



Engineering +  
Environmental

# Phase II Environmental Site Assessment

Blocks A & N  
510 NW 3rd Avenue  
Portland, Oregon 97209

Prepared for:  
Portland Development Commission  
222 NW 5th Avenue  
Portland, Oregon 97209-3859

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**TABLE OF CONTENTS**

**1.0 EXECUTIVE SUMMARY ..... 1**

**2.0 INTRODUCTION..... 2**

    2.1 Site Location and Description ..... 2

    2.2 Geology and Hydrology..... 2

**3.0 PREVIOUS INVESTIGATIONS ..... 3**

    3.1 Phase I Environmental Assessment (ESA)..... 3

**4.0 PURPOSE AND SCOPE ..... 3**

**5.0 GEOPHYSICAL SURVEY ..... 3**

**6.0 SOIL SAMPLING..... 4**

**7.0 FINDINGS ..... 5**

    7.1 Site-Wide Soil Sampling..... 5

    7.2 Underground Heating Oil Tank ..... 7

    7.3 Investigation-Derived Wastes ..... 7

**8.0 RISK-BASED EVALUATION ..... 8**

    8.1 Conceptual Site Model..... 8

    8.2 Locality of the Facility..... 8

    8.3 Expected Future Use of the Site ..... 8

    8.4 Soil Exposure Pathways ..... 8

        8.4.1 Soil Ingestion, Dermal Contact, and Inhalation Exposure Pathway ..... 8

        8.4.2 Soil Volatilization to Outdoor Air Pathway ..... 9

        8.4.3 Soil Vapor Intrusion into Buildings Pathway ..... 9

        8.4.4 Soil Leaching to Groundwater ..... 9

    8.6 Risk Assessment Conclusions ..... 10

**9.0 CONCLUSIONS AND RECOMMENDATIONS ..... 10**

    9.1 Conclusions..... 10

    9.2 Recommendations ..... 10

**10.0 LIMITATIONS ..... 12**

## **SUPPORTING DATA**

### **TAB 1 - FIGURES**

Figure 1 - Vicinity Map

Figure 2 - Site Plan - Blocks A & N: Showing Borehole/Sample Locations

Figure 3 - Graphic Conceptual Site Model for the Site and Vicinity

### **TAB 2 - TABLES**

Table 1 - Soil Analysis Results

Table 2 - Underground Heating Oil Tank Soil Analysis Results

## **APPENDICES**

Appendix A - Contract to Perform Soil Investigation

Appendix B - Boring Logs

Appendix C - Laboratory Reports  
Chain-of-Custody Forms

Appendix D - Report of Geophysical Survey  
Well Logs

## 1.0 EXECUTIVE SUMMARY

The subject property is an irregularly shaped parcel located at the northeast corner of the intersection of NW Glisan Street and NW 3<sup>rd</sup> Avenue. The site is bound by railroad tracks and rail facilities to the north and west and by bridge ramps and warehouses to the east and south. In the late 1800s and early 1900s, the site was occupied by a railroad roundhouse that was removed prior to construction of the existing former fire station building in 1913. The building was most recently used as office space, but has been vacant for several years. The *subject property* may be redeveloped for commercial use; tentative plans are reported to include an at-grade structure.

A previous Phase I Environmental Site Assessment (ESA) identified an abandoned underground heating oil tank near the southwest corner of the building. Further studies were recommended to evaluate the historical underground heating oil tank (UST) and areas of the site that may have been impacted by historical railroad uses.

The Scope of Work is outlined in the Work Order included in Appendix A.

PBS arranged for a geophysical survey to be performed to outline the UST for the purpose of collecting soil samples from two or more areas adjacent to the UST. Only two sample points were feasible due to space limitations. Soils were collected using a push-probe-type rig. Analysis of samples collected from depths of 10 and 15 feet below the ground surface (bgs) at the west end of the tank did not reveal contamination from heating oil (diesel). A sample collected from a depth of approximately 13 feet bgs at the east end of the tank contained 8,370 milligrams per kilogram (mg/kg) diesel, while soils collected from a depth of 20 feet bgs at the same location did not contain detectable levels of diesel. Field indications and laboratory results indicated that the tank is a leaking underground storage tank (LUST) and was reported (by the client) to the Oregon Department of Environmental Quality (DEQ).

PBS selected a total of 14 sample locations across the north and east portions of the *subject property*. Soils were collected from representative depths, or from soils that exhibited field indications of contamination. Selected samples were initially analyzed for diesel and/or gasoline-related compounds, and heavy metals. Follow-up analyses for volatile organic compounds (VOCs) and polynuclear aromatic compounds (PAHs) were performed on selected samples based on initial results or field indications of contamination. Low levels of petroleum (diesel-range) contaminants were detected in soils from across the site, but at levels that did not exceed applicable Risk-Based Concentrations (RBCs), with the exception of one sample that was reported to contain 96.2 mg/kg gasoline. This result was flagged as reflecting overlap from heavier petroleum components. VOCs were not detected in that sample. Follow-up analyses showed PAHs present at levels that exceeded several applicable RBCs in one sample (B6-5) collected from a depth of 5 feet near the east end of the *subject property*, posing a risk if site redevelopment plans include excavation into this material.

The distribution of petroleum contaminants across the site did not point to one or more source areas, but was discontinuous and variable, and is likely secondary to the historical introduction of fill materials, historical railroad uses and soil disturbance.

Arsenic and lead were detected in multiple samples at levels that exceeded several applicable RBCs; however, arsenic concentrations were consistent with regional soil background arsenic levels. Lead concentrations exceeded only the Leaching to Groundwater exposure pathway, which is not considered to be complete for the *subject property* based on the nonuse of groundwater in the vicinity and the availability of high-quality municipal drinking water in the City of Portland. The

source of lead in the soils is likely historical railroad activities and the presence of fill materials that cover much of the site to a depth of approximately 15 feet.

Boring Logs are included in Appendix B. Laboratory Reports are included in Appendix C.

Based on the findings of this study, PBS makes the following recommendations:

1. The abandoned LUST should be decommissioned by removal and underlying diesel-impacted soils excavated and disposed of properly. Documentation of tank decommissioning should be provided to the DEQ in order to obtain closure of the LUST file that has been opened as a result of this investigation.
2. If future site redevelopment includes excavation for utilities that extends into soils containing PAHs that exceed RBCs for construction and excavation workers, a Contaminated Media Management Plan should be prepared.

## 2.0 INTRODUCTION

PBS Engineering + Environmental (PBS) has completed a Phase II Environmental Site Assessment for the property at 510 NW 3<sup>rd</sup> Avenue in Portland, Oregon. This report summarizes the previous work performed at the site, and presents the results of the current investigation and PBS' conclusions.

### 2.1 Site Location and Description

The subject property is the site of a vacant former fire station building, which occupies approximately one-third of the site. The remainder of the property is vacant and covered in gravel.

### 2.2 Geology and Hydrology

The *subject property* and vicinity are underlain by fill material comprised primarily of sands, silts, clays and gravel that may represent Willamette River dredge materials. Sands, silts, and gravels deposited by the Willamette River and by Pleistocene catastrophic flood events are present beneath the fill materials, and are underlain by sands and gravels of the Troutdale Formation. Sediments in the area may extend to depths of 700 to 1,000 feet locally. Columbia River Basalts are present at depth.

The *subject property* is relatively flat at an elevation of approximately 30 to 35 feet above mean sea level. There is a gentle regional slope to the west-northwest toward the Willamette River. Groundwater flow in the area of the *subject property* is expected to be generally toward the west-northwest, although tidal influences may make groundwater flow variable.

Well logs for vicinity properties indicate that shallow groundwater may be present at depths of 20 to 30 feet bgs with productive aquifers at much deeper levels.

### 3.0 PREVIOUS INVESTIGATIONS

#### 3.1 Phase I Environmental Assessment (ESA)

The User provided PBS with a Phase I ESA completed by Parametrix<sup>1</sup> in December 2005. This ESA included two other properties nearby to the *subject property*. The assessment findings related to the *subject property* at 510 NW 3<sup>rd</sup> Avenue included:

- A former railroad maintenance facility (roundhouse).
- A vent pipe and fill port were identified near the southwest corner of the *subject property* building (a former firehouse). An oil burner and boiler were observed in the basement of the building.

Parametrix recommended that a geophysical survey be performed to outline the location of the UST, subsurface soil testing in the vicinity of the UST, and soil investigation of other areas of the site to evaluate potential impacts from historical uses.

### 4.0 PURPOSE AND SCOPE

The purpose of the current investigation was to identify impacts to soil from an on-site historical heating oil UST and past use of the site for railroad-related repair activities.

The scope of work for the current investigation consisted of the following:

1. Perform a geophysical survey in the vicinity of the historical underground heating oil tank.
2. Place soil borings in the vicinity of the UST and accessible areas across the site to evaluate potential impacts from historical uses.
3. Submit selected soil samples for analysis for petroleum contaminants and heavy metals, with possible follow-up analyses for volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs).
4. Prepare a report of the findings of this study.

### 5.0 GEOPHYSICAL SURVEY

PBS arranged for Pacific Geophysics to outline the UST using magnetometer and ground-penetrating radar. The UST was located in a very restricted area adjacent to the southwest corner of the building. Access was extremely limited. Prior to the survey, the fill cap was opened and, using a metal measuring tape inserted into the fill pipe, the base of the tank was measured to be approximately 8.5 feet bgs. and the top of the tank (the base of the fill pipe) was measured to be approximately 4.5 feet bgs, for a tank diameter of approximately 4 feet . The length of the tank was 8-9 feet long, for an approximate capacity of 675 gallons.

A metal pipe was detected parallel to and adjacent to the south side of the tank. Nearby to the west of the pipe was a metal Portland Coke and Gas cap that covered a green PVC pipe that was embedded in new-appearing sidewalk.

The tank, supply lines and possible gas line were marked on the pavement. A letter report was prepared by Pacific Geophysics and is included in Appendix D.

<sup>1</sup> Parametrix (December 2005). *Phase I Environmental Site Assessment Firehouse Properties*, Prepared for TriMet, Portland, Oregon.

## 6.0 SOIL SAMPLING

### 6.1 Utility Locating

PBS arranged for public utility locating services to mark underground services on the site. This was followed up by private utility locating services to clear each sample point. PBS met with personnel from Locates Down Under at the site on January 11, 2010, and it was reported that several unmarked underground power lines were detected on the east portion of the site. It was also noted that markings in the vicinity of the UST indicated "No Gas," but the possible gas line identified during the geophysical survey had not been marked by the utility. PBS filed a second utility locating request and contacted Portland General Electric and Northwest Natural Gas directly to request re-marking.

Personnel from Portland General Electric met PBS at the site and located and marked underground trunk lines on the east portion of the site. PGE reported that the lines provided electricity for the entire downtown core. This resulted in PBS changing several proposed sample locations. Northwest Natural Gas reported no gas lines on the *subject property* and confirmed that the gas line adjacent to the UST has been disconnected.

Sample locations are illustrated on Figure 2 (Tab 1).

### 6.2 Site-Wide Sampling

A total of twelve borings (B1 through B12) were placed in areas to the north and east of the building. Boreholes were advanced to depths of 20 feet bgs, with the exception of B1, which was advanced to 15 feet bgs and borehole B2, which was advanced to a depth of 25 feet.

All recovered soils were screened for volatile organic compounds using a portable Mini-RAE photoionization detector (PID), visual, olfactory examination or sheen test (dropping a small quantity of soil into clean water and noting whether an oily sheen appears). Field-screening data and comments are included on boring logs (Appendix B).

Soil samples were typically collected from depths of 5, 10, 15, 20, and/or 25 feet bgs, or from soils that exhibited signs of petroleum impact based on PID, odor, or sheen tests. All samples were placed into laboratory-provided 8-ounce glass sample jars and sealed. All samples were stored on ice for the duration of the fieldwork. The samples were delivered to Apex Laboratory in Tigard, Oregon, under chain of custody documentation. Selected samples were analyzed for diesel and/or gasoline-range petroleum hydrocarbons, heavy metals, PAHs, and VOCs. Following receipt of initial results, additional tests for VOCs and/or PAHs were requested.

Each boring was backfilled with granular bentonite and hydrated with tap water. The surface was finished to match the surroundings. Soil cuttings and decontamination wastewater were placed in 55-gallon drums, labeled, sealed, and left on-site in a secure location.

Graphic logs of subsurface soil conditions are presented in Appendix B. Copies of all laboratory reports and sample chain-of-custody forms are presented in Appendix C. Laboratory results from site-wide testing are discussed below and are summarized in Table 1 (Tab 2).

### 6.3 UST Sampling

The UST was located adjacent to the southwest corner of the building, an area bound on the west by sidewalk and urban rail tracks, on the south by ramps to the Steel Bridge, and on

the north and east by portions of the building. Because of this the severe limitation of space, only two sample points from around the heating oil UST were feasible, one at each end of the east-west oriented tank ("Tank West" and "Tank East"). Soil samples collected from depths of approximately 10 feet and 15 feet bgs on the west end of the tank, and 13 feet and 20 feet bgs from the east end of the tank were submitted for analysis. The samples were managed as described above for site-wide sampling. Laboratory results are summarized in Table 2.

## 7.0 FINDINGS

### 7.1 Site-Wide Soil Sampling

#### Observations

The soils encountered consisted of approximately 15 feet of apparent fill, containing variable amounts of silt, sand, clay, and gravel. Layers of charcoal, wood fragments and sooty material were present across the site at depths of 3 to 5 feet bgs in most of the boreholes and may reflect a historical burn. Wood and plant debris were present in most soils. Light brown sands with few fines and a large quantity of apparent shell debris were encountered in several boreholes at depths ranging from approximately 12 feet bgs at B7 to 17 or 18 feet bgs in B8 and at the east end of the UST (see Section 6.2, below) and may represent native soils (river deposits). Soils ranged from damp to wet, but most of the moisture appeared to be due to ongoing heavy rain and the saturation of shallow gravelly soils that released moisture during drilling.

The "burn" layer encountered at approximately 3 to 5 feet bgs across the site was generally thin, 0.5 to 1.0 feet in thickness, and contained wood debris, glassy black charcoal or other vitrified material, gravel and sooty residue. Samples of this material from Boreholes B4 and B8 were submitted for analysis for heavy metals. Sample B6-5 also contained this "burned" material and was analyzed for heavy metals and PAHs.

A slight petroleum-type odor and a slight oily sheen were detected in soils collected from Borehole B2 at a depth of approximately 17 feet bgs and in other boreholes where a large amount of wood debris was present, although unusual odors might represent the decomposition of organic materials, as well. Soils in boring B10 exhibited an unusual slightly sweet odor at a depth of approximately 8-10 feet bgs.

Due to heavy rain and the resulting atmospheric and sample moisture content, the PID functioned only intermittently. PBS, therefore, relied on visible and olfactory signs of contamination and on sheen tests when PID screening was unavailable.

Laboratory results are summarized in Table 2 (Tab 2) and are discussed below.

#### Laboratory Results: Petroleum Hydrocarbons

Low levels of diesel-range petroleum hydrocarbons were detected in samples from across the site, but at levels well below risk-based concentrations. The highest concentrations were identified in Sample B2-17 collected from the north-central boundary of the site at a depth of 17 feet bgs, and contained 602 mg/kg diesel and 1,410 mg/kg heavy oil; and in sample B6-5 (located at the east end of the site at a depth of 5 feet bgs), which contained no detectable diesel, although the reporting limit was high at 547 mg/kg. Heavy oil was detected in this sample at a concentration of 2,850 mg/kg. The laboratory flagged the heavy oil result as follows: "Detected hydrocarbon pattern resembles creosote or similar product." None of



these results exceeded applicable Risk-Based Concentrations (see Section 8.0, below, for discussions of Risk-Based scenarios).

Samples B2-17, B4-3.5, B9-5, and B9-15 were flagged by the laboratory because of “elevated analyte peaks in the quantitation range that are not representative of the fuel pattern reported,” or because the “sample chromatographic pattern does not resemble the fuel standard used for quantitation.” It is considered likely that these flags are secondary to weathering of petroleum contaminants in these samples.

One sample (B10-9) was reported to contain low levels of diesel and gasoline-range petroleum. The gasoline result exceeded RBCs for Leaching to Groundwater exposure pathway for Urban Residential receptors, but was flagged as being “primarily due to overlap from a heavier fuel hydrocarbon product.” This sample was also analyzed for VOCs, but none were detected above method reporting limits. Follow-up PAH analysis was not performed due to relatively low combined diesel and heavy oil levels.

Tests for PAHs were done as follow-ups on Samples B2-17 and B6-5. Sample B2-17 showed detections of multiple PAHs. Sample B6-5 contained concentrations of multiple PAHs, including the following results that exceeded one or more of the applicable RBCs:

- Benz(a)anthracene, 6.51 mg/kg  
This PAH exceeds Soil Ingestion, Dermal Contact and Inhalation exposure pathways for Urban Residential and Occupational receptors.
- Benzo(a)pyrene at 17.40 mg/kg  
This PAH exceeds Soil Ingestion, Dermal Contact and Inhalation exposure pathways for Urban Residential, Occupational and Construction Worker receptors, and the Leaching to Groundwater RBC for Urban Residential receptors.
- Benzo(b)fluoranthene at 21.30 mg/kg  
This PAH exceeds Soil Ingestion, Dermal Contact and Inhalation exposure pathways for Urban Residential and Occupational receptors.
- Dibenz(a,h)anthracene at 3.68 mg/kg  
This PAH exceeds Soil Ingestion, Dermal Contact and Inhalation exposure pathways for Urban Residential, Occupational and Construction Worker receptors.
- Indeno(1,2,3-cd)pyrene at 19.40 mg/kg  
This PAH exceeds Soil Ingestion, Dermal Contact and Inhalation exposure pathways for Urban Residential and Occupational receptors.

Samples B2-17 and B6-5 were also analyzed for PCBs as follow-up tests due to elevated heavy oil detections; no PCBs were detected above laboratory reporting limits.

#### Laboratory Results: Heavy Metals

Multiple samples collected from the north and east portion of the site were submitted for analysis for heavy metals, based on the historical use of this area as a railroad roundhouse and proximity to active railroad tracks.

Most of the metals that were detected were present at concentrations that were well below the most conservative applicable RBCs. The exceptions were arsenic and lead.

All arsenic values exceeded applicable RBCs, but appear to be within normal background levels for this region<sup>2</sup>. Arsenic results ranged from a low of 2.64 mg/kg in Sample B9-15, collected from a depth of 15 feet bgs near the east side of the building, to a high of 10.2 mg/kg in Sample B3-5, collected from the north property boundary at a depth of approximately 5 feet bgs. The highest arsenic concentrations were in samples that contained “burn” material, but those values were within the range of normal background concentrations, as well. The variable distribution of arsenic concentration across the site likely reflects historical placement of fill material, historical fires, historical railroad use, and soil disturbance.

Lead was detected in all analyzed samples but at the highest concentrations were in soils that contained some of the “burn” material, including Sample B3-3.5 with 208 mg/kg lead and Sample B8-3 with 305 mg/kg lead. Elevated but variable lead levels across the site are likely to be the result of the historical placement of fill materials, possible historical fires, railroad-related activities and soil disturbance.

## 7.2 Underground Heating Oil Tank

Obvious petroleum odor was detected in soils at the east end of the tank at a depth of approximately 13 feet, but became faint to nonexistent by 20 feet bgs. Very slight petroleum odor was detected in soils from the west end of the tank at a depth of approximately 10 feet bgs, but the odor disappeared almost immediately upon exposure of the sample to air and there were no PID or sheen-test signs of petroleum impact.

### Laboratory Results

Laboratory analysis of two samples from each end of the tank showed no detectable diesel contamination in soils collected from the west end of the tank; diesel-range petroleum hydrocarbons were detected at 8,370 mg/kg in sample Tank East-13, collected from a depth of 13 feet bgs. Heavy oil was not reported in that sample, but the reporting limit for heavy oil was quite high (1,260 mg/kg). Diesel and heavy oil contamination were not detected in sample Tank East-20 at a depth of 20 feet bgs. Diesel-range contaminants were not detected in samples collected from the west end of the tank (“Tank West”) at depths of 10 and 15 feet bgs.

Follow-up analyses on sample Tank East-13 included PAHs and benzene, toluene, ethylbenzene and xylene (BTEX). PAHs that were detected were present at concentrations well below applicable RBCs. BTEX constituents were reported as “Not Detected”; however, the reporting limit for benzene was 0.0603 mg/kg, which exceeded applicable RBCs for Leaching to Groundwater. This will be further discussed below in the Risk-Based Evaluation (Section 8.0).

## 7.3 Investigation-Derived Wastes

A total of two 55-gallon drums were used to contain soil cuttings and decontamination water. The drums were sealed and labeled. Based on the results of laboratory analyses, these materials should be disposed of as petroleum contaminated material at an approved facility.

<sup>2</sup> Natural Background Soil Metals Concentrations in Washington State, Washington Department of Ecology Toxics Cleanup Program, Publication 94-115, October 1994; Memo to DEQ Cleanup Project Managers, October 28, 2002, “Default background concentrations for metals”

## 8.0 RISK-BASED EVALUATION

### 8.1 Conceptual Site Model

A Conceptual Site Model (CSM) describes the known or suspected source of contamination, considers how the contaminants are likely to migrate (pathways), and identifies who is likely to be affected by the contaminants (receptors). In order for risk to be present at the site, a source must be present, pathways must be complete, and receptors must be present. Current conditions as well as future conditions must be considered in the CSM. The risk is evaluated for each contaminant of concern in order to determine whether risk is present at a site. Figure 3 (Tab 1) presents a preliminary graphic CSM for the site and vicinity, based on current information.

Contaminants of concern (CoCs) include the following:

- Diesel-range petroleum hydrocarbons
- PAHs
- Arsenic
- Lead

### 8.2 Locality of the Facility

The Locality of the Facility (LOF) is defined by the Oregon Department of Environmental Quality (DEQ) as the area where human or ecological receptors are reasonably likely to come in contact with hazardous substances. The area is determined by considering factors such as the physical and chemical characteristics of the contaminants, the physical characteristics that govern the migration of contaminants (soil characteristics and groundwater gradient), and human activities in the vicinity. The LOF accounts for the likelihood of the contamination migrating over time, so it may be larger than the Facility.

The LOF is the property 510 NW 3<sup>rd</sup> Avenue, Multnomah County Assessor's ID No. 1N1E34BD, Lot 600.

The Facility is defined by the DEQ as an area where hazardous substances or materials may have been deposited, stored, placed, or otherwise have come to be located.

The LOF is the north and east portions and the southwest corner of the property located at 510 NW 3<sup>rd</sup> Avenue, Multnomah County Assessor's ID No. 1N1E34BD, Lot 600.

### 8.3 Expected Future Use of the Site

The *subject property* is zoned "CX" for central commercial, and this designation is unlikely to change in the future, based on the site's location in the downtown core of Portland. This zoning does not preclude residential development of the site, but such use would likely be limited to upper stories, with street-level development dedicated to commercial uses.

### 8.4 Soil Exposure Pathways

#### 8.4.1 Soil Ingestion, Dermal Contact, and Inhalation Exposure Pathway

For the Residential and Occupational receptor scenario, this exposure pathway *must be considered* when contamination is present in the upper 3 feet of soils. According to the Conceptual Site Model, this exposure pathway is complete for future Urban Residential and current and future Occupational, Construction and Excavation receptors.

CoCs identified in soil samples collected from a depth of 3 to 3.5 feet bgs were petroleum hydrocarbons, arsenic and lead. Diesel and gasoline-range petroleum contaminants did not exceed RBCs for this exposure pathway except in the vicinity of the heating oil UST, where diesel-range contaminants pose a risk for future Urban Residential receptors.

Several PAHs were present at concentrations that exceeded RBCs for Urban Residential, Occupational and Construction Worker receptors.

Arsenic levels were slightly higher than assumed regional background levels, but still within range of normal background values, and exceeded RBCs for this exposure pathway for future Urban Residential use and Current and Future Occupational receptors.

Lead levels did not exceed RBCs for this exposure pathway.

Future site redevelopment would likely be for commercial use but with residential spaces on upper floors. Therefore, the risk for future Urban Residential development is considered to be low. Construction and excavation workers could be exposed to soils contaminated with low levels of petroleum and heavy metals if future site redevelopment includes excavation (such as for the installation of utilities) into impacted soils.

#### **8.4.2 Soil Volatilization to Outdoor Air Pathway**

Based on the Conceptual Site Model this exposure pathway is potentially complete for future Urban Residential, Occupational, Construction and Excavation receptors.

