R E P O R T

Storm Water Evaluation Work Plan
Terminal 2 Upland Facility

Port of Portland
Portland, Oregon

August 2007

NEWFIELDS

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

REPORT

Storm Water Evaluation Work Plan
Terminal 2 Upland Facility

Respectfully submitted,

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NEWFIELDS

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1. Introduction

This Work Plan presents the proposed methodology to complete storm water characterization at the Terminal 2 Upland Facility (Facility) located in Portland, Oregon (Figure 1). The characterization is being conducted in response to a request by the Oregon Department of Environmental Quality (DEQ) in a letter to the Port of Portland (Port) dated June 15, 2007. The purpose of the Storm Water Evaluation is to confirm whether storm water from the Facility may be a current source to the Willamette River, specifically to the Initial Areas of Potential Concern (iAOPCs) identified in the course of the Harbor-wide Remedial Investigation and Feasibility Study (RI/FS). This work is being performed in the context of the Port's 2000 Preliminary Assessment in which it requested a No Further Action (NFA) determination for the site.

This Storm Water Evaluation is limited to evaluating discharges that may originate at the Facility. It does not include an evaluation of discharges from City of Portland (City) outfalls, located adjacent to the west end of the Facility. These discharges are being handled under the Intergovernmental Agreement for Remedial Investigation and Source Control Measures between the City of Portland and DEQ (August 13, 2003).

The proposed Storm Water Evaluation at the Facility includes the following:

- Step 1 – Characterizing storm water basins;
    - Defining the storm drain system and associated drainage basins;
    - Identifying Contaminants of Interest (COI);
- Step 2 – Preparing Work Plan;
- Step 3 - Conducting Storm Water Evaluation sampling; and
- Step 4 – Reporting.

This Work Plan comprises Steps 1 and 2 of the approach. Step 3 and Step 4 will be conducted in the Fall/Winter of 2007/2008.

1.1 Work Plan Organization

This Work Plan is organized as follows:

- Section 2 describes the Facility and the existing storm drain system, and summarizes Facility operations and available relevant environmental assessment information;
- Section 3 lays out the overall methodology being used to evaluate storm water at the Facility and the proposed scope of sampling activities for this evaluation; and
- Section 4 describes the proposed data evaluation and reporting procedures.

2. Background

This section describes the Facility storm drain system and summarizes existing relevant data. Primary source documents are the Terminal 2 Storm Water Pollution Control Plan (SWPCP; Port, 2005), as well as operations and environmental and maintenance records maintained by the Port.

2.1 Facility Description and Uses

The Facility comprises 50.4 acres on the west bank of the lower Willamette River and is downstream of the Fremont Bridge in northwest Portland, Oregon, at approximately River Mile 10.0. Figures 1 and 2 show the vicinity and layout of the Facility. The topography of the Facility is relatively flat, with an elevation of approximately 30 feet above mean sea level (MSL). The ground surface of the Facility is predominantly paved with asphalt or concrete or covered with buildings or other impervious surfaces. The only substantial pervious area is located along an approximately 500-foot-long rip-rapped area at the north boundary of the Facility (Figure 2). Several smaller pervious areas are located along NW Front Avenue. No surface water bodies are located on the Facility, but the Facility is located adjacent to the Willamette River.

The northeastern portion of the Facility consists of four berths (Berths 203 through 206). Berth 203 faces north, toward a river cove. City of Portland Fire Station 6 and Sause Brothers both have docks in this cove. Berths 204 through 206 face the main stem of the Willamette River. The dock area is traversed by crane rail tracks for cargo transfer. The area of Berths 205 and 206 was part of the original terminal configuration. The area of Berths 203 and 204 was constructed during terminal upgrades completed in 1968.

The Facility is also currently temporarily being used as a base (in the northeast portion of the Facility) to assemble the Sauvie Island Bridge. Transport and distribution of finished goods (e.g., steel materials, lumber, etc.) are the primary operations periodically conducted at the Facility; however, the Facility has handled raw materials on occasion (including natural inert materials such as raw manganese and barite ore) in the past 3 years. Equipment fueling (forklifts, loaders, etc.) is completed in a designated area just west of Warehouse 205. These Facility activities are managed in accordance with the Facility SWPCP and Port best management practices (BMPs).

Currently, Stevedoring Services of America (SSA) is the main leasehold tenant at the Facility. SSA bases their operations in the southwest portion of the Facility near the Gearlocker Building (Figure 2). Next to the Gearlocker Building, SSA uses aboveground storage tanks (ASTs) with double-wall containment to store diesel fuel (3,000 gallon capacity) and gasoline (5,000 gallon capacity). Within the Gearlocker Building, SSA stores lube oils in a 350-gallon tank and waste oil, anti-freeze, and biodegradable degreasers in drums. SSA vehicle and equipment fueling occurs adjacent to Building 3080 in a dedicated area.

An outdoor steam cleaning facility located adjacent to the Gearlocker Building is used to clean vehicles and equipment. The entire steam cleaning facility is bermed with curbs and there are 4-foot sidewalls attached to the curbing to prevent overspray. A sloped trench drain that drains to a sump is located within the steam cleaning facility. The water flows through an oil/water separator in the sump

prior to moving into the City's sanitary sewer system. Washwaters are removed from the sump as needed and managed at an off-site facility.

2.2 Drainage Basins Area and Storm Water System

Storm drain drawings were reviewed to identify existing storm drain conveyance systems. Figure 3 shows the basins and drainage systems for the Facility. Based on information in the SWPCP (Port, 2005), the Facility contains two drainage basins that drain approximately the northern 1/3 of the Facility (Basin A) and the southern 2/3 of the Facility (Basin B). Several storm drains are located along the dock line and drain a small portion of the dock area directly to the river. The characteristics of each basin are summarized in the following table.

Basin	Surface Area (Acres)	Pervious Area (Percent)	Impervious Area (Percent)
Basin A	17.4	3.4	14.0
Basin B	33.0	2.8	30.2
Total	**50.4**	**6.2**	**44.2**

Basin A. Basin A drains to Outfall A, which subsequently drains into a slip located behind the Willamette River Harbor Line (Harbor Line). Basin A contains the Administration Building, a large parking lot, the security station, Warehouse No. 203, and the dock office. Pervious areas in Basin A include landscaped areas around the Administration Building and the rip-rapped slope adjacent to Warehouse No. 203 (Figure 3). Two storm drain catch-basins were formerly located in Warehouse 203. These were plugged and isolated from the storm sewer system in 2007.

Basin B. Basin B drains to Outfall B, which subsequently drains to the Willamette River at the approximate location of the Basin A/Basin B divide (Figure 3). Basin B contains Warehouse No. 204, Warehouse No. 205, Warehouse No. 206, the guard house, the electric shop, SSA Gearlocker Storage Building, SSA Gearlocker Maintenance Building, and modular trailers for office and storage uses. A floor drain in Warehouse No. 206 was recently isolated from the storm water system to comply with new storm water permit conditions. The only pervious portion of Basin B is a landscaped area near the western corner of the basin.

2.3 Storm Water Permits and BMPs

Storm water discharges from the Facility are permitted under the Port's NPDES DEQ Municipal Separate Storm Sewer System (MS4) Discharge Permit No. 101314, the Port's NPDES 1200-Z General Industrial Storm Water Permit, and SSA's NPDES 1200-Z General Industrial Storm Water Permit. Between 1985 and 2004, SSA managed the entire Facility, including storm water. In 2004, SSA substantially scaled back its stevedoring activities to a small leasehold in the vicinity of the Gearlocker Building (Figure 3). SSA's storm water permit area changed accordingly and is now limited to Basin B. SSA is responsible for legal compliance under its operating agreements, including

operational permits, implementation of a Spill Response Plan and a Storm Water Pollution Control Plan, and compliance with the Port's MS4 Discharge Permit.

While the site is only intermittently used as a marine terminal at this time, the Port obtained a 1200-Z General Industrial Storm Water Permit in 2005 for the remaining portion of the Facility to make the Facility "tenant-ready" in the event a permanent marine tenant is found. This permit is also managed by the Port.

The Port and SSA implement the terms and conditions of their permits and report annually to DEQ. As part of this evaluation, the Port's NPDES 1200-Z reporting records were reviewed for the period of 2005 to present. Under its 1200-Z Permit, the Port is required to monitor for oil and grease, pH, total suspended solids, as well as total copper, lead, and zinc. Permit benchmarks have not been exceeded in any of the 1200-Z compliance monitoring completed since the permit's inception. A summary of these data are included in Appendix A. Sampling is not required under the MS4 Permit.

Historical records for SSA's 1200-Z Permit were not readily available; however, SSA's Outfall B discharge is representative of drainage from all of Basin B (including SSA). Thus, SSA's contributions to the Basin B drainage are captured by the Port's records for Basin B discharge monitoring.

2.3.1 Port BMPs

The Port has implemented numerous BMPs at Terminal 2 as part of its tenant and licensee contracts, Environmental Management System Program, and continual improvement policy. The following is a list of implemented BMPs that are specifically related to activities conducted at the Facility relevant to the T2 Storm Water Pollution Control Plan for the NPDES 1200-Z Permit (Port of Portland, 2005) and the MS4 Storm Water Management Plan (Port, 2006):

- Covered storage, material, and maintenance areas to reduce storm water contact area;
- Waste chemical handling, storage, and disposal procedures to prevent and control spills;
- Regular inspection, cleaning, and maintenance of the storm water conveyance system to prevent blocking and accumulations;
- Deployment and regular maintenance of catch-basin inserts in select catch-basins to prevent sediment loading;
- Annual sweeping of impervious areas exposed to storm water to remove any accumulated sediments;
- Implementation of a comprehensive Spill Response Program (including a reporting component that provides for immediate action to ensure appropriate and timely spill cleanup and reporting);
- Membership in the City's Regional Spill Committee and the Clean Rivers Cooperative, which are organizations committed to spill prevention and response, and the ongoing protection of maritime environments; and

- Administration of a training program for all affected personnel who play a role in the protection of storm water.

Residuals from catch-basin cleanout and street sweeping are managed by the Port's Marine Facility Maintenance (MFM) personnel. Waste residuals (e.g., catch-basin cleanout and street sweeping debris) are collected by MFM and consolidated with similar waste streams from other Port facilities. These wastes are subsequently profiled for waste characterization to determine appropriate treatment or disposal. Since the residuals are combined with other residuals from other Port facilities, the waste profile information is not useful to support COI selection as part of the Terminal 2 Source Control Evaluation.

2.3.2 SSA BMPs

SSA implements BMPs within its leasehold in the form of storm water pollution controls and source control (SSA SWPCP, 1996). The following controls are specifically related to SSA activities at the Facility:

- General housekeeping (e.g., maintenance, storage, and inventory control);
- Preventative maintenance;
- Spill prevention and response procedures;
- Employee training;
- Vehicle equipment washing and steam cleaning;
- Liquid transfer and storage;
- Container storage of liquids and wastes; and
- Welding residues.

2.4 Summary of Relevant Assessment Information

The Port conducted a Preliminary Assessment for the Facility that contains a two-volume record of available upland and sediment assessment information (Appendices I and II; Port, 2000). The Preliminary Assessment concluded there is little potential for impacts to the Willamette River from historical or current storm water discharges at the Facility. In addition to the Preliminary Assessment, Port records and files as well as relevant Lower Willamette Group (LWG) documents were reviewed.

2.4.1 Disposal of Grease Pit Sludge

As summarized in the Preliminary Assessment, waste profiling work was completed by Hahn and Associates, Inc. (HAI) in February 1992 relating to disposal of sludge accumulation in an on-site steam cleaning sump located immediately south of the Gearlocker Building (HAI, 1992). During the waste profiling activities, four samples were collected and analyzed for some or all of the following parameters:

- Halogenated volatile organic compounds (HVOCs) using EPA Method 8010;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020;

- TCLP cadmium, chromium, and lead using EPA Method 1311;
- Polychlorinated biphenyls (PCBs) using EPA Method 8080; and
- Total Petroleum Hydrocarbons (TPH) using EPA 418.1.

Non-hazardous waste concentrations of cadmium and lead were detected in the sludge sample, along with petroleum hydrocarbons and related constituents. Other parameters, including HVOCs and PCBs, were not detected.

2.4.2 Waste Characterization for Drain Cleanout Material

In November 1994, waste profiling work was completed by HAI relating to disposal of two drums of drain cleanout material generated at the Facility. The location of the drains that were cleaned was not described in the letter report (HAI, 1994). The drums contained both aqueous and solid materials. Two separate composite samples were collected from the drums (one aqueous, one solid-phase) and analyzed for the following parameters:

- Volatile organic compounds (VOCs) using EPA Method 8240;
- TCLP cadmium, chromium, and lead using EPA Method 1311;
- PCBs using EPA Method 8080; and
- TPH using EPA 418.1.

Concentrations of petroleum hydrocarbons and related constituents were detected in the sludge sample. Other parameters, including leachable metals and PCBs, were not detected in the sludge sample. VOCs were not detected in the aqueous sample (other parameters were not analyzed in the aqueous sample).

2.4.3 Dredge Material Characterization

In 1999, Hart Crowser completed a dredge material characterization for the Port at the Facility. In total, two sediment composite samples were collected and analyzed. The first sample (B203-C1) was a two-point composite from the vicinity of Berth 203 (at the north end of the Facility). The second sample (B204-C1) was a three-point composite sample collected from the vicinity of Berths 204, 205, and 206, located on the eastern (riverside) portion of the Facility. Each composite sample represented the 0- to 3-foot (below mudline) sediment interval.

