
Nickel	43.3	25.9	28.4	26.6	23.9	28.6	26.1	23.1
Silver	<0.65	<0.51	<0.62	<0.56	<0.50	<0.55	<0.50	<0.53
Zinc	101	52.4	84.4	63.4	60.7	69.3	61.2	62.9
Mercury	<0.11	0.098J	0.040J	0.094J	0.017J	0.041J	0.031J	<0.11

Notes:

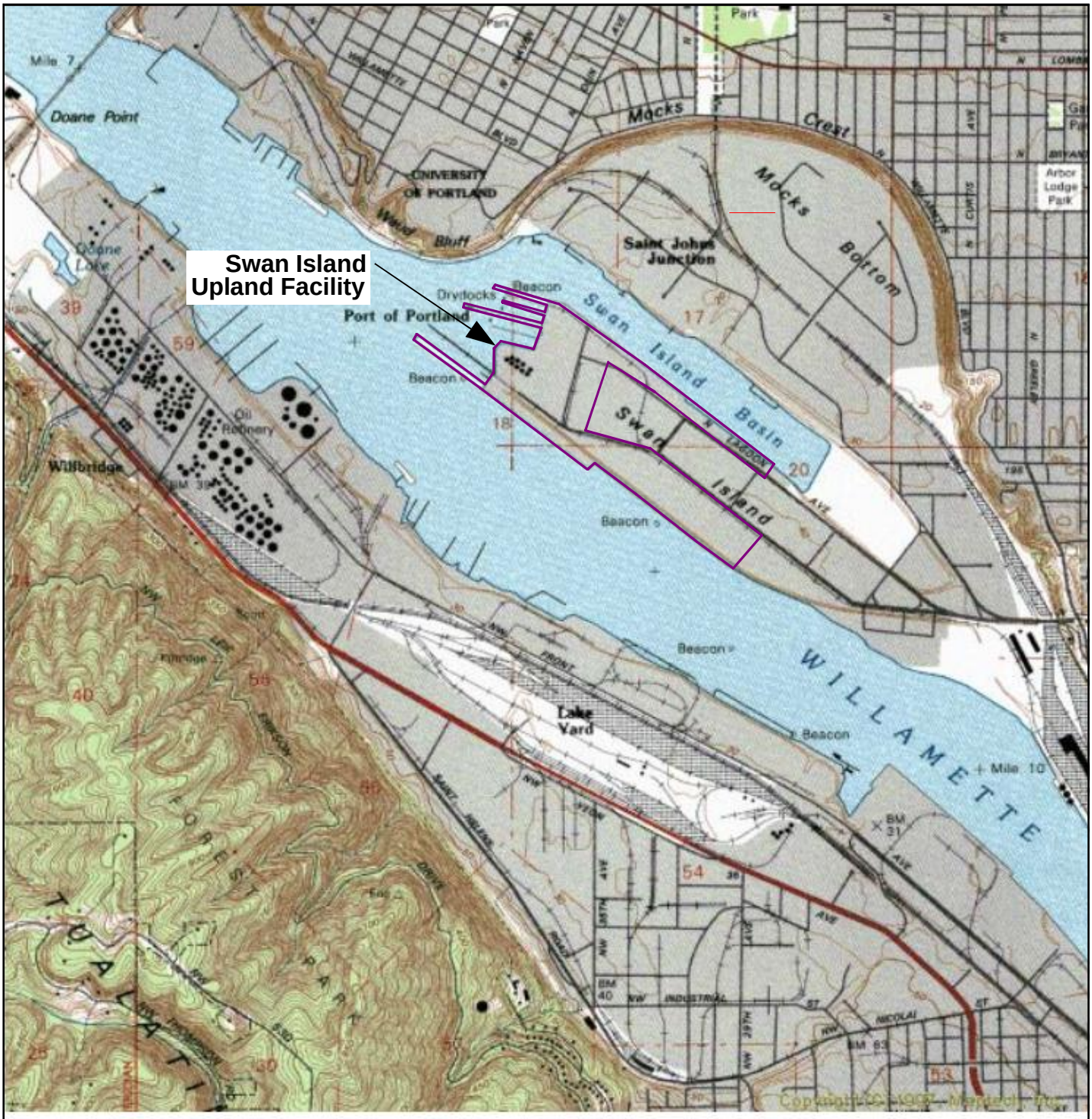
1. Metals by EPA 6000/7000 Series Methods.
2. mg/kg (ppm) = milligrams per kilogram (parts per million).
3. < = Not detected above the method reporting limit (MRL).
4. J = Estimated concentration above the method detection limit and below the MRL.