Volatile CoCs were not detected at concentrations that exceeded RBCs for potential receptors via this exposure pathway.

#### **8.4.3 Soil Vapor Intrusion into Buildings Pathway**

Based on the Conceptual Site Model, this is a potentially complete exposure pathway for future Urban Residential and current and future Occupational, Construction and Excavation receptors.

Volatile CoCs were not detected at concentrations that exceeded RBCs for potential receptors via this exposure pathway.

#### **8.4.4 Soil Leaching to Groundwater**

According to the Conceptual Site Model, the Soil Leaching to Groundwater exposure pathway is potentially complete for current and future Urban Residential, Occupational, and Construction/Excavation Worker receptors.

Gasoline-range petroleum hydrocarbons and several PAHs that exceeded this exposure pathway for Urban Residential and/or Occupational receptors were present in samples collected from a depth of 9 feet bgs or shallower. Deeper samples did not contain petroleum hydrocarbon concentrations that exceeded RBCs for this exposure pathway.

According to previous studies (Parametrix, 2005, Phase I Environmental Site Assessment), groundwater in the area of the *subject property* could be present at depths ranging from 10 to 20 feet bgs. Wet soils were observed during the current investigation, but free groundwater was not encountered at the depths explored (25 feet bgs).

A limited review of water well logs available from the Oregon Water Resources Department at [http://apps2.wrd.state.or.us/apps/gw/well\\_log/Default.aspx](http://apps2.wrd.state.or.us/apps/gw/well_log/Default.aspx), was performed to evaluate the potential for domestic groundwater use in the area of the *subject property*. None of the logs listed for “water” wells were indicated to be used for domestic water and were for industrial uses, for de-watering or for chilling/cooling equipment. Copies of selected well logs (logs that contained sufficient information to determine their location relative to the *subject property*) are included in Appendix D.

Based on this limited review, groundwater in the vicinity of the subject is not used as a potable water source. Because high-quality drinking water is available from the City of Portland, the Leaching to Groundwater exposure pathway is not considered to be complete.

## 8.6 Risk Assessment Conclusions

- There are potential risks from arsenic in soil by Ingestion, Dermal Contact and Inhalation exposure pathways for future Urban Residential and future and current Occupational receptors. However, all arsenic levels were within the range of normal background concentrations for this region.
- There are potential risks from PAHs by soil Ingestion, Dermal Contact and Inhalation exposure pathways for future Urban Residential and Construction Worker receptors.
- Because future site redevelopment is unlikely to include ground-floor residential use, the risk to future Urban Residential receptors is considered to be low.

## 9.0 CONCLUSIONS AND RECOMMENDATIONS

### 9.1 Conclusions

- 1) The presence of low levels of petroleum, PAHs and heavy metal contamination in soils beneath the *subject property* is likely secondary to historical uses of the site for railroad-related activities and the historical placement fill materials that extend to a depth of approximately 15 feet bgs across the site.
- 2) A leaking historical underground heating oil tank is present near the southwest corner of the building on the *subject property*.

### 9.2 Recommendations

- 1) The abandoned LUST should be decommissioned by removal and underlying diesel-impacted soils excavated and disposed of properly. Documentation of tank decommissioning should be provided to the DEQ in order to obtain closure of the LUST.

- 2) If future site redevelopment plans includes excavation for utilities that extends into soils containing PAHs that exceed RBCs for Construction and Excavation workers, a Contaminated Media Management Plan should be prepared.

## 10.0 LIMITATIONS

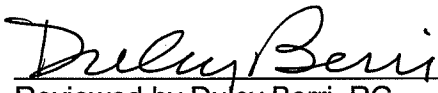
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This study was limited to the tests, locations, and depths as indicated to determine the absence or presence of certain contaminants. The site as a whole may have other contamination that was not characterized by this study. The findings and conclusions of this report are not scientific certainties but, rather, probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent that the site or adjoining land contain no hazardous waste, oil, or other latent conditions beyond that detected or observed by PBS.

### PBS ENGINEERING + ENVIRONMENTAL

  
Marsha Walker, RG  
Senior Geologist

2/5/2010  
Date

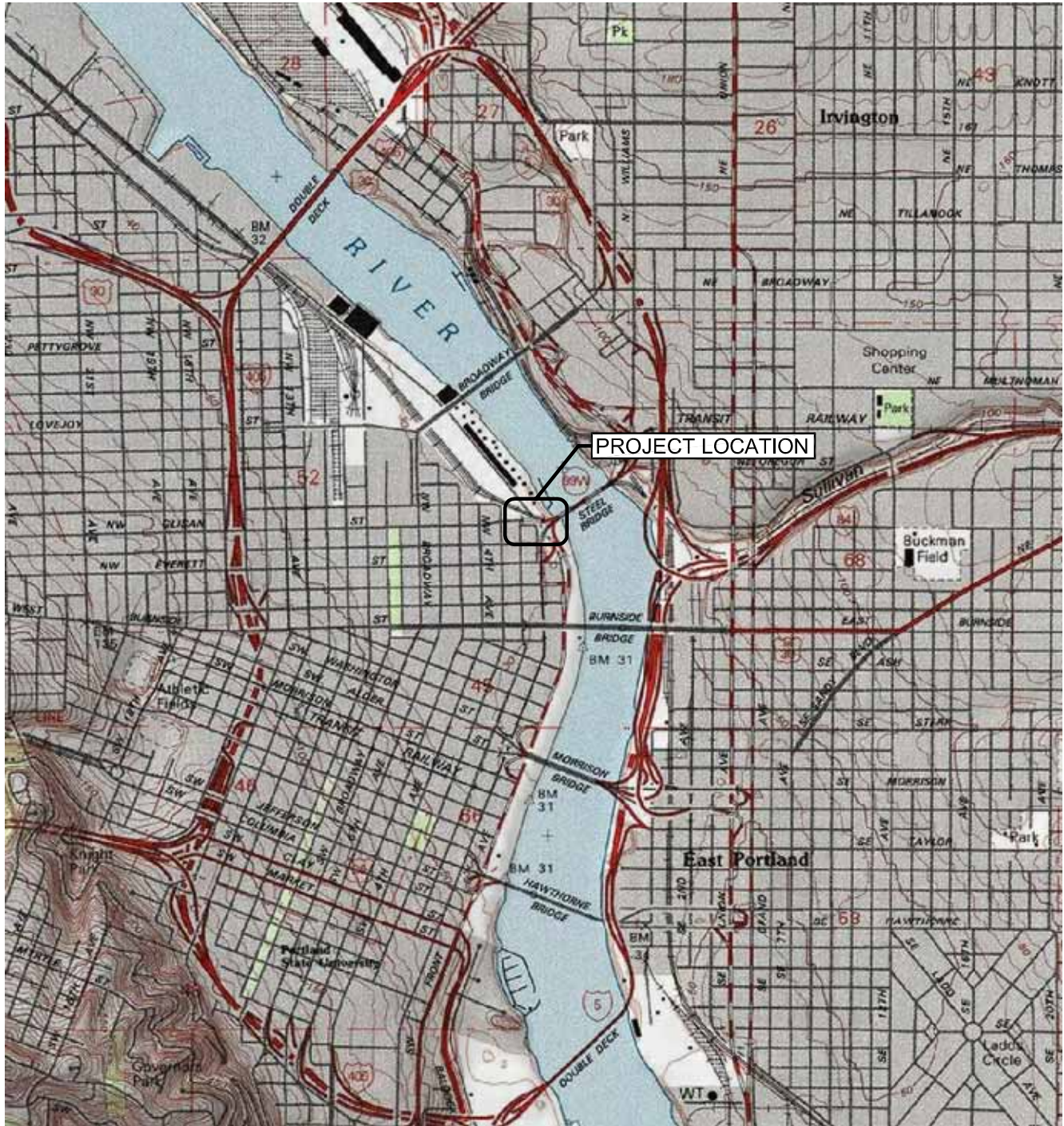
  
Reviewed by Ducy Berri, RG  
Principal/Senior Hydrogeologist

2/5/10  
Date

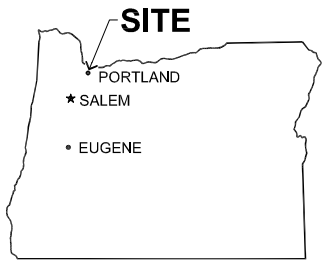
## **FIGURES**

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SOURCE: USGS PORTLAND, OR WA QUADRANGLE, OR 1990, PHOTO REVISED 1990.



**SITE**

- PORTLAND
- ★ SALEM
- EUGENE

**OREGON**



SCALE: 1" = 2,000'

PREPARED FOR: PORTLAND DEVELOPMENT COMMISSION



PROJECT #  
20130.000

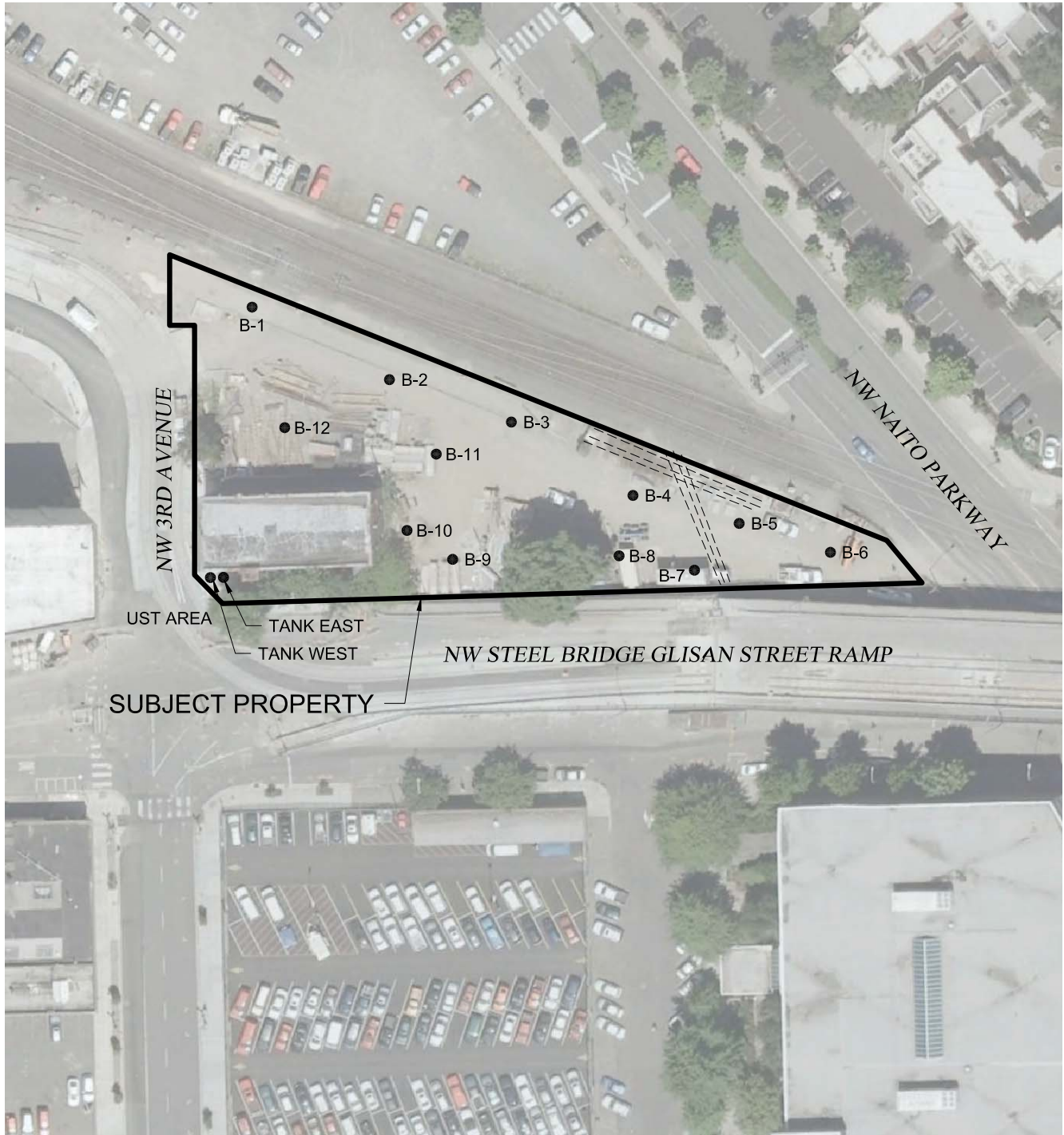
DATE  
FEB 2010

**VICINITY MAP**  
510 NW 3RD AVENUE  
PORTLAND, OREGON

**FIGURE**  
**1**

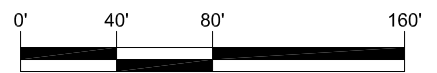
L:\PORTLAND\20000\20001-20499\20130.Blocks A.NIDWG\20130.000\_FIG-2.dwg\_Feb 05, 2010 10:07am JimB





**LEGEND**

- B-1 SAMPLE NUMBER AND LOCATION
- ==== UNDERGROUND ELECTRICAL UTILITIES



SCALE: 1" = 80'

PREPARED FOR: PORTLAND DEVELOPMENT COMMISSION

L:\PORTLAND\20000\20001-20499\20130,000\_Blocks A, N\DWG\20130,000\_FIG-2.dwg Feb 12, 2010 04:08pm donj



PROJECT #  
20130.000

DATE  
FEB 2010

**SITE PLAN - BLOCKS A & N**


510 NW 3RD AVENUE  
PORTLAND, OREGON

FIGURE  
**2**

## **TABLES**

---

Table 1 - Soil Analysis Results - Blocks A & N, 510 NW 3rd Avenue, Portland, Oregon

		Sample number	RISK-BASED CONCENTRATIONS (September 15, 2009)																																											
			Sample Date	B1-5	B2-5	B2-17	B3-5	B4-3.5	B4-20	B5-5	B5-15	B6-5	B7-7	B8-3	B8-10	B9-5	B9-15	B10-9	B11-8	B12-8	Soil Ingestion, Dermal contact and Inhalation				Volatilization to Outdoor Air		Vapor Intrusion into Buildings		Leaching to Groundwater																	
																					1/13/2010																Urban Res-idential	Occup-ational	Construc-tion Worker	Excav-ation Worker	Urban	Occup-	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational
																					Push Probe																									
Type	Sample Depth	5	5	17	5	3.5	20	5	15	5	7	3	10	5	15	9	8	8																												
TPH	Gasoline	-	-	-	-	-	-	-	-	-	-	-	-	-	<5.64	<b>96.2*</b>	<6.37	-	1,500	22,000	13,000	>MAX	5,100	100,000	160	>MAX	<b>28</b>	110																		
	Diesel	<34.3	<68.3	602	<39.5	64.2	34.9	<26.4	<31.4	<547	<30.3	-	<33.1	206	78.4	415	<33.3	<35.0	8,300	70,000	23,000	>MAX	>MAX	>MAX	>MAX	>MAX	>MAX	>MAX																		
	Heavy Oil	<68.5	655	1,410	<78.9	95.8	<63.1	<52.7	<62.8	2,850	<60.6	-	<66.3	288	115	<64.2	<66.6	<70.0	20,000	>MAX	40,000	>MAX	>MAX	>MAX	>MAX	>MAX	>MAX	>MAX																		
VOCS	Detected analytes, only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-	na	na	na	na	na		na	na	na	na																		
PAHs	Acenaphthene	-	-	0.264	-	-	-	-	-	0.19	-	-	-	-	-	-	-	-	9,400	61,000	19,000	>Max	>MAX	>MAX	>Max	>Max	>Csat	>Csat																		
	Acenaphthylene	-	-	0.0893	-	-	-	-	-	<0.178	-	-	-	-	-	-	-	-	nl	nl	nl	nl	nl	nl	nl	nl	nl	nl																		
	Anthracene	-	-	0.607	-	-	-	-	-	0.63	-	-	-	-	-	-	-	-	47,000	>Max	93,000	>Max	>MAX	>MAX	>Max	>Max	>Csat	>Csat																		
	Benz(a)anthracene	-	-	0.522	-	-	-	-	-	<b>6.51</b>	-	-	-	-	-	-	-	-	0.34	2.7	21	590	NV	NV	NV	NV	<b>10</b>	>Csat																		
	Benzo(a)pyrene	-	-	0.437	-	-	-	-	-	<b>17.40</b>	-	-	-	-	-	-	-	-	0.034	0.27	2.1	59	NV	NV	NV	NV	<b>2.7</b>	>Csat																		
	Benzo(b)fluoranthenes	-	-	0.614	-	-	-	-	-	<b>21.30</b>	-	-	-	-	-	-	-	-	0.34	2.7	21	590	NV	NV	NV	NV	>Csat	>Csat																		
	Benzo(g,h,i)perylene	-	-	0.286	-	-	-	-	-	18.80	-	-	-	-	-	-	-	-	nl	nl	nl	nl	nl	nl	nl	nl	nl	nl	nl																	
	Chrysene	-	-	0.633	-	-	-	-	-	6.33	-	-	-	-	-	-	-	-	34	270	2100	59,000	NV	NV	NV	NV	>Csat	>Csat																		
	Dibenz(a,h)anthracene	-	-	0.10	-	-	-	-	-	<b>3.68</b>	-	-	-	-	-	-	-	-	0.034	0.27	2.1	59	NV	NV	NV	NV	>Csat	>Csat																		
	Fluoranthene	-	-	1.250	-	-	-	-	-	5.48	-	-	-	-	-	-	-	-	4,600	29,000	8,900	>Max	NV	NV	NV	NV	>Csat	>Csat																		
	Fluorene	-	-	0.397	-	-	-	-	-	<0.178	-	-	-	-	-	-	-	-	6,300	41,000	12,000	>Max	>MAX	>MAX	>Max	>Max	>Csat	>Csat																		
	Indeno(1,2,3-cd)pyrene	-	-	0.259	-	-	-	-	-	<b>19.40</b>	-	-	-	-	-	-	-	-	0.34	2.7	21	590	NV	NV	NV	NV	>Csat	>Csat																		
	Naphthalene	-	-	0.468	-	-	-	-	-	0.38	-	-	-	-	-	-	-	-	25	23	580	16000	15	27	18	99	0.47	0.44																		
	Phenanthrene	-	-	2.17	-	-	-	-	-	1.92	-	-	-	-	-	-	-	-	nl	nl	nl	nl	nl	nl	nl	nl	nl	nl	nl																	
Pyrene	-	-	1.07	-	-	-	-	-	5.30	-	-	-	-	-	-	-	-	3,400	21,000	6,700	>Max	NV	NV	NV	NV	>Csat	>Csat																			
PCBs	Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	-	-	-	na	na	na	na	na	na	na	na	na	na																		
Metals	Arsenic	-	<b>7.15</b>	-	<b>10.2</b>	<b>4.97</b>	-	<b>8.57</b>	-	<b>8.94</b>	<b>8.58</b>	<b>8.94</b>	-	-	<b>2.64</b>	-	-	<b>1</b>	<b>1.7</b>	13	370	NV	NV	NV	NV	io	io																			
	Barium	-	193	-	177	379	-	60	-	157	246	172	-	-	86.8	-	-	31,000	>Max	60000	>Max	NV	NV	NV	NV	io	io																			
	Cadmium	-	<1.31	-	<1.35	<1.39	-	<1.21	-	<1.24	<1.27	<1.19	-	-	<1.30	-	-	78	500	150	4,100	NV	NV	NV	NV	io	io																			
	Chromium	-	25.7	-	26.4	17.3	-	28.5	-	20.6	31.6	24.7	-	-	10.3	-	-	21^	190	920	26,000	NV	NV	NV	NV	io	io																			
	Lead	-	<b>56</b>	-	<b>90.8</b>	<b>208</b>	-	<b>93.7</b>	-	<b>101</b>	17.3	<b>305</b>	-	-	<b>51.1</b>	-	-	400	800	800	800	NV	NV	NV	NV	<b>30</b>	<b>30</b>																			
	Mercury	-	0.184	-	0.501	0.919	-	0.242	-	0.31	ND	0.367	-	-	0.325	-	-	47	310	93	2,600	NV	NV	NV	NV	io	io																			
	Selenium	-	<2.63	-	<2.71	<2.78	-	<2.42	-	<2.48	<2.54	<2.37	-	-	<2.60	-	-	nl	nl	nl	nl	NV	NV	nl	nl	nl	nl	nl																		
	Silver	-	<1.31	-	<1.35	<1.39	-	<1.21	-	<1.24	<1.27	<1.19	-	-	<1.30	-	-	780	5,100	1,500	43,000	NV	NV	NV	NV	io	io																			

All values in table are in mg/kg (parts per million); the laboratory reports VOCs and PAHs in micrograms/kg and these values were converted for entry into the table

\* Results in the Gasoline Range are primarily due to overlap from a heavier fuel hydrocarbon product

< : Method reporting limit (indicates that this analyte was not detected above the reporting limit)

>MAX: The constituent RBC for this pathway is greater than the amount that would be present if all pore spaces in the soil were filled with product

>Csat: Exceeds the solubility limit for the compound. Concentrations greater than the solubility limit indicate that free product may be present

ND = Not detected above laboratory reporting limits

nv: not volatile - no standard set

- : not analyzed


io: Leaching to groundwater values for inorganic compounds listed; leaching tests required if this exposure pathway is a concern

na: not applicable (no analytes detected)

^ : This RBC is for Cr VI, RBCs for Cr III are >Max; the laboratory result is reported for total chromium (Cr VI plus CR III)

**Bold** denotes exceeds applicable pathway

Table 2 - Underground Heating Oil Tank Soil Analysis Results - Blocks A & N, 510 NW 3rd Avenue, Portland, Oregon

		Sample number	Tank West-10	Tank West-15	Tank East-13	Tank East-20	RISK-BASED CONCENTRATIONS (September 15, 2009)								SOIL MATRIX LEVEL II
							Soil Ingestion, Dermal contact and Inhalation				Vapor Intrusion into Buildings		Leaching to Groundwater		
							Urban Res-idential	Occup-ational	Construc-tion Worker	Excav-ation Worker	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational	
Type	Push Probe					Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational				
Sample Depth	10	15	13	20	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational	Urban Res-idential	Occup-ational			
TPH	Diesel	<25.2	<29.1	<b>8,370</b>	<27.4	8,300	70,000	23,000	>MAX	>MAX	>MAX	3,200	>MAX	500	
	Heavy Oil	<50.5	<58.2	<1,260	<54.8	20,000	>MAX	40,000	>MAX	>MAX	>MAX	>MAX	>MAX	500	
PAHs	Acenaphthene	-	-	<0.629	-	9,400	61,000	19,000	>Max	>Max	>Max	>Csat	>Csat		
	Acenaphthylene	-	-	<.415	-	nl	nl	nl	nl	nl	nl	nl	nl		
	Anthracene	-	-	0.225	-	47,000	>Max	93,000	>Max	>Max	>Max	>Csat	>Csat		
	Benz(a)anthracene	-	-	<0.179	-	0.34	2.7	21	590	NV	NV	10	>Csat		
	Benzo(a)pyrene	-	-	<0.179	-	0.034	0.27	2.1	59	NV	NV	2.7	>Csat		
	Benzo(b)fluoranthenes	-	-	<0.179	-	0.34	2.7	21	590	NV	NV	>Csat	>Csat		
	Benzo(g,h,i)perylene	-	-	<0.179	-	nl	nl	nl	nl	nl	nl	nl	nl		
	Chrysene	-	-	<0.179	-	34	270	2100	59,000	NV	NV	>Csat	>Csat		
	Dibenz(a,h)anthracene	-	-	<0.179	-	0.034	0.27	2.1	59	NV	NV	>Csat	>Csat		
	Fluoranthene	-	-	<0.179	-	4,600	29,000	8,900	>Max	NV	NV	>Csat	>Csat		
	Fluorene	-	-	1.9	-	6,300	41,000	12,000	>Max	>Max	>Max	>Csat	>Csat		
	Indeno(1,2,3-cd)pyrene	-	-	<0.179	-	0.34	2.7	21	590	NV	NV	>Csat	>Csat		
	Naphthalene	-	-	0.356	-	25	23	580	16000	18	99	0.47	0.44		
	Phenanthrene	-	-	4.28	-	nl	nl	nl	nl	nl	nl	nl	nl		
Pyrene	-	-	<0.179	-	3,400	21,000	6,700	>Max	NV	NV	>Csat	>Csat			
BTEX	Benzene	-	-	<0.060*	-	24	34	340	9,500	0.22	1.2	0.042	0.053		
	Toluene	-	-	<0.241	-	12,000	77,000	24,000	>Max	>Csat	>Csat	280	>Csat		
	Ethylbenzene	-	-	<0.121	-	110	140	1,600	44,000	2.2	1.2	0.77	0.9		
	Xylenes	-	-	<0.362	-	2,900	25,000	19,000	>Max	100	>Csat	50	100		

All values in table are in mg/kg (parts per million); the laboratory reports BTEX and PAHs in micrograms/kg and these values were converted for entry into the table

< : Method reporting limit (indicates that this analyte was not detected above the reporting limit)

>MAX: The constituent RBC for this pathway is greater than the amount that would be present if all pore spaces in the soil were filled with product

>Csat: Exceeds the solubility limit for the compound. Concentrations greater than the solubility limit indicate that free product may be present

- : not analyzed

\* :This Method Reporting Limit exceeds RBCs for leaching to groundwater

**Bold** denotes exceeds value applicable pathway

## **APPENDIX A**

---

Contract to Perform Phase II Investigation



WORK ORDER FORM  
 WORK ORDER AMENDMENT

A Work Order Form is used to initiate any work being performed under a Flexible Service Contract.