Samples were analyzed for several metals, tri-butyltin, polynuclear aromatic hydrocarbons (PAHs), phenols, phthalates, pesticides, and PCBs. In summary, the dredge material characterization data indicated:

- Concentrations of tri-butyltin, phenols, and herbicides/pesticides were generally not detected (except for a trace concentration of DDE detected in one sample);
- Concentrations of metals were detected. All detected concentrations were well below Joint Source Control Strategy (JSCS) screening levels (MacDonald et al., 2000, from DEQ/EPA, 2005);
- Concentrations of several PAHs were detected. All detected concentrations were well below JSCS screening levels (MacDonald et al., 2000, from DEQ/EPA, 2005);

- Concentrations of PCBs were detected in one sample (Aroclor 1260). The detected concentration was well below JSCS screening levels (MacDonald et al., 2000, from DEQ/EPA, 2005).

The sample with the single PCB detection (Aroclor 1260 in B203-C1) was collected in the inlet north of Basin A. Two City outfalls discharge to this inlet, including the outfall that drains the vicinity of the General Electric Equipment Facility (ECSI 4003), where electrical equipment has been serviced and repaired.

2.4.4 Round 2 LWG Data

The LWG recently published the Portland Harbor Superfund Site Remedial Investigation/Feasibility Study, Comprehensive Round 2 Site Characterization Summary & Data Gaps Analysis Report (LWG, 2007). This report is intended to provide a comprehensive summary of the in-water data collected during the RI/FS and also identify data gaps to be resolved during Round 3 (final) sampling.

The LWG data summary concludes that chemical concentrations in sediment tend to be fairly uniform across the Lower Willamette Study Area (Study Area) except in near-shore and off-channel areas. These areas are generally associated with known or suspected historical or current sources, where concentrations tend to be higher. The Round 2 Report offers several preliminary findings based on human health (HHRA) and ecological risk, repeated below.

Round 2 HHRA findings (LWG, 2007):

- Potential risks from consumption of fish or shellfish represent the highest human health risk;
- Depending on the assumptions used, potential risks from consumption of fish or shellfish may exceed U.S. Environmental Protection Agency (EPA) target ranges for cancer and non-cancer risks;
- Depending on the assumptions used, potential risks from consumption of upstream (Willamette Falls) fish also may exceed the EPA target risk ranges;
- PCBs result in the highest potential cancer and non-cancer risks from fish consumption; and
- Potential risks from direct exposure to beach sediment, in-water sediment, surface water, and groundwater seeps are generally within EPA acceptable risk ranges except in two areas of in-water sediments (one area located about 1 mile north of the St. Johns Bridge and another area just north of the Rail Road Bridge).

Ecological Risk Assessment findings (LWG, 2007):

- A high percentage of sediment sampling stations were classified as nontoxic to sediment dwelling organisms;
- Potential risks to fish are mostly from PCBs;
- Potential risks to wildlife are mostly from PCBs, dioxins, mercury, and DDTs; and
- There were no potential unacceptable risks identified for amphibians, reptiles, and aquatic plants.

Based on the Risk Assessment findings, the Round 2 Report concludes that greatest potential risks to human and ecological health are likely to be derived from PCB exposure. PCBs are the most

widespread chemical causing the identification of iAOPCs, and PCB risks are present throughout the Study Area. The Round 2 Report describes two iAOPCs for data gap identification purposes in the vicinity of the Terminal 2 Upland Facility: iAOPC #24 is located in the cove just to the north of the Terminal 2 Upland Facility; and iAOPC #26 is located adjacent to the Sulzer Pumps property (Figure 4). PCBs were the only compound found to result in human health or ecological risk within iAOPCs #24 and #26 (Table 10.5-1, LWG, 2007).

iAOPC #24. Sediment data within iAOPC #24 consists of six surface samples generally collected adjacent to the three outfalls to the cove (City Outfall16, City Outfall 17, and Facility Outfall A) and four subsurface samples collected downstream of City Outfall 17 and adjacent to Terminal 2 Berth 203. City Outfall 17 is the where waters from the GE Electrical Equipment Facility have been discharged. Other marine-related uses in iAOPC #24 include the dock for Portland Fire and Rescue Station 6 and the Sause Brothers Dock. Relative to other locations in iAOPC #24, PCB concentrations in surface sediment are highest downgradient of City Outfall 17 and steadily decrease towards Berth 203 and the river. PCB concentrations in the subsurface sample collected closest to City Outfall 17 were elevated by a factor of about 4, compared to the subsurface samples collected adjacent to Terminal 2, Berth 203. LWG summary figures illustrating the sample results and distribution of PCBs are included in Appendix B.

iAOPC #26. Sediment data within iAOPC #26 consists of surface sediment sample 41T, 146T, and 898T. In these samples, the highest relative PCB concentrations (as aroclors) were found adjacent to the Sulzer dock in sample 989T. PCB concentrations decreased by a factor of 10 to 100 in samples 41T and 146T, located downriver between the Sulzer dock and the upland Sulzer facility (LWG, 2007, Map 11.3.19-3). One subsurface sample (WR_VC_106) is a depth average composite representing an interval of approximately 20 feet. This sample was collected approximately 250 feet offshore of the boundary between the Sulzer Pumps property and the Facility. Each sample used to define the boundary of iAOPC #26 is located upriver from Terminal 2. LWG summary figures illustrating the sample results and distribution of PCBs are included in Appendix B.

2.4.5 Underground Storage Tank (UST) Cleanup

As discussed in the Preliminary Assessment, a Heating Oil Tank Assessment and risk-based cleanup took place at the Facility in 1998 (LUST 26-98-0081). The cleanup was conducted near the Gearlocker Building in the SSA leasehold area in the western portion of the Facility. This was a petroleum (non-PCB) subsurface release, which carries no anticipated storm water risk to the Facility.

3. Proposed Storm Water Sampling and Analysis

The location of Terminal 2 relative to iAOPCs #24 and #26 suggests a Storm Water Source Control Evaluation is warranted to confirm that storm water from the Facility is not a current source to these iAOPCs. This section presents the approach, scope, and frequency of the sampling and analysis program.

3.1 Storm Water Basin Evaluation

Section 2.2 described the storm drain system and drainage basins as they currently exist, and discussed the nature of the Facility operations. The review of current Facility operations did not indicate operational activities with a significant potential to adversely impact the Willamette River. Thus, sampling activities will be conducted at the basin level; sub-basin sampling is not proposed. Whole-water grab samples from both Basins A and B will be collected consistent with JSCS and analytical results will be screened against JSCS screening level values (SLVs; DEQ/EPA, December 2005).

3.2 COI

Based on the findings of the Round 2 Sediment Sampling Report (LWG, 2007), DEQ identified PCBs as a COI due to the location of the site relative to iAOPCs #24 and #26, where PCBs were detected. No other COI were identified based on the historical and current Facility operations, storm water data, and sediment data.

3.3 Proposed Sampling

Whole-water grab samples will be collected from Basins A and B. Grab storm water samples will be collected from before the discharge to Outfalls A and B, at the locations shown on Figure 3. These locations are the same compliance monitoring points used by the Port for the 1200-Z Permit monitoring. Grab samples will be collected using a remote surface water sampler, consistent with the JSCS guidance.

Sampling Frequency and Storm Event Selection Criteria. Three representative storm events will be sampled: The first sampling event will consist of the seasonal first flush storm event (Fall 2007), to the extent practicable; and the second and third sampling events will be conducted during routine Facility operations. A storm event will be considered representative consistent with the Storm Event Criteria and Selection outlined in the JSCS (DEQ/EPA, 2005), as follows:

1. Each sampling event will be preceded by an antecedent dry period of at least 24 hours (as defined by less than 0.1 inch over the previous 24 hours);
2. Minimum predicted rainfall volume of greater than 0.2 inch per event; and
3. Expected storm event duration of at least 3 hours.

3.4 Laboratory Analysis

The proposed analytical program was developed based on the COI identified in Section 3.2 and is summarized below for the Facility (both Basins A and B):

- PCBs aroclors using EPA 8082.

Both filtered and non-filtered samples will be collected. The EPA 8082 method detection limit for most individual aroclors is 0.001 microgram per liter (µg/L) and the method reporting limits, absent interferences, are generally 0.005 µg/L. These reporting limits are below the applicable JSCS screening criteria.

4. Reporting

Reporting for the Storm Water Characterization Program will consist of a Data Summary Report that will include:

- A discussion of the methods and procedures used;
- A summary of storm water event data and conformance with storm event criteria;
- A tabular summary of the analytical results and JSCS screening; and
- A quality assurance review.

The data (both as discrete sample and statistical average) will be screened using the relevant JSCS screening levels.

5. References

Dames and Moore, 1996. Storm Water Pollution Control Plan, Stevedoring Services of America, Terminal 2. January 31, 2002.

DEQ/EPA, 2005. Portland Harbor Joint Source Control Strategy – Final. December 2005.

HAI, 1992. Disposal of Grease Pit Sludge, Marine Terminal 2, Port of Portland, Portland, Oregon. Hahn and Associates, Inc., September 19, 1992.

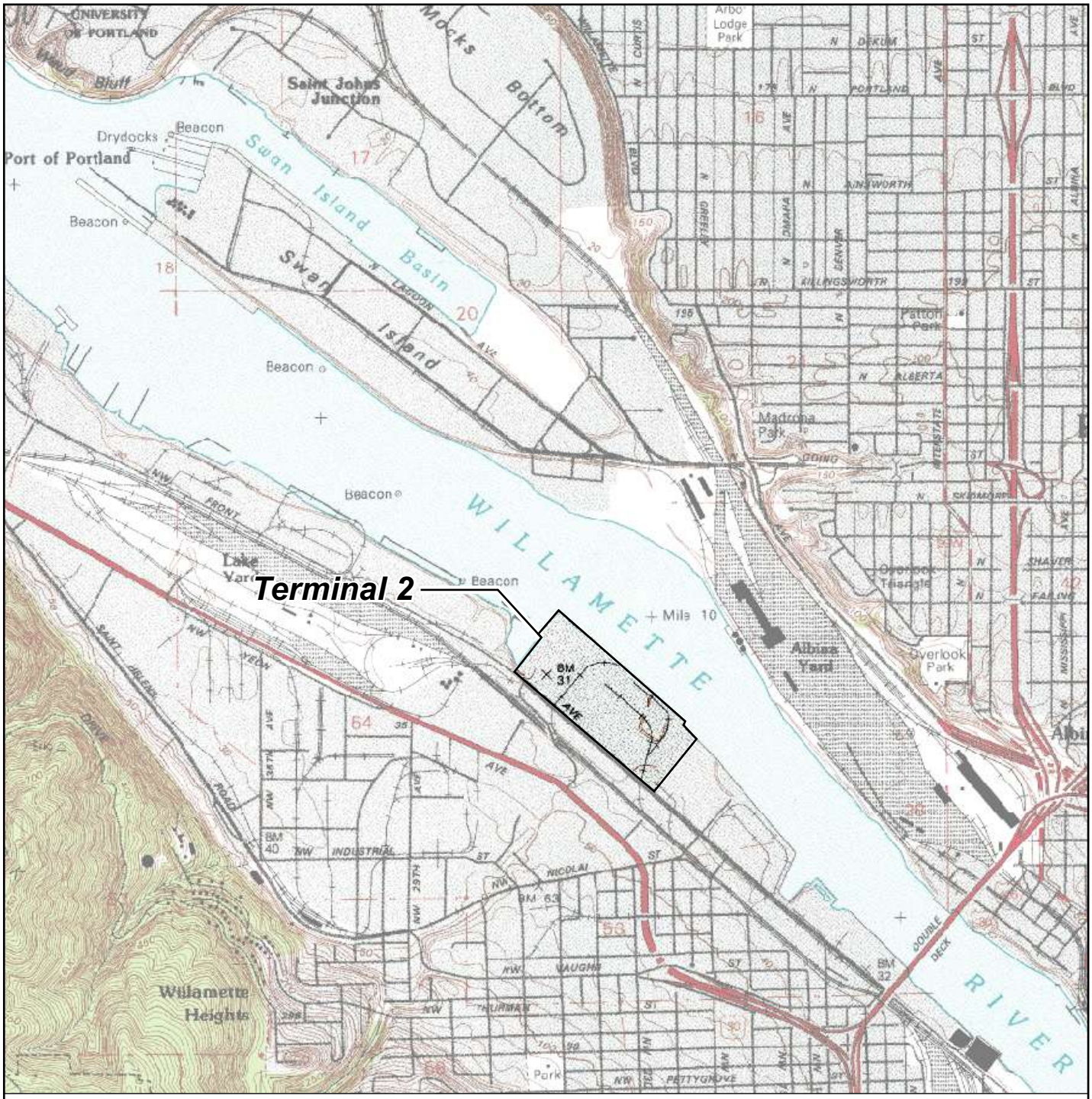
HAI, 1994. Waste Characterization and Disposal Assistance, Drain Clean-out Material, Marine Terminal 2, Port of Portland, Portland, Oregon. Hahn and Associates, Inc., December 27, 1994.

LWG, 2007. Comprehensive Round 2 Site Characterization Summary Report. Lower Willamette Group, February 21, 2007.

Port, 2006. National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Storm Water Management Plan. May 2006.

Port, 2005. Terminal 2 Storm Water Pollution Control Plan (SWPCP). September 19, 2005.

Port, 2000. Preliminary Assessment for the Port of Portland Terminal 2. August 29, 2000.



Base map prepared from USGS 7.5-minute quadrangle of Portland, OR, dated 1990 as provided by Topozone.

0 2000 4000

Scale in Feet

N

Facility Location Map

Storm Water Evaluation
Terminal 2
Portland, Oregon

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Project Number	1053-01	Figure
July 2007		1

WILLAMETTE RIVER

PROPERTY LINE

CRANE TRACKS (TYPICAL)

BERTH 204

BERTH 205

BERTH 206

BERTH 203

BERTH DOCK OFFICES

DESIGNATED MOBILE FUELING AREA

WAREHOUSE 205

WAREHOUSE 204

WAREHOUSE 203

RIP-RAP BANK

OIL/WATER SEPARATOR

ABOVE GROUND FUEL TANKS

NW FRONT AVENUE

TERMINAL 2 ADMINISTRATION BUILDING

SSA STEAM CLEANING AND FUELING AREA

SSA GEARLOCKER

ELECTRIC SHOP

SSA GEARLOCKER STORAGE

Legend:

Spill Kit Location

Pervious Area

0 200 400

Scale in Feet

Facility Layout

Storm Water Evaluation
Terminal 2
Portland, Oregon

Ash Creek Associates, Inc.
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Project Number	1053-01	Figure
	July 2006	2

Note: Base map prepared from a Terminal 2 base map provided by the Port of Portland.