Table 3
Soil Analytical Results: PAHs
SIUF, Operable Unit 4
Portland, Oregon

Sample ID:	OU4-1	OU4-2	OU4-3	OU4-4	OU4-5	OU4-6	OU4-7	OU4-8
Sampling Interval (inches):	12 - 30	8 - 32	12 - 34	12 - 34	12 - 22	12 - 38	12 - 20	12 - 25
Sample Date:	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010	2/3/2010
PAHs (ug/kg)								
1-Methylnaphthalene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
2-Methylnaphthalene	<44.8	45.0	<9.7	<8.6	52.1	<9.0	<8.8	<8.5
Acenaphthene	<44.8	68.1	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Acenaphthylene	439	868	<9.7	<8.6	1,150	<9.0	<8.8	<8.5
Anthracene	173	695	<9.7	<8.6	716	<9.0	<8.8	<8.5
Benzo(a)anthracene	1,560	4,030	25.9	14.3	6,500	16	<8.8	<8.5
Benzo(a)pyrene	2,850	7,220	26.8	15.3	10,100	24.6	9.7	<8.5
Benzo(b)fluoranthene	2,540	5,420	15.7	10.4	8,340	14.6	<8.8	<8.5
Benzo(g,h,i)perylene	3,430	7,050	14.6	11.4	11,300	16.6	8.9	<8.5
Benzo(k)fluoranthene	1,550	4,180	17.1	10.4	6,860	14.1	<8.8	<8.5
Chrysene	2,110	5,950	23.0	13.7	8,770	18.9	<8.8	<8.5
Dibenz(a,h)anthracene	<44.8	<43.6	<9.7	<8.6	<39.8	<9.0	<8.8	<8.5
Fluoranthene	4,370	16,200	36.0	26.9	21,700	22.6	12.3	11.2
Fluorene	49	277	<9.7	<8.6	191	<9.0	<8.8	<8.5
Indeno(1,2,3-cd)pyrene	2,310	5,080	11.8	<8.6	8,130	13.3	<8.8	<8.5
Naphthalene	51.2	131	14.6	<8.6	133	9.9	<8.8	<8.5
Phenanthrene	1,490	9,480	15.7	10	9,620	11.1	<8.8	<8.5
Pyrene	7,050	19,800	46.0	30.7	26,600	29.5	22.7	13.7

Notes:

1. PAHs = Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270M-SIM.
2. µg/kg (ppb) = Micrograms per kilogram (parts per billion).
3. < = Not detected above the method reporting limit (MRL).



Base map prepared from USGS 7.5-minute quadrangles as provided by Topozone. (1990)