222 NW Fifth Avenue  
Portland, OR 97209-3859

Date: January 11, 2010

Contract Number: 207101 Contract Expiration Date: 4/30/11

PDC Work Order No.: 9 Amendment No.: N/A  
(To be assigned by Professional Services)

Vendor: PBS ENVIRONMENTAL CONSULTS INC

Project Name: OLD FIREHOUSE PHASE II

Address: 4412 SW CORBETT  
PORTLAND, OR 97239

Work Order Manager: BOB VANVICKLE

Contact Name: \_\_\_\_\_  
Contact Phone: \_\_\_\_\_

Vendor Number: 1167

- This Work Order, and Attachments, is specifically subject to the terms and conditions of the above mentioned Flexible Services Contract. Upon approval and notice to proceed the Contractor agrees to complete the stated work.
- This Work Order Amendment, and Attachments, modifies the original authorized Work Order. The following marked items are hereby Amended. Upon approval, the Contractor agrees to complete the stated work.

- Work Order Amount (Scope of Work Attached) OR  Amended Amount: \$18,060.00
- Work Order Expiration Date (Sched. of Deliverables Attached) OR  Amended Expiration Date April 30, 2010

**Please Note: Invoices must reference the PDC Work Order Number listed above**

Contractor Acceptance: See attached Date: \_\_\_\_\_  
Signature & Title of Authorized Representative

Questions may be referred to originator: WENDY WILCOX at \_\_\_\_\_

Project Manager Initial \_\_\_\_\_ OR  Email Attached Approval if needed. (for Budget Code Used)

Work Order Manager Approval: BOB VANVICKLE \_\_\_\_\_ 1/11/10  
PDC Representative Print Name Signature Date

Expenditure Approval: Paul Slyman \_\_\_\_\_ 1/12/10  
PDC Representative Print Name Signature Date

Charge Code(s): ~~5080~~ 330-310-160-H12145-6320 \$18,060.00

Verification of accounting code by Budget Analyst: \_\_\_\_\_ Date: 1/11/10 Encumbered by: td Date: 01/21/10

Accounting/Professional Services Use Only

Date Received in Finance: \_\_\_\_\_

Date Mailed: 01/22/10

REQ. #: 1179

RECEIVED

Copies to: Originator, Contractor  
Revised 3/2008

JAN 11 2010

PDC  
ACCOUNTING DEPT.



**FLEXIBLE SERVICES WORK ORDER**  
**SCOPE OF WORK**

**Work Order No.:**

**Project Name: Old Fire Station, Blocks A & N**

**Project Task: Phase II Environmental Assessment**

**Project Address: 510 NW 3<sup>rd</sup> Ave.**

**A. Site Description:**

Portland Development Commission is conducting a pre development Phase II on Blocks A & N, at 510 NW 3<sup>rd</sup> Ave. The site is a .77 acre triangular parcel adjacent to the Union Station rail yard. The site has a 6,692 sq. ft. building in the SW corner that was previously used as a fire station and has been vacant for several years. The building was built in 1913. The remainder of the property is a gravel covered area that has been used for equipment storage and construction staging for several projects in this area over the past few years.

A Phase I ESA (ESA I) was conducted for the site in December 2005 by Parametrix. The ESA I identified a recognized environmental condition (REC), a UST, near the SW corner of the building. The fill port and vent pipe for the tank is still in place. A geophysical survey will be needed to identify the exact location and size of the UST. Another REC is the long term railroad operations in the area, both adjacent to and on the site. The Phase I information will be made available to the contractor.

The purpose of the work order is to conduct a subsurface investigation of the site soils using geoprobe drilling. At least 2 of the geoprobe holes will be advanced deep enough to sample the groundwater. Based on nearby sites groundwater is likely to be encountered at about 15 to 20 ft. below ground surface (bgs). Of particular interest is the portion of the property along the border with the existing rail yard and the area around the UST. The remainder of the property will be explored on a grid pattern to explore for contamination from previous uses or from offsite sources. The contractor will need to provide a drilling plan to PDC for review prior to the beginning of the exploration. The plan will include hole locations and depth as well as the sampling strategy.

**B. Principal Scope of Work Items:**

1. Contractor shall develop an exploration plan showing the proposed drill locations and sampling strategy and submit it to PDC for review. After review by PDC, the Contractor will implement the approved exploration plan. For cost estimating on this work order the contractor will assume 2 days of geoprobe exploration.
2. The Phase II ESA will be performed in general accordance with ASTM Standard E 1903-97, Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process. The general scope of the Phase II ESA will consist of the following activities: Review of previous ESA 1 assessment, drilling and soil sampling, laboratory analysis of soil and groundwater samples, data analysis and interpretation, and report preparation.
  - Drilling and sampling operations will be directed by the contractor, and field personnel will be OSHA trained in accordance with 29 CFR 1910.120.



**Work Order No.:**  
**Project Name: Old Fire Station, Blocks A & N**  
**Project Task: Phase II Environmental Assessment**  
**Project Address: 510 NW 3<sup>rd</sup> Ave.**

**Professional Services Labor:**

Personnel Classification	Billing Rate/Hour	Est. Hours	Total
Principle Hydrogeologist			
Senior Geologist			
Staff Geologist			
CAD/gINT/Technical Editing/Data Entry			

**Sub-Consultants:**

Name of Sub-Consultant	Billing Rate/Hour	Est. Hours	Total
Pacific Geophysical			
Pacific Soil & Water			
Locates Down Under			

**Testing & Lab Costs:** regular turnaround, certain follow-up analyses)  
**Materials & Supplies:** -  
**Total Not to Exceed**

Note: Supporting cost detail shall be provided in the Contractors Proposal (if any attached) and must follow the schedule as set forth in Personal Services Contract, unless otherwise approved by PDC. Total cost is an estimated Not to Exceed Amount unless otherwise Amended. Final payment will be made only for actual work performed and accepted by PDC.

All other Work Order terms and conditions are governed by the Personal Services Contract.

**Accepted by Contractor:**

Signature *Dulcy Berri* Date: Jan. 11, 2010

Name and Title: Dulcy Berri, Principal












## **APPENDIX B**

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Boring Logs

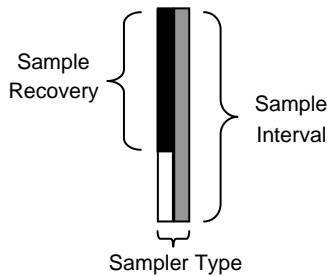
# Key To Test Pit and Boring Log Symbols

## SAMPLING DESCRIPTIONS

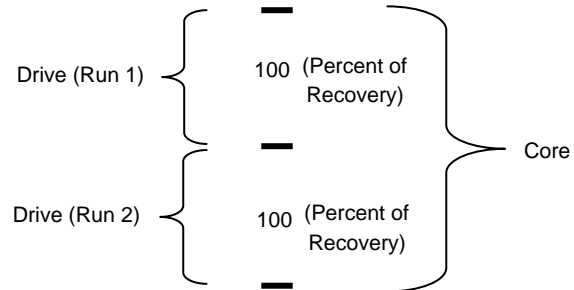
SPT Drive Sampler Standard Penetration Test ASTM D 1586	Shelby Tube Push Sampler ASTM D 1587	Specialized Drive Samplers (Details in Comments)	Grab Sample	Environmental Soil Sample	Asbestos Sample	Biosolid Sample	Screen (Water or Air Sampling)	Free Product (Hydrocarbons)	Water Level During Drilling/Excavation	Water Level After Drilling/Excavation
										

## LOG GRAPHICS

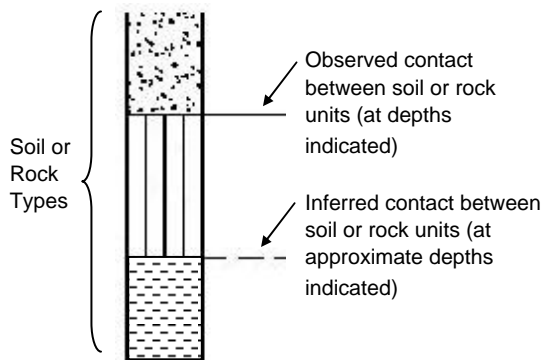
### Sampling Symbols



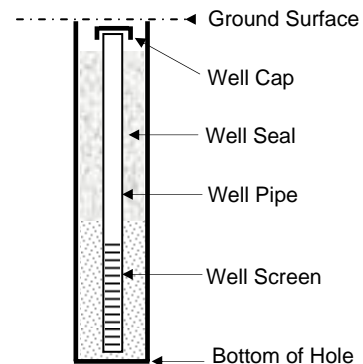
### Direct Push, Geoprobe®, Sonic, Vibracore Drilling



### Soil and Rock



### Well Detail



## ENVIRONMENTAL TESTING EXPLANATIONS

ATD	At Time of Drilling	PPM	Parts Per Million
BGS	Below Ground Surface	VOC	Volatile Organic Compounds
MSL	Mean Sea Level	ND	Not Detected
MW	Monitoring Well (Water Sampling)	NS	No Sheen
NWTPH-Gx	Gasoline-Range Petroleum Hydrocarbon Testing	SS	Slight Sheen
OD	Outside Diameter	MS	Moderate Sheen
PID	Photoionization Detector Headspace Analysis	HS	High Sheen



4412 SW Corbett Avenue  
 Portland, Oregon 97239  
 Phone: 503.248.1939  
 Fax: 503.248.0223

510 NW 3RD AVENUE  
 PORTLAND, OREGON

**BORING B-1**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-1 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown, sandy coarse GRAVEL with silt and sand; moist, no odor						
2.0		Dark brown to black, coarse silty SAND; moist		2.1	B1-5'		60	No sheen
4.0		Dark brown, medium fine SAND with trace silt; moist, no odor						
6.0		Dark brown, medium fine SAND and SILT; moist						
8.0		Stiff, dark gray-brown, clayey SILT and SAND; moist, no odor		4.7	B1-10'		80	No sheen
10.0		Dark gray-brown, moderately stiff, silty CLAY; moist, slight swelling, no odor to slight organic odor						
12.0				6.9	B1-15'		70	No sheen
14.0								
15.0		Final depth 15.0 feet bgs						
16.0								
18.0								
20.0								
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10/RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



4412 SW Corbett Avenue  
 Portland, Oregon 97239  
 Phone: 503.248.1939  
 Fax: 503.248.0223

510 NW 3RD AVENUE  
 PORTLAND, OREGON

**BORING B-2**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-2 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown, coarse SAND with small gravel; damp grading to dry, no odor						
2.0				6.0			50	No sheen
4.0		Moderately stiff, brown, silty CLAY with occasional gravel; damp			B2-5'			
6.0		broken bricks						
8.0				12.7			60	No sheen
10.0		Soft, dark brown, silty CLAY to clayey SILT; moist, layers of wood debris (approximately 4 inches)			B2-10'			
10.0		layer of medium sand (approximately 3 inches)						
12.0		Brown, silty SAND with wood debris grading to fine silty SAND with some wood debris; wet		16.8			70	No sheen
14.0					B2-15'			
16.0		Soft, brown, silty SAND with wood debris; wet						
18.0		becomes silty SAND, slight petroleum odor at approximately 17.0 feet bgs		15.6	B2-17'		?	Slight sheen
20.0		Dark brown, silty SAND with small gravel; slight petroleum odor			B2-19'			
20.0		layer of sandy WOOD DEBRIS at approximately 19.0 feet bgs, very slight odor						
22.0		Silty clayey medium SAND with wood debris; moist to wet, no odor					?	
24.0				15.9	B2-25'			No sheen
		Final depth 25.0 feet bgs						

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT\_PRINT DATE: 2/9/10:RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



4412 SW Corbett Avenue  
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510 NW 3RD AVENUE  
 PORTLAND, OREGON

**BORING B-3**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-3 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown-tan, coarse sandy GRAVEL with some clay; damp, no odor						
2.0		Dark brown-black (burn?) coarse SAND with small gravel; damp, no odor		24.9			60	No sheen
4.0		Moderately stiff, brown, clayey very fine SAND and SILT; damp, no odor		23.9	B3-5'			
6.0		Brown, coarse sandy SILT; no odor						Very slight sheen
8.0		Brown-gray, coarse silty SAND with small gravel; damp to moist		22.6			50	
10.0		Moderately stiff, clayey SILT with gravel; no odor fine sandy layer approximately 3 inches		27.0	B3-10'			Very slight sheen
12.0		Moderately stiff, brown-gray, silty CLAY; moist, no odor						Lots of slough
14.0		Moderately soft, brown, clayey SILT with occasional medium coarse sand; no odor		23.7	B3-15'		40	
16.0								No sheen
18.0							30	
20.0				25.1	B3-20'			
22.0							?	
24.0								
		Final depth 25.1 feet bgs						

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING B-4**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-4 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Silty GRAVEL; dry to damp						Driller hit wood; redrilled 2 cores 0.0-3.5 feet bgs and 3.5-5.0 feet bgs
2.0		Black and brown, silty coarse SAND (burn?) with brick;		27.1	B4-3.5		40	
4.0		WOOD						
4.0		Moderately stiff, gray-brown, clayey SILT with occasional small gravel; damp, no odor		24.6	B4-5'			
6.0		Moderately stiff, brown, clayey SILT with gravel; damp						
8.0		Moderately soft, clayey silty very fine SAND with occasional small gravel and wood debris; no odor		24.9	B4-10'		50	No sheen
10.0		Stiff, brown-gray, clayey SILT; moist						
12.0		Moderately stiff, brown-gray, clayey SILT with wood chunks, brick, and gravel; no odor		24.0	B4-15'		?	No sheen
14.0		Moderately stiff, brown-gray, clayey SILT with fine sand and wood chunks; damp						
16.0								
18.0								
20.0		very faint odor in wood (treated lumber?); no odor in other material at 20.0 feet bgs		26.1	B4-20'			No sheen
20.0		Final depth 20.0 feet bgs						
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ\_DATATMPL.GDT\_PRINT DATE: 2/9/10/RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING B-5**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-5 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Dark brown, sandy GRAVEL; damp						
2.0		Light brown, silty SAND with gravel and some brick pieces; damp, no odor		23.5			30	
		black, sooty debris (burn?)						
		Light brown, silty fine SAND; damp						
4.0		Light and dark brown, silty clayey fine SAND with lots of brick and gravel; damp						
6.0		Brown, silty medium fine SAND; moist to wet, no odor						No sheen
8.0		layer of wood at 8.0 feet bgs		31.5			50	No sheen
10.0		Moderately stiff, brown-gray, clayey SILT with some fine sand and occasional gravel;		30.8	B5-10'			No sheen
12.0		Moderately stiff, gray-brown, clayey SILT with occasional medium to coarse sand and small gravel						
14.0		Moderately stiff, brown, silty CLAY with plant/wood debris; moist, no odor		30.8	B5-15'		60	
16.0		Moderately stiff, brown, silty CLAY with plant/wood debris; moist, no odor						Lots of wet slough; No sheen
18.0		Moderately stiff, brown, silty CLAY with plant/wood debris; moist, no odor					70	
20.0		Final depth 20.0 feet bgs			B5-20'			

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10





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**BORING B-6**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-6 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Brown, silty sandy GRAVEL with brick						
2.0		approximately 2 inches of burned material at 2.5 feet bgs; damp, no odor Brown, clayey SILT and occasional gravel and wood debris; no odor		26.4			70	No sheen
4.0		Brown-black GRAVEL, charcoal; no odor			B6-5'			Sample includes ash/charcoal
4.0		Stiff, clayey SILT; dry to damp, no odor						No sheen
6.0		Brown, silty medium coarse SAND; no odor						
6.0		Moderately stiff, brown, clayey SILT with very fine sand; damp					80	No sheen
8.0		Soft, clayey SILT; damp to moist, moderately plastic, no odor		26.5	B6-10'			No sheen
10.0		Moderately soft, dark brown, clayey SILT with occasional fine gravel; moist, no odor						
12.0							80	
14.0				23.5	B6-15'			No sheen
16.0		Brown, silty moderately coarse SAND; moist, no odor Dark gray-brown, clayey SILT; moist, no odor						
16.0							90	
18.0								
20.0				26.0	B6-20'			
20.0		Final depth 20.0 feet bgs						
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING B-7**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-7 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Dark brown, silty sandy GRAVEL; damp, no odor		Too Wet for PID Readings				
2.0		Moderately stiff, brown, clayey SILT with fine sand, brick pieces, and wood debris					50	No sheen
4.0		Moderately stiff, gray/red mottled, silty CLAY _____; no odor						No sample at 4.0 feet bgs; too many brick pieces No sheen
6.0		concrete pieces			B7-7			
8.0		concrete pieces			B7-10			Driller's comment: concrete at 8.0 feet bgs
10.0		Brown-green, clayey SILT and fine SAND; damp to moist, no odor						
12.0		GRAVEL with some sand; moist						
12.0		Light brown, fine silty SAND; damp						
12.0		Stiff, brown-gray, silty very fine SAND with tiny pieces of shell; moist, no odor					70	
14.0		no odor			B7-15			No sheen Lots of slough from 15.0 to 20.0 feet bgs
16.0		no odor						
18.0		no odor					?	
20.0		Final depth 20.0 feet bgs			B7-20			
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING B-8**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-8 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		GRAVEL, CHARCOAL, SAND, BRICK throughout with few fines; no odor		Too Wet for PID Readings				No sheen
2.0					B8-3'		?	
4.0								
6.0		Moderately coarse brown SAND; damp, no odor						No sheen
6.0		Moderately stiff, brown, clayey SILT; no odor						No sheen
6.5		Gray, fine silty SAND; damp, rock at 6.5 feet bgs					?	
8.0		Stiff, gray, silty CLAY; dry to damp, no odor						
9.0		wood debris from 9.0 to 10.0 feet bgs			B8-10'			No sheen
10.0								
12.0							?	
14.0		Moderately stiff, gray, silty fine SAND with lots of wood debris; damp, no odor			B8-15'			No sheen
16.0								
18.0		Brown, clayey SILT and moderately coarse SAND; no odor					?	No sheen
18.0		Black, PEATY WOOD DEBRIS; organic odor						No sheen
18.0		Moderately stiff, gray, clayey, silty fine SAND with lots of small rounded gravel and shells; no odor			B8-20'			No sheen
20.0		Final depth 20.0 feet bgs						
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING B-9**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-9 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Dark brown, sandy GRAVEL; damp (FILL)		Too Wet for PID Readings				
2.0		Moderately stiff, brown SILT; damp, no odor					60	
4.0		Dark brown-black, SAND with gravel and chunks of charcoal; damp, no odor			B9-5'			No sheen (Sample for metals)
6.0		increasing charcoal Brown, silty CLAY with lots of small gravel and some plant debris; moist						
8.0		Soft, clayey SILT with some sand and small gravel and wood; moist, no odor			B9-10'		60	No sheen
10.0		Soft, brown to brown-gray, silty fine SAND with lots of wood debris; moist						No sheen
12.0							?	
14.0					B9-15'			No sheen
16.0		Soft, brown-gray, clayey SILT and very fine SAND with lots of wood debris; no odor						
18.0							?	
20.0		Final depth 20.0 feet bgs			B9-20'			

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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510 NW 3RD AVENUE  
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**BORING B-10**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-10 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Dark brown, sandy GRAVEL; damp, no odor		Too Wet for PID Readings				
2.0		broken brick pieces						
4.0		Brown and black SAND with gravel and sawdust (burn?); no odor			B10-5'		50	No sheen
6.0		Dark brown, medium coarse SAND; damp, no odor						
6.0		becomes black and gravelly right at 5.0 feet bgs						
6.0		Dark brown, sandy GRAVEL; no odor						± Sheen
8.0		Moderately stiff, brown, clayey SILT with small gravel; damp						
8.0		Moderately soft, gray-brown, clayey SILT with occasional gravel; moist, some odor (sweet)			B10-9'		70	"Stinky" material from approximately 8.0 to 10.0 feet bgs
10.0		no odor from 10.0 to 20.0 feet bgs						No sheen
12.0					B10-12'		?	
14.0								
16.0								No sheen
18.0								
20.0					B10-20'			
20.0		Final depth 20.0 feet bgs						
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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510 NW 3RD AVENUE  
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**BORING B-11**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-11 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Coarse SAND with gravel; damp, no odor		Too Wet for PID Readings				
2.0		Brown, silty GRAVEL with sand; damp, no odor					40	No sheen
4.0		Brown to black WOOD and brown, moderately coarse SAND with rocks and sawdust (?); no odor			B11-5'			No sheen
6.0		Dark brown, medium coarse SAND with a little silt; damp to moist, no odor						No sheen
6.0		Soft, clayey SILT with occasional brown gravel; no odor						No sheen
8.0		layer of gravel at 9.0 feet bgs			B11-8'		?	
10.0		Soft, dark brown, silty fine SAND with lots of wood debris						
12.0		faint odor at approximately 12.0 feet bgs			B11-12'		?	
16.0		Soft, dark brown, silty fine SAND with occasional small gravel and lots of wood debris; no odor						No sheen
20.0		Soft, dark brown, silty clayey fine SAND with lots of wood debris and occasional gravel; no odor			B11-20'			No sheen
20.0		Final depth 20.0 feet bgs						

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10/RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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510 NW 3RD AVENUE  
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**BORING B-12**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING B-12 LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		ASPHALT		Too Wet for PID Readings				
0.0 - 1.5		Stiff, SILT with some very fine sand; damp, no odor						No sheen
1.5 - 2.5		Dark brown-black CHARCOAL with small gravel					70	No sheen
2.5 - 4.0		Stiff, brown, clayey SILT with some fine sand; damp, no odor			B12-5'			
4.0 - 5.5		Moderately stiff, clayey SILT with occasional sand			B12-8'		70	
5.5 - 8.0		Soft, brown, clayey SILT with occasional sand and small gravel; no odor						No sheen
8.0 - 8.5		wood at approximately 8.0 or 8.5 feet bgs						
8.5 - 10.0		small gravel, lots of wood debris; damp, no odor						
10.0 - 15.0		No recovery			B12-15'			
15.0 - 16.0								
16.0 - 18.0								
18.0 - 20.0					B12-20'			
20.0		Final depth 20.0 feet bgs						

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10



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**BORING Tank East**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING Tank East LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Silty, brown, GRAVEL; damp, no odor		Too Wet for PID Readings				
2.0		Silty GRAVEL with broken brick, cobbles, bits of charcoal; no odor					50	No sheen No sample
4.0		burn (?)						
10.0		Stiff, brown SILT; damp, no odor Stiff, brown SILT; damp, no odor						No sheen Not enough non-charred material to fill sample jar
12.0		odor begins at approximately 11.0 feet bgs Brown-gray, silty SAND; strong odor			Tank East-13'		?	
16.0		No recovery						
18.0		Brown, coarse SAND with bits of shell; moist; petroleum odor but less strong					?	
20.0		Final depth 20.0 feet bgs			Tank East-20'			

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK-E&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/3/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10





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**BORING Tank West**

PBS PROJECT NUMBER:  
 12060.000 (20130.000)

BORING Tank West LOCATION:

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		GRAVEL with some sand Sandy GRAVEL with broken bricks, charcoal; no obvious odor		Too Wet for PID Readings			—	
2.0							?	
4.0		Stiff, brown clayey SILT with bits of charcoal; damp, slight petroleum odor			Tank West-5'		—	
6.0								
8.0		Brown, coarse silty SAND with bricks and gravel; no odor					?	
10.0		slight odor; damp no odor; damp to moist					—	
12.0							?	
14.0		Brown to gray, clayey SILT with occasional small gravel; moist to wet, slight odor			Tank West-15'		—	Sample contains both clayey and sandy material
16.0		Moderately stiff, brown-gray, clayey SILT with small gravel; no odor to faint odor					?	
18.0								
20.0		Final depth 20.0 feet bgs			Tank West-20'		—	
22.0								
24.0								

BORING LOG-ENV CORE\_20130\_12030\_B1-12TANK-E&W\_020310.GPJ DATATMPL.GDT PRINT DATE: 2/9/10.RSD

BORING METHOD: Direct Push  
 DRILLED BY: Pacific Soil & Water LLC  
 BORING BIT DIAMETER: 2-inch

LOGGED BY: M. Walker, R.G.  
 COMPLETED: 1/12/10

---

## **APPENDIX C**

Laboratory Reports  
Chain-of-Custody Documentation

# Apex Labs

12232 S.W. Garden Place  
Tigard, OR 97223  
503-718-2323 Phone  
503-718-0333 Fax

Saturday, March 6, 2010

Marsha Walker  
PBS Engineering and Environmental  
4412 SW Corbett Ave  
Portland, OR 97239

RE: 510 NW 3rd / 21030.000

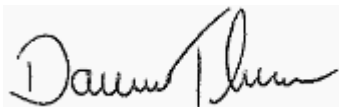
Enclosed are the results of analyses for work order A10A10Z, which was received by the laboratory on 1/13/2010 at 12:00:00PM.