WILLAMETTE RIVER

PROPERTY LINE

CRANE TRACKS (TYPICAL)

BERTH 204

BERTH 205

BERTH 206

BASIN A

BASIN B

BERTH 203

BASIN A SAMPLING LOCATION

OUTFALL A

BERTH DOCK OFFICES

OUTFALL B

WAREHOUSE 205

DESIGNATED MOBILE FUELING AREA

BASIN B SAMPLING LOCATION

WAREHOUSE 204

FLOOR DRAINS ISOLATED 2007

DRAINAGE DIVIDE

RIP-RAP BANK

WAREHOUSE 203

PORTION OF DRAIN TRENCH ISOLATED 2007

ABOVE GROUND FUEL TANKS

OIL/WATER SEPARATOR

SSA PERMIT AREA

NW FRONT AVE.

TERMINAL 2 ADMINISTRATION BUILDING

SSA STEAM CLEANING AND FUELING AREA

SSA GEARLOCKER

ELECTRIC SHOP

SSA GEARLOCKER STORAGE

N

Legend:

- Outfall Location
- Catch Basin
- Manhole
- STS Location and Flow Direction (Port of Portland)
- STS Location and Flow Direction (City of Portland)
- Trench Drain
- Spill Kit
- Pervious Area

0 200 400

Scale in Feet

Note: Base map prepared from a Terminal 2 base map provided by the Port of Portland.

Storm Water Plan

Storm Water Evaluation
Terminal 2
Portland, Oregon

Ash Creek Associates, Inc.
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Project Number	1053-01	Figure
	July 2006	3

0 2000 4000

Scale in Feet

iAOPC in Facility Vicinity

Storm Water Evaluation
Terminal 2
Portland, Oregon

Ash Creek Associates, Inc. Environmental and Geotechnical Consultants	Project Number	1053-01	Figure
	July 2007		4

Appendix A

Terminal 2 Historical Information

Attachment C
1992 Steam Cleanup Sump Project
Port of Portland Terminal 2

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT

SEP 23 1992

September 19, 1992

Mr. Russ Korvola
Port of Portland
Box 3529
Portland, Oregon 97208

HAI Project # 2060

SUBJECT: Disposal of Grease Pit Sludge, Marine Terminal 2, Port of Portland, Portland, Oregon.

Dear Mr. Korvola:

As requested, Hahn and Associates, Inc. (HAI) has completed work on the above-described project for the Port of Portland - Marine Terminal 2 (Terminal 2). The scope of work for the project included characterizing the contents of the steam clean sump located at Terminal 2, identifying disposal option, and disposing of the sludge. Furthermore, information pertaining to the disposal of the sludge was forwarded to the steam clean sump operator, Stevedoring Services of America (SSA).

On February 26, 1992, Mr. John Aniello obtained two samples, one sludge (Sample #3) and one liquid (Sample #4), of the steam clean sump contents at Terminal 2 (HAI Project # 1922).

Sample #3 was analyzed for the following parameters by Pacific Environmental Laboratory, Inc. (PEL):

- Halogenated volatile compounds [Environmental Protection Agency (EPA) Method 8010] and
- Benzene, toluene, ethylbenzene, and xylenes (EPA Method 8020).

Sample #4 was analyzed for the following parameters by PEL:

- Halogenated volatile compounds [Environmental Protection Agency (EPA) Method 8010];
- Benzene, toluene, ethylbenzene, and xylenes (EPA Method 8020) and
- Cadmium, chromium, and lead (EPA Method 1311).

The analytical results for Samples #3 and #4 are summarized in Table 1.

Because the steam clean sump was overflowing and the SSA operators required immediate content removal from the sump, only one estimate was obtained for disposal of the sump contents. Spencer Environmental Services, Inc. (SES) was contacted for the removal and disposal of the sump material. Upon review of the analytical parameters and results for Samples #3 and #4 of HAI Project # 1922, it was determined by SES that one additional sample of the sump sludge be obtained and analyzed for the following parameters by PEL:

- Polychlorinated biphenyls (PCBs) (EPA Method 8080) and
- Total Petroleum Hydrocarbons (TPH) (Oregon Method 418.1M).

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503/796-0717 OFFICE • 503/227-2209 FAX

recycled paper

On July 24, 1992, Mr. William J. Malloch, Project Manager, HAI, obtained one sample (S-1) of the sump sludge. The sample was analyzed for PCBs and TPH by Pacific Environmental Laboratory. The analytical results for samples S-1 are summarized in Table 1.

The analyses for the sump material did not detect concentrations of hazardous materials or metal concentrations above regulatory levels. Accordingly, the sump material was acceptable for oil recycling and landfill disposal by SES.

On August 14, 1992, SES pumped approximately 357 gallons of oily liquid and 138 gallons of sludge from the sump at Terminal 2. The SES crew cleaned the sump trough and pumped the oily water and sludge from the oil water separators.

After the successful cleaning of the sump by SES, Mr. Dave Madill, General Superintendent Marine Terminals, Port, forwarded the bid SES submitted for the initial sump cleaning to SSA and informed SSA that they would be responsible all future cleaning of the steam clean sump.

This project only covers the steam clean sump operations at Terminal 2. Disposal of steam clean material from Terminal 6 will be included in HAI Project #2119.

If there are any comments or questions, please contact the undersigned. Thank you for the opportunity to be of service.

Sincerely,

William J. Malloch
Project Manager

Attachments: 2

c: Mr. Dave Madill, General Superintendent, Marine Facilities, Port

TABLE 1
Summary of Analytical Results - Steam Clean Sump
(Samples obtained February 26, 1992 (#3 and #4) and July 24, 1992 (#S-1))

Port of Portland - Marine Terminal 2
Portland, Oregon

Analytical Constituents	concentrations in parts per million (ppm)		
	Sample #3 (Sludge)	Sample #4 (Liquid)	Sample #S-1 (Sludge)
Halogenated VOCs	ND	ND	-
Benzene	ND	ND	-
Ethylbenzene	7.2	ND	-
Toluene	9.0	1.7	-
Xylenes (total)	75.0	2.7	-
PCBs	-	-	ND
TPH	-	-	300,000
TCLP cadmium	-	0.30	-
TCLP Chromium	-	ND	-
TCLP Lead	-	0.11	-

Note:

ND = Not Detected above analytical detection limit
- = not analyzed
VOCs = volatile organic compounds
PCBs = polychlorinated biphenyls
TPH = Total Petroleum Hydrocarbons
TCLP = toxic characteristic leachate procedure

- Constituents that were not detected are not shown in this table.
- Analytical methods and chain-of-custody have been referenced in the Pacific Environmental Laboratory Inc. reports (attached).

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

March 6, 1992

Hahn & Associates, Inc.
434 N.W. Sixth Avenue
Suite 203
Portland, OR 97209

Attn: John Aniello

Re: JOB #1922
PROJECT - TSXSMP
PEL #92-0670

Enclosed is the lab report for your samples which were received on February 27, 1992.

I. Sample Description

Three Sludge Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

METHOD: T.C.L.P. per EPA 1311, 3005, 6010
Results in mg/L (ppm)

Sample I.D.	Cadmium	Chromium	Lead
4	0.30	ND	0.11
Lab Blank	ND	ND	ND
Detection Limit	0.01	0.01	0.05

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PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb)

Compound	1	Detection Limit
Bromodichloromethane	ND	100
Bromoform	ND	100
Bromomethane	ND	500
Carbon tetrachloride	ND	100
Chlorobenzene	ND	100
Chloroethane	ND	500
2-Chloroethylvinyl ether	ND	250
Chloroform	ND	100
Chloromethane	ND	500
Dibromochloromethane	ND	100
1,2-Dichlorobenzene	ND	100
1,3-Dichlorobenzene	ND	100
1,4-Dichlorobenzene	ND	100
Dichlorodifluoromethane	ND	250
1,1-Dichloroethane	ND	100
1,2-Dichloroethane	ND	100
1,1-Dichloroethene	ND	100
cis-1,2-Dichloroethene	ND	100
trans-1,2,-Dichloroethene	ND	100
1,2-Dichloropropane	ND	100
cis-1,3-Dichloropropene	ND	100
trans-1,3-Dichloropropene	ND	100
Methylene chloride	ND	100
1,1,2,2-Tetrachloroethane	ND	100
Tetrachloroethene	130	100
1,1,1-Trichloroethane	ND	100
1,1,2-Trichloroethane	ND	100
Trichloroethene	ND	100
Trichlorofluoromethane	ND	100
Vinyl chloride	ND	250

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb)

Compound	3	Detection Limit
Bromodichloromethane	ND	4,000
Bromoform	ND	4,000
Bromomethane	ND	20,000
Carbon tetrachloride	ND	4,000
Chlorobenzene	ND	4,000
Chloroethane	ND	20,000
2-Chloroethylvinyl ether	ND	10,000
Chloroform	ND	4,000
Chloromethane	ND	20,000
Dibromochloromethane	ND	4,000
1,2-Dichlorobenzene	ND	4,000
1,3-Dichlorobenzene	ND	4,000
1,4-Dichlorobenzene	ND	4,000
Dichlorodifluoromethane	ND	10,000
1,1-Dichloroethane	ND	4,000
1,2-Dichloroethane	ND	4,000
1,1-Dichloroethene	ND	4,000
cis-1,2-Dichloroethene	ND	4,000
trans-1,2,-Dichloroethene	ND	4,000
1,2-Dichloropropane	ND	4,000
cis-1,3-Dichloropropene	ND	4,000
trans-1,3-Dichloropropene	ND	4,000
Methylene chloride	ND	4,000
1,1,2,2-Tetrachloroethane	ND	4,000
Tetrachloroethene	ND	4,000
1,1,1-Trichloroethane	ND	4,000
1,1,2-Trichloroethane	ND	4,000
Trichloroethene	ND	4,000
Trichlorofluoromethane	ND	4,000
Vinyl chloride	ND	10,000

PACIFIC ENVIRONMENTAL LABORATORY INC.

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb)

Compound	4	Detection Limit
Bromodichloromethane	ND	2,000
Bromoform	ND	2,000
Bromomethane	ND	10,000
Carbon tetrachloride	ND	2,000
Chlorobenzene	ND	2,000
Chloroethane	ND	10,000
2-Chloroethylvinyl ether	ND	5,000
Chloroform	ND	2,000
Chloromethane	ND	10,000
Dibromochloromethane	ND	2,000
1,2-Dichlorobenzene	ND	2,000
1,3-Dichlorobenzene	ND	2,000
1,4-Dichlorobenzene	ND	2,000
Dichlorodifluoromethane	ND	5,000
1,1-Dichloroethane	ND	2,000
1,2-Dichloroethane	ND	2,000
1,1-Dichloroethene	ND	2,000
cis-1,2-Dichloroethene	ND	2,000
trans-1,2,-Dichloroethene	ND	2,000
1,2-Dichloropropane	ND	2,000
cis-1,3-Dichloropropene	ND	2,000
trans-1,3-Dichloropropene	ND	2,000
Methylene chloride	ND	2,000
1,1,2,2-Tetrachloroethane	ND	2,000
Tetrachloroethene	ND	2,000
1,1,1-Trichloroethane	ND	2,000
1,1,2-Trichloroethane	ND	2,000
Trichloroethene	ND	2,000
Trichlorofluoromethane	ND	2,000
Vinyl chloride	ND	5,000

METHOD: Halogenated Volatile Organic Compounds per EPA 8010 (GC/MS)
Results in ug/kg (ppb)

Compound	Lab Blank	Detection Limit
Bromodichloromethane	ND	2.0
Bromoform	ND	2.0
Bromomethane	ND	10
Carbon tetrachloride	ND	2.0
Chlorobenzene	ND	2.0
Chloroethane	ND	10
2-Chloroethylvinyl ether	ND	5.0
Chloroform	ND	2.0
Chloromethane	ND	10
Dibromochloromethane	ND	2.0
1,2-Dichlorobenzene	ND	2.0
1,3-Dichlorobenzene	ND	2.0
1,4-Dichlorobenzene	ND	2.0
Dichlorodifluoromethane	ND	5.0
1,1-Dichloroethane	ND	2.0
1,2-Dichloroethane	ND	2.0
1,1-Dichloroethene	ND	2.0
cis-1,2-Dichloroethene	ND	2.0
trans-1,2,-Dichloroethene	ND	2.0
1,2-Dichloropropane	ND	2.0
cis-1,3-Dichloropropene	ND	2.0
trans-1,3-Dichloropropene	ND	2.0
Methylene chloride	ND	2.0
1,1,2,2-Tetrachloroethane	ND	2.0
Tetrachloroethene	ND	2.0
1,1,1-Trichloroethane	ND	2.0
1,1,2-Trichloroethane	ND	2.0
Trichloroethene	ND	2.0
Trichlorofluoromethane	ND	2.0
Vinyl chloride	ND	5.0

METHOD: BTEX per EPA 8020 by GC/MS
Results in ug/kg (ppb)

Sample ID:	1*	3*	4*	Lab Blank
Benzene	ND	ND	ND	ND
Toluene	560	9,000	1,700	ND
Ethylbenzene	58	7,200	ND	ND
Total Xylenes	780	75,000	2,700	ND
Detection Limit	50	2,000	1,000	1.0

* Sample detection limits are raised due to matrix interferences.