0 2,000 4,000

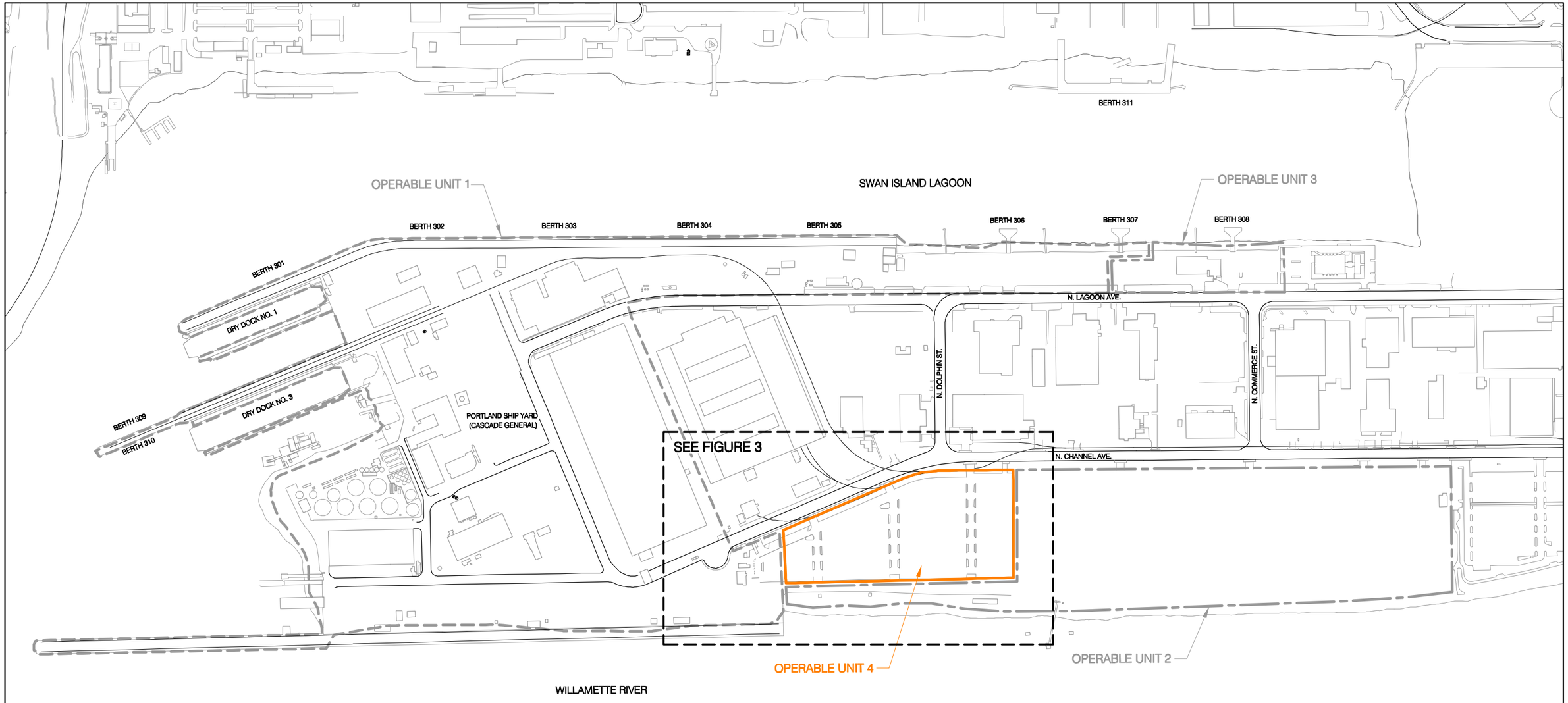
Approximate Scale in Feet

Facility Location Map

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure 1
May 2010		



N

0 400 800

Scale in Feet

Legend:

- Operable Unit 1 Boundary
- Operable Unit 2 Boundary
- Operable Unit 3 Boundary
- Operable Unit 4 Boundary

NOTE:

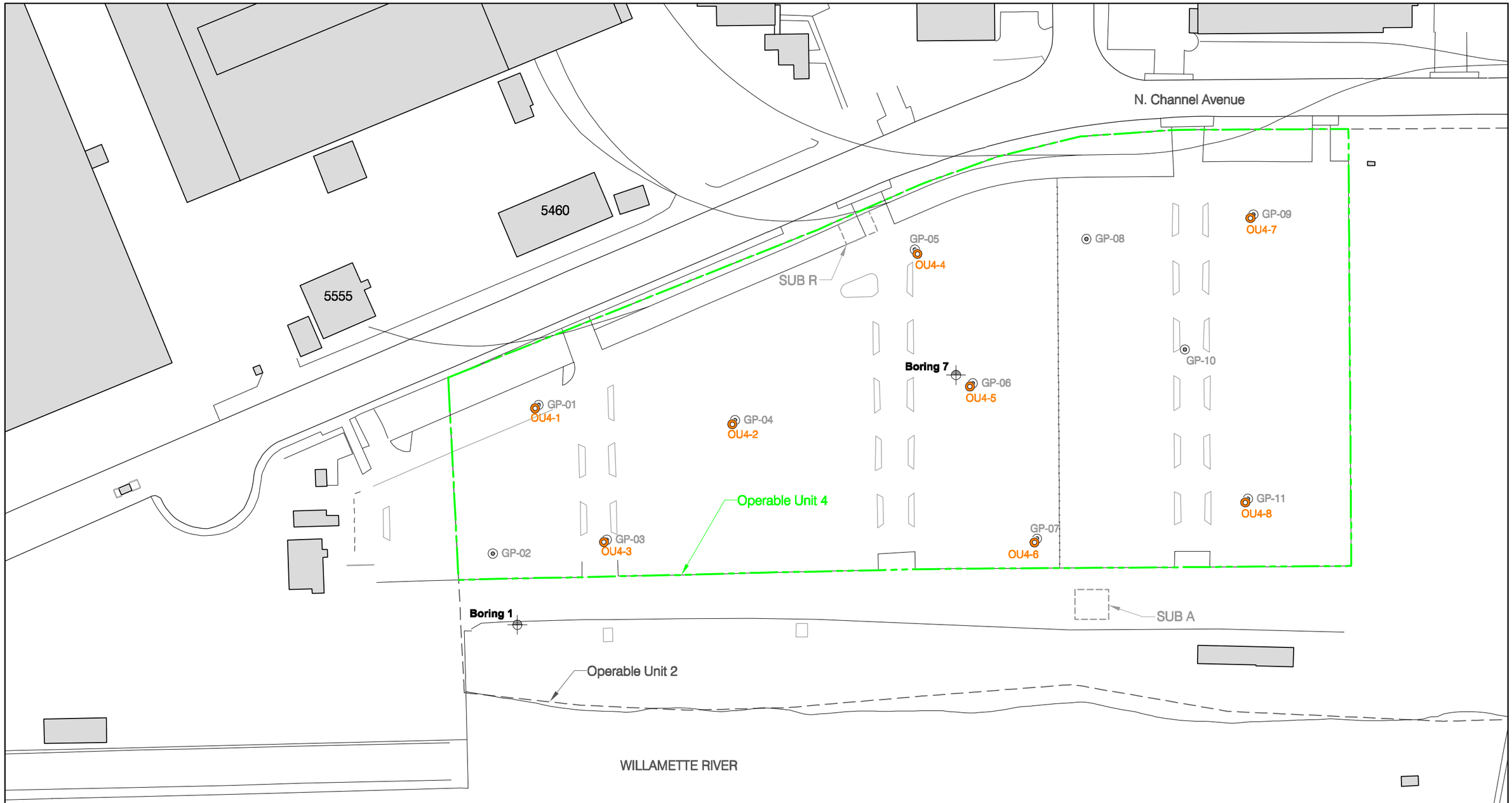
1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

Facility Vicinity Map

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1115-11	Figure
May 2010		2



Legend:

OU4-1 Proposed Boring Location

Boring 1 Soil Boring Location (1998)

GP-07 URS Boring Location (2009)

SUB A Kaiser Shipyard Substation Location - 1942 Plan (Locations Approximate) - Soil samples collected at North, South, East, and West corners

N E W S

0 100 200

Scale in Feet

NOTES:

1. Prepared from AutoCAD base map received from the Port of Portland in June 2007.

Sampling Plan

Surface Soil Sampling Letter
Swan Island Upland Facility Operable Unit 4
Portland, Oregon

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number 1115-11

May 2010

Figure 3

Attachment 6

River Sediment Sample Screening Results

Table D-1 - River Sediment Analytical Results: Metals (mg/kg)
SIUF - OU4
Portland, Oregon

Location ID:	G429	B023	BT027-1	BT027-2	G433-1	G433-2	PSY47	SD138	
Sample Interval (cm):	0 - 27	0 - 15	0 - 10	0 - 10	0 - 26	0 - 27	0 - 10	0 - 10	JSCS SLV
Metals (mg/kg)									
Antimony	0.11 J	<0.11 J	0.11 J	0.125 J	0.15 J	0.13 J	0.1 UJ	6 J	64
Arsenic	4.17	1.67	3.12	3.31	3.56 J	3.36 J	5.0	5 U	7
Cadmium	0.207	0.098	0.24	0.26	0.216	0.221	0.2	0.4	1
Chromium	34.3 J	14.8	32.8	33.2	39.2 J	36.1 J	38.0	38.2	111
Copper	39.6 J	25.1 J	36.6	37.8	41.8	40.1	46.9 J	56.3	149
Lead	12.4	14	16.9	15.8	17.2 J	14.5 J	15.7	15.0	17
Nickel	26.5	19.8	20.2 J	21.6 J	28.5	27.1	29.7	30.0	48.6
Silver	0.394 J	0.036	0.133 J	0.133 J	0.226	0.22	0.20	0.60	5
Zinc	101	76.6	121	119	119	114	101 J	112	459

Notes:

1. mg/kg = Milligrams per kilogram (parts per million).
2. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
3. Shading indicates that the reported concentration exceeds the screening level.