Thank you for using Apex Labs. We appreciate your business and strive to provide the highest quality services to the environmental industry.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: [dthomas@apex-labs.com](mailto:dthomas@apex-labs.com), or by phone at 503-718-2323.

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Apex Laboratories



*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

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Darwin Thomas, Business Development Director

Page 1 of 48

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

**Reported:**

03/06/10 11:01

## ANALYTICAL REPORT FOR SAMPLES

### SAMPLE INFORMATION

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B1-5	A10A107-01	Soil	01/12/10 09:00	01/13/10 12:00
B2-5	A10A107-04	Soil	01/12/10 09:20	01/13/10 12:00
B2-17	A10A107-07	Soil	01/12/10 09:35	01/13/10 12:00
B3-5	A10A107-10	Soil	01/12/10 09:55	01/13/10 12:00
B4-3.5	A10A107-14	Soil	01/12/10 00:00	01/13/10 12:00
B4-20	A10A107-18	Soil	01/12/10 10:45	01/13/10 12:00
B5-5	A10A107-19	Soil	01/12/10 11:00	01/13/10 12:00
B5-15	A10A107-21	Soil	01/12/10 11:10	01/13/10 12:00
B6-5	A10A107-23	Soil	01/12/10 11:20	01/13/10 12:00
B7-7	A10A107-27	Soil	01/12/10 11:40	01/13/10 12:00
B8-3	A10A107-31	Soil	01/12/10 12:00	01/13/10 12:00
B8-10	A10A107-32	Soil	01/12/10 12:10	01/13/10 12:00
B9-5	A10A107-35	Soil	01/12/10 12:55	01/13/10 12:00
B9-15	A10A107-37	Soil	01/12/10 00:00	01/13/10 12:00
B11-8	A10A107-43	Soil	01/12/10 00:00	01/13/10 12:00
B12-8	A10A107-48	Soil	01/12/10 00:00	01/13/10 12:00
Tank West-10	A10A107-52	Soil	01/12/10 00:00	01/13/10 12:00
Tank West-15	A10A107-53	Soil	01/12/10 00:00	01/13/10 12:00
Tank East-13	A10A107-55	Soil	01/12/10 00:00	01/13/10 12:00
Tank East-20	A10A107-56	Soil	01/12/10 15:00	01/13/10 12:00
B10-9	A10A107-57	Soil	01/12/10 13:00	01/13/10 12:00

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

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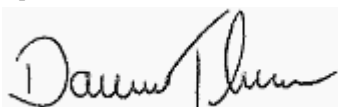
03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B1-5 (A10A107-01)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001169</b>			
Diesel Range Organics	ND	---	34.3	mg/kg dry	1	01/15/10 04:08	NWTPH-Dx	
Oil Range Organics	ND	---	68.5	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>			
<b>B2-5 (A10A107-04)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001169</b>			
Diesel Range Organics	ND	---	68.3	mg/kg dry	2	01/15/10 04:31	NWTPH-Dx	
<b>Oil Range Organics</b>	<b>655</b>	---	137	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>			
<b>B2-17 (A10A107-07)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001169</b>			
Diesel Range Organics	<b>602</b>	---	33.4	mg/kg dry	1	01/15/10 05:18	NWTPH-Dx	F-05
Oil Range Organics	<b>1410</b>	---	66.7	"	"	"	"	F-03
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 110 %</i>		<i>Limits: 50-150 %</i>			
<b>B3-5 (A10A107-10)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001169</b>			
Diesel Range Organics	ND	---	39.5	mg/kg dry	1	01/15/10 07:17	NWTPH-Dx	
Oil Range Organics	ND	---	78.9	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 96 %</i>		<i>Limits: 50-150 %</i>			
<b>B4-3.5 (A10A107-14)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001169</b>			
Diesel Range Organics	<b>64.2</b>	---	38.6	mg/kg dry	1	01/15/10 07:41	NWTPH-Dx	F-05
Oil Range Organics	<b>95.8</b>	---	77.1	"	"	"	"	F-03
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>			
<b>B4-20 (A10A107-18)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	<b>34.9</b>	---	31.6	mg/kg dry	1	01/15/10 16:32	NWTPH-Dx	F-12
Oil Range Organics	ND	---	63.1	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 82 %</i>		<i>Limits: 50-150 %</i>			
<b>B5-5 (A10A107-19)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	26.4	mg/kg dry	1	01/15/10 15:48	NWTPH-Dx	
Oil Range Organics	ND	---	52.7	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 99 %</i>		<i>Limits: 50-150 %</i>			
<b>B5-15 (A10A107-21)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	31.4	mg/kg dry	1	01/15/10 16:54	NWTPH-Dx	
Oil Range Organics	ND	---	62.8	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 83 %</i>		<i>Limits: 50-150 %</i>			

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**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:

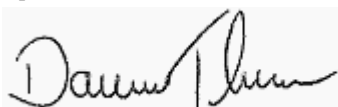
03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B6-5 (A10A107-23)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	547	mg/kg dry	20	01/15/10 17:38	NWTPH-Dx	
<b>Oil Range Organics</b>	<b>2850</b>	---	1090	"	"	"	"	A-02
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: %</i>	<i>Limits: 50-150 %</i>	"	"	"	S-01
<b>B7-7 (A10A107-27)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	30.3	mg/kg dry	1	01/15/10 16:10	NWTPH-Dx	
Oil Range Organics	ND	---	60.6	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 99 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B8-10 (A10A107-32)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	33.1	mg/kg dry	1	01/15/10 16:32	NWTPH-Dx	
Oil Range Organics	ND	---	66.3	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 98 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B9-5 (A10A107-35)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
<b>Diesel Range Organics</b>	<b>206</b>	---	56.4	mg/kg dry	2	01/15/10 18:21	NWTPH-Dx	F-05
<b>Oil Range Organics</b>	<b>288</b>	---	113	"	"	"	"	F-03
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 78 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B9-15 (A10A107-37)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
<b>Diesel Range Organics</b>	<b>78.4</b>	---	29.3	mg/kg dry	1	01/15/10 19:49	NWTPH-Dx	F-03, F-05
<b>Oil Range Organics</b>	<b>115</b>	---	58.6	"	"	"	"	F-03, F-05
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 84 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B11-8 (A10A107-43)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	33.3	mg/kg dry	1	01/15/10 20:10	NWTPH-Dx	
Oil Range Organics	ND	---	66.6	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 77 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B12-8 (A10A107-48)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001187</b>			
Diesel Range Organics	ND	---	35.0	mg/kg dry	1	01/15/10 20:32	NWTPH-Dx	
Oil Range Organics	ND	---	70.0	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 81 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>Tank West-10 (A10A107-52)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001240</b>			
Diesel Range Organics	ND	---	25.2	mg/kg dry	1	01/20/10 19:10	NWTPH-Dx	
Oil Range Organics	ND	---	50.5	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 99 %</i>	<i>Limits: 50-150 %</i>	"	"	"	

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**PBS Engineering and Environmental**  
 4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**  
 Project Number: 21030.000  
 Project Manager: Marsha Walker

**Reported:**  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
<b>Tank West-15 (A10A107-53)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001240</b>				
Diesel Range Organics	ND	---	29.1	mg/kg dry	1	01/20/10 19:35	NWTPH-Dx	
Oil Range Organics	ND	---	58.2	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 90 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>Tank East-13 (A10A107-55)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001169</b>				
Diesel Range Organics	<b>8370</b>	---	629	mg/kg dry	20	01/14/10 19:52	NWTPH-Dx	
Oil Range Organics	ND	---	1260	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: %</i>	<i>Limits: 50-150 %</i>	"	"	"	<i>S-01</i>
<b>Tank East-20 (A10A107-56)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001240</b>				
Diesel Range Organics	ND	---	27.4	mg/kg dry	1	01/20/10 19:59	NWTPH-Dx	
Oil Range Organics	ND	---	54.8	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 100 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B10-9 (A10A107-57)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001187</b>				
Diesel Range Organics	<b>415</b>	---	32.1	mg/kg dry	1	01/15/10 16:54	NWTPH-Dx	F-02
Oil Range Organics	ND	---	64.2	"	"	"	"	
<i>Surrogate: o-Terphenyl (Surr)</i>			<i>Recovery: 83 %</i>	<i>Limits: 50-150 %</i>	"	"	"	

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 Portland, OR 97239

Project: **510 NW 3rd**  
 Project Number: 21030.000  
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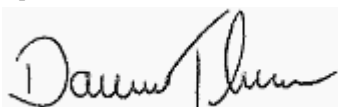
**Reported:**  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
<b>B9-15 (A10A107-37RE1)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001201</b>				<b>V-06</b>
Gasoline Range Organics	ND	---	5.64	mg/kg dry	50	01/18/10 15:36	NWTPH-Gx	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>			<i>Recovery: 96 %</i>	<i>Limits: 50-150 %</i>	1	"	"	
<i>1,4-Difluorobenzene (Sur)</i>			<i>94 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B11-8 (A10A107-43)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001199</b>				<b>V-06</b>
Gasoline Range Organics	ND	---	6.37	mg/kg dry	50	01/16/10 19:04	NWTPH-Gx	
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>			<i>Recovery: 86 %</i>	<i>Limits: 50-150 %</i>	1	"	"	
<i>1,4-Difluorobenzene (Sur)</i>			<i>85 %</i>	<i>Limits: 50-150 %</i>	"	"	"	
<b>B10-9 (A10A107-57)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001199</b>				<b>V-06</b>
Gasoline Range Organics	<b>96.2</b>	---	6.09	mg/kg dry	50	01/16/10 19:32	NWTPH-Gx	F-09
<i>Surrogate: 4-Bromofluorobenzene (Sur)</i>			<i>Recovery: 127 %</i>	<i>Limits: 50-150 %</i>	1	"	"	
<i>1,4-Difluorobenzene (Sur)</i>			<i>85 %</i>	<i>Limits: 50-150 %</i>	"	"	"	

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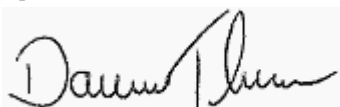
Reported:  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### BTEX Compounds by EPA 8260B

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>Tank East-13 (A10A107-55)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001238</b>			<b>V-08</b>
Benzene	ND	---	60.3	ug/kg dry	200	01/20/10 15:01	5035/8260B	
Toluene	ND	---	241	"	"	"	"	
Ethylbenzene	ND	---	121	"	"	"	"	
Xylenes, total	ND	---	362	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 105 %</i>	<i>Limits: 70-130 %</i>	1	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>101 %</i>	<i>Limits: 70-130 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>105 %</i>	<i>Limits: 70-130 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>97 %</i>	<i>Limits: 70-130 %</i>	"	"	"	

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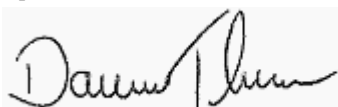
Reported:  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B10-9 (A10A107-57)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001199</b>			<b>V-06</b>
Acetone	ND	---	1520	ug/kg dry	50	01/16/10 19:32	5035/8260B	
Benzene	ND	---	19.0	"	"	"	"	
Bromobenzene	ND	---	38.1	"	"	"	"	
Bromochloromethane	ND	---	76.1	"	"	"	"	
Bromodichloromethane	ND	---	38.1	"	"	"	"	
Bromoform	ND	---	76.1	"	"	"	"	
Bromomethane	ND	---	76.1	"	"	"	"	
2-Butanone (MEK)	ND	---	76.1	"	"	"	"	
n-Butylbenzene	ND	---	76.1	"	"	"	"	
sec-Butylbenzene	ND	---	76.1	"	"	"	"	
tert-Butylbenzene	ND	---	76.1	"	"	"	"	
Carbon tetrachloride	ND	---	152	"	"	"	"	
Chlorobenzene	ND	---	38.1	"	"	"	"	
Chloroethane	ND	---	76.1	"	"	"	"	
Chloroform	ND	---	38.1	"	"	"	"	
Chloromethane	ND	---	38.1	"	"	"	"	
2-Chlorotoluene	ND	---	38.1	"	"	"	"	
4-Chlorotoluene	ND	---	76.1	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	---	152	"	"	"	"	
Dibromochloromethane	ND	---	152	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	---	38.1	"	"	"	"	
Dibromomethane	ND	---	76.1	"	"	"	"	
1,2-Dichlorobenzene	ND	---	38.1	"	"	"	"	
1,3-Dichlorobenzene	ND	---	38.1	"	"	"	"	
1,4-Dichlorobenzene	ND	---	76.1	"	"	"	"	
Dichlorodifluoromethane	ND	---	152	"	"	"	"	
1,1-Dichloroethane	ND	---	38.1	"	"	"	"	
1,2-Dichloroethane (EDC)	ND	---	38.1	"	"	"	"	
1,1-Dichloroethene	ND	---	38.1	"	"	"	"	
cis-1,2-Dichloroethene	ND	---	38.1	"	"	"	"	
trans-1,2-Dichloroethene	ND	---	76.1	"	"	"	"	
1,2-Dichloropropane	ND	---	38.1	"	"	"	"	
1,3-Dichloropropane	ND	---	38.1	"	"	"	"	
2,2-Dichloropropane	ND	---	76.1	"	"	"	"	
1,1-Dichloropropene	ND	---	152	"	"	"	"	

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Project: **510 NW 3rd**

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 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B10-9 (A10A107-57)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001199</b>			<b>V-06</b>
cis-1,3-Dichloropropene	ND	---	152	ug/kg dry	50	"	5035/8260B	
trans-1,3-Dichloropropene	ND	---	152	"	"	"	"	
Ethylbenzene	ND	---	38.1	"	"	"	"	
Hexachlorobutadiene	ND	---	381	"	"	"	"	
2-Hexanone	ND	---	761	"	"	"	"	
Isopropylbenzene	ND	---	76.1	"	"	"	"	
4-Isopropyltoluene	ND	---	76.1	"	"	"	"	
4-Methyl-2-pentanone (MiBK)	ND	---	761	"	"	"	"	
Methyl tert-butyl ether (MTBE)	ND	---	76.1	"	"	"	"	
Methylene chloride	ND	---	381	"	"	"	"	
Naphthalene	ND	---	381	"	"	"	"	
n-Propylbenzene	ND	---	38.1	"	"	"	"	
Styrene	ND	---	152	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	---	76.1	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	---	76.1	"	"	"	"	
Tetrachloroethene (PCE)	ND	---	76.1	"	"	"	"	
Toluene	ND	---	76.1	"	"	"	"	
1,2,3-Trichlorobenzene	ND	---	152	"	"	"	"	
1,2,4-Trichlorobenzene	ND	---	152	"	"	"	"	
1,1,1-Trichloroethane	ND	---	76.1	"	"	"	"	
1,1,2-Trichloroethane	ND	---	76.1	"	"	"	"	
Trichloroethene (TCE)	ND	---	38.1	"	"	"	"	
Trichlorofluoromethane	ND	---	152	"	"	"	"	
1,2,3-Trichloropropane	ND	---	76.1	"	"	"	"	
1,2,4-Trimethylbenzene	ND	---	76.1	"	"	"	"	
1,3,5-Trimethylbenzene	ND	---	76.1	"	"	"	"	
Vinyl chloride	ND	---	38.1	"	"	"	"	
m,p-Xylene	ND	---	76.1	"	"	"	"	
o-Xylene	ND	---	38.1	"	"	"	"	
<i>Surrogate: Dibromofluoromethane (Surr)</i>			<i>Recovery: 96 %</i>	<i>Limits: 70-130 %</i>	1	"	"	
<i>1,4-Difluorobenzene (Surr)</i>			<i>97 %</i>	<i>Limits: 70-130 %</i>	"	"	"	
<i>Toluene-d8 (Surr)</i>			<i>104 %</i>	<i>Limits: 70-130 %</i>	"	"	"	
<i>4-Bromofluorobenzene (Surr)</i>			<i>99 %</i>	<i>Limits: 70-130 %</i>	"	"	"	

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

Reported:  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Polychlorinated Biphenyls by EPA 8082A

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B2-17 (A10A107-07)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001252</b>			<b>C-07</b>
Aroclor 1016	ND	---	9.35	ug/kg dry	1	01/22/10 09:55	EPA 8082A	
Aroclor 1221	ND	---	9.35	"	"	"	"	
Aroclor 1232	ND	---	9.35	"	"	"	"	
Aroclor 1242	ND	---	9.35	"	"	"	"	
Aroclor 1248	ND	---	9.35	"	"	"	"	
Aroclor 1254	ND	---	9.35	"	"	"	"	
Aroclor 1260	ND	---	9.35	"	"	"	"	
<i>Surrogate: 2,4,5,6-TCMX (Surr)</i>			<i>Recovery: 61 %</i>	<i>Limits: 50-125 %</i>	"	"	"	
<i>Decachlorobiphenyl (Surr)</i>			<i>78 %</i>	<i>Limits: 55-130 %</i>	"	"	"	
<b>B6-5 (A10A107-23)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001252</b>			<b>C-07</b>
Aroclor 1016	ND	---	8.36	ug/kg dry	1	01/22/10 10:10	EPA 8082A	
Aroclor 1221	ND	---	8.36	"	"	"	"	
Aroclor 1232	ND	---	8.36	"	"	"	"	
Aroclor 1242	ND	---	8.36	"	"	"	"	
Aroclor 1248	ND	---	8.36	"	"	"	"	
Aroclor 1254	ND	---	8.36	"	"	"	"	
Aroclor 1260	ND	---	8.36	"	"	"	"	
<i>Surrogate: 2,4,5,6-TCMX (Surr)</i>			<i>Recovery: 80 %</i>	<i>Limits: 50-125 %</i>	"	"	"	
<i>Decachlorobiphenyl (Surr)</i>			<i>76 %</i>	<i>Limits: 55-130 %</i>	"	"	"	

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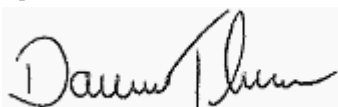
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## ANALYTICAL SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B2-17 (A10A107-07RE1)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001250</b>			<b>C-05</b>
Acenaphthene	264	---	23.0	ug/kg dry	1	01/21/10 16:04	EPA 8270C (SIM)	
Acenaphthylene	89.3	---	23.0	"	"	"	"	
Anthracene	607	---	23.0	"	"	"	"	
Benz(a)anthracene	522	---	23.0	"	"	"	"	
Benzo(a)pyrene	437	---	23.0	"	"	"	"	
Benzo(b+k)fluoranthene(s)	614	---	46.1	"	"	"	"	Q-26
Benzo(g,h,i)perylene	286	---	23.0	"	"	"	"	
Chrysene	633	---	23.0	"	"	"	"	
Dibenz(a,h)anthracene	100	---	23.0	"	"	"	"	
Fluoranthene	1250	---	23.0	"	"	"	"	
Fluorene	397	---	23.0	"	"	"	"	
Indeno(1,2,3-cd)pyrene	259	---	23.0	"	"	"	"	
Naphthalene	468	---	45.9	"	"	"	"	
Phenanthrene	2170	---	23.0	"	"	"	"	
Pyrene	1070	---	23.0	"	"	"	"	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>			<i>Recovery: 50 %</i>	<i>Limits: 35-120 %</i>	"	"	"	
<i>2-Fluorobiphenyl (Surr)</i>			<i>63 %</i>	<i>Limits: 45-120 %</i>	"	"	"	
<i>p-Terphenyl-d14 (Surr)</i>			<i>87 %</i>	<i>Limits: 30-120 %</i>	"	"	"	

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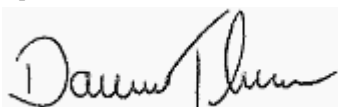
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## ANALYTICAL SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B6-5 (A10A107-23RE1)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001250</b>			<b>C-05</b>
Acenaphthene	192	---	178	ug/kg dry	5	01/21/10 16:32	EPA 8270C (SIM)	
Acenaphthylene	ND	---	178	"	"	"	"	
Anthracene	630	---	178	"	"	"	"	
Benz(a)anthracene	6510	---	178	"	"	"	"	
Benzo(a)pyrene	17400	---	178	"	"	"	"	
Benzo(b+k)fluoranthene(s)	21300	---	356	"	"	"	"	Q-26
Benzo(g,h,i)perylene	18800	---	178	"	"	"	"	
Chrysene	6330	---	178	"	"	"	"	
Dibenz(a,h)anthracene	3680	---	178	"	"	"	"	
Fluoranthene	5480	---	178	"	"	"	"	
Fluorene	ND	---	178	"	"	"	"	
Indeno(1,2,3-cd)pyrene	19400	---	178	"	"	"	"	
Naphthalene	378	---	355	"	"	"	"	
Phenanthrene	1920	---	178	"	"	"	"	
Pyrene	5300	---	178	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)			Recovery: 62 %	Limits: 35-120 %	"	"	"	
2-Fluorobiphenyl (Surr)			62 %	Limits: 45-120 %	"	"	"	
p-Terphenyl-d14 (Surr)			93 %	Limits: 30-120 %	"	"	"	

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## ANALYTICAL SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
<b>Tank East-13 (A10A107-55RE2)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001250</b>			<b>C-05</b>
Acenaphthene	ND	---	629	ug/kg dry	20	01/21/10 17:53	EPA 8270C (SIM)	R-01
Acenaphthylene	ND	---	415	"	"	"	"	R-01
<b>Anthracene</b>	<b>225</b>	---	179	"	"	"	"	
Benz(a)anthracene	ND	---	179	"	"	"	"	
Benzo(a)pyrene	ND	---	179	"	"	"	"	
Benzo(b)fluoranthene	ND	---	179	"	"	"	"	
Benzo(k)fluoranthene	ND	---	179	"	"	"	"	
Benzo(g,h,i)perylene	ND	---	179	"	"	"	"	
Chrysene	ND	---	179	"	"	"	"	
Dibenz(a,h)anthracene	ND	---	179	"	"	"	"	
Fluoranthene	ND	---	179	"	"	"	"	
<b>Fluorene</b>	<b>1900</b>	---	179	"	"	"	"	
Indeno(1,2,3-cd)pyrene	ND	---	179	"	"	"	"	
Naphthalene	ND	---	356	"	"	"	"	
<b>Phenanthrene</b>	<b>4280</b>	---	179	"	"	"	"	
Pyrene	ND	---	179	"	"	"	"	
<i>Surrogate: Nitrobenzene-d5 (Surr)</i>			<i>Recovery: 124 %</i>	<i>Limits: 35-120 %</i>	"	"	"	<i>S-02</i>
<i>2-Fluorobiphenyl (Surr)</i>			<i>76 %</i>	<i>Limits: 45-120 %</i>	"	"	"	
<i>p-Terphenyl-d14 (Surr)</i>			<i>85 %</i>	<i>Limits: 30-120 %</i>	"	"	"	

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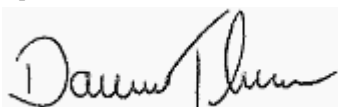
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## ANALYTICAL SAMPLE RESULTS

### Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B2-5 (A10A107-04)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	7.15	---	2.63	mg/kg dry	10	01/19/10 12:34	EPA 6020	
Barium	193	---	1.31	"	"	"	"	
Cadmium	ND	---	1.31	"	"	"	"	
Chromium	25.7	---	2.63	"	"	"	"	
Lead	56.0	---	1.31	"	"	"	"	
Mercury	0.184	---	0.105	"	"	"	"	
Selenium	ND	---	2.63	"	"	"	"	
Silver	ND	---	1.31	"	"	"	"	
<b>B3-5 (A10A107-10)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	10.2	---	2.71	mg/kg dry	10	01/19/10 12:42	EPA 6020	
Barium	177	---	1.35	"	"	"	"	
Cadmium	ND	---	1.35	"	"	"	"	
Chromium	26.4	---	2.71	"	"	"	"	
Lead	90.8	---	1.35	"	"	"	"	
Mercury	0.501	---	0.108	"	"	"	"	
Selenium	ND	---	2.71	"	"	"	"	
Silver	ND	---	1.35	"	"	"	"	
<b>B4-3.5 (A10A107-14)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	4.97	---	2.78	mg/kg dry	10	01/19/10 12:45	EPA 6020	
Barium	379	---	1.39	"	"	"	"	
Cadmium	ND	---	1.39	"	"	"	"	
Chromium	17.3	---	2.78	"	"	"	"	
Lead	208	---	1.39	"	"	"	"	
Mercury	0.919	---	0.111	"	"	"	"	
Selenium	ND	---	2.78	"	"	"	"	
Silver	ND	---	1.39	"	"	"	"	
<b>B5-5 (A10A107-19)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	8.57	---	2.42	mg/kg dry	10	01/19/10 12:47	EPA 6020	
Barium	260	---	1.21	"	"	"	"	
Cadmium	ND	---	1.21	"	"	"	"	
Chromium	28.5	---	2.42	"	"	"	"	
Lead	93.7	---	1.21	"	"	"	"	
Mercury	0.242	---	0.0968	"	"	"	"	
Selenium	ND	---	2.42	"	"	"	"	
Silver	ND	---	1.21	"	"	"	"	

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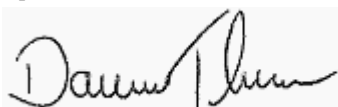
Reported:  
03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting		Dilution	Date Analyzed	Method	Notes
			Limit	Units				
<b>B6-5 (A10A107-23)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	8.94	---	2.48	mg/kg dry	10	01/19/10 12:50	EPA 6020	
Barium	157	---	1.24	"	"	"	"	
Cadmium	ND	---	1.24	"	"	"	"	
Chromium	20.6	---	2.48	"	"	"	"	
Lead	101	---	1.24	"	"	"	"	
Mercury	0.310	---	0.0991	"	"	"	"	
Selenium	ND	---	2.48	"	"	"	"	
Silver	ND	---	1.24	"	"	"	"	
<b>B7-7 (A10A107-27)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	8.58	---	2.54	mg/kg dry	10	01/19/10 12:53	EPA 6020	
Barium	246	---	1.27	"	"	"	"	
Cadmium	ND	---	1.27	"	"	"	"	
Chromium	31.6	---	2.54	"	"	"	"	
Lead	17.3	---	1.27	"	"	"	"	
Mercury	ND	---	0.102	"	"	"	"	
Selenium	ND	---	2.54	"	"	"	"	
Silver	ND	---	1.27	"	"	"	"	
<b>B8-3 (A10A107-31)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	8.94	---	2.37	mg/kg dry	10	01/19/10 13:01	EPA 6020	
Barium	172	---	1.19	"	"	"	"	
Cadmium	ND	---	1.19	"	"	"	"	
Chromium	24.7	---	2.37	"	"	"	"	
Lead	305	---	1.19	"	"	"	"	
Mercury	0.367	---	0.0948	"	"	"	"	
Selenium	ND	---	2.37	"	"	"	"	
Silver	ND	---	1.19	"	"	"	"	
<b>B9-15 (A10A107-37)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001210</b>			
Arsenic	2.64	---	2.60	mg/kg dry	10	01/19/10 13:04	EPA 6020	
Barium	86.8	---	1.30	"	"	"	"	
Cadmium	ND	---	1.30	"	"	"	"	
Chromium	10.3	---	2.60	"	"	"	"	
Lead	51.1	---	1.30	"	"	"	"	
Mercury	0.325	---	0.104	"	"	"	"	
Selenium	ND	---	2.60	"	"	"	"	
Silver	ND	---	1.30	"	"	"	"	

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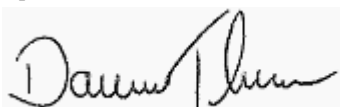
Reported:  
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## ANALYTICAL SAMPLE RESULTS

### Percent Dry Weight by D2216

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
<b>B1-5 (A10A107-01)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	79.5	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B2-5 (A10A107-04)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	76.9	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B2-17 (A10A107-07)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	71.6	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B3-5 (A10A107-10)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	72.9	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B4-3.5 (A10A107-14)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	72.7	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B4-20 (A10A107-18)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	73.1	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B5-5 (A10A107-19)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	82.3	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B5-15 (A10A107-21)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	75.2	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B6-5 (A10A107-23)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	80.4	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B7-7 (A10A107-27)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	77.4	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B8-3 (A10A107-31)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	85.9	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B8-10 (A10A107-32)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	72.6	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B9-5 (A10A107-35)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	77.5	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B9-15 (A10A107-37)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	75.9	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B11-8 (A10A107-43)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	72.6	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>B12-8 (A10A107-48)</b>			<b>Matrix: Soil</b>		<b>Batch: 1001159</b>			
% Solids	67.9	---	1.00	% by Weight	1	01/14/10 08:55	D2216	

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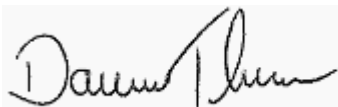
**Reported:**  
 03/06/10 11:01

## ANALYTICAL SAMPLE RESULTS

### Percent Dry Weight by D2216

Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
<b>Tank West-10 (A10A107-52)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001234</b>				
% Solids	91.2	---	1.00	% by Weight	1	01/20/10 08:24	D2216	
<b>Tank West-15 (A10A107-53)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001234</b>				
% Solids	78.6	---	1.00	% by Weight	1	01/20/10 08:24	D2216	
<b>Tank East-13 (A10A107-55)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001159</b>				
% Solids	83.7	---	1.00	% by Weight	1	01/14/10 08:55	D2216	
<b>Tank East-20 (A10A107-56)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001234</b>				
% Solids	83.1	---	1.00	% by Weight	1	01/20/10 08:24	D2216	
<b>B10-9 (A10A107-57)</b>			<b>Matrix: Soil</b>	<b>Batch: 1001159</b>				
% Solids	73.2	---	1.00	% by Weight	1	01/14/10 08:55	D2216	

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**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:

03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001169 - EPA 3546 (Fuels)</b>						<b>Soil</b>						
<b>Blank (1001169-BLK1)</b>						Prepared: 01/14/10 11:47 Analyzed: 01/14/10 19:04						
<b>NWTPH-Dx</b>												
Diesel Range Organics	ND	---	20.0	mg/kg wet	1	---	---	---	---	---	---	---
Oil Range Organics	ND	---	40.0	"	"	---	---	---	---	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>			<i>Recovery: 91 %</i>			<i>Limits: 50-150 %</i>			<i>Dilution: 1x</i>			
<b>LCS (1001169-BS1)</b>						Prepared: 01/14/10 11:47 Analyzed: 01/14/10 19:28						
<b>NWTPH-Dx</b>												
Diesel Range Organics	81.6	---	20.0	mg/kg wet	1	83.3	---	98	70-130%	---	---	---
Oil Range Organics	85.3	---	40.0	"	"	"	---	102	"	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>			<i>Recovery: 90 %</i>			<i>Limits: 50-150 %</i>			<i>Dilution: 1x</i>			
<b>Batch 1001187 - EPA 3546 (Fuels)</b>						<b>Soil</b>						
<b>Blank (1001187-BLK1)</b>						Prepared: 01/15/10 11:06 Analyzed: 01/15/10 15:48						
<b>NWTPH-Dx</b>												
Diesel Range Organics	ND	---	20.0	mg/kg wet	1	---	---	---	---	---	---	---
Oil Range Organics	ND	---	40.0	"	"	---	---	---	---	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>			<i>Recovery: 82 %</i>			<i>Limits: 50-150 %</i>			<i>Dilution: 1x</i>			
<b>LCS (1001187-BS1)</b>						Prepared: 01/15/10 11:06 Analyzed: 01/15/10 16:10						
<b>NWTPH-Dx</b>												
Diesel Range Organics	79.9	---	20.0	mg/kg wet	1	83.3	---	96	70-130%	---	---	---
Oil Range Organics	82.1	---	40.0	"	"	"	---	99	"	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>			<i>Recovery: 88 %</i>			<i>Limits: 50-150 %</i>			<i>Dilution: 1x</i>			
<b>Duplicate (1001187-DUP1)</b>						Prepared: 01/15/10 11:06 Analyzed: 01/15/10 17:16						
<b>QC Source Sample: B5-15 (A10A107-21)</b>												
<b>NWTPH-Dx</b>												
Diesel Range Organics	ND	---	31.0	mg/kg dry	1	---	ND	---	---	---	40%	---
Oil Range Organics	ND	---	62.0	"	"	---	ND	---	---	---	40%	---
<i>Surr: o-Terphenyl (Surr)</i>			<i>Recovery: 76 %</i>			<i>Limits: 50-150 %</i>			<i>Dilution: 1x</i>			

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Project: **510 NW 3rd**

Project Number: 21030.000  
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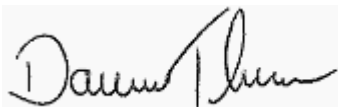
Reported:  
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## QUALITY CONTROL (QC) SAMPLE RESULTS

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001240 - EPA 3546 (Fuels)</b>						<b>Soil</b>						
<b>Blank (1001240-BLK1)</b>						Prepared: 01/20/10 09:00 Analyzed: 01/20/10 18:21						
<b>NWTPH-Dx</b>												
Diesel Range Organics	ND	---	20.0	mg/kg wet	1	---	---	---	---	---	---	---
Oil Range Organics	ND	---	40.0	"	"	---	---	---	---	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<b>LCS (1001240-BS1)</b>						Prepared: 01/20/10 09:00 Analyzed: 01/20/10 18:46						
<b>NWTPH-Dx</b>												
Diesel Range Organics	90.3	---	20.0	mg/kg wet	1	83.3	---	108	70-130%	---	---	---
Oil Range Organics	89.9	---	40.0	"	"	"	---	108	"	---	---	---
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 98 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						

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Project: **510 NW 3rd**

Project Number: 21030.000  
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## QUALITY CONTROL (QC) SAMPLE RESULTS

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Blank (1001199-BLK1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 13:33						
<b>NWTPH-Gx</b>												
Gasoline Range Organics	ND	---	4.00	mg/kg wet	50	---	---	---	---	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 80 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>83 %</i>		<i>50-150 %</i>		<i>"</i>						
<b>LCS (1001199-BS2)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 12:52						
<b>NWTPH-Gx</b>												
Gasoline Range Organics	25.2	---	4.00	mg/kg wet	50	25.0	---	101	70-130%	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 86 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>87 %</i>		<i>50-150 %</i>		<i>"</i>						

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Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001201 - EPA 5035A</b>						<b>Soil</b>						
<b>Blank (1001201-BLK1)</b>						Prepared: 01/16/10 09:44 Analyzed: 01/18/10 15:08						
<b>NWTPH-Gx</b>												
Gasoline Range Organics	ND	---	4.00	mg/kg wet	50	---	---	---	---	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 93 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>94 %</i>		<i>50-150 %</i>		<i>"</i>						
<b>LCS (1001201-BS2)</b>						Prepared: 01/16/10 09:44 Analyzed: 01/18/10 14:41						
<b>NWTPH-Gx</b>												
Gasoline Range Organics	26.7	---	4.00	mg/kg wet	50	25.0	---	107	70-130%	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 95 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>96 %</i>		<i>50-150 %</i>		<i>"</i>						

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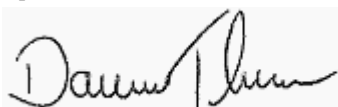
Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### BTEX Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001238 - EPA 5035A</b>						<b>Soil</b>						
<b>Blank (1001238-BLK1)</b>						Prepared: 01/20/10 08:45 Analyzed: 01/20/10 11:20						
<b>5035/8260B</b>												
Benzene	ND	---	12.5	ug/kg wet	50	---	---	---	---	---	---	---
Toluene	ND	---	50.0	"	"	---	---	---	---	---	---	---
Ethylbenzene	ND	---	25.0	"	"	---	---	---	---	---	---	---
Xylenes, total	ND	---	75.0	"	"	---	---	---	---	---	---	---
<i>Surr: Dibromofluoromethane (Surr)</i>			<i>Recovery: 101 %</i>	<i>Limits: 70-130 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Surr)</i>			<i>100 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>Toluene-d8 (Surr)</i>			<i>105 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>			<i>102 %</i>	<i>70-130 %</i>		<i>"</i>						
<b>LCS (1001238-BS1)</b>						Prepared: 01/20/10 08:45 Analyzed: 01/20/10 10:25						
<b>5035/8260B</b>												
Benzene	892	---	12.5	ug/kg wet	50	1000	---	89	65-135%	---	---	---
Toluene	1030	---	50.0	"	"	"	---	103	"	---	---	---
Ethylbenzene	1060	---	25.0	"	"	"	---	106	"	---	---	---
Xylenes, total	3140	---	75.0	"	"	3000	---	105	"	---	---	---
<i>Surr: Dibromofluoromethane (Surr)</i>			<i>Recovery: 105 %</i>	<i>Limits: 70-130 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Surr)</i>			<i>99 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>Toluene-d8 (Surr)</i>			<i>105 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>			<i>99 %</i>	<i>70-130 %</i>		<i>"</i>						
<b>Matrix Spike (1001238-MS1)</b>						Prepared: 01/20/10 08:45 Analyzed: 01/20/10 15:29						
<b>QC Source Sample: Tank East-13 (A10A107-55)</b>												
<b>5035/8260B</b>												
Benzene	4020	---	60.3	ug/kg dry	200	4830	ND	83	65-135%	---	---	---
Toluene	4700	---	241	"	"	"	ND	97	"	---	---	---
Ethylbenzene	4770	---	121	"	"	"	ND	99	"	---	---	---
Xylenes, total	14200	---	362	"	"	14500	ND	98	"	---	---	---
<i>Surr: Dibromofluoromethane (Surr)</i>			<i>Recovery: 100 %</i>	<i>Limits: 70-130 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Surr)</i>			<i>98 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>Toluene-d8 (Surr)</i>			<i>107 %</i>	<i>70-130 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>			<i>100 %</i>	<i>70-130 %</i>		<i>"</i>						

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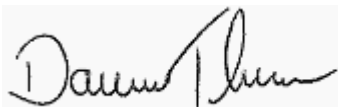
Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Blank (1001199-BLK1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 13:33						
<b>5035/8260B</b>												
Acetone	ND	---	1000	ug/kg wet	50	---	---	---	---	---	---	---
Benzene	ND	---	12.5	"	"	---	---	---	---	---	---	---
Bromobenzene	ND	---	25.0	"	"	---	---	---	---	---	---	---
Bromochloromethane	ND	---	50.0	"	"	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	25.0	"	"	---	---	---	---	---	---	---
Bromoform	ND	---	50.0	"	"	---	---	---	---	---	---	---
Bromomethane	ND	---	500	"	"	---	---	---	---	---	---	---
2-Butanone (MEK)	ND	---	500	"	"	---	---	---	---	---	---	---
n-Butylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	---
sec-Butylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	---
tert-Butylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	100	"	"	---	---	---	---	---	---	---
Chlorobenzene	ND	---	25.0	"	"	---	---	---	---	---	---	---
Chloroethane	ND	---	500	"	"	---	---	---	---	---	---	---
Chloroform	ND	---	250	"	"	---	---	---	---	---	---	---
Chloromethane	ND	---	250	"	"	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	25.0	"	"	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	50.0	"	"	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	100	"	"	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	100	"	"	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	25.0	"	"	---	---	---	---	---	---	---
Dibromomethane	ND	---	50.0	"	"	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	25.0	"	"	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	25.0	"	"	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	50.0	"	"	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	100	"	"	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	25.0	"	"	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	25.0	"	"	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	25.0	"	"	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	25.0	"	"	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	50.0	"	"	---	---	---	---	---	---	---
1,2-Dichloropropane	ND	---	25.0	"	"	---	---	---	---	---	---	---
1,3-Dichloropropane	ND	---	25.0	"	"	---	---	---	---	---	---	---
2,2-Dichloropropane	ND	---	50.0	"	"	---	---	---	---	---	---	---

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Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

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## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Blank (1001199-BLK1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 13:33						
1,1-Dichloropropene	ND	---	100	ug/kg wet	"	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	100	"	"	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	100	"	"	---	---	---	---	---	---	
Ethylbenzene	ND	---	25.0	"	"	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	250	"	"	---	---	---	---	---	---	
2-Hexanone	ND	---	500	"	"	---	---	---	---	---	---	
Isopropylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	
4-Isopropyltoluene	ND	---	50.0	"	"	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	---	500	"	"	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	50.0	"	"	---	---	---	---	---	---	
Methylene chloride	ND	---	250	"	"	---	---	---	---	---	---	
Naphthalene	ND	---	250	"	"	---	---	---	---	---	---	
n-Propylbenzene	ND	---	25.0	"	"	---	---	---	---	---	---	
Styrene	ND	---	100	"	"	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	---	50.0	"	"	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	50.0	"	"	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	50.0	"	"	---	---	---	---	---	---	
Toluene	ND	---	50.0	"	"	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	100	"	"	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	100	"	"	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	50.0	"	"	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	50.0	"	"	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	25.0	"	"	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	100	"	"	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	50.0	"	"	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	50.0	"	"	---	---	---	---	---	---	
Vinyl chloride	ND	---	25.0	"	"	---	---	---	---	---	---	
m,p-Xylene	ND	---	50.0	"	"	---	---	---	---	---	---	
o-Xylene	ND	---	25.0	"	"	---	---	---	---	---	---	

Surr: Dibromofluoromethane (Surr)	Recovery: 92 %	Limits: 70-130 %	Dilution: 1x
1,4-Difluorobenzene (Surr)	94 %	70-130 %	"
Toluene-d8 (Surr)	108 %	70-130 %	"
4-Bromofluorobenzene (Surr)	104 %	70-130 %	"

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 Project Manager: Marsha Walker

Reported:

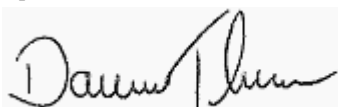
03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>LCS (1001199-BS1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 12:24						
<b>5035/8260B</b>												
Acetone	1910	---	1000	ug/kg wet	50	2000	---	95	65-135%	---	---	
Benzene	926	---	12.5	"	"	1000	---	93	"	---	---	
Bromobenzene	1080	---	25.0	"	"	"	---	108	"	---	---	
Bromochloromethane	1010	---	50.0	"	"	"	---	101	"	---	---	
Bromodichloromethane	967	---	25.0	"	"	"	---	97	"	---	---	
Bromoform	1090	---	50.0	"	"	"	---	109	"	---	---	
Bromomethane	770	---	500	"	"	"	---	77	"	---	---	
2-Butanone (MEK)	1790	---	500	"	"	2000	---	89	"	---	---	
n-Butylbenzene	1120	---	50.0	"	"	1000	---	112	"	---	---	
sec-Butylbenzene	1120	---	50.0	"	"	"	---	112	"	---	---	
tert-Butylbenzene	1090	---	50.0	"	"	"	---	109	"	---	---	
Carbon tetrachloride	964	---	100	"	"	"	---	96	"	---	---	
Chlorobenzene	1060	---	25.0	"	"	"	---	106	"	---	---	
Chloroethane	954	---	500	"	"	"	---	95	"	---	---	
Chloroform	914	---	250	"	"	"	---	91	"	---	---	
Chloromethane	869	---	250	"	"	"	---	87	"	---	---	
2-Chlorotoluene	1100	---	25.0	"	"	"	---	110	"	---	---	
4-Chlorotoluene	1060	---	50.0	"	"	"	---	106	"	---	---	
1,2-Dibromo-3-chloropropane	1110	---	100	"	"	"	---	111	"	---	---	
Dibromochloromethane	1080	---	100	"	"	"	---	108	"	---	---	
1,2-Dibromoethane (EDB)	1140	---	25.0	"	"	"	---	114	"	---	---	
Dibromomethane	967	---	50.0	"	"	"	---	97	"	---	---	
1,2-Dichlorobenzene	1060	---	25.0	"	"	"	---	106	"	---	---	
1,3-Dichlorobenzene	1050	---	25.0	"	"	"	---	105	"	---	---	
1,4-Dichlorobenzene	1050	---	50.0	"	"	"	---	105	"	---	---	
Dichlorodifluoromethane	1010	---	100	"	"	"	---	101	"	---	---	
1,1-Dichloroethane	970	---	25.0	"	"	"	---	97	"	---	---	
1,2-Dichloroethane (EDC)	925	---	25.0	"	"	"	---	92	"	---	---	
1,1-Dichloroethene	937	---	25.0	"	"	"	---	94	"	---	---	
cis-1,2-Dichloroethene	986	---	25.0	"	"	"	---	99	"	---	---	
trans-1,2-Dichloroethene	886	---	50.0	"	"	"	---	89	"	---	---	
1,2-Dichloropropane	905	---	25.0	"	"	"	---	90	"	---	---	
1,3-Dichloropropane	1070	---	25.0	"	"	"	---	107	"	---	---	
2,2-Dichloropropane	1040	---	50.0	"	"	"	---	104	"	---	---	

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Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:

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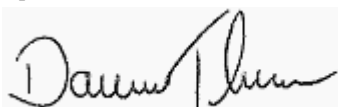
## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>LCS (1001199-BS1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 12:24						
1,1-Dichloropropene	892	---	100	ug/kg wet	"	"	---	89	"	---	---	
cis-1,3-Dichloropropene	1050	---	100	"	"	"	---	105	"	---	---	
trans-1,3-Dichloropropene	1050	---	100	"	"	"	---	105	"	---	---	
Ethylbenzene	1090	---	25.0	"	"	"	---	109	"	---	---	
Hexachlorobutadiene	1060	---	250	"	"	"	---	106	"	---	---	
2-Hexanone	1920	---	500	"	"	2000	---	96	"	---	---	
Isopropylbenzene	1100	---	50.0	"	"	1000	---	110	"	---	---	
4-Isopropyltoluene	1110	---	50.0	"	"	"	---	111	"	---	---	
4-Methyl-2-pentanone (MiBK)	1900	---	500	"	"	2000	---	95	"	---	---	
Methyl tert-butyl ether (MTBE)	856	---	50.0	"	"	1000	---	86	"	---	---	
Methylene chloride	844	---	250	"	"	"	---	84	"	---	---	
Naphthalene	902	---	250	"	"	"	---	90	"	---	---	
n-Propylbenzene	1100	---	25.0	"	"	"	---	110	"	---	---	
Styrene	1090	---	100	"	"	"	---	109	"	---	---	
1,1,1,2-Tetrachloroethane	1110	---	50.0	"	"	"	---	111	"	---	---	
1,1,2,2-Tetrachloroethane	1090	---	50.0	"	"	"	---	109	"	---	---	
Tetrachloroethene (PCE)	1040	---	50.0	"	"	"	---	104	"	---	---	
Toluene	1070	---	50.0	"	"	"	---	107	"	---	---	
1,2,3-Trichlorobenzene	1090	---	100	"	"	"	---	109	"	---	---	
1,2,4-Trichlorobenzene	1100	---	100	"	"	"	---	110	"	---	---	
1,1,1-Trichloroethane	934	---	50.0	"	"	"	---	93	"	---	---	
1,1,2-Trichloroethane	1050	---	50.0	"	"	"	---	105	"	---	---	
Trichloroethene (TCE)	960	---	25.0	"	"	"	---	96	"	---	---	
Trichlorofluoromethane	931	---	100	"	"	"	---	93	"	---	---	
1,2,3-Trichloropropane	1100	---	50.0	"	"	"	---	110	"	---	---	
1,2,4-Trimethylbenzene	1080	---	50.0	"	"	"	---	108	"	---	---	
1,3,5-Trimethylbenzene	1080	---	50.0	"	"	"	---	108	"	---	---	
Vinyl chloride	890	---	25.0	"	"	"	---	89	"	---	---	
m,p-Xylene	2160	---	50.0	"	"	2000	---	108	"	---	---	
o-Xylene	1060	---	25.0	"	"	1000	---	106	"	---	---	