8010/8020 Surrogate Recoveries (%)

Sample I.D.	1,2-Dichloroethane-d4	4-Bromofluorobenzene
1	98	103
3	91	93
4	104	98
Lab Blank	89	104
Limits	70-121	74-121

PACIFIC ENVIRONMENTAL LABORATORY INC.

9405 S.W. Nimbus Ave.
Beaverton, OR 97005
(503) 644-0660
Fax (503) 644-2202

☒ Please bill the Port of Portland
☐ Please bill Hahn and Associates, Inc.

CHAIN OF CUSTODY RECORD

COMPANY: Hahn + Associates, Inc.
PROJECT NAME: TSX Sump
LAB PROJECT NUMBER:
PROJECT MANAGER: John Amello
PROJECT NUMBER: 1922
COLLECTED BY: John Amello
P.O. NUMBER:
RUSH ☐ YES ☒ NO

COMMENTS

SAMPLES RECEIVED AT 4°C ☐ YES ☐ NO
SAMPLES IN APPROPRIATE CONTAINERS ☐ YES ☐ NO

PROVIDE VERBAL RESULTS ☐ YES ☐ NO
PROVIDE PRELIMINARY FAX RESULTS ☐ YES ☐ NO
PROVIDE FINAL FAX RESULTS ☐ YES ☐ NO

PEL NO.	SAMPLE I.D.	DATE	TIME	SAMPLE DESCRIPTION	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH - HCID OAR/DEQ	TPH - Gasoline OAR/DEQ	TPH - Diesel OAR/DEQ	TPH - 418.1 Modified OAR/DEQ	HCID - Fuel Scan GC/FID	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	TCLP Cd, Cr, Pb					REMARKS
	1	25 Feb		0.1			x	1							X	X					X					
	3	25 Feb		0.1 / water			x	1							X	X										
	4	25 Feb		Sludge			x	1							X	X					X					

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
J C Ale	HAI	2/27/92 @ 1635	Bob Falkenberg	PEL

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

August 3, 1992

Hahn & Associates, Inc.
434 N.W. Sixth Avenue
Suite 203
Portland, OR 97209

Attn: Bill Malloch

Re: JOB #2060
PEL #92-2416

Enclosed is the lab report for your sample which was received on July 24, 1992.

I. Sample Description

One Solid Sample

The sample was received under a chain of custody.

The sample was received in a container consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

T#2

METHOD: TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

Sample I.D.	TPH
S-1	300,000
Method Blank	ND
Detection Limit	10

METHOD: PCB's per EPA 8080
Results in mg/kg (ppm)

Compound	S-1	Method Blank
Aroclor	--	--
Amount	ND	ND
Detection Limit	1.0	1.0

8080 Surrogate Recoveries (%)

Compound	S-1	Method Blank
2,4,5,6-Tetrachloro-m-xylene (80-150%)	76	94

PACIFIC ENVIRONMENTAL LABORATORY INC.

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Beaverton, OR 97005
(503) 644-0660
Fax (503) 644-2202

☑ Please bill the Port of Portland
☐ Please bill Hahn and Associates, Inc.

CHAIN OF CUSTODY RECORD

COMPANY: Hahn and Associates
PROJECT NAME:
LAB PROJECT NUMBER: 92-2416
PROJECT MANAGER: Bill Mallock
PROJECT NUMBER: 2060
COLLECTED BY: Bill Mallock
P.O. NUMBER:
RUSH ☐ YES ☒ NO

COMMENTS

SAMPLES RECEIVED AT 4°C ☐ YES ☐ NO
SAMPLES IN APPROPRIATE CONTAINERS ☐ YES ☐ NO

PROVIDE VERBAL RESULTS ☐ YES ☐ NO
PROVIDE PRELIMINARY FAX RESULTS ☐ YES ☐ NO
PROVIDE FINAL FAX RESULTS ☐ YES ☐ NO

PEL NO.	SAMPLE I.D.	DATE	TIME	SAMPLE DESCRIPTION	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH - HCID OAR/DEQ	TPH - Gasoline OAR/DEQ	TPH - Diesel OAR/DEQ	TPH - 418.1 Modified OAR/DEQ	HCID - Fuel Scan GC/FID	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	TCLP (8) Metals						REMARKS
	S-1	7/24/92	8:30	Sludge.	X	X		1				X							X								Thanks!

ANALYSES TO BE PERFORMED

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
William J Mallock	Hahn & Assoc.	7/24/92 9:30	Bob Fahey	PEL
Bob Fahey		7/24/92 1215	Sara Cole	PEL

Attachment D
1994 Drain Cleanout Study
Port of Portland Terminal 2

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT

RECEIVED
DEC 29 1994
ENGINEERING SERVICES

December 27, 1994

Ms. Fay Malloy
Port of Portland
10801 N. Lombard
Portland, Oregon 97203

HAI Project #2876

SUBJECT: Waste Characterization and Disposal Assistance, Drain Clean-out Material, Marine Terminal 2, Port of Portland, Portland , Oregon.

Dear Ms. Malloy:

At your request, Hahn and Associates, Inc. (HAI) has completed work on the above described project for the Port of Portland (Port).

Purpose

The environmental management activities were undertaken by the Port to characterize waste material which was generated during drain clean-out activities at Terminal 2 (T-2) and to evaluate appropriate treatment or disposal options prior to final disposition of the material. This report includes all pertinent documentation including waste stream determinations, analytical data, and Generator's Special Waste Profile Sheet.

Scope of Work

The environmental management activities included the following five tasks:

1) Obtain representative samples of each phase of the waste material;

2) Characterize the waste material as either hazardous or non-hazardous waste based upon the analytical results;

3) Obtain approval for acceptance of the waste material at appropriate treatment or disposal facilities;

4) Coordinate the removal of the waste material form Terminal 2 to ultimate disposition locations;

5) Provide documentation regarding field activities, waste determination methodology, and treatment or disposal of the waste material.

434 NW SIXTH AVENUE, SUITE 203 • PORTLAND, OREGON 97209-3600
503/796-0717 OFFICE • 503/227-2209 FAX

Recycled Recyclable

Background

The waste material included a total of two 55-gallon drums containing drain clean-out material. The material was generated during activities associated with cleaning storm drains located at T-2.

Each drum contained two phases of waste material, an aqueous phase and solid phase. For management and tracking purposes, each drum was labeled by HAI as number 2876-01 and 2876-02. The drums were staged at T-2, located at 3556 NW Front, Portland, Oregon.

Sampling Activities

On November 19, 1994, Jennifer Bach, a representative of HAI, obtained samples of the aqueous phase and the solid phase from drums 2876-01 and 2876-02. Each drum was labeled by HAI as "pending analysis" until the analytical data was available for review and a waste determination could be made. The aqueous and solid material from each drum was composited so that a total of two samples were obtained for analyses, (one sample being representative of each phase).

The samples were placed in appropriate containers, labeled with discrete sample identification numbers, and transported in a chilled cooler under chain-of-custody documentation to North Creek Analytical Laboratory located in Beaverton, Oregon for analyses.

Laboratory Analyses

The laboratory tests selected for the samples were pertinent to the waste characterization process. Specific analyses selected for each phase of the waste material are summarized in Table 1.

Pursuant to Title 40 of the Code of Federal Regulations, Part 261.20 (40 CFR §261.20) the samples were analyzed to determine whether or not the materials exhibit hazardous waste characteristics. Analytical tests relevant to hazardous waste characteristics include heavy metals analyzed by the toxicity characteristic leaching procedure (TCLP), the F-Listed Solvent Scan, and flashpoint.

The aqueous phases of the material was analyzed for the presence of total petroleum hydrocarbons by Oregon Department of Environmental Quality (ODEQ) Method 418.1 and the solid phase of the material was analyzed for polychlorinated biphenyl's (PCB's) to further characterize the waste stream for acceptance by the appropriate treatment or disposal facilities.

Analytical Results and Waste Stream Determinations

Subsequent to a review of the analytical data, the waste materials were characterized in the form of a waste stream determination. The determination is documented on an HAI Hazardous Waste Characterization Worksheet (worksheet). The worksheet identifies the

source of the waste (if known), the HAI drum inventory number, and the analyses performed for characterization purposes. The purpose of preparing the worksheet is to identify each waste stream as either hazardous or non-hazardous waste.

Following the preparation of the worksheets, it was determined that the aqueous and solid phase of the material contained in drums 2876-01 and 2876-02 were non-hazardous waste.

A copy of the Hazardous Waste Characterization Worksheets for each phase of the waste material is included as Attachment A. A copy of the analytical data sheets and associated chain-of-custody documentation is included as Attachment B.

Waste Treatment or Disposal

Non-Hazardous Aqueous Waste

Upon review of the pertinent analytical data, the aqueous material from drums 2876-01 and 2876-02 was accepted by NWFS as non-hazardous waste liquid to be treated at Harbor Oil Company. The aqueous material from each drum (approximately 55 gallons) was pumped into a vacuum truck by NWFS on December 21, 1994

Non-Hazardous Solid Waste

Upon review of the pertinent analytical data, the solid material from drums 2876-01 and 2876-02 was accepted by Hillsboro Landfill as non-hazardous waste solid. The drums were transported to Hillsboro Landfill by Wark Trucking and Excavating, Inc. on December 27, 1994. A copy of the Sanifill Northwest, Generator's Special Waste Profile Sheet, which was prepared by HAI for disposal acceptance of the waste material is included in Attachment C of this report.

Any questions regarding the information presented in this report are welcome and should be referred to the undersigned project manager. Thank you for the opportunity to be of service to you in this matter.

Sincerely,

Jennifer Bach
Environmental Scientist

c: Pad Quinn

SUMMARY OF ANALYTICAL RESULTS

Sump Clean Out
Port of Portland, Terminal 2
Portland, Oregon

(December 27, 1994)

Results expressed in parts per million

Sample Number	Matrix	TPH-HCID	TPH-G	TPH-418.1M	TPH-418.1	EPA 8240 (TCLP)	F-Listed Solvents	PCB's	Metals (TCLP)	Flashpoint
2876-941111-01	water	NA	NA	NA	76	NA	ND	NA	NA	> 150^{0}F
2874-941101-02	sludge	D and G	120	9,000	NA	Benzene = 1.5 Ethylbenzene = 8.2 Toluene = 25 Xylenes = 52	NA	ND	Ba = 0.86	NA
Regulatory Standards		--	--	--	--	*	--	--	*	≤ 140°F

Notes:

1) TPH-HCID = Total Petroleum Hydrocarbons-Hydrocarbon Identification (by Oregon DEQ TPH-HCID)
2) TPH-G = Total Petroleum Hydrocarbons - Gasoline Range (by Oregon DEQ TPH-G)
3) TPH-418.1M = Total Petroleum Hydrocarbons - Heavy Oil Range (by Oregon DEQ TPH-418.1 Modified)
4) EPA 8240 = Volatiles Organic Compounds (by EPA Method 8240)
5) F-Listed Solvents = F001, F002 F003, F005
6) PCB's - Polychlorinated Biphenyls (by EPA Method 8080)
7) Metals = Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver
8) TCLP - Toxicity Characteristic Leaching Procedure
9) NA = Not analyzed
10) ND = Not Detected at concentrations above the method detection level.
11) D = Diesel range hydrocarbons
12) G = Gasoline range hydrocarbons
13) * = Appropriate regulatory standards are identified in 40 CFR §261.24(b), Table 1.
14) -- = Not Applicable
15) Ba = Barium

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

November 22, 1994

Hahn and Associates, Inc.
434 N.W. 6th Avenue
Suite 203
Portland, OR 97209-3600

Attention: Jennifer Bach

RE: JOB # 2876
P.O.# R000496
PROJECT - T2DRMS

Enclosed are test results for your samples received in this lab on Nov. 10, 1994. For your reference, these analyses have been assigned our NCA # 94-3458.

Solid samples are reported on a dry weight basis except for Oregon DEQ Fuels Methods and where otherwise noted.

Please call if you have any questions.