Table D-2 - River Sediment Analytical Results: Total Petroleum Hydrocarbons (mg/kg)
SIUF - OU4
Portland, Oregon

Location ID: / Sample Interval (cm):	BT027-1 0 - 10	BT027-2 0 - 10	JSCS SLV
NWTPH-Gx (mg/kg)			
Gasoline	13 J	<2	--
NWTPH-Dx (mg/kg)			
Diesel	76 J	78 J	--
Residual	390 J	490 J	--

Notes:

1. mg/kg = Milligrams per kilogram (parts per million).
2. < = Not detected above the Method Reporting Limit (MRL).
3. J = The result is an estimated concentration that is less than the MRL but greater than or equal to the Method Detection Limit (MDL).
4. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1:

Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).

5. -- = Not available or not analyzed.
6. Shading indicates that the reported concentration exceeds the screening level.

Table D-3 - River Sediment Analytical Results: Polycyclic Aromatic Hydrocarbons (ug/kg)
SIUF - OU4
Portland, Oregon

Location ID:	G429	B023	BT027-1	BT027-2	G433-1	G433-2	PSY47	SD138	
Sample Interval (cm):	0 - 27	0 - 15	0 - 10	0 - 10	0 - 26	0 - 27	0 - 10	0 - 10	JSCS SLV
PAHs (µg/kg)									
Naphthalene	<3.5	<1.7	<0.67 J	<0.7 J	<8.4	11	<10	<19	561
2-Methylnaphthalene	1.1 J	0.73 J	1.9 J	4.3	3	2.3 J	<10	<19	200
Acenaphthylene	1.3 J	1.6 J	3.7	1.9 J	2 J	5.8	<10	<19	200
Acenaphthene	0.87 J	0.23 J	2 J	2.3 J	5.3	5	<10	<19	300
Fluorene	0.93 J	0.28 J	2.5	3.25	4.4	3.6	<10	<19	536
Dibenzofuran	0.52 J	0.28 J	1.4 J	1.5 J	2.5 J	2.7 J	<10	<19	--
Phenanthrene	6.3	2.9	14	24	33	32	25	<19	1,170
Anthracene	1.9 J	1.3 J	3.4	4.95	4.7	6	<10	<19	845
Fluoranthene	14	7.2	32	49	63	83	70	34	2,230
Pyrene	15	8.5	46	50	63	72	71	32	1,520
Benzo(b)fluoranthene	12	8.9	29	23	73	96	37	22	--
Benzo(k)fluoranthene	4.2	2.7	21	19	23	30	25	<19	13,000
Benz(a)anthracene	6.5	3.8	22	18	40	48	30	<19	1,050
Chrysene	8.4	6	29	30	51	61	34	25	1,290
Benzo(a)pyrene	8.4	6.3	31	23.5	53	62	32	20	1,450
Indeno(1,2,3-cd)pyrene	7.5	7.9	25	20	43	59	30	<19	100
Dibenz(a,h)anthracene	1.6 J	1.4 J	4.1	2.8	10	14	<10	<19	1,300
Benzo(g,h,i)perylene	8.9	10	27	19.5	44	59	19	<19	300

Notes:

1. µg/kg = Micrograms per kilogram (parts per billion).
2. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
3. -- = Not available.
4. < = Not detected above the Method Reporting Limit (MRL).
5. Shading indicates that the reported concentration exceeds the screening level.
6. J = The result is an estimated concentration that is less than the MRL but greater than or equal to the Method Detection Limit (MDL).