Surr: Dibromofluoromethane (Surr)	Recovery: 98 %	Limits: 70-130 %	Dilution: 1x
1,4-Difluorobenzene (Surr)	97 %	70-130 %	"
Toluene-d8 (Surr)	105 %	70-130 %	"
4-Bromofluorobenzene (Surr)	103 %	70-130 %	"

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4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

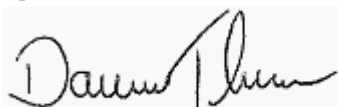
Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Matrix Spike (1001199-MS1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 19:59						
<b>QC Source Sample: B10-9 (A10A107-57)</b>												
<b>5035/8260B</b>												
Acetone	1660	---	1520	ug/kg dry	50	3160	ND	53	65-135%	---	---	Q-01
Benzene	1390	---	19.0	"	"	1580	ND	88	"	---	---	
Bromobenzene	1620	---	38.1	"	"	"	ND	102	"	---	---	
Bromochloromethane	1570	---	76.1	"	"	"	ND	100	"	---	---	
Bromodichloromethane	1410	---	38.1	"	"	"	ND	89	"	---	---	
Bromoform	1610	---	76.1	"	"	"	ND	102	"	---	---	
Bromomethane	1250	---	76.1	"	"	"	ND	79	"	---	---	
2-Butanone (MEK)	1970	---	76.1	"	"	3160	ND	62	"	---	---	Q-01
n-Butylbenzene	1810	---	76.1	"	"	1580	ND	115	"	---	---	
sec-Butylbenzene	1690	---	76.1	"	"	"	ND	107	"	---	---	
tert-Butylbenzene	1660	---	76.1	"	"	"	ND	105	"	---	---	
Carbon tetrachloride	1480	---	152	"	"	"	ND	94	"	---	---	
Chlorobenzene	1640	---	38.1	"	"	"	ND	104	"	---	---	
Chloroethane	1590	---	76.1	"	"	"	ND	101	"	---	---	
Chloroform	1350	---	38.1	"	"	"	ND	85	"	---	---	
Chloromethane	1280	---	38.1	"	"	"	ND	81	"	---	---	
2-Chlorotoluene	1690	---	38.1	"	"	"	ND	107	"	---	---	
4-Chlorotoluene	1600	---	76.1	"	"	"	ND	101	"	---	---	
1,2-Dibromo-3-chloropropane	1550	---	152	"	"	"	ND	98	"	---	---	
Dibromochloromethane	1630	---	152	"	"	"	ND	103	"	---	---	
1,2-Dibromoethane (EDB)	1670	---	38.1	"	"	"	ND	106	"	---	---	
Dibromomethane	1450	---	76.1	"	"	"	ND	92	"	---	---	
1,2-Dichlorobenzene	1590	---	38.1	"	"	"	ND	101	"	---	---	
1,3-Dichlorobenzene	1560	---	38.1	"	"	"	ND	99	"	---	---	
1,4-Dichlorobenzene	1600	---	76.1	"	"	"	ND	101	"	---	---	
Dichlorodifluoromethane	1520	---	152	"	"	"	ND	96	"	---	---	
1,1-Dichloroethane	1460	---	38.1	"	"	"	ND	92	"	---	---	
1,2-Dichloroethane (EDC)	1370	---	38.1	"	"	"	ND	87	"	---	---	
1,1-Dichloroethene	1350	---	38.1	"	"	"	ND	85	"	---	---	
cis-1,2-Dichloroethene	1440	---	38.1	"	"	"	ND	91	"	---	---	
trans-1,2-Dichloroethene	1280	---	76.1	"	"	"	ND	81	"	---	---	
1,2-Dichloropropane	1370	---	38.1	"	"	"	ND	87	"	---	---	
1,3-Dichloropropane	1620	---	38.1	"	"	"	ND	103	"	---	---	

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Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

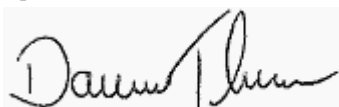
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Matrix Spike (1001199-MS1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 19:59						
<b>QC Source Sample: B10-9 (A10A107-57)</b>												
2,2-Dichloropropane	1340	---	76.1	ug/kg dry	"	"	ND	85	"	---	---	
1,1-Dichloropropene	1330	---	152	"	"	"	ND	84	"	---	---	
cis-1,3-Dichloropropene	1610	---	152	"	"	"	ND	102	"	---	---	
trans-1,3-Dichloropropene	1520	---	152	"	"	"	ND	96	"	---	---	
Ethylbenzene	1660	---	38.1	"	"	"	ND	105	"	---	---	
Hexachlorobutadiene	2040	---	381	"	"	"	ND	129	"	---	---	
2-Hexanone	2290	---	761	"	"	3160	ND	73	"	---	---	
Isopropylbenzene	1690	---	76.1	"	"	1580	ND	107	"	---	---	
4-Isopropyltoluene	1730	---	76.1	"	"	"	ND	109	"	---	---	
4-Methyl-2-pentanone (MiBK)	2860	---	761	"	"	3160	ND	90	"	---	---	
Methyl tert-butyl ether (MTBE)	1260	---	76.1	"	"	1580	ND	80	"	---	---	
Methylene chloride	1220	---	381	"	"	"	ND	77	"	---	---	
Naphthalene	1650	---	381	"	"	"	ND	104	"	---	---	
n-Propylbenzene	1640	---	38.1	"	"	"	ND	104	"	---	---	
Styrene	1680	---	152	"	"	"	ND	106	"	---	---	
1,1,1,2-Tetrachloroethane	1670	---	76.1	"	"	"	ND	106	"	---	---	
1,1,2,2-Tetrachloroethane	1590	---	76.1	"	"	"	ND	101	"	---	---	
Tetrachloroethene (PCE)	1560	---	76.1	"	"	"	ND	99	"	---	---	
Toluene	1680	---	76.1	"	"	"	ND	106	"	---	---	
1,2,3-Trichlorobenzene	1780	---	152	"	"	"	ND	113	"	---	---	
1,2,4-Trichlorobenzene	1720	---	152	"	"	"	ND	109	"	---	---	
1,1,1-Trichloroethane	1350	---	76.1	"	"	"	ND	86	"	---	---	
1,1,2-Trichloroethane	1560	---	76.1	"	"	"	ND	99	"	---	---	
Trichloroethene (TCE)	1440	---	38.1	"	"	"	ND	91	"	---	---	
Trichlorofluoromethane	1350	---	152	"	"	"	ND	86	"	---	---	
1,2,3-Trichloropropane	1600	---	76.1	"	"	"	ND	101	"	---	---	
1,2,4-Trimethylbenzene	1680	---	76.1	"	"	"	ND	107	"	---	---	
1,3,5-Trimethylbenzene	1630	---	76.1	"	"	"	ND	103	"	---	---	
Vinyl chloride	1370	---	38.1	"	"	"	ND	87	"	---	---	
m,p-Xylene	3280	---	76.1	"	"	3160	ND	104	"	---	---	
o-Xylene	1610	---	38.1	"	"	1580	ND	102	"	---	---	

Surr: Dibromofluoromethane (Surr)  
1,4-Difluorobenzene (Surr)

Recovery: 95 % Limits: 70-130 % Dilution: 1x  
97 % 70-130 % "

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

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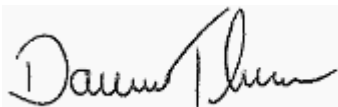
Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Volatile Organic Compounds by EPA 8260B

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001199 - EPA 5035A</b>						<b>Soil</b>						
<b>Matrix Spike (1001199-MS1)</b>						Prepared: 01/15/10 16:47 Analyzed: 01/16/10 19:59						
<b>QC Source Sample: B10-9 (A10A107-57)</b>												
Surr: Toluene-d8 (Surr)			Recovery: 109 %		Limits: 70-130 %		Dilution: 1x					
4-Bromofluorobenzene (Surr)			101 %		70-130 %		"					

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**  
 4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**  
 Project Number: 21030.000  
 Project Manager: Marsha Walker

**Reported:**  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Polychlorinated Biphenyls by EPA 8082A

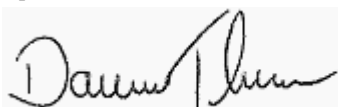
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001252 - EPA 3546</b>												
<b>Soil</b>												
<b>Blank (1001252-BLK1)</b>			Prepared: 01/20/10 15:02 Analyzed: 01/22/10 09:26						<b>C-07</b>			
<b>EPA 8082A</b>												
Aroclor 1016	ND	---	10.0	ug/kg wet	1	---	---	---	---	---	---	
Aroclor 1221	ND	---	10.0	"	"	---	---	---	---	---	---	
Aroclor 1232	ND	---	10.0	"	"	---	---	---	---	---	---	
Aroclor 1242	ND	---	10.0	"	"	---	---	---	---	---	---	
Aroclor 1248	ND	---	10.0	"	"	---	---	---	---	---	---	
Aroclor 1254	ND	---	10.0	"	"	---	---	---	---	---	---	
Aroclor 1260	ND	---	10.0	"	"	---	---	---	---	---	---	

Surr: 2,4,5,6-TCMX (Surr) Recovery: 91 % Limits: 50-125 % Dilution: 1x  
 Decachlorobiphenyl (Surr) 101 % 55-130 % "

<b>LCS (1001252-BS1)</b>			Prepared: 01/20/10 15:02 Analyzed: 01/22/10 09:41						<b>C-07</b>			
<b>EPA 8082A</b>												
Aroclor 1016	269	---	10.0	ug/kg wet	1	250	---	108	40-140%	---	---	
Aroclor 1260	305	---	10.0	"	"	"	---	122	60-130%	---	---	

Surr: 2,4,5,6-TCMX (Surr) Recovery: 97 % Limits: 50-125 % Dilution: 1x  
 Decachlorobiphenyl (Surr) 106 % 55-130 % "

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Reported:

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## QUALITY CONTROL (QC) SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----	-----------------	-------	------	--------------	---------------	------	-------------	-----	-----------	-------

**Batch 1001245 - EPA 3546**

**Soil**

**Blank (1001245-BLK1)**

Prepared: 01/20/10 11:07 Analyzed: 01/20/10 16:42

**EPA 8270C (SIM)**

Acenaphthene	ND	---	6.67	ug/kg wet	1	---	---	---	---	---	---	---
Acenaphthylene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Benz(a)anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Benzo(a)pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Benzo(b)fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Benzo(k)fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Benzo(b+k)fluoranthene(s)	ND	---	13.3	"	"	---	---	---	---	---	---	---
Benzo(g,h,i)perylene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Chrysene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Dibenz(a,h)anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Fluorene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Naphthalene	ND	---	13.3	"	"	---	---	---	---	---	---	---
Phenanthrene	ND	---	6.67	"	"	---	---	---	---	---	---	---
Pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	---

Surr: Nitrobenzene-d5 (Surr)

Recovery: 72 %

Limits: 35-120 %

Dilution: 1x

2-Fluorobiphenyl (Surr)

88 %

45-120 %

"

p-Terphenyl-d14 (Surr)

88 %

30-120 %

"

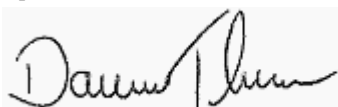
**LCS (1001245-BS1)**

Prepared: 01/20/10 11:07 Analyzed: 01/20/10 17:09

**EPA 8270C (SIM)**

Acenaphthene	243	---	6.67	ug/kg wet	1	333	---	73	45-125%	---	---	---
Acenaphthylene	237	---	6.67	"	"	"	---	71	"	---	---	---
Anthracene	251	---	6.67	"	"	"	---	75	55-125%	---	---	---
Benz(a)anthracene	258	---	6.67	"	"	"	---	77	50-125%	---	---	---
Benzo(a)pyrene	257	---	6.67	"	"	"	---	77	"	---	---	---
Benzo(b)fluoranthene	266	---	6.67	"	"	"	---	80	45-125%	---	---	---
Benzo(k)fluoranthene	266	---	6.67	"	"	"	---	80	"	---	---	---
Benzo(b+k)fluoranthene(s)	525	---	13.3	"	"	667	---	79	"	---	---	---
Benzo(g,h,i)perylene	266	---	6.67	"	"	333	---	80	40-125%	---	---	---
Chrysene	269	---	6.67	"	"	"	---	81	55-125%	---	---	---
Dibenz(a,h)anthracene	270	---	6.67	"	"	"	---	81	40-125%	---	---	---

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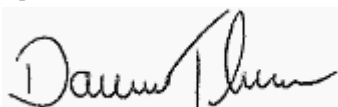
**Reported:**  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001245 - EPA 3546</b>						<b>Soil</b>						
<b>LCS (1001245-BS1)</b>						Prepared: 01/20/10 11:07 Analyzed: 01/20/10 17:09						
Fluoranthene	259	---	6.67	ug/kg wet	"	"	---	78	55-125%	---	---	
Fluorene	241	---	6.67	"	"	"	---	72	50-125%	---	---	
Indeno(1,2,3-cd)pyrene	253	---	6.67	"	"	"	---	76	40-125%	---	---	
Naphthalene	246	---	13.3	"	"	"	---	74	"	---	---	
Phenanthrene	255	---	6.67	"	"	"	---	76	50-125%	---	---	
Pyrene	259	---	6.67	"	"	"	---	78	45-125%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>			<i>Recovery: 73 %</i>		<i>Limits: 35-120 %</i>		<i>Dilution: 1x</i>					
<i>2-Fluorobiphenyl (Surr)</i>			<i>83 %</i>		<i>45-120 %</i>		<i>"</i>					
<i>p-Terphenyl-d14 (Surr)</i>			<i>80 %</i>		<i>30-120 %</i>		<i>"</i>					

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Project: **510 NW 3rd**

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Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----	-----------------	-------	------	--------------	---------------	------	-------------	-----	-----------	-------

**Batch 1001250 - EPA 3546/3640A (GPC)**

**Soil**

Blank (1001250-BLK1)

Prepared: 01/20/10 11:07 Analyzed: 01/21/10 12:55

C-05

EPA 8270C (SIM)

Acenaphthene	ND	---	6.67	ug/kg wet	1	---	---	---	---	---	---	
Acenaphthylene	ND	---	6.67	"	"	---	---	---	---	---	---	
Anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	
Benz(a)anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	
Benzo(a)pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	
Benzo(b)fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	
Benzo(k)fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	
Benzo(b+k)fluoranthene(s)	ND	---	13.3	"	"	---	---	---	---	---	---	
Benzo(g,h,i)perylene	ND	---	6.67	"	"	---	---	---	---	---	---	
Chrysene	ND	---	6.67	"	"	---	---	---	---	---	---	
Dibenz(a,h)anthracene	ND	---	6.67	"	"	---	---	---	---	---	---	
Fluoranthene	ND	---	6.67	"	"	---	---	---	---	---	---	
Fluorene	ND	---	6.67	"	"	---	---	---	---	---	---	
Indeno(1,2,3-cd)pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	
Naphthalene	ND	---	13.3	"	"	---	---	---	---	---	---	
Phenanthrene	ND	---	6.67	"	"	---	---	---	---	---	---	
Pyrene	ND	---	6.67	"	"	---	---	---	---	---	---	

Surr: Nitrobenzene-d5 (Surr)

Recovery: 57 % Limits: 35-120 % Dilution: 1x

2-Fluorobiphenyl (Surr)

66 % 45-120 % "

p-Terphenyl-d14 (Surr)

85 % 30-120 % "

**LCS (1001250-BS1)**

Prepared: 01/20/10 11:07 Analyzed: 01/21/10 13:22

C-05

EPA 8270C (SIM)

Acenaphthene	233	---	6.67	ug/kg wet	1	333	---	70	45-125%	---	---	
Acenaphthylene	225	---	6.67	"	"	"	---	67	"	---	---	
Anthracene	249	---	6.67	"	"	"	---	75	55-125%	---	---	
Benz(a)anthracene	295	---	6.67	"	"	"	---	88	50-125%	---	---	
Benzo(a)pyrene	293	---	6.67	"	"	"	---	88	"	---	---	
Benzo(b)fluoranthene	302	---	6.67	"	"	"	---	91	45-125%	---	---	
Benzo(k)fluoranthene	315	---	6.67	"	"	"	---	94	"	---	---	
Benzo(b+k)fluoranthene(s)	609	---	13.3	"	"	667	---	91	"	---	---	
Benzo(g,h,i)perylene	283	---	6.67	"	"	333	---	85	40-125%	---	---	
Chrysene	307	---	6.67	"	"	"	---	92	55-125%	---	---	
Dibenz(a,h)anthracene	308	---	6.67	"	"	"	---	92	40-125%	---	---	

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Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

Reported:  
 03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001250 - EPA 3546/3640A (GPC)</b>						<b>Soil</b>						
<b>LCS (1001250-BS1)</b>						Prepared: 01/20/10 11:07 Analyzed: 01/21/10 13:22						<b>C-05</b>
Fluoranthene	282	---	6.67	ug/kg wet	"	"	---	85	55-125%	---	---	
Fluorene	235	---	6.67	"	"	"	---	70	50-125%	---	---	
Indeno(1,2,3-cd)pyrene	289	---	6.67	"	"	"	---	87	40-125%	---	---	
Naphthalene	236	---	13.3	"	"	"	---	71	"	---	---	
Phenanthrene	255	---	6.67	"	"	"	---	77	50-125%	---	---	
Pyrene	283	---	6.67	"	"	"	---	85	45-125%	---	---	
<i>Surr: Nitrobenzene-d5 (Surr)</i>			<i>Recovery: 70 %</i>		<i>Limits: 35-120 %</i>		<i>Dilution: 1x</i>					
<i>2-Fluorobiphenyl (Surr)</i>			<i>66 %</i>		<i>45-120 %</i>		<i>"</i>					
<i>p-Terphenyl-d14 (Surr)</i>			<i>92 %</i>		<i>30-120 %</i>		<i>"</i>					

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03/06/10 11:01

## QUALITY CONTROL (QC) SAMPLE RESULTS

### Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001210 - EPA 3051A</b>						<b>Soil</b>						
<b>Blank (1001210-BLK1)</b>						Prepared: 01/18/10 17:30 Analyzed: 01/19/10 11:51						
<b>EPA 6020</b>												
Arsenic	ND	---	2.00	mg/kg wet	10	---	---	---	---	---	---	---
Barium	ND	---	1.00	"	"	---	---	---	---	---	---	---
Cadmium	ND	---	1.00	"	"	---	---	---	---	---	---	---
Chromium	ND	---	2.00	"	"	---	---	---	---	---	---	---
Lead	ND	---	1.00	"	"	---	---	---	---	---	---	---
Mercury	ND	---	0.0800	"	"	---	---	---	---	---	---	---
Selenium	ND	---	2.00	"	"	---	---	---	---	---	---	---
Silver	ND	---	1.00	"	"	---	---	---	---	---	---	---
<b>LCS (1001210-BS1)</b>						Prepared: 01/18/10 17:30 Analyzed: 01/19/10 11:53						
<b>EPA 6020</b>												
Arsenic	50.0	---	2.00	mg/kg wet	10	50.0	---	100	80-120%	---	---	---
Barium	49.8	---	1.00	"	"	"	---	99	"	---	---	---
Cadmium	50.7	---	1.00	"	"	"	---	101	"	---	---	---
Chromium	49.1	---	2.00	"	"	"	---	98	"	---	---	---
Lead	50.4	---	1.00	"	"	"	---	101	"	---	---	---
Mercury	1.98	---	0.0800	"	"	2.00	---	99	"	---	---	---
Selenium	23.9	---	2.00	"	"	25.0	---	96	"	---	---	---
Silver	24.7	---	1.00	"	"	"	---	99	"	---	---	---
<b>Duplicate (1001210-DUP1)</b>						Prepared: 01/18/10 17:30 Analyzed: 01/19/10 12:56						
<b>QC Source Sample: B7-7 (A10A107-27)</b>												
<b>EPA 6020</b>												
Arsenic	<b>8.41</b>	---	2.56	mg/kg dry	10	---	8.58	---	---	2	40%	---
Barium	<b>228</b>	---	1.28	"	"	---	246	---	---	8	40%	---
Cadmium	ND	---	1.28	"	"	---	ND	---	---	---	40%	---
Chromium	<b>32.0</b>	---	2.56	"	"	---	31.6	---	---	1	40%	---
Lead	<b>17.2</b>	---	1.28	"	"	---	17.3	---	---	0.5	40%	---
Mercury	ND	---	0.103	"	"	---	ND	---	---	---	40%	---
Selenium	ND	---	2.56	"	"	---	ND	---	---	---	40%	---
Silver	ND	---	1.28	"	"	---	ND	---	---	---	40%	---
<b>Matrix Spike (1001210-MS2)</b>						Prepared: 01/18/10 17:30 Analyzed: 01/19/10 12:59						
<b>QC Source Sample: B7-7 (A10A107-27)</b>												

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 Project Manager: Marsha Walker

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## QUALITY CONTROL (QC) SAMPLE RESULTS

### Total Metals by EPA 6020 (ICPMS)

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001210 - EPA 3051A</b>						<b>Soil</b>						
<b>Matrix Spike (1001210-MS2)</b>						Prepared: 01/18/10 17:30 Analyzed: 01/19/10 12:59						
<b>QC Source Sample: B7-7 (A10A107-27)</b>												
<b>EPA 6020</b>												
Arsenic	69.5	---	2.58	mg/kg dry	10	64.6	8.58	94	75-125%	---	---	
Barium	295	---	1.29	"	"	"	246	76	"	---	---	
Cadmium	63.2	---	1.29	"	"	"	0.509	97	"	---	---	
Chromium	91.7	---	2.58	"	"	"	31.6	93	"	---	---	
Lead	77.5	---	1.29	"	"	"	17.3	93	"	---	---	
Mercury	2.47	---	0.103	"	"	2.58	0.0381	94	"	---	---	
Selenium	29.8	---	2.58	"	"	32.3	0.547	91	"	---	---	
Silver	30.9	---	1.29	"	"	"	ND	96	"	---	---	

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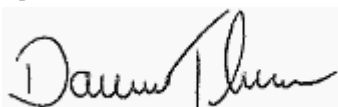
## QUALITY CONTROL (QC) SAMPLE RESULTS

### Percent Dry Weight by D2216

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 1001159 - Dry Weight</b>						<b>Soil</b>						
<b>Duplicate (1001159-DUP2)</b>						Prepared: 01/13/10 15:20 Analyzed: 01/14/10 08:55						
QC Source Sample: B4-20 (A10A107-18)												
D2216												
% Solids	71.8	---	1.00	% by Weight	1	---	73.1	---	---	2	20%	
<b>Duplicate (1001159-DUP3)</b>						Prepared: 01/13/10 15:20 Analyzed: 01/14/10 08:55						
QC Source Sample: B12-8 (A10A107-48)												
D2216												
% Solids	69.8	---	1.00	% by Weight	1	---	67.9	---	---	3	20%	
<b>Batch 1001234 - Dry Weight</b>						<b>Soil</b>						

No Client related Batch QC samples analyzed for this batch. See notes page for more information.