Respectfully,

Howard Holmes
Project Manager

NORTH CREEK ANALYTICAL

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East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TCLP per EPA 1311, 6010, 7000 series
Results In mg/L (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL	Date Extracted	Date Prepped	Date Analyzed
2876-941111-02	Arsenic	ND	0.50	11/13/94	11/14/94	11/15/94
	Barium	0.86	0.50			
	Cadmium	ND	0.020			
	Chromium	ND	0.020			
	Lead	ND	0.20			
	Mercury	ND	0.010			
	Selenium	ND	0.25			
	Silver	ND	0.020			
Method Blank	Arsenic	ND	0.50			
	Barium	ND	0.50			
	Cadmium	ND	0.020			
	Chromium	ND	0.020			
	Lead	ND	0.20			
	Mercury	ND	0.010			
	Selenium	ND	0.25			
	Silver	ND	0.020			

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL

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9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

Flashpoint (PMCC) per EPA 1010
Results In degrees F

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-01	No flash to	150		11/17/94	11/17/94

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
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9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

Total Petroleum Hydrocarbons per EPA 418.1
Results In mg/L (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-01	TPH	76	0.50	11/11/94	11/14/94
Method Blank	TPH	ND	0.50		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TPH-HCID per Oregon DEQ
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-02	Diesel	DET	250	11/11/94	11/12/94
	Gasoline	DET	100		
	Heavy/Bunker	DET	–		
Method Blank	Diesel	ND	50		
	Gasoline	ND	20		
	Heavy/Bunker	ND	–		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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TPH-G per Oregon DEQ
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: sludge

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-02	Gasoline	120	20	11/16/94	11/17/94
Method Blank	Gasoline	ND	2.0		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: sludge

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-02	TPH	9,000	20	11/16/94	11/17/94
Method Blank	TPH	ND	20		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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F-List Solvents (0001, 0002, partial 0003 and 0005) by GC/MS
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
2876-941111-01	Acetone	ND	6.3
	Benzene	ND	1.3
	n-Butyl Alcohol	ND	63
	Carbon Disulfide	ND	1.3
	Carbon Tetrachloride	ND	1.3
	Chlorobenzene	ND	1.3
	Cyclohexanone	ND	25
	1,2-Dichlorobenzene	ND	1.3
	Dichlorodifluoromethane	ND	3.8
	Ethyl Acetate	ND	1.3
	Ethyl Ether	ND	1.3
	Ethylbenzene	ND	1.3
	Isobutyl Alcohol	ND	25
	Isopropyl Alcohol	ND	25
	Methyl Ethyl Ketone	ND	5.0
	Methyl Isobutyl Ketone	ND	3.8
	Methylene Chloride	ND	3.8
	Tetrachloroethene	ND	1.3
	Toluene	ND	1.3
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.3
	1,1,1-Trichloroethane	ND	1.3
	1,1,2-Trichloroethane	ND	1.3
	Trichloroethene	ND	1.3
	Trichlorofluoromethane	ND	1.3
	Xylenes (total)	ND	1.3
	Date Prepped	11/15/94	
	Date Analyzed	11/15/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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F-List Solvents (0001, 0002, partial 0003 and 0005) by GC/MS
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
Method Blank	Acetone	ND	6.3
	Benzene	ND	1.3
	n-Butyl Alcohol	ND	63
	Carbon Disulfide	ND	1.3
	Carbon Tetrachloride	ND	1.3
	Chlorobenzene	ND	1.3
	Cyclohexanone	ND	25
	1,2-Dichlorobenzene	ND	1.3
	Dichlorodifluoromethane	ND	3.8
	Ethyl Acetate	ND	1.3
	Ethyl Ether	ND	1.3
	Ethylbenzene	ND	1.3
	Isobutyl Alcohol	ND	25
	Isopropyl Alcohol	ND	25
	Methyl Ethyl Ketone	ND	5.0
	Methyl Isobutyl Ketone	ND	3.8
	Methylene Chloride	ND	3.8
	Tetrachloroethene	ND	1.3
	Toluene	ND	1.3
	1,1,2-Trichloro-1,2,2-trifluoroethane	ND	1.3
	1,1,1-Trichloroethane	ND	1.3
	1,1,2-Trichloroethane	ND	1.3
	Trichloroethene	ND	1.3
	Trichlorofluoromethane	ND	1.3
	Xylenes (total)	ND	1.3

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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Volatile Organic Compounds per EPA 8240
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
2876-941111-02 *[1]	Acetone	ND	13
	Acrolein	ND	100
	Acrylonitrile	ND	5.0
	Benzene	1.5	1.0
	Bromodichloromethane	ND	1.0
	Bromoform	ND	1.0
	Bromomethane	ND	5.0
	2-Butanone	ND	13
	Carbon Disulfide	ND	1.0
	Carbon Tetrachloride	ND	1.0
	Chlorobenzene	ND	1.0
	Chloroethane	ND	5.0
	Chloroform	ND	1.0
	Chloromethane	ND	5.0
	Dibromochloromethane	ND	1.0
	Dibromomethane	ND	1.0
	1,4-Dichloro-2-butene	ND	5.0
	1,2-Dichlorobenzene	ND	1.0
	1,3-Dichlorobenzene	ND	1.0
	1,4-Dichlorobenzene	ND	1.0
	Dichlorodifluoromethane	ND	2.5
	1,1-Dichloroethane	ND	1.0
	1,2-Dichloroethane	ND	1.0
	1,1-Dichloroethene	ND	1.0
	cis-1,2-Dichloroethene	ND	1.0
	trans1,2Dichloroethene	ND	1.0
	1,2-Dichloropropane	ND	1.0
	cis-1,3-Dichloropropene	ND	1.0
	trans1,3Dichlbropropene	ND	1.0
	Ethyl Methacrylate	ND	1.0
	Ethylbenzene	8.2	1.0
	2-Hexanone	ND	2.5
	Iodomethane	ND	1.0
	4-Methyl-2-pentanone	ND	2.5
	Methylene Chloride	ND	2.5
	Styrene	ND	1.0
	1,1,2,2-Tetrachloroethane	ND	1.0
	Tetrachloroethene	ND	1.0
	Toluene	25	1.0
	1,1,1-Trichloroethane	ND	1.0
	1,1,2-Trichloroethane	ND	1.0
	Trichloroethene	ND	1.0

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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Volatile Organic Compounds per EPA 8240
Results in mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
2876-941111-02 *1 (continued)	Trichlorofluoromethane	ND	1.0
	1,2,3-Trichloropropane	ND	1.0
	Vinyl Acetate	ND	2.5
	Vinyl Chloride	ND	2.5
	Xylenes (total)	52	1.0
	Date Prepped	11/15/94	
	Date Analyzed	11/15/94	

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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Volatile Organic Compounds per EPA 8240
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
Method Blank	Acetone	ND	3.1
	Acrolein	ND	25
	Acrylonitrile	ND	1.3
	Benzene	ND	0.25
	Bromodichloromethane	ND	0.25
	Bromoform	ND	0.25
	Bromomethane	ND	1.3
	2-Butanone	ND	3.1
	Carbon Disulfide	ND	0.25
	Carbon Tetrachloride	ND	0.25
	Chlorobenzene	ND	0.25
	Chloroethane	ND	1.3
	Chloroform	ND	0.25
	Chloromethane	ND	1.3
	Dibromochloromethane	ND	0.25
	Dibromomethane	ND	0.25
	1,4-Dichloro-2-butene	ND	1.3
	1,2-Dichlorobenzene	ND	0.25
	1,3-Dichlorobenzene	ND	0.25
	1,4-Dichlorobenzene	ND	0.25
	Dichlorodifluoromethane	ND	0.63
	1,1-Dichloroethane	ND	0.25
	1,2-Dichloroethane	ND	0.25
	1,1-Dichloroethene	ND	0.25
	cis-1,2-Dichloroethene	ND	0.25
	trans1,2Dichloroethene	ND	0.25
	1,2-Dichloropropane	ND	0.25
	cis-1,3-Dichloropropene	ND	0.25
	trans1,3Dichloropropene	ND	0.25
	Ethyl Methacrylate	ND	0.25
	Ethylbenzene	ND	0.25
	2-Hexanone	ND	0.63
	Iodomethane	ND	0.25
	4-Methyl-2-pentanone	ND	0.63
	Methylene Chloride	ND	0.63
	Styrene	ND	0.25
	1,1,2,2-Tetrachloroethane	ND	0.25
	Tetrachloroethene	ND	0.25
	Toluene	ND	0.25
	1,1,1-Trichloroethane	ND	0.25
	1,1,2-Trichloroethane	ND	0.25
	Trichloroethene	ND	0.25

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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Volatile Organic Compounds per EPA 8240
Results In mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL
Method Blank (continued)	Trichlorofluoromethane	ND	0.25
	1,2,3-Trichloropropane	ND	0.25
	Vinyl Acetate	ND	0.63
	Vinyl Chloride	ND	0.63
	Xylenes (total)	ND	0.25

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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PCB's per EPA 8080
Results in mg/kg (ppm)

Client: Hahn and Associates, Inc.
Project: T2DRMS
Received: 11/10/1994

NCA Number: 94-3458
Matrix: water

Sample Name	Analyte	Result	MRL	Date Prepped	Date Analyzed
2876-941111-02 *2	PCB 1016	ND	0.22	11/14/94	11/21/94
	PCB 1221	ND	0.50		
	PCB 1232	ND	0.60		
	PCB 1242	ND	0.24		
	PCB 1248	ND	0.24		
	PCB 1254	ND	0.10		
	PCB 1260	ND	0.61		
Method Blank	PCB 1016	ND	0.050		
	PCB 1221	ND	0.10		
	PCB 1232	ND	0.050		
	PCB 1242	ND	0.050		
	PCB 1248	ND	0.050		
	PCB 1254	ND	0.050		
	PCB 1260	ND	0.050		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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SURROGATE RECOVERIES (%)

Client: Hahn and Associates, Inc.
Project: T2DRMS

NCA Number: 94-3458
Received: 11/10/1994

Sample Name	Analyte	Result	Control Limits
TPH-HCID per Oregon DEQ			
2876-941111-02	1-Chlorooctadecane	113	50-150
TPH-G per Oregon DEQ			
2876-941111-02	4-Bromofluorobenzene	110	63-126
	Trifluorotoluene	72	50-150
F-List Solvents (0001, 0002, partial 0003 and 0005) by GC/MS			
2876-941111-01	4-Bromofluorobenzene	77	50-150
	1,2-Dichloroethane-d4	75	50-150
	Toluene-d8	86	50-150
Volatile Organic Compounds per EPA 8240			
2876-941111-02	4-Bromofluorobenzene	– *3	74-121
	1,2-Dichloroethane-d4	– *3	70-121
	Toluene-d8	– *3	81-117
PCB's per EPA 8080			
2876-941111-02	Decachlorobiphenyl	103	74-127
	2,4,5,6-Tetrachloro-m-xylene	91	73-125

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

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COMMENTS

Client: Hahn and Associates, Inc.
Project: T2DRMS

NCA Number: 94-3458
Received: 11/10/1994

1. Detection limit is raised due to dilution necessary for analysis.

2. Detection limit is raised due to matrix interference.

3. Unable to calculate surrogate recovery due to dilution necessary for analysis.

94-3458

HAHN AND ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT

434 NW 6th Ave., Suite 203 • Portland, Oregon 97209-3600
503/796-0717 Office • 503/227-2209 FAX

LABORATORY North Creek Analytical

Lab Project No.

CHAIN OF CUSTODY

☒ Please bill the Port of Portland
☐ Please bill Hahn and Associates, Inc.

Project Manager: JENNIFER BACH
Project No.: 2876
Project Name: T2DRMS
Collected by: JEN BACH

LIQUID WITH SEDIMENT SAMPLE
___ Test Filtrate ___ Test Sediment ___ Test Both
MULTI-PHASE SAMPLE (_____)
___ Test one (which) ___ Test Separately ___ Shake

Samples Received at 4°C ☐ YES ☐ NO
Appropriate Containers Used ☐ YES ☐ NO
Provide Verbal Results ☐ YES ☐ NO
Provide Preliminary FAX Results ☐ YES ☐ NO