Table D-4 - River Sediment Analytical Results: Phthalates (ug/kg)
SIUF - OU4
Portland, Oregon

Location ID:	G429	B023	BT027-1	BT027-2	G433-1	G433-2	PSY47	SD138	
Sample Interval (cm):	0 - 27	0 - 15	0 - 10	0 - 10	0 - 26	0 - 27	0 - 10	0 - 10	JSCS SLV
Phthalates (µg/kg)									
Dimethyl Phthalate	<3.5	<2.1	<3.5	<3.6	<3.7 J	<3.9 J	<10	<19	--
Diethyl Phthalate	<6.8	<4	<6.7	<7	<7.2 J	<7.5 J	<10	<19	600
Di-n-butyl Phthalate	<5	3.5 J	8 J	<8.9	<5.4 J	5.8 J	16	<19	100
Butyl Benzyl Phthalate	6.9 J	<1.8	5.8 J	34	<3.1 J	<3.2 J	<10	<19	--
Bis(2-ethylhexyl) Phthalate	80	<25	<95	242	<58 J	<91 J	460	120	800
Di-n-octyl Phthalate	<2.3	<1.4	<2.3	<2.4	<2.5 J	<2.6 J	44	<19	--

Notes:

1. µg/kg = Micrograms per kilogram (parts per billion).
2. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision)
3. -- = Not available.
4. < = Not detected above the Method Reporting Limit (MRL).
5. J = The result is an estimated concentration that is less than the MRL but greater than or equal to the Method Detection Limit (MDL).

Table D-5 - River Sediment Analytical Results: Polychlorinated Biphenyls (ug/kg)
SIUF - OU4
Portland, Oregon

Location ID:	G429	B023	BT027-1	BT027-2	G433	G433-2	PSY47	SD138	
Sample Interval (cm):	0 - 27	0 - 15	0 - 10	0 - 10	0 - 26	0 - 27	0 - 10	0 - 10	JSCS SLV
PCBs (µg/kg)									
Aroclor 1016	<1.61	<1.1	<4.2	<2.2	<1.92	<2.04	<10	<19	530
Aroclor 1221	<2.98	<2	<4.2	<2.2	<3.55	<3.77	<10	<38	--
Aroclor 1232	<2.69	<1.8	<4.2	<2.2	<3.2	<3.41	<10	<19	--
Aroclor 1242	<1.63	<1.1	<4.2	<2.2	<1.95	<2.07	<10	<19	--
Aroclor 1248	<2.09	<1.4	<4.2	<2.2	3.45 J	3.88 J	<10	<19	1,500
Aroclor 1254	<0.977	<0.67	27 J	<2.2	9.95	9.13	<10	<19	300
Aroclor 1260	25.2	32	26 J	15 J	16.8 J	21	<10	<19	200
Aroclor 1262	<1.5	<1	<4.2	<2.2	<1.79	<1.9	--	--	--
Aroclor 1268	<3.22 J	<0.89	<4.2	<2.2	3.63 J	<1.63	--	--	--
Total PCBs	25.2	32	53 J	15 J	33.8 J	34 J	<10	<38	0.39

Notes:

1. µg/kg = Micrograms per kilogram (parts per billion).
2. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision)
3. -- = Not available.
4. < = Not detected above the Method Reporting Limit (MRL).
5. Shading indicates that the reported concentration exceeds the screening level.
6. Total PCBs = Sum of the detected Aroclors or highest detection limit when not detected.

Table D-6 - River Sediment Analytical Results: Tributyltin (ug/kg)
SIUF - OU4
Portland, Oregon