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## SAMPLE PREPARATION INFORMATION

### Diesel Range (C10-C22) and Oil Range (C22-C40) Hydrocarbons by NWTPH-Dx

**Prep: EPA 3546 (Fuels)**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001169</b>							
A10A107-01	Soil	NWTPH-Dx	01/12/10 09:00	01/14/10 11:50	11.01g/5mL	15g/5mL	1.36
A10A107-04	Soil	NWTPH-Dx	01/12/10 09:20	01/14/10 11:50	11.42g/5mL	15g/5mL	1.31
A10A107-07	Soil	NWTPH-Dx	01/12/10 09:35	01/14/10 11:50	12.56g/5mL	15g/5mL	1.19
A10A107-10	Soil	NWTPH-Dx	01/12/10 09:55	01/14/10 11:50	10.43g/5mL	15g/5mL	1.44
A10A107-14	Soil	NWTPH-Dx	01/12/10 00:00	01/14/10 11:50	10.7g/5mL	15g/5mL	1.40
A10A107-55	Soil	NWTPH-Dx	01/12/10 00:00	01/14/10 11:47	11.39g/5mL	15g/5mL	1.32
<b>Batch: 1001187</b>							
A10A107-18	Soil	NWTPH-Dx	01/12/10 10:45	01/15/10 11:06	13g/5mL	15g/5mL	1.15
A10A107-19	Soil	NWTPH-Dx	01/12/10 11:00	01/15/10 11:06	13.83g/5mL	15g/5mL	1.08
A10A107-21	Soil	NWTPH-Dx	01/12/10 11:10	01/15/10 11:06	12.71g/5mL	15g/5mL	1.18
A10A107-23	Soil	NWTPH-Dx	01/12/10 11:20	01/15/10 11:06	13.65g/5mL	15g/5mL	1.10
A10A107-27	Soil	NWTPH-Dx	01/12/10 11:40	01/15/10 11:06	12.79g/5mL	15g/5mL	1.17
A10A107-32	Soil	NWTPH-Dx	01/12/10 12:10	01/15/10 11:06	12.47g/5mL	15g/5mL	1.20
A10A107-35	Soil	NWTPH-Dx	01/12/10 12:55	01/15/10 11:06	13.72g/5mL	15g/5mL	1.09
A10A107-37	Soil	NWTPH-Dx	01/12/10 00:00	01/15/10 11:06	13.49g/5mL	15g/5mL	1.11
A10A107-43	Soil	NWTPH-Dx	01/12/10 00:00	01/15/10 11:06	12.41g/5mL	15g/5mL	1.21
A10A107-48	Soil	NWTPH-Dx	01/12/10 00:00	01/15/10 11:06	12.63g/5mL	15g/5mL	1.19
A10A107-57	Soil	NWTPH-Dx	01/12/10 13:00	01/15/10 11:06	12.76g/5mL	15g/5mL	1.18
<b>Batch: 1001240</b>							
A10A107-52	Soil	NWTPH-Dx	01/12/10 00:00	01/20/10 09:00	13.03g/5mL	15g/5mL	1.15
A10A107-53	Soil	NWTPH-Dx	01/12/10 00:00	01/20/10 09:00	13.12g/5mL	15g/5mL	1.14
A10A107-56	Soil	NWTPH-Dx	01/12/10 15:00	01/20/10 09:00	13.18g/5mL	15g/5mL	1.14

### Gasoline Range Hydrocarbons (Benzene to Naphthalene) by NWTPH-Gx

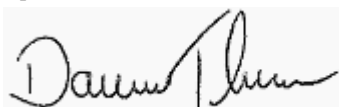
**Prep: EPA 5035A**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001199</b>							
A10A107-43	Soil	NWTPH-Gx	01/12/10 00:00	01/13/10 14:05	11.335g/10mL	10g/10mL	0.88
A10A107-57	Soil	NWTPH-Gx	01/12/10 13:00	01/13/10 14:05	11.818g/10mL	10g/10mL	0.85
<b>Batch: 1001201</b>							
A10A107-37RE1	Soil	NWTPH-Gx	01/12/10 00:00	01/13/10 14:05	12.066g/10mL	10g/10mL	0.83

### BTEX Compounds by EPA 8260B

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Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

## SAMPLE PREPARATION INFORMATION

### BTEX Compounds by EPA 8260B

**Prep: EPA 5035A**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001238</b>							
A10A107-55	Soil	5035/8260B	01/12/10 00:00	01/19/10 16:30	11.81g/10mL	10g/10mL	0.85

### Volatile Organic Compounds by EPA 8260B

**Prep: EPA 5035A**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001199</b>							
A10A107-57	Soil	5035/8260B	01/12/10 13:00	01/13/10 14:05	11.818g/10mL	10g/10mL	0.85

### Polychlorinated Biphenyls by EPA 8082A

**Prep: EPA 3546**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001252</b>							
A10A107-07	Soil	EPA 8082A	01/12/10 09:35	01/20/10 15:02	14.94g/5mL	10g/5mL	0.67
A10A107-23	Soil	EPA 8082A	01/12/10 11:20	01/20/10 15:02	14.88g/5mL	10g/5mL	0.67

### Polyaromatic Hydrocarbons (PAH) by EPA 8270C SIM

**Prep: EPA 3546/3640A (GPC)**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001250</b>							
A10A107-07RE1	Soil	EPA 8270C (SIM)	01/12/10 09:35	01/20/10 11:07	12.13g/10mL	15g/5mL	2.47
A10A107-23RE1	Soil	EPA 8270C (SIM)	01/12/10 11:20	01/20/10 11:07	13.98g/20mL	15g/5mL	4.29
A10A107-55RE2	Soil	EPA 8270C (SIM)	01/12/10 00:00	01/20/10 11:07	13.39g/5mL	15g/5mL	1.12

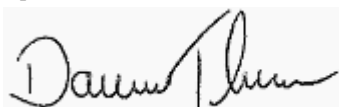
### Total Metals by EPA 6020 (ICPMS)

**Prep: EPA 3051A**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<b>Batch: 1001210</b>							
A10A107-04	Soil	EPA 6020	01/12/10 09:20	01/18/10 17:30	0.495g/50mL	0.5g/50mL	1.01
A10A107-10	Soil	EPA 6020	01/12/10 09:55	01/18/10 17:30	0.507g/50mL	0.5g/50mL	0.99
A10A107-14	Soil	EPA 6020	01/12/10 00:00	01/18/10 17:30	0.494g/50mL	0.5g/50mL	1.01
A10A107-19	Soil	EPA 6020	01/12/10 11:00	01/18/10 17:30	0.502g/50mL	0.5g/50mL	1.00
A10A107-23	Soil	EPA 6020	01/12/10 11:20	01/18/10 17:30	0.502g/50mL	0.5g/50mL	1.00

Apex Laboratories

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
 Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
 Project Manager: Marsha Walker

Reported:  
 03/06/10 11:01

**SAMPLE PREPARATION INFORMATION**

**Total Metals by EPA 6020 (ICPMS)**

**Prep: EPA 3051A**

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
A10A107-27	Soil	EPA 6020	01/12/10 11:40	01/18/10 17:30	0.508g/50mL	0.5g/50mL	0.98
A10A107-31	Soil	EPA 6020	01/12/10 12:00	01/18/10 17:30	0.491g/50mL	0.5g/50mL	1.02
A10A107-37	Soil	EPA 6020	01/12/10 00:00	01/18/10 17:30	0.507g/50mL	0.5g/50mL	0.99

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

## Notes and Definitions

### Qualifiers:

- A-02 Detected hydrocarbon pattern resembles creosote or similar product
- C-05 Extract has undergone a GPC (Gel-Permeation Chromatography) cleanup per EPA 3640A.
- C-07 Extract has undergone Sulfuric Acid Cleanup by EPA 3665A, Sulfur Cleanup by EPA 3660B, and Florisil Cleanup by EPA 3620B in order to minimize matrix interference.
- F-02 Results in the reported range are primarily due to a mid-range hydrocarbon.
- F-03 The result for this hydrocarbon range is elevated due to the presence of individual analyte peaks in the quantitation range that are not representative of the fuel pattern reported.
- F-05 The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
- F-09 Results in the Gasoline Range are primarily due to overlap from a heavier fuel hydrocarbon product.
- F-12 The result for this hydrocarbon range is primarily due to the presence of individual analyte peaks in the quantitation range. No fuel pattern detected.
- Q-01 Percent recovery and/or RPD is outside acceptance limits.
- Q-26 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)Fluoranthenes.
- R-01 The Reporting Limit for this analyte has been raised to account for matrix interference.
- S-01 Surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference.
- S-02 Surrogate recovery cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.
- V-06 Sample aliquot was subsampled from a soil jar with minimal headspace. The subsampled aliquot was preserved in methanol within 48 hours of sampling.
- V-08 Sample aliquot was subsampled from a soil jar with significant headspace. The subsampled aliquot was not preserved in methanol within 48 hours of sampling. Results are likely biased low.

### Notes and Conventions:

- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit

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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**

Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

NR Not Reported

dry Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry' designation are not dry weight corrected.

RPD Relative Percent Difference

MDL If MDL is not listed, data has been evaluated to the Method Reporting Limit only.

WMSC Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.

Batch QC Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.

Blank Policy Apex assesses blank data for potential high bias down to a level equal to 1/2 the method reporting limit (MRL), except for conventional chemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the blank for organic analyses.

For accurate comparison of volatile results to the level found in the blank; water sample results should be divided by the dilution factor, and soil sample results should be divided by 1/50 of the sample dilution to account for the sample prep factor.

Results qualified as reported below the MRL may include a potential high bias if associated with a B or B-02 qualified blank. B and B-02 qualifications are not applied to J qualified results reported below the MRL.

Apex Laboratories



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Darwin Thomas, Business Development Director

**PBS Engineering and Environmental**  
4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**  
Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

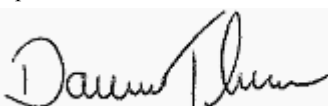
**APEX LABS**  
**CHAIN OF CUSTODY**  
 Lab #                      coc 1 of 6

Contract: PBS Project Name: 510 NW 3rd Project #: 21030.000  
 Address: 4412 SW Corbett, Portland Phone: 503.248.1939 Fax: 503.248.0223 Email: marsha@pbsenv.com  
 Sampled by: M Walker

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTR-HClD	NWTR-Ds	NWTR-Gs	RTX	R260 RHDM VOCs	R260 HALO VOCs	R260 SVOCs	R270 SIM PAHs	8082 PCBs	8081 CHLOR. PEST	PCFA Metals (8)	Priority Metals (13)	AL. SH. AR. BR. BA. CA. CR. CU. FE. NI. PB. SE. SI. ZN	8 Ag. M. TL. V. W.	TCLP Metals (8)	1390-COLS	1390-Z	
B1-5	1/16/10	0900	Soil	1	X																	
B1-10		0905		1																		
B1-15		0910		1																		
B2-5				1	X																	
B2-10		0920		1																		
B2-15				1																		
B2-17		0935		1	X																	
B2-20		0935		1																		
B2-25		0940		1																		
B3-5		0955		1	X																	

TAT Requested (circle): 24 HR 48 HR 72 HR  
 4 DAY 5 DAY Other: \_\_\_\_\_  
 Normal Turn Around Time (TAT) = 5-10 Business Days

HELD/UNHELD BY: Marsha Walker Date: 1/17/10 Signature: [Signature]  
 RECEIVED BY: Cam Obrien Date: 1/20 Signature: [Signature]  
 Printed Name: Marsha Walker Printed Name: Cam Obrien  
 Company: Apex Company: Apex

Apex Laboratories  


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**PBS Engineering and Environmental**  
4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**  
Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

Lab # **A10A107** coc 2 of 6

### CHAIN OF CUSTODY

### APEX LABS

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: <b>PBS</b>	Project Mgr: <b>Marsha Walker</b>	Project Name: <b>510 NW 3rd</b>	Project #: <b>21030.000</b>																						
Address: <b>4412 SW Corbett, PDX</b>	Phone: <b>503-248-1939</b>	Fax: <b>503-248-0223</b>	Email: <b>mar.walker@pbsenv.com</b>																						
Sampled by: <b>M Walker</b>																									
Site Location: <input checked="" type="radio"/> OR <input type="radio"/> WA																									
Other:																									
SAMPLE ID	LAB #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTR-PHCD	NWTR-PHDX	NWTR-PHGX	BTEX	8269 HAP VOCs	8269 RBDN VOCs	8269 HAP VOCs	8269 VOCs	8370 SINE PAHs	8082 PCBs	8081 Chlor. Pest	RCRA Metals (9)	Priority Metals (13)	AL, SR, AS, BA, BB, BI, BR, CA, CD, CE, CH, CO, CU, CR, CY, FE, NI, MN, NA, NH, NI, NO, PB, SE, SI, SN, S, T, TL, VA, ZN, ZN	TCLP Metals (9)	1200-COLS	1200-Z			
B3-10	11	1/24/10		SWC	1																				
B3-15	12	10/65			1																				
B3-20	13	10/10			1																				
B4-3.5	14				1		X																		
B4-5	15	10/25			1																				
B4-10	16	10/30			1																				
B4-15	17	10/35			1																				
B4-20	18	10/45			1		X																		
B5-5	19	11/00			1		X																		
B5-10	20				1																				
Normal Turn Around Time (TAT) = 5-10 Business Days																									
TAT Requested (circle)		24 HR	48 HR	72 HR																					
		4 DAY	5 DAY	Other:																					
SPECIAL INSTRUCTIONS:																									
RELINQUISHED BY: <b>Marsha Walker</b> Date: <b>1/13/10</b> Signature: <i>[Signature]</i>												RECEIVED BY: _____ Date: _____ Signature: _____													
Printed Name: <b>Marsha Walker</b> Title: <b>1200 1200 Cum O'Brien</b>												Printed Name: _____ Title: _____													
Company: <b>PBS</b>												Company: <b>Apex</b>													

Apex Laboratories

*[Signature]*

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**PBS Engineering and Environmental**  
4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**  
Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

**CHAIN OF CUSTODY**

**APEX LABS**      Lab # A10A107      coc 3 of 6

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: PBS      Project Name: 510 NW 3rd      Project # 21030.000  
 Address: 4412 SW Corbett, PDX      Project Mgr: Marsha Walker      Email: marsha@pbsenv.com  
 Sampled by: M Walker      Phone: 503-248-1937      Fax: 503-248-0223

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTRH-CID	NWTRH-D	NWTRH-G	BTEX	8169 RBDM VOCS	8169 Halo VOCS	8169 SIM PAHs	8082 PCBs	8081 Chlor. Pest	RCRA Metals (3)	Priority Metals (13)	M, Si, As, Ba, Be, Bi, Br, Cd, Cr, Cu, Pb, Se, Zn	Hg, Mg, Mn, Ni, N, N, N, N, N, N, N, N, N, N, N, N, N	Pb, Ag, Na, TL, V, Zn	TCLP Metals (3)	1200-COLS	1200-Z
B5-15	21 Mar 10	1110	Soil	1	X																
B5-20	22	1110		1																	
B6-5	23			1	X																
B6-10	24	1120		1																	
B6-15	25	1130		1																	
B6-20	26	1135		1																	
B7-7	27	1140		1	X																
B7-10	28			1																	
B7-15	29	1150		1																	
B7-20	30	1155		1																	

ANALYSIS REQUEST

SPECIAL INSTRUCTIONS:

Normal Turn Around Time (TAT) = 5-10 Business Days

TAT Requested (circle): 24 HR    48 HR    72 HR    5 DAY    Other: \_\_\_\_\_

SAMPLES ARE HELD FOR 30 DAYS

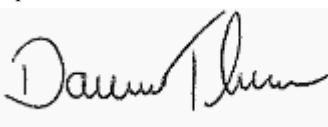
RELINQUISHED BY: Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Time: \_\_\_\_\_  
 Company: \_\_\_\_\_

RECEIVED BY: Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Time: \_\_\_\_\_  
 Company: \_\_\_\_\_

RELINQUISHED BY: Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Time: \_\_\_\_\_  
 Company: \_\_\_\_\_

RECEIVED BY: Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Time: \_\_\_\_\_  
 Company: \_\_\_\_\_

Apex Laboratories



Darwin Thomas, Business Development Director

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PBS Engineering and Environmental  
4412 SW Corbett Ave  
Portland, OR 97239

Project: 510 NW 3rd  
Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

**CHAIN OF CUSTODY**

**APEX LABS**      Lab # A10A107      coc # 4 of 6

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: PBS      Project Name: 510 NW 3rd Ave      Project #: 12030.000  
 Address: 4412 SW Corbett Ave      Phone: 503-248-1939      Fax: 503-248-0223      Email: Marsha@pbsenv.com  
 Sampled by: Marsha Walker

Site Location: OR      WA \_\_\_\_\_


SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS	NWTR-HCD	NWTR-DS	NWTR-GX	RTX	350 REDM VOCs	350 HAP VOCs	350 SVOCs	8170 SEM PAHs	8082 PCBs	8081 Chluc. Pchl	ICTLA Metals (8)	Priority Metals (13)	AL, SH, AS, BA, BR, CA, CD, CR, CU, FE, NI, PB, SE, SG, SI, MN, MR, Ni, Ni, V, Zn	TCLP Metals (8)	1209-COLS	1209-Z	
B8-3	3/1/10	1200	50L	1																	
B8-10	3/2	1210		1		X															
B8-15	3/3			1																	
B8-20	3/4	1215		1																	
B9-5	3/5	1255		1		X															
B9-10	3/6	1310		1																	
B9-15	3/7			1		X															
B9-20	3/8	1305		1		X															
B10-5	3/9			1																	
B10-12	4/0	1325		1																	

Normal Turn Around Time (TAT) = 5-10 Business Days

TAT Requested (circle): 34 HR    48 HR    72 HR    Other: \_\_\_\_\_  
 4 DAY    5 DAY

SPECIAL INSTRUCTIONS:

RELINQUISHED BY: Marsha Walker    Date: 7/13/10    RECEIVED BY: \_\_\_\_\_  
 Signature: \_\_\_\_\_    Printed Name: \_\_\_\_\_    Signature: \_\_\_\_\_  
 Project Name: Marsha Walker-1200 1200    Time: \_\_\_\_\_    Date: \_\_\_\_\_  
 Company: PBS    Company: Apex

Apex Laboratories  


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**PBS Engineering and Environmental**  
4412 SW Corbett Ave  
Portland, OR 97239

Project: **510 NW 3rd**  
Project Number: 21030.000  
Project Manager: Marsha Walker

Reported:  
03/06/10 11:01

**CHAIN OF CUSTODY**

**APEX LABS**      Lab # A10A107      Cox 5 of 6

12232 S.W. Garden Place, Tigard, OR 97223    Ph: 503-718-2323    Fax: 503-718-0333

Company: PBS      Project Name: 510 NW 3rd      Project #: 21030.000  
 Address: 4412 SW Corbett Ave      Project Mgr: Marsha Walker      Email: marsha@pbsenv.com  
 Sampled by: M. Walker      Phone: 503-248-0223      Fax: 503-248-0223

Site Location: OR      WA \_\_\_\_\_  
 Other: \_\_\_\_\_

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NVTRH-CHD	NVTRH-DS	NVTRH-CA	BTEX	R200 HHVH VOCs	R200 Halo VOCs	R200 VOCs	R270 SIM PAHs	R082 PCBs	R081 Chlor. Pest	RCRA Metals (9)	Priority Metals (13)	As, Sb, As, Hg, Pb, Cd, Cr, Cu, Ni, Zn	TCLP Metals (9)	1200-Z
B10-20	41	1/21/10	1330	Soil	1															
B11-5	42		1335		1															
B11-8	43				1		X	X												
B11-12	44				1															
B11-15	45		1345		1															
B11-20	46		1345		1															
B12-5	47		1400		1															
B12-8	48				1		X													
B12-15	49				1															
B12-20	50		1410		1															

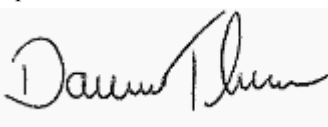
Normal Turn Around Time (TAT) = 5-10 Business Days

TAT Requested (circle): 24 HR    48 HR    72 HR    Other: \_\_\_\_\_  
 4 DAY    5 DAY

SPECIAL INSTRUCTIONS:

RELINQUISHED BY: Marsha Walker    RECEIVED BY: Cam Olvera  
 Signature: \_\_\_\_\_    Signature: \_\_\_\_\_  
 Date: 1/23/10    Date: \_\_\_\_\_  
 Printed Name: Marsha Walker    Printed Name: Cam Olvera  
 Company: PBS    Company: Apex

Apex Laboratories



Darwin Thomas, Business Development Director

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## **APPENDIX D**

---

Report of Geophysical Survey  
Well Logs



## GEOPHYSICAL SURVEY LETTER REPORT

PBS Engineering and Environmental  
4412 SW Corbett Avenue  
Portland, OR 97239

January 11, 2010  
Project number: 100102

### **Underground Storage Tank Survey 510 NW 3<sup>rd</sup> Avenue Portland, Oregon**

This letter report briefly describes a geophysical survey conducted across an underground storage tank (UST) at the above address. The survey was conducted to accurately locate the edges of the UST prior to collecting soil samples near the ends of the tank. A sampling location was cleared of underground obstructions near each end of the tank.

A GSSI SIR-2000 Ground Penetrating Radar (GPR) system coupled to a 270 MHz antenna was used to collect radar data in the vicinity of a UST vent pipe and fill port located near the southwest corner of the building. Several small hand-held metal detectors were also used.

A measuring tape was lowered through the fill port. The bottom of the tank was measured to be 102" below the ground surface (bgs). The bottom of the fill pipe was 56" bgs, giving the tank a diameter of about 48". The tank appeared to be dry. No odor was noticed.

At a depth of 54", the top of the tank was near the maximum depth that radar can penetrate in the Portland area. The tank was not seen in the many radar profiles made across it. Radar showed several obvious pipes in the area.

The vent pipe and product lines were electronically "traced" using an RD-8000 PDL cable and pipe locator. The pipes appeared to extend directly outward from the south wall of the building, ending 4.5 feet from the wall, the same distance as the fill pipe, suggesting the tank lies parallel to the wall, and mostly east of the fill port. With this information available, an AquaTronics Tracer metal detector was used to scan the area. The response of the Tracer was subtle in part because of the depth of the tank and its proximity to the vent and product lines, and another unknown pipe lying parallel to the tank, about 1 foot south. These pipes created "noise" limiting the effectiveness of the instrument.

Boring locations were cleared of buried objects that could pose a safety hazard to the sampling program. Because the UST was difficult to detect, care should be taken when drilling.

Figure 1 shows the results of the survey.

Jeff Mann and Nikos Tzetos of Pacific Geophysics conducted the survey for Ms. Marsha Walker of PBS on January 11, 2010. This report was written by Jeff Mann, reviewed by Nikos Tzetos, and sent to Ms Walker on January 13, 2010.

Additional information regarding geophysical surveys is included as an Appendix at the end of this report.

## Limitations

The conclusions presented in this report were based upon widely-accepted geophysical principles, methods and equipment. This survey was conducted with limited knowledge of the site, the site history and the subsurface conditions.

The goal of near-surface geophysics is to provide a rapid means of characterizing the subsurface using non-intrusive methods. Conclusions based upon these methods are generally reliable; however, due to the inherent ambiguity of the methods, no single interpretation of the data can be made. As an example, rocks and roots produce radar reflections that may appear the same as pipes and tanks.

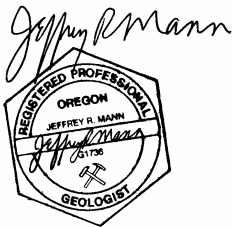
Under reasonable site conditions, geophysical surveys are good at detecting changes in the subsurface caused by manmade objects or changes in subsurface conditions, but they are poor at identifying those objects or subsurface conditions.

Objects of interest are not always detectable due to surface and subsurface conditions. The deeper an object is buried, the more difficult it is to detect, and the less accurately it can be located.

The only way to see an object is to physically expose it.