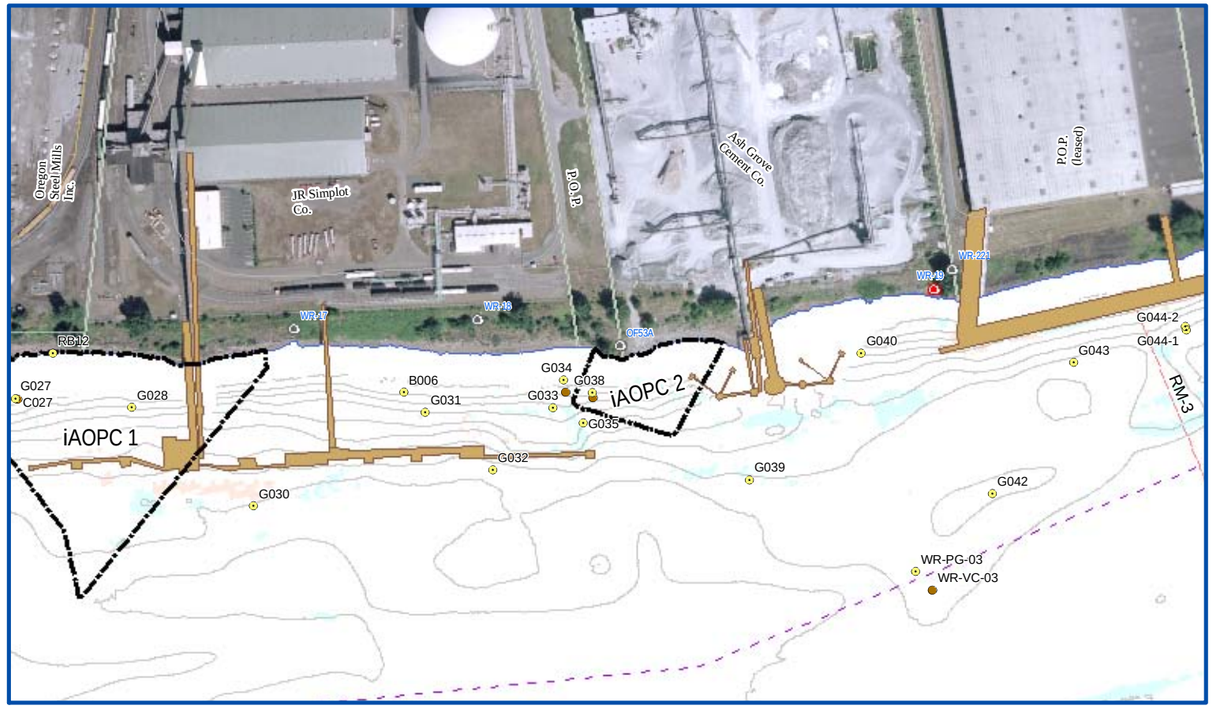
COMMENTS

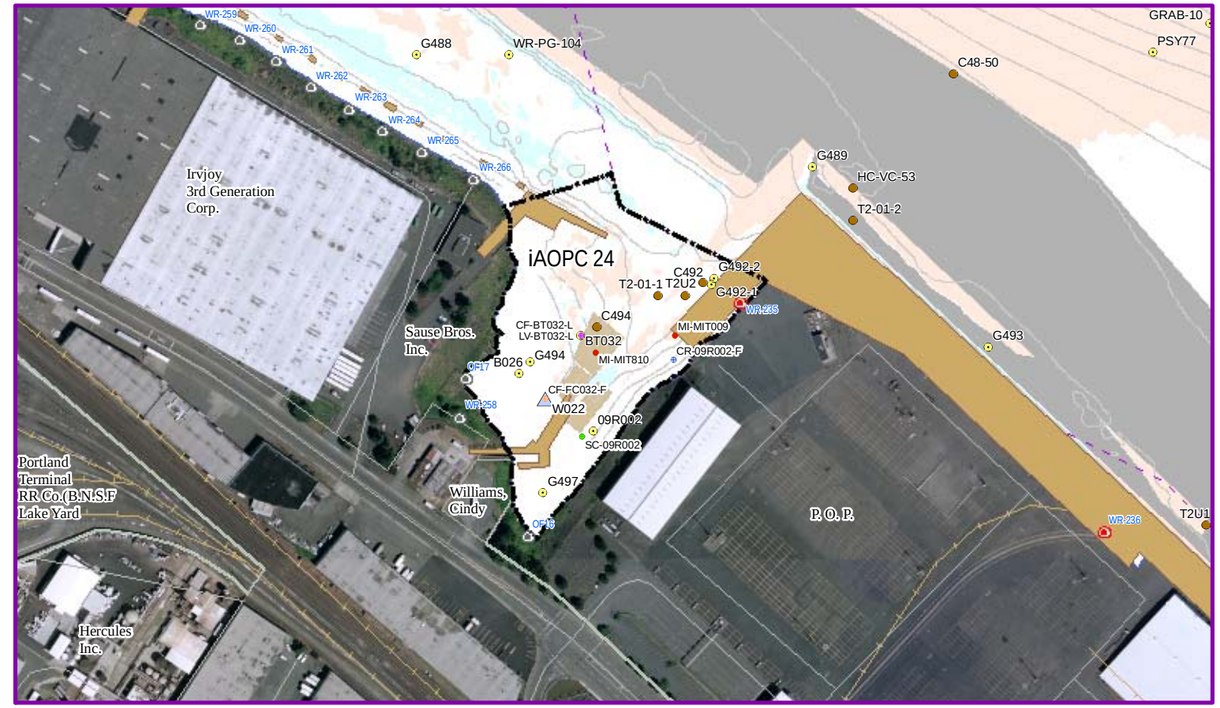
LAB I.D.	SAMPLE I.D.	DATE	TIME	SAMPLE DESCRIPTION	MATRIX: Soil	MATRIX: Water	MATRIX: Other	Number of Containers	TPH-HCID (OAR/DEQ)	Quantify HCID (if detected)	TPH-G (OAR/DEQ)	TPH-D (OAR/DEQ)	TPH-418.1 Mod. (OAR/DEQ)	TPH (EPA 418.1)	BTEX (EPA 8020)	PAHs (EPA 8310-OAR/DEQ)	PAHs (GC/MS SIM Mode)	Halo.-Volatiles (EPA 8010)	Volatiles (EPA 8240)	Semivolatiles (EPA 8270)	TCLP (3) Metals	TCLP (8) Metals	Pesticides (EPA 8080)	PCBs (EPA 8080)	Flash	F-Listed Solvents		RUSH	REMARKS
	2876-941111-01	11-11-94	1115	Drain Clean-Out		X		2	X					X											X	X			
	2876-941111-02	11-11-94	1120	Drain Clean-Out			X	1	X	X									X			X		X					

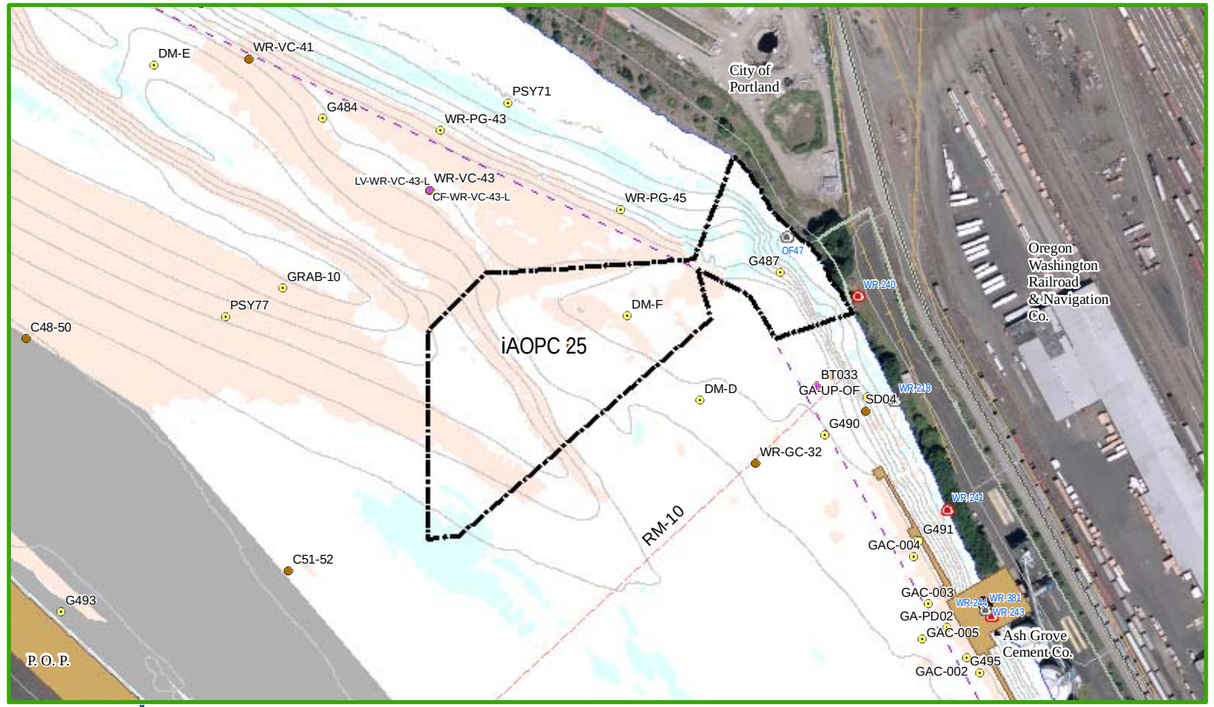
Relinquished by	Company	Date	Time	Received by	Company
[signature]	HAHN & ASS.	11-10-94	@ 1440 1:00 pm	[signature]	NCA
[signature]		11-10-94	1638	Duncan Ross	NCA

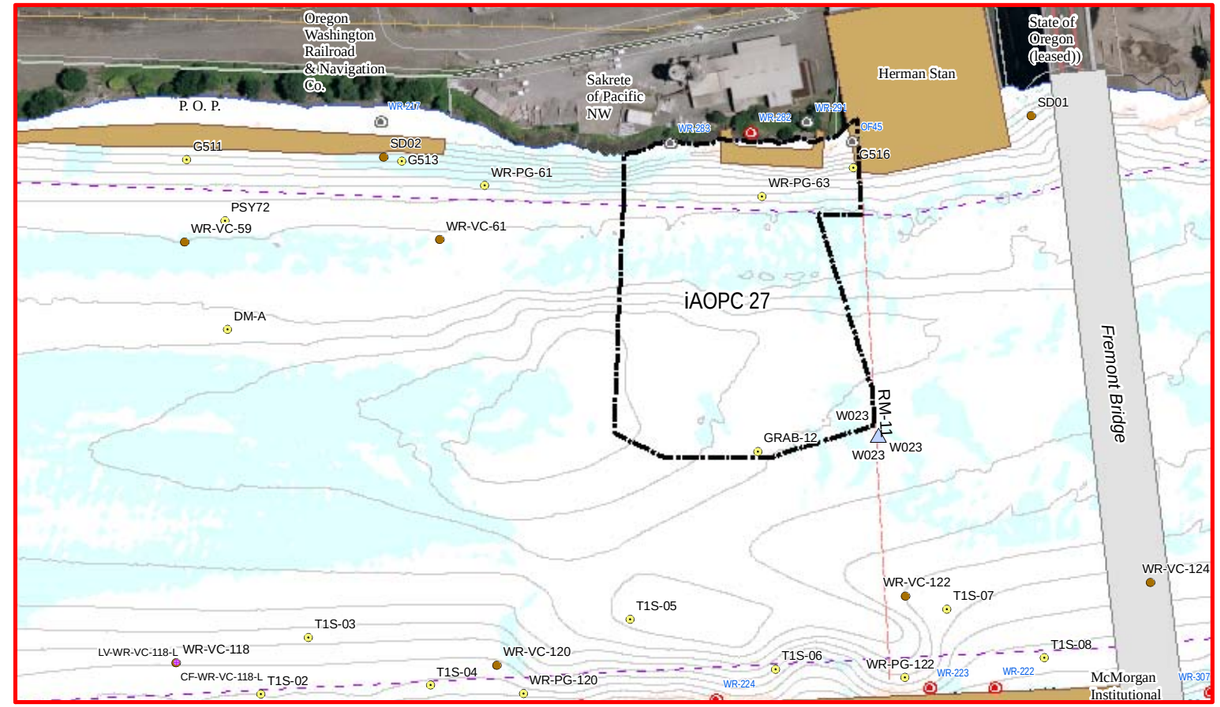
Appendix B

Lower Willamette Group Round 2 Report Maps for iAOPC #24 and #26









Map Document: (P:\Projects\Portland_Harbor\LWG-Map-Projects\Round2_Reporting\AOPCs\SiteOverviews12020006_4panel.mxd)
2/8/2007 -- 9:10:32 AM

integral consulting inc.

LWG Lower Willamette Group

0 100 200 300 Feet

FEATURE SOURCES
Transportation, Property boundaries: Metro RLIS.

Channel & River miles: US Army Corps of Engineers.

Bathymetric Information: David Evans and Associates, Inc.

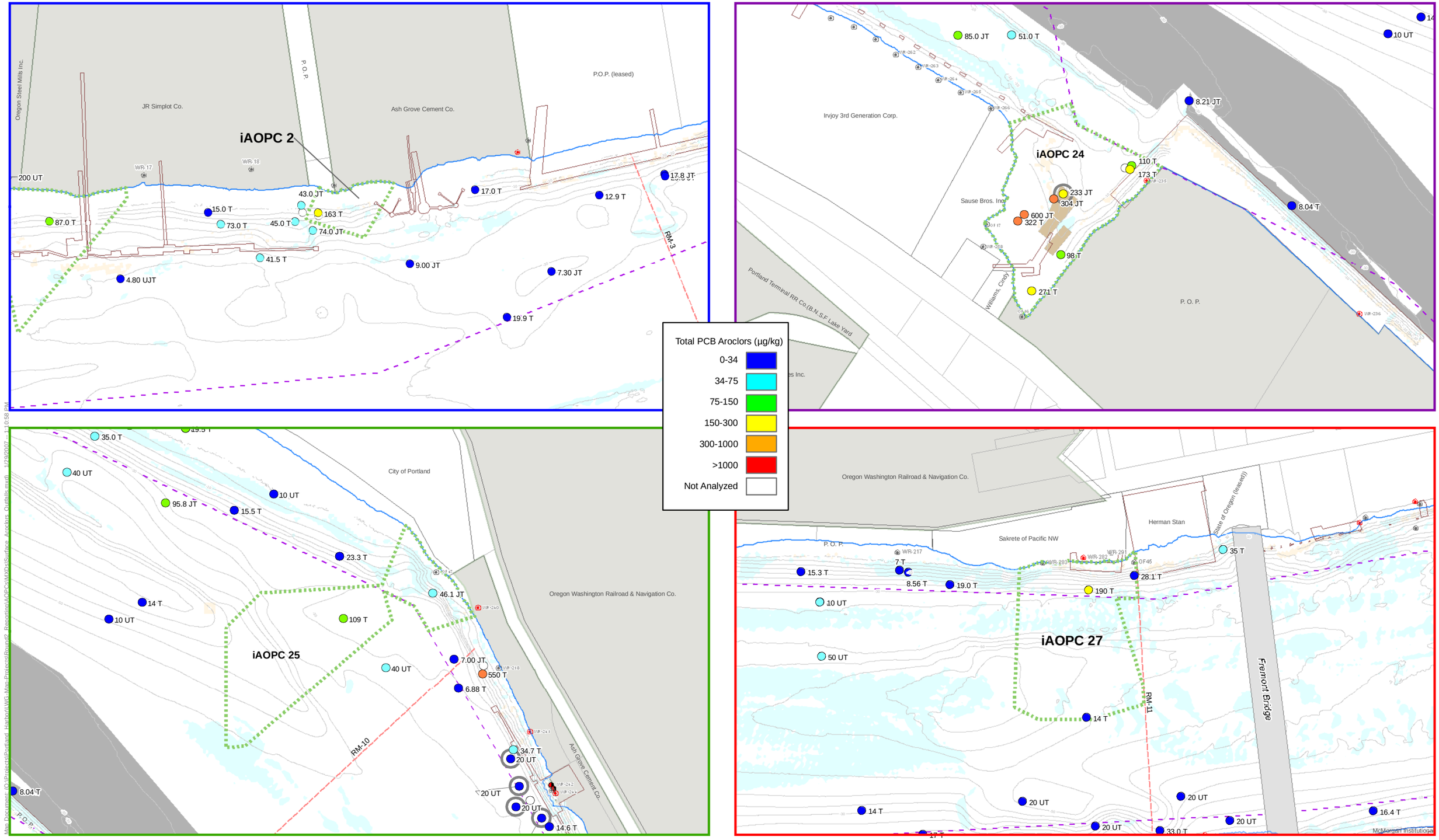
RLIS Aerial Images: February 2005 'leaf off' flight (6" pixel).

- Active Outfalls
- Unknown Outfalls
- Abandoned Outfalls
- Docks and Structures
- River Mile
- Navigation Channel
- iAOPCs
- Capping
- Dredging (Post 1997)
- River 13ft NAVD88

Bathymetric Change
- -22 - -0.49 Shoaling
- -0.5 - 0.5
- 0.51 - 37 Deepening

- Clam, CF
- Mudworm, LV
- Crayfish, CR
- Sculpin, SC
- Multiplate Invertebrates, MI
- Surface Water
- Surface Sediment
- Subsurface Sediment
- TZW Sample Location (<38cm BML)

Map 11.3.2-1
Portland Harbor RI/FS
Comprehensive Round 2 Report
iAOPC Site Overview
iAOPC 2, 24, 25, 27



integral consulting inc.