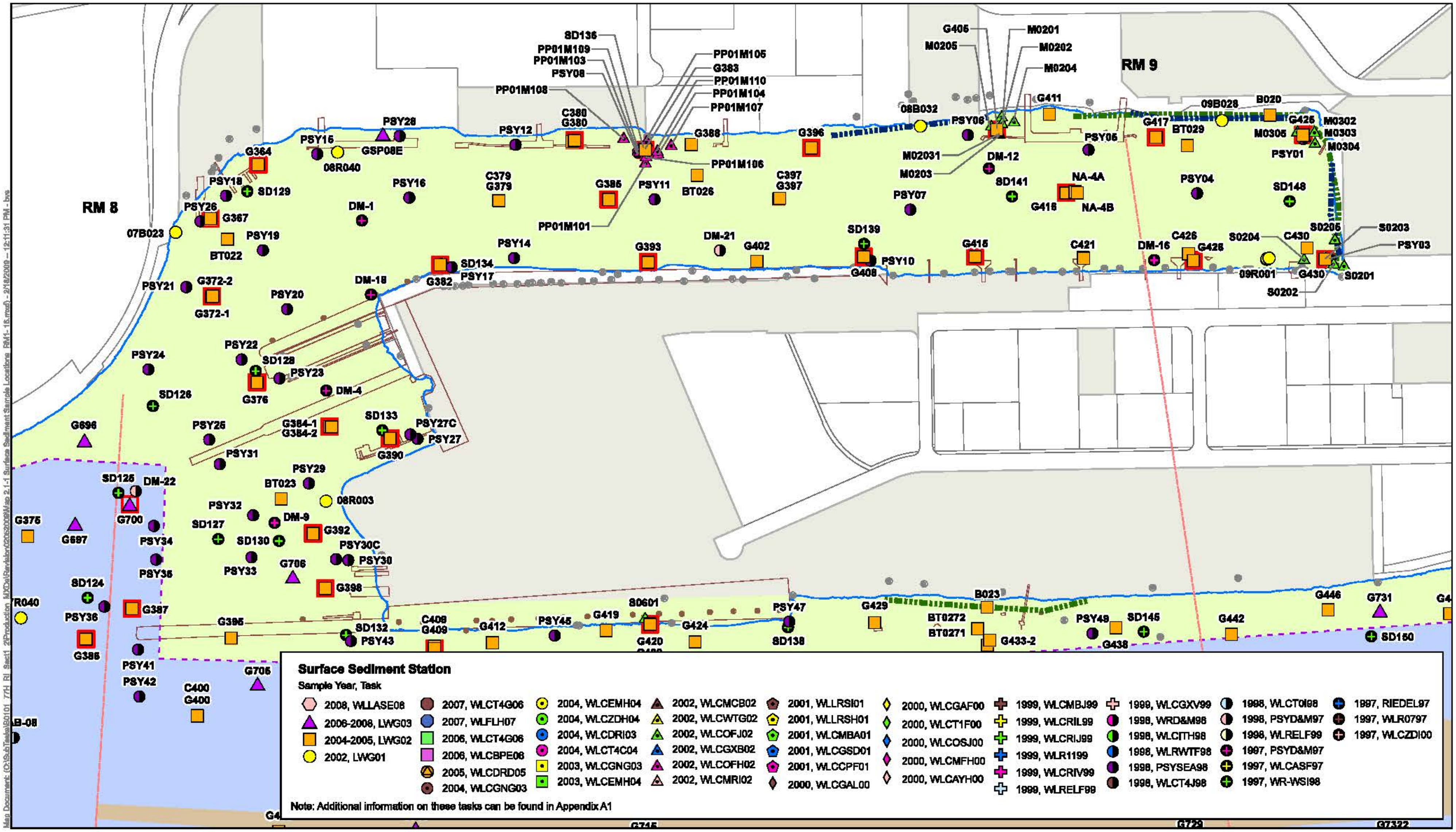
Location ID:	BT027-1	BT027-2	
Sample Interval (cm):	0 - 10	0 - 10	JSCS SLV
Tri-n-butyltin (µg/kg)			
TBT	30	31	2.3

Notes:

1. µg/kg = Micrograms per kilogram (parts per billion).
2. JSCS SLV = Portland Harbor Joint Source Control Strategy Table 3-1: Screening Level Values for Soil/Storm Water Sediment (7/16/07 Revision).
3. -- = Not available.
4. < = Not detected above the Method Reporting Limit (MRL).
5. Shading indicates that the reported concentration exceeds the screening level.

Attachment 7

River Sediment Sample Locations



integral consulting inc.

LWG LOWER WILLAMETTE GROUP

FEATURE SOURCES:
Transportation, Property, or Boundaries: Metro RLIS.
Channel & River miles: US Army Corps of Engineers.
Bathymetric information: David Evans and Associates, Inc.

0 150 300 450 600 750 Feet

Map Features

- River Miles
- Navigation Channel
- West/East River Zones
- River Edge +13 ft NAVD

Outfalls

- Outfall
- Dock Drain
- Roof Drain

- Bridges
- Docks and Structures
- Freeways
- Arterials

- Bioassay Sampling Locations
- Dredge and Cap Stations
- Capping Areas
- Dredging Areas

- Upland ECSI Sites (2006)
- Waterfront Taxlots
- Shorebird Sample Transect
- Round 1 Beach Sample Collection Area

DRAFT
DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Map 2.2-1k
Portland Harbor RI/FS
Remedial Investigation Report
Surface Sediment Sampling Locations
River Mile 08 to 09 -Swan Is. East