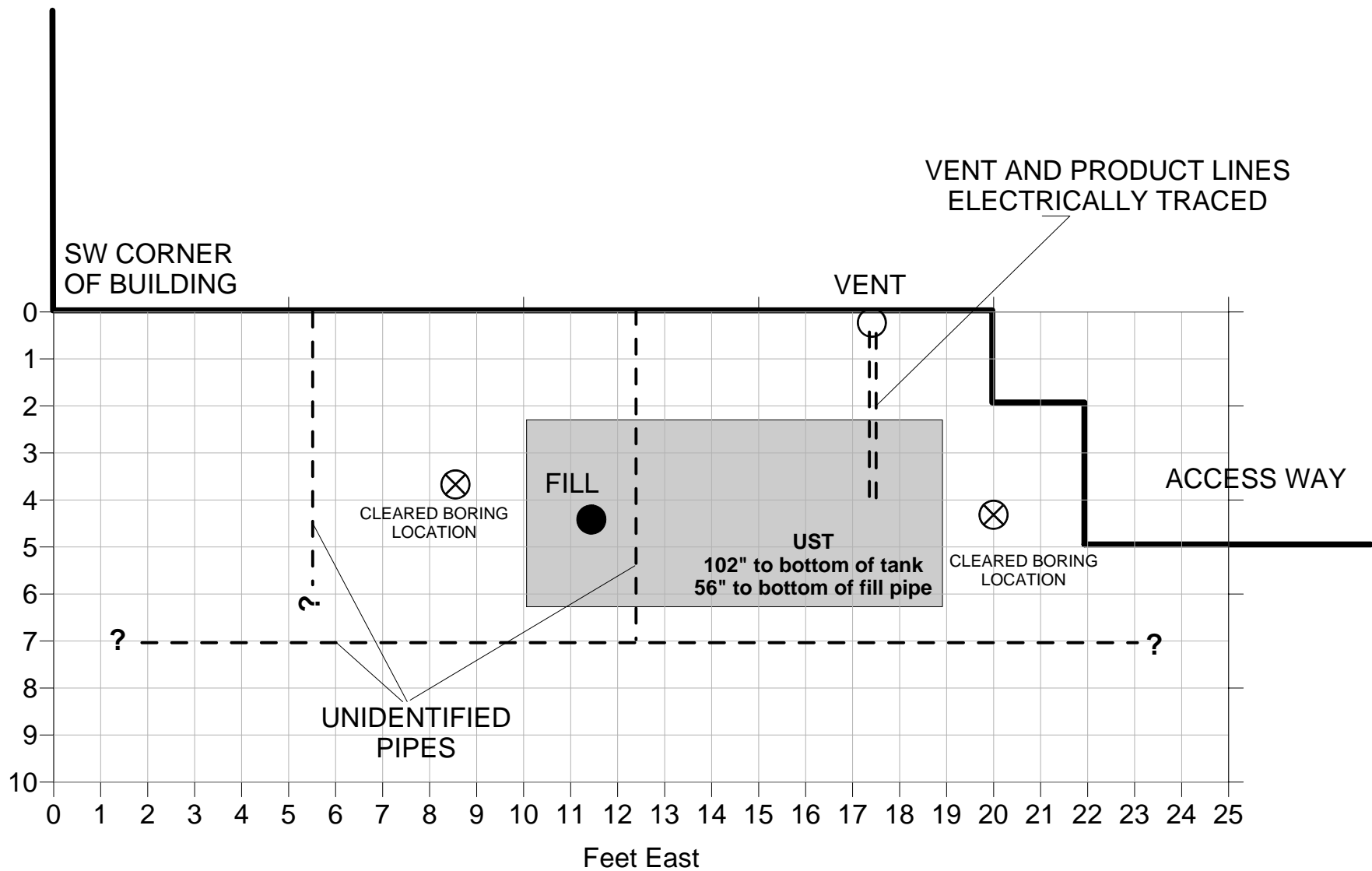
Jeff Mann  
Pacific Geophysics

January 11, 2010



Nikos Tzetos  
Pacific Geophysics

January 11, 2010



FIGURE

1

Results of UST Survey

Project: 100102	Abandoned Building 510 NW 3rd Avenue Portland, OR
Drawn by : JM	For: PBS Engineering and Environmental Survey Date: January 11, 2010





## GEOPHYSICAL SURVEY REPORT

### Appendix

#### Geophysical Equipment and Methods used by Pacific Geophysics

##### Magnetometer Surveys

Small disturbances in the Earth's local magnetic field are called "magnetic anomalies". These may be caused by naturally occurring features such as metallic mineral ore bodies or from manmade features such as metal buildings, vehicles, fences, and underground storage tanks. The magnetometer only detects changes produced by *ferrous* objects. Aluminum and brass are non-ferrous metals and cannot be detected using a magnetometer.

A magnetometer is an electronic instrument designed to detect small changes in the Earth's local magnetic field. Over the years different technologies have been used in magnetometers. The Geometrics G-858 Cesium Vapor Magnetometer used to collect magnetic data for Pacific Geophysics uses one of the most recent methods to detect magnetic anomalies. A detailed discussion describing the method this unit uses is available at [Geometrics.com](http://Geometrics.com).

This magnetometer enables the operator to collect data rapidly and continuously rather than the older instruments that collected data at discrete points only. The G-858 is carried by hand across the site. The sensor is carried at waist level. Typically individual data points collected at normal walking speed are about 6" apart along survey lines usually 5 feet apart, depending on the dimensions of the target objects.

It is critical to know the exact location of each data point so that if an anomaly is detected it can be accurately plotted on a magnetic contour map and found on the site. At small sites, data are collected along straight, parallel survey lines set up with measuring tapes and wheels before the data collection stage begins. For large, complex sites, or sites where there are no nearby geographical features to tie the survey to, the G-858 can be connected to a Global Positioning System (GPS) antenna which allows the operator to collect accurately located data without establishing a survey grid. Data are collected wherever the operator walks.

The accuracy of the GPS data is approximately 1-2 feet; however, if the antenna is under trees or near tall buildings and does not have an unobstructed view of the GPS satellites, the accuracy of individual data points is compromised.

Data are stored in the G-858's memory for downloading and processing in the field. A magnetic contour map of the data is then plotted. Geographical features are drawn on the map. Magnetic anomalies appearing to be caused by objects of interest are then investigated on the site using several small handheld metal detectors. If an object appears to be a possible object of interest, it may be investigated with GPR.

Magnetic contour maps may be printed in color in order to highlight anomalies caused by ferrous objects located under the magnetic sensor. Usually, ferrous objects situated below the sensor produce magnetic "highs" and anomalies located above the sensor produce magnetic "lows". Magnetic highs are of interest to the operator since most objects of interest are located underground.

Magnetometer surveys have limitations. Magnetometers only detect objects made of ferrous (iron-containing) metal. Large ferrous objects (buildings, cars, fences, etc.) within several feet of the magnetometer create interference that may hide the anomaly produced by an object of interest.

### **Ground Penetrating Radar Surveys**

A Geophysical Survey Systems, Inc (GSSI) SIR-2000 GPR system coupled to a 270 MHz GSSI antenna may have been used to obtain the radar data for this project.

The 270 Mhz radar antenna is designed to transmit and receive electromagnetic (EM) energy. A portion of the EM energy transmitted into the material the antenna passes over is reflected back to the antenna and amplified. Reflections are displayed in real-time in a continuous cross section of the near subsurface. Reflections are produced where there is a sufficient electrical contrast between two materials. Changes in the electrical properties (namely the dielectric constant) that produce radar reflections include not only objects of interest, but also naturally occurring features such as the moisture content, porosity, mineralogy, and texture of the material. Metallic objects of interest usually, but not always, exhibit a strong electrical contrast with the surrounding material and thus produce relatively strong reflections. Non-metallic objects of interest (septic tanks, cesspools, dry wells, PVC and clay pipes) are not always good reflectors. Objects with too small an electrical contrast may produce no reflections at all and may be missed.

Radar data are ambiguous. It can be difficult to distinguish the reflection produced by an object of interest from the reflection caused by some natural



feature. Rocks or tree roots have reflections that appear similar to reflections from pipes, and in some situations they may produce stronger signals than the target object.

GPR has several significant limitations that cannot be controlled by the operator. The primary limitation to the method in the NW is that radar signals are severely attenuated by electrically conductive material, including wet, clay-rich soil and reinforced concrete. In eastern Oregon the depth of penetration of the radar signal may be 15 feet, whereas in the Portland area objects below 5 feet may not be detected. The only way to increase the depth of penetration is to increase the power of the antenna by using a lower frequency, but this comes at a cost. Lower frequency antennas may detect objects somewhat deeper, but they have lower resolution. Small objects such as pipes and utilities may not be detected with low frequency antennas.

The quality of the data is affected by the surface conditions over which the antenna is pulled. Ideally the antenna should rest firmly on a smooth surface. Hard, dry sand, grass or asphalt produce the best results. Rough terrain and tall grass reduce the quality of radar data.

It is the job of an experienced interpreter to examine the GPR profiles and deduce if reflections are from objects of interest. GPR does not enable the operator to see underground. The operator interprets reflections based on experience.

The only way to truly identify an object is to excavate.

### **Handheld Metal Detector Surveys**

Two small, non-recording metal detectors can be used to detect buried metallic objects at small sites where a detailed magnetic contour map of the survey area is not needed. At most sites they are used to locate suspect magnetic anomalies detected using the G-858 Magnetometer in order to determine if the anomalies could be caused by an object of interest.

A **Schonstedt Magnetic Gradiometer** is used to find the anomaly and locate its center. If the anomaly appears to be caused by a subsurface object, an **AquaTronics Tracer** is used to determine if the object producing the anomaly is three-dimensional (UST?) or linear (pipe or utility?). Most anomalies are at least in part produced by features observed on the ground surface. Buried objects located within several feet of large surface objects may be missed because of the "interference" created by the surface object.

**Schonstedt Magnetic Gradiometer** – This magnetometer has two magnetic sensors separated vertically by 10". The magnetic field surrounding a ferrous object is strongest near the object and decreases rapidly as the distance between the object and the sensor increases. If the magnitude measured by the sensor located in the tip of the Schonstedt is very high, and

the magnetic field measured by the sensor located farther up the shaft of the Schonstedt is low, there is a large vertical magnetic gradient and the instrument responds with a loud whistle indicating the object is near the surface. For deeper objects there is a small difference in the magnitudes measured by the two sensors, and the instrument responds with a softer tone. A discussion of this instrument is available at Schonstedt.com.

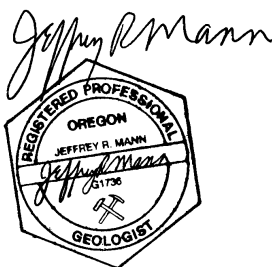
**AquaTronics A-6 Tracer** - The AquaTronics A-6 Tracer uses a different method to detect metallic objects. This instrument measures the electrical conductivity of a metal object, and unlike the G-858 and the Schonstedt magnetometers, it is capable of detecting any electrically conductive metal, including non-ferrous aluminum and brass.

The Tracer consists of a transmitter coil and a receiver coil. The orientation of one coil is adjusted (nulled) in an area clear of metallic objects. In the absence of a metallic object, the electromagnetic field between the coils is balanced; the instrument responds with no meter reading and no audible tone. When a metallic object is located near the coils the electromagnetic field becomes distorted. The Tracer responds with an analog meter reading and an audible tone.

The effectiveness of these magnetic and electromagnetic instruments is lessened to some extent when used near large metallic objects seen on the surface at sites, including metal sided buildings, parked vehicles and chainlink fences.

Jeff Mann, MS, RG

November 2008



A handwritten signature of Nikos Tzetos.

Nikos Tzetos  
Pacific Geophysics

STATE ENGINEER  
Salem, Oregon

MULT  
1068

# Well Record

STATE WELL NO. 1N/1-34D1  
COUNTY Multnomah  
APPLICATION NO. \_\_\_\_\_

OWNER: S. P. & S. Railroad Co.

MAILING ADDRESS: 900 N. W. Front Ave.

LOCATION OF WELL: Owner's No. \_\_\_\_\_

CITY AND STATE: Portland, Oregon

1/4 1/4 Sec. T N. E.  
S., R. W., W.M.

Bearing and distance from section or subdivision  
corner \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_


Altitude at well \_\_\_\_\_

TYPE OF WELL: Drilled Date Constructed 9/18/43

Depth drilled 166 Depth cased \_\_\_\_\_

Section \_\_\_\_\_

### CASING RECORD:

18 inch casing

### FINISH:

### AQUIFERS:

### WATER LEVEL:

PUMPING EQUIPMENT: Type Turbine H.P. 25  
Capacity 2000 G.P.M.

WELL TESTS:  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.

USE OF WATER Railroad boiler supply Temp. \_\_\_\_\_ °F., 19\_\_\_\_

SOURCE OF INFORMATION Mr. Monahan Public Works Dept. HCN U.S.G.S.

DRILLER or DIGGER R.J. Strasser

### ADDITIONAL DATA:

Log \_\_\_\_\_ Water Level Measurements \_\_\_\_\_ Chemical Analysis \_\_\_\_\_ Aquifer Test \_\_\_\_\_

### REMARKS:

Well abandoned 1945 covered over in railyards located 80 feet north of Q of 9th Ave.  
on north side of Overton St. (projected)

STATE ENGINEER  
Salem, Oregon

MULT  
1069

# Well Record

STATE WELL NO. 1N/1-34L1  
COUNTY Multnomah  
APPLICATION NO. \_\_\_\_\_

OWNER: Day Lite Meat Market

MAILING ADDRESS: 101 N.W. Third Ave.

LOCATION OF WELL: Owner's No. \_\_\_\_\_

CITY AND STATE: Portland, Oregon

NE 1/4 SW 1/4 Sec. 34 T. 1 N. S. R. 1 E. W., W.M.

Bearing and distance from section or subdivision corner \_\_\_\_\_


Altitude at well \_\_\_\_\_

TYPE OF WELL: Drilled Date Constructed 1939

Depth drilled 180 Depth cased \_\_\_\_\_

Section \_\_\_\_\_

### CASING RECORD:

6 inch steel casing

### FINISH:

### AQUIFERS:

Gravel

### WATER LEVEL:

PUMPING EQUIPMENT: Type Centrifugal elect. H.P. 2  
Capacity 950 G.P.M. H.

### WELL TESTS:

Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.

USE OF WATER None Temp. \_\_\_\_\_ °F. \_\_\_\_\_, 19\_\_\_\_

SOURCE OF INFORMATION Mr. Monahan Public Works Dept.

DRILLER or DIGGER A. M. Janssen

### ADDITIONAL DATA:

Log \_\_\_\_\_ Water Level Measurements \_\_\_\_\_ Chemical Analysis \_\_\_\_\_ Aquifer Test \_\_\_\_\_

### REMARKS:

Not in use

STATE ENGINEER  
Salem, Oregon

MULT  
1070

# Well Record

STATE WELL NO. 1N/1-34L2  
COUNTY Multnomah  
APPLICATION NO. \_\_\_\_\_

OWNER: Portland Fish Co.

MAILING ADDRESS: 301 N. W. 3rd

LOCATION OF WELL: Owner's No. \_\_\_\_\_

CITY AND STATE: Portland, Oregon

\_\_\_\_\_  $\frac{1}{4}$  \_\_\_\_\_  $\frac{1}{4}$  Sec. \_\_\_\_\_ T. \_\_\_\_\_ N. \_\_\_\_\_ E. \_\_\_\_\_ S., R. \_\_\_\_\_ W., W.M.

Bearing and distance from section or subdivision corner \_\_\_\_\_


Altitude at well \_\_\_\_\_

TYPE OF WELL: Drilled Date Constructed 1942

Depth drilled 78 Depth cased \_\_\_\_\_

Section \_\_\_\_\_

### CASING RECORD:

8 inch steel casing

### FINISH:

### AQUIFERS:

Gravel

### WATER LEVEL:

PUMPING EQUIPMENT: Type Turbine H.P. 5  
Capacity \_\_\_\_\_ G.P.M.

### WELL TESTS:

Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.

USE OF WATER Industrial cooling condensers \_\_\_\_\_ °F. \_\_\_\_\_, 19\_\_\_\_

SOURCE OF INFORMATION Mr. Monahan Public Works Department

DRILLER or DIGGER R. J. Strasser

### ADDITIONAL DATA:

Log \_\_\_\_\_ Water Level Measurements \_\_\_\_\_ Chemical Analysis \_\_\_\_\_ Aquifer Test \_\_\_\_\_

### REMARKS:

STATE ENGINEER  
Salem, Oregon

MULT  
1072

# Well Record

STATE WELL NO. 1N/1-34L3  
COUNTY Multnomah  
APPLICATION NO. \_\_\_\_\_

OWNER: Portland Fish Co. (Atlantic)

MAILING ADDRESS: 139 N. W. 3rd Ave.

LOCATION OF WELL: Owner's No. \_\_\_\_\_

CITY AND STATE: Portland, Oregon

\_\_\_\_\_  $\frac{1}{4}$  \_\_\_\_\_  $\frac{1}{4}$  Sec. \_\_\_\_\_ T. \_\_\_\_\_ N. \_\_\_\_\_ E. \_\_\_\_\_ S., R. \_\_\_\_\_ W., W.M.

Bearing and distance from section or subdivision corner \_\_\_\_\_


Altitude at well \_\_\_\_\_

TYPE OF WELL: Drilled Date Constructed Dec. 42

Depth drilled 78 Depth cased \_\_\_\_\_

Section \_\_\_\_\_

### CASING RECORD:

8 inch casing

### FINISH:

Perforations set from 60 to 70 feet

### AQUIFERS:

Gravel

### WATER LEVEL:

21 feet below land surface

### PUMPING EQUIPMENT: Type \_\_\_\_\_

Capacity \_\_\_\_\_ G.P.M.

H.P. \_\_\_\_\_

### WELL TESTS:

Drawdown 5 ft. after \_\_\_\_\_ hours pumping 200 G.P.M.

Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.

USE OF WATER Industrial

Temp. \_\_\_\_\_ °F. \_\_\_\_\_, 19

SOURCE OF INFORMATION Mr. Monahan Public Works Dept.

DRILLER or DIGGER \_\_\_\_\_

### ADDITIONAL DATA:

Log  Water Level Measurements \_\_\_\_\_ Chemical Analysis \_\_\_\_\_ Aquifer Test \_\_\_\_\_

### REMARKS:

Clay 0 to 30 feet  
Gravel cement 30 to 60 feet  
Gravel, water bearing 60 to 65 feet  
Gravel, cement 65 to 78 feet

Perforated between 60 and 70 feet







STATE ENGINEER  
Salem, Oregon

MULT  
1081

# Well Record

STATE WELL NO. 1N/1-34F2  
COUNTY Multnomah  
APPLICATION NO. \_\_\_\_\_

OWNER: Swift & Co.

MAILING ADDRESS: 434 N. W. Hoyt

LOCATION OF WELL: Owner's No. \_\_\_\_\_

CITY AND STATE: Portland, Oregon

SE ¼ NE ¼ Sec. 34 T. 1 N. S., R. 1 W., W.M.

Bearing and distance from section or subdivision corner \_\_\_\_\_


Altitude at well \_\_\_\_\_

TYPE OF WELL: Drilled Date Constructed \_\_\_\_\_

Depth drilled 60 Depth cased \_\_\_\_\_

Section \_\_\_\_\_

### CASING RECORD:

5 inch steel casing

### FINISH:

### AQUIFERS:

Gravel

### WATER LEVEL:

PUMPING EQUIPMENT: Type Turbine H.P. 7½  
Capacity 125 G.P.M.

### WELL TESTS:

Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.  
Drawdown \_\_\_\_\_ ft. after \_\_\_\_\_ hours \_\_\_\_\_ G.P.M.

USE OF WATER Industrial Ammonia Condensers Temp. 57 °F., 19 \_\_\_\_\_

### SOURCE OF INFORMATION

DRILLER or DIGGER \_\_\_\_\_

### ADDITIONAL DATA:

Log \_\_\_\_\_ Water Level Measurements \_\_\_\_\_ Chemical Analysis \_\_\_\_\_ Aquifer Test \_\_\_\_\_

### REMARKS:

STATE OF OREGON  
WATER SUPPLY WELL REPORT  
(as required by ORS 537.765)

AP05-017-110

WELL I.D. # L47957  
START CARD # 175196

Instructions for completing this report are on the last page of this form.

(1) LAND OWNER Well Number SP-3  
Name City of Portland BES  
Address 1120 SW 5th Ave #1000  
City Portland State OR Zip 97204

(2) TYPE OF WORK  New Well  
 Deepening  Alteration (repair/recondition)  Abandonment  Conversion

(3) DRILL METHOD  
 Rotary Air  Rotary Mud  Cable  Auger  Cable Mud  
 Other

(4) PROPOSED USE  
 Domestic  Community  Industrial  Irrigation  
 Thermal  Injection  Livestock  Other Dewater

(5) BORE HOLE CONSTRUCTION Special Construction  Yes  No  
Depth of Completed Well 51 ft.  
Explosives used:  Yes  No Type \_\_\_\_\_ Amount \_\_\_\_\_

BORE HOLE		SEAL	
Diameter	From To	Material	From To
<u>14</u>	<u>0</u> <u>51'</u>	<u>chips</u>	<u>0</u> <u>20'</u>
			<u>15 bags</u>

How was seal placed: Method  A  B  C  D  E  
 Other Routed  
Backfill placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft. Material \_\_\_\_\_  
Gravel placed from 51' ft. to 20 ft. Size of gravel 8x12

Casing	Diameter	From	To	Gauge	SEAL			
					Steel	Plastic	Welded	Threaded
<u>10"</u>	<u>+3</u>	<u>23'</u>	<u>48'</u>	<u>1/4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Drive Shoe used  Inside  Outside  None  
Final location of shoe(s) \_\_\_\_\_

(7) PERFORATIONS/SCREENS Method  Perforations  Screens Type U-wire Material Steel

From	To	Slot Size	Number	Diameter	Tele/pipe size	Casing	Liner
<u>23'</u>	<u>48'</u>	<u>10/32</u>				<input type="checkbox"/>	<input type="checkbox"/>
<u>48'</u>	<u>51'</u>					<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour  
 Pump  Bailor  Air lift  Flowing Artesian  
Yield gal/min 90 Drawdown 0 Drill stem at Random Time 4 hours

Temperature of water 58° Depth Artesian Flow Found \_\_\_\_\_  
Was a water analysis done?  Yes By whom \_\_\_\_\_  
Did any strata contain water not suitable for intended use? no  Too little  
 Salty  Muddy  Odor  Colored  Other \_\_\_\_\_  
Depth of strata: \_\_\_\_\_

(9) LOCATION OF WELL (legal description)  
County Multnomah  
Tax Lot 3700 Lot \_\_\_\_\_  
Township 1 N Range 1 E WM  
Section 34 SW 14 SE 1/4  
Lat \_\_\_\_\_ " or \_\_\_\_\_ (degrees or decimal)  
Long \_\_\_\_\_ " or \_\_\_\_\_ (degrees or decimal)  
Street Address of Well (or nearest address) 36 SW Front Ave, Portland, OR

(10) STATIC WATER LEVEL  
22' ft. below land surface. Date 5-27-05  
\_\_\_\_\_ ft. below land surface. Date \_\_\_\_\_  
Artesian pressure \_\_\_\_\_ lb. per square inch Date \_\_\_\_\_

(11) WATER BEARING ZONES  
Depth at which water was first found 32'

Front	To	Estimated Flow Rate	SWL
<u>32'</u>	<u>51'</u>	<u>200 gpm</u>	<u>22'</u>

(12) WELL LOG Ground Elevation \_\_\_\_\_

Material	From	To	SWL
<u>Backfill: silt/clay w/ misc debris</u>	<u>0</u>	<u>32'</u>	<u>22'</u>
<u>gravels w/ sand</u>	<u>32'</u>	<u>51'</u>	

RECEIVED  
JUL 27 2005  
WATER RESOURCES DEPT  
SALEM, OREGON

Date Started 5-24-05 Completed 5-25-05

(unbonded) Water Well Constructor Certification  
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.  
WWC Number 1709 Date 6-7-05  
Signed [Signature]

(bonded) Water Well Constructor Certification  
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.  
WWC Number 1522 Date 6/7/05  
Signed [Signature]





# Oregon

Theodore R. Kulongoski, Governor

**Water Resources Department**  
 North Mall Office Building  
 725 Summer Street NE, Suite A  
 Salem, OR 97301-1271  
 503-986-0900  
 FAX 503-986-0904

May 17, 2005

CASCADE DRILLING INC.  
 MICHAEL BRUCE NIERMEYER #1522  
 PO BOX 1184  
 WOODINVILLE, WA 98072

## FINAL ORDER

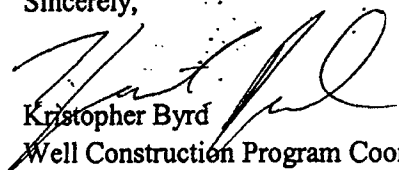
Dear Bruce:

The Special Standard request you submitted for owner: City of Portland BES, Start Card numbers 175196 thru 175199 is approved for the following: You may construct these dewatering wells to a total depth of 52 feet bgs. The wells shall be cased with ten inch nominal diameter steel casing. The seal shall consist of 20 feet of bentonite along with a three foot concrete surface seal. These wells shall be permanently abandoned within one year from the date of this Final Order. See Oregon Administrative Rule (OAR) 690-210-0130. All other construction requirements apply. Your Special Standard request form is enclosed.

The Well Construction Standards serve to protect ground water resources. By approving and issuing this special construction standard the Oregon Water Resources Department is not representing that a well constructed in accordance with this condition will maintain structural integrity or that it meets engineering standards. The well constructor/or landowner is responsible for ensuring that a well is constructed in a manner that protects ground water resources as required under Oregon Administrative Rules 690-200 through 690-240.

If you have any questions concerning this letter, I may be contacted at (503) 986-0851, or by e-mail at [Kristopher.R.Byrd@wrp.state.or.us](mailto:Kristopher.R.Byrd@wrp.state.or.us).

Sincerely,

  
 Kristopher Byrd  
 Well Construction Program Coordinator  
 Enforcement Section

enclosures

cc: Ken Wilcke, NW Region Well Inspector  
 File

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.