LWG Lower Willamette Group

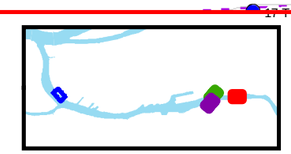
0 100 200 300 Feet

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

- Active Outfalls
- Unknown Outfalls
- Abandoned Outfalls
- Docks and Structures
- Navigation Channel
- River_13ft_NAVD88

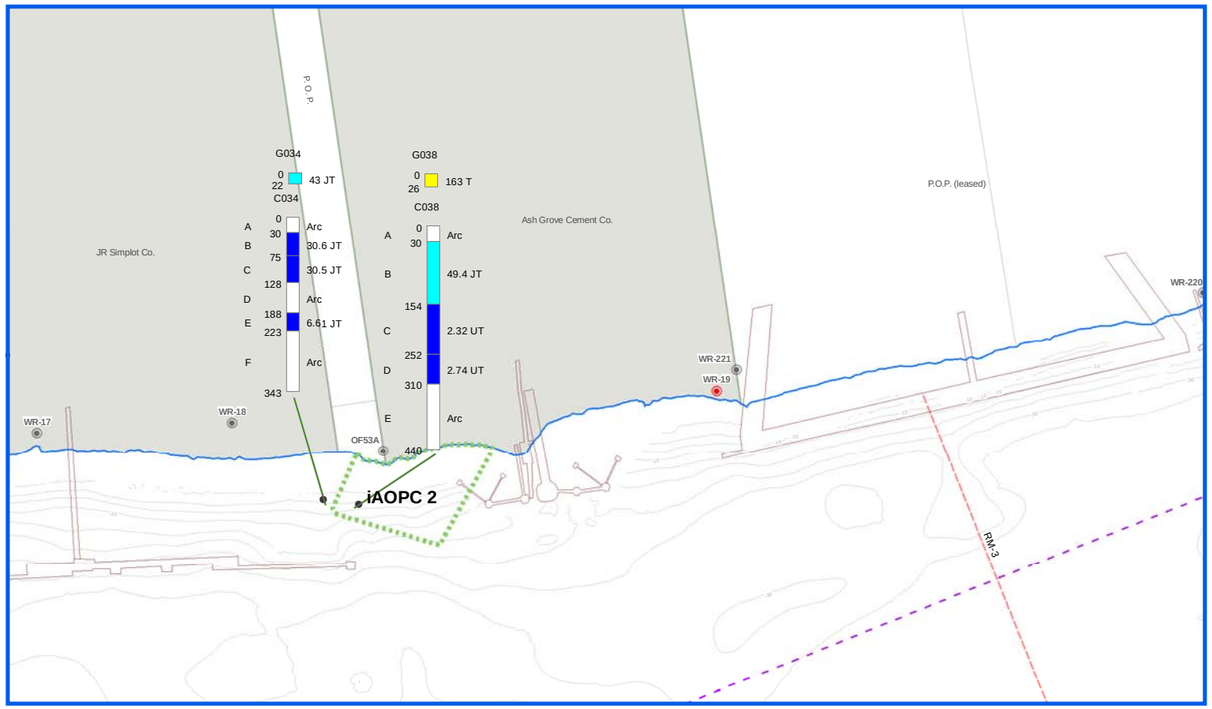
Bathymetric Change
- -22 - -0.49 Shoaling
- -0.5 - 0.5
- 0.51 - 37 Deepening
- 5 foot Contours (NAVD88)

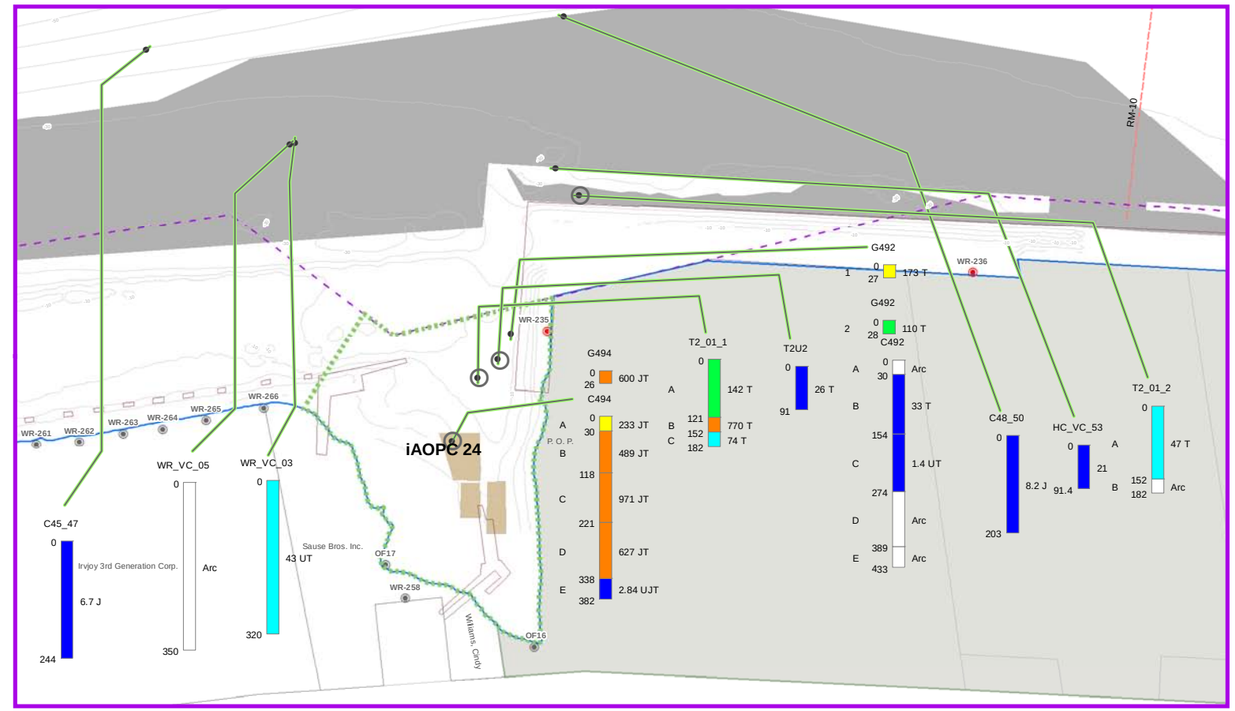
- iAOPC Boundary
- capping
- Dredging (Post 1997)
- Dredged or Capped

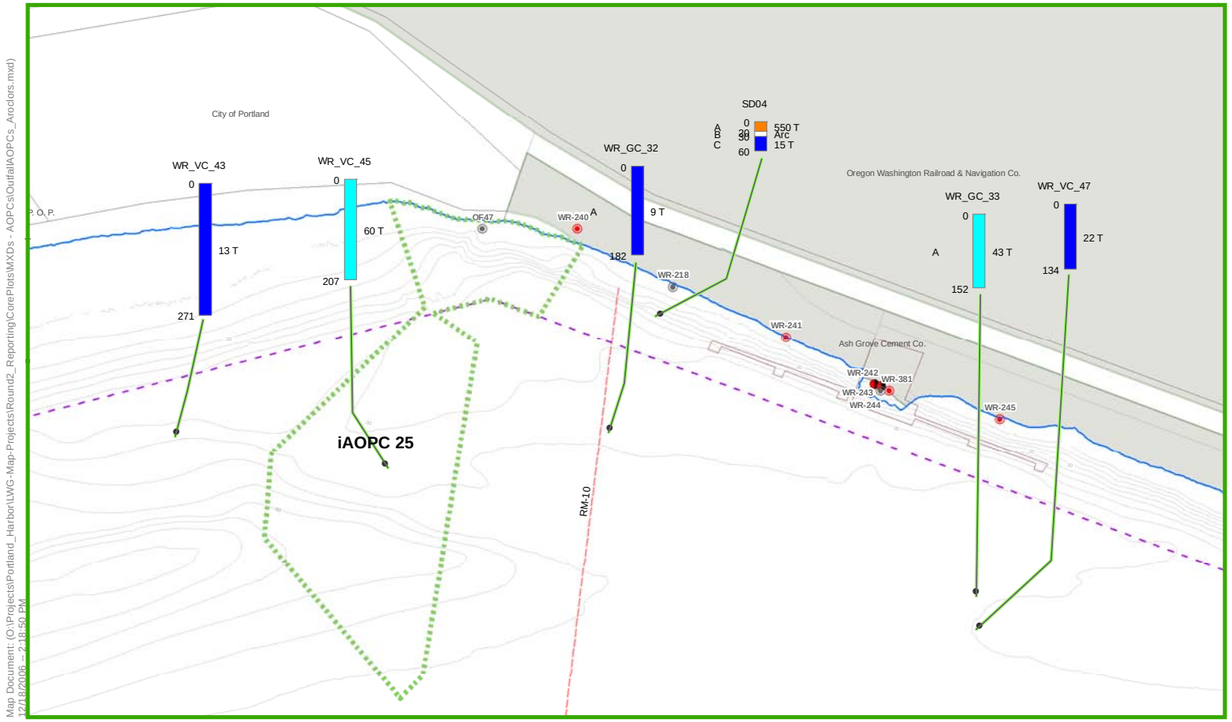


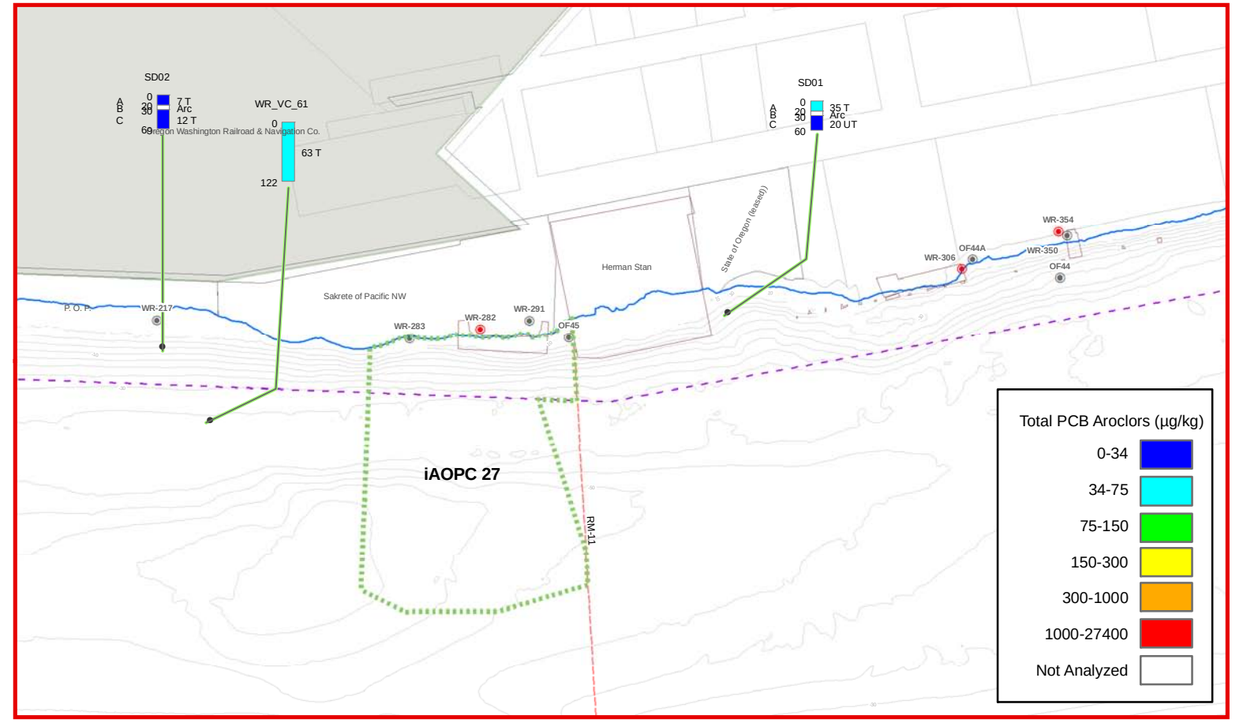
Map 11.3.2-3
Portland Harbor RI/FS
Comprehensive Round 2 Report
Concentrations in Surface Sediment
Total PCB Aroclors (µg/kg)

iAOPC 2, 24, 25, 27









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integral consulting inc.

LWG Lower Willamette Group

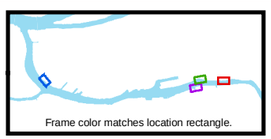
0 100 200 300 Feet

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

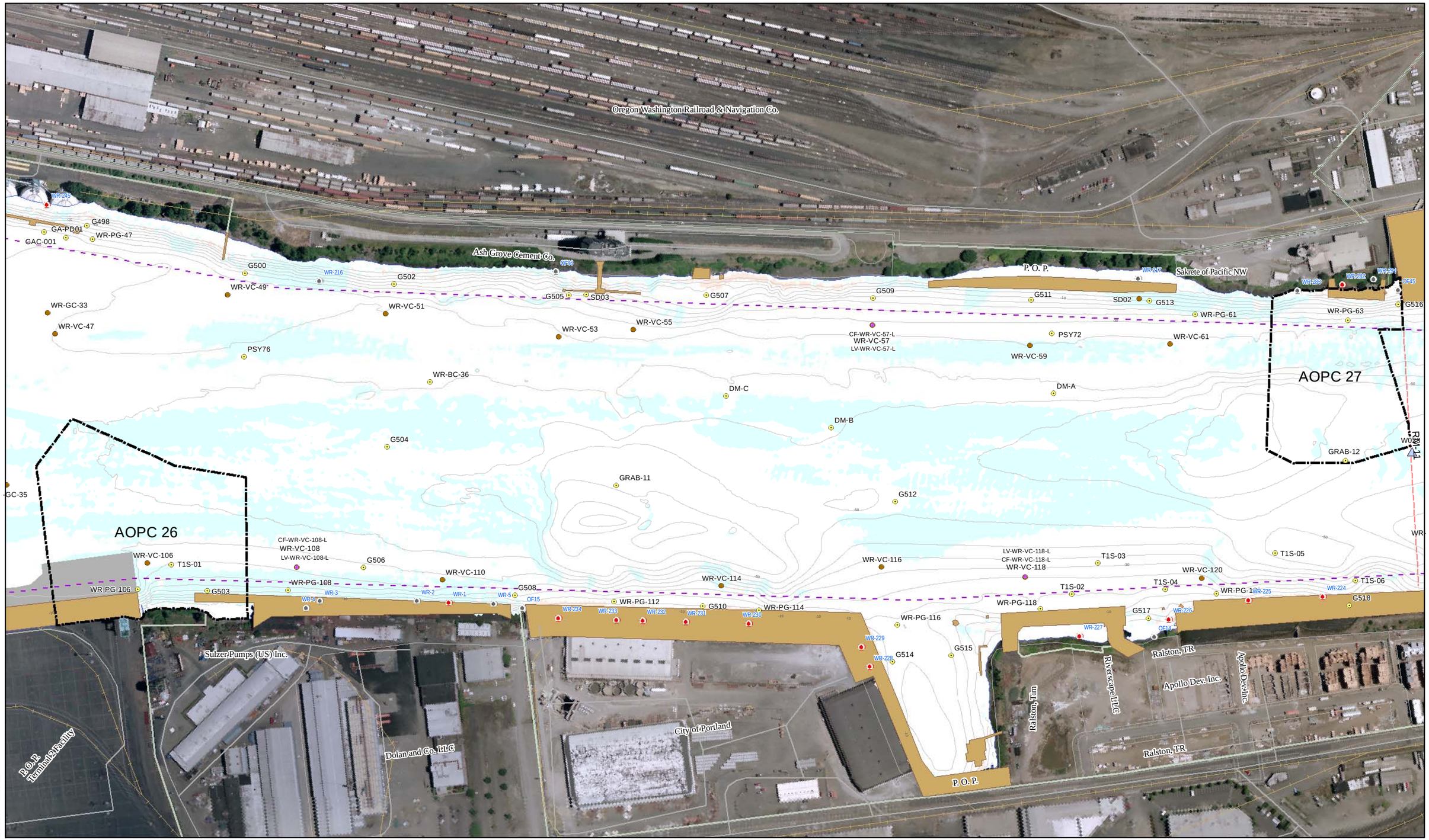
- Active Outfalls
- Unknown Outfalls
- Abandoned Outfalls
- Docks and Structures
- River Miles
- 5 foot Contours (NAVD88)

Bathymetric Change
- -22 - -0.49 Shoaling
- -0.5 - 0.5
- 0.51 - 37 Deepening
- Navigation Channel

- iAOPC Boundary
- Capping Footprint
- Dredging (Post 1997)
- Dredged or Capped



Map 11.3.2-5
Portland Harbor RI/FS
Comprehensive Round 2 Report
Concentrations in Subsurface Sediment
Total PCB Aroclors (µg/kg)
iAOPC 2, 24, 25, 27



integral consulting inc.

0 100 200 300 Feet

LWG Lower Willamette Group

FEATURE SOURCES
Transportation, Property boundaries: Metro RLIS.

Channel & River miles: US Army Corps of Engineers.

Bathymetric Information: David Evans and Associates, Inc.

RLIS Aerial Images: February 2005 'leaf off' flight (6" pixel).

iAOPCs
River Mile
Navigation Channel
River 13ft NAVD88

Docks and Structures
Capping
Dredging (Post 1997)

Bathymetric Change
-22 - -0.49 Shoaling
-0.5 - 0.5
0.51 - 37 Deepening

Clam, CF
Mudworm, LV
Crayfish, CR
Sculpin, SC
Multiplate Invertebrates, MI

Surface Water
Surface Sediment
Subsurface Sediment
TZW Sample Location (<38cm BML)

Active Outfalls
Unknown Outfalls
Abandoned Outfalls

Map 11.3.19-1
Portland Harbor RI/FS
Comprehensive Round 2 Report
iAOPC Site Overview
iAOPC 26,27

Map Document: (P:\Projects\Portland_Harbor\LWG-Map-Projects\Round2_Reporting\AOPCs\SiteOverviews01292007.mxd)
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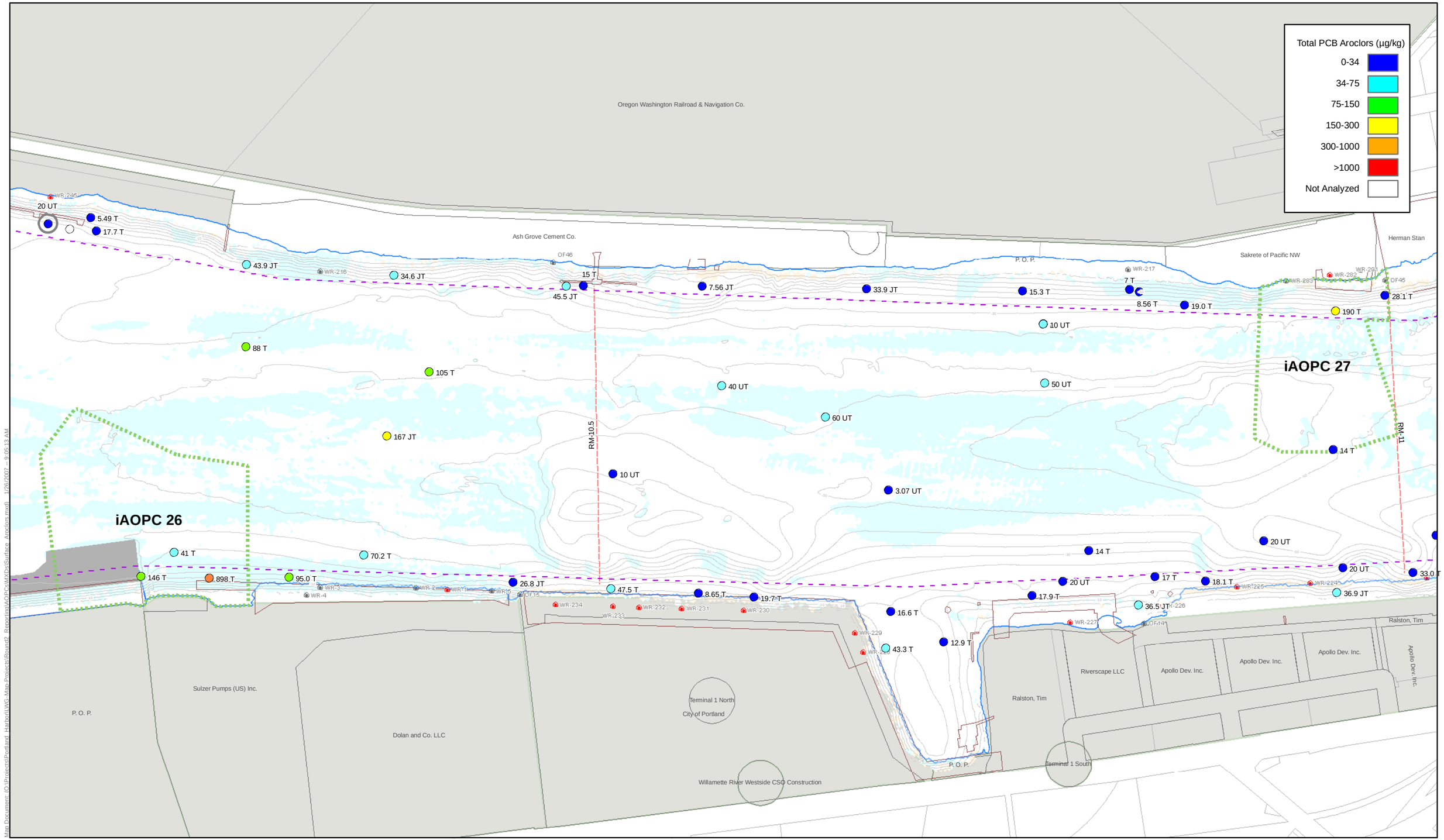


integral consulting inc.

LWG Lower Willamette Group

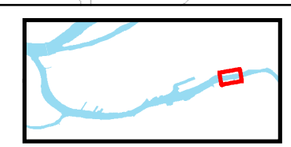
0 100 200 300 Feet

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

Active Outfalls
Unknown Outfalls
Abandoned Outfalls
Docks and Structures
Navigation Channel
River_13ft_NAVD88

Bathymetric Change
-22 - -0.49 Shoaling
-0.5 - 0.5
0.51 - 37 Deepening
5 foot Contours (NAVD88)

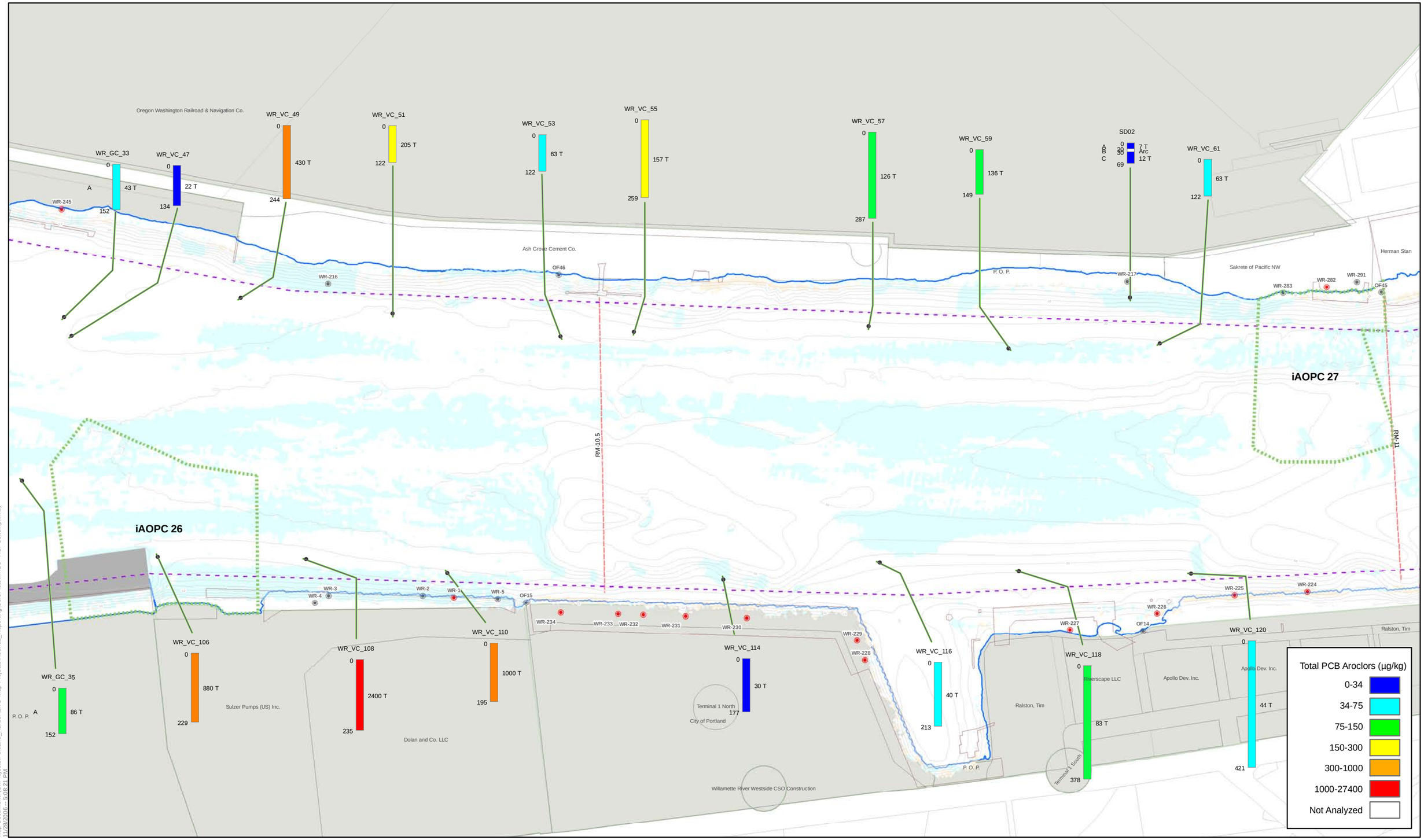
iAOPC Boundary
capping
Dredging (Post 1997)
Dredged or Capped



Map 11.3.19-3
Portland Harbor RI/FS
Comprehensive Round 2 Report
Concentrations in Surface Sediment
Total PCB Aroclors (µg/kg)

iAOPC 26,27

Map Document: (Q:\Projects\Portland_Harbor\LWG_Map_Projects\Round2_Reporting\AOPC\MXD\Surface_Aroclors.mxd) 1/26/2007 -- 9:05:13 AM



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11/28/2016 -- 5:08:21 PM

integral consulting inc.

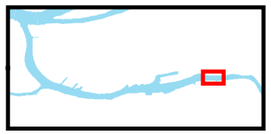
LWG Lower Willamette Group

0 100 200 300 Feet

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

- Active Outfalls
- Unknown Outfalls
- Abandoned Outfalls
- Docks and Structures
- River Miles
- 5 foot Contours (NAVD88)

Bathymetric Change
- -22 - -0.49 Shoaling
- -0.5 - 0.5
- 0.51 - 37 Deepening
- Navigation Channel
- iAOPC Boundary
- Capping Footprint
- Dredging (Post 1997)



Map 11.3.19-5
Portland Harbor RI/FS
Comprehensive Round 2 Report
Concentrations in Subsurface Sediment
Total PCB Aroclors (µg/kg)
iAOPC 26, 27