Cascadia Associates, LLC

**Memorandum**

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| **To** | Jim Orr, Oregon DEQ | File no. | 0085-001-001 |
| **cc** | Eva DeMaria/EPA<br>Tom Leaptrott/Steel Hammer Properties<br>Mat Cusma/Schnitzer<br>Mark Myers/William Kastner<br>Ross Rieke/Rieke Consulting Services<br>Andy Jansky/Flowing Systems | | |
| **From** | Amanda Spencer, R.G., P.E.<br>Cascadia Associates, LLC | | |
| **Date** | March 2, 2020 | | |
| **Subject** | Monitoring Well Installation Work Plan<br>Crawford Street Site, Portland, Oregon | | |

This Monitoring Well Installation Work Plan (work plan) describes methods and procedures for installing nine wells at the Crawford Street site located near the intersection of North Crawford Street and North Richmond Street in the St. Johns area of Portland, Oregon ("the Site"). A Site Location Map is shown on Figure 1 and a Site Plan is shown on Figure 2. Figure 3 shows the locations of the proposed monitoring wells, and Appendix A presents the quality assurance project plan (QAPP).

The monitoring well installation and associated soil sampling is being conducted in response to Oregon Department of Environmental Quality (DEQ) comments on the October 29, 2015 *Data Gap Analysis and Sampling and Analysis Plan Source Control Evaluation* report (Bridgewater, 2015) transmitted via an October 11, 2019 letter to Mr. Tom Leaptrott, the current Site owner. In the October 11, 2019 letter, DEQ requested:

1. Installation of nine wells evenly spaced across the upland portion of the Site, with placement of well screens to intersect the water table based on highest historical groundwater elevations.
2. Continuous soil sample collection for lithologic description at each well borehole.
3. Soil sampling for chemical analysis at each location from three depth intervals: 2 feet below ground surface (bgs) below any paving materials; 10 feet bgs; and just above seasonal high water elevations.
4. Additional soil sampling for chemical analysis if field screening suggests the potential presence of chemicals of potential concern (COPCs).

5. Analysis of soil and groundwater samples for the chemicals of interest (COI) for the Site and dioxin/furans.
6. Groundwater sample analysis for metals including dissolved and total analyses.
7. Preparation of a quality control plan.
8. Completion of four quarters of monitoring of the installed wells.

This work plan presents a background for the Site and the scope of work, methods, and procedures for the requested work modified based on the results of recent riverbank sampling results.

## BACKGROUND

### Site Description

The Site is an approximately 15-acre property located along the Willamette River in the St. Johns neighborhood of Portland, Oregon (Figure 1). The Site is situated in the northeast quarter of Section 12, Township 1 North, Range 1 West and is bordered by the Willamette River to the south, North Burlington and North Richmond Streets to the west and east, respectively, and by North Crawford Street to the north (Figure 2). A Union Pacific Railroad (UPRR) rail spur runs east/west through the center of the Site, on land owned by the City of Portland (Bridgewater Group, 2002a). The area south of the rail spur is currently vacant and surrounded by a chain link fence with a gated entry and patrolled by security personnel. The area north of the rail spur houses the offices and shops for Columbia Forge and Machine Works.

### Site History

The upland portion of the Site has been used for a variety of purposes since the late 1800s (Bridgewater Group, 2000). The property was largely unoccupied until the late 1800s, when a small lumber mill was constructed near the downstream end of the property. This small lumber mill closed down by approximately 1905. From 1905 to approximately 1977, the property was used for lumber mill and related activities by various companies that expanded operations, including machine works, plywood milling, and warehousing and storage throughout the property. Lumber mill and related structures remaining on the property were removed by the late 1970s, and the property south of the rail spur has been undeveloped and used for storage since that time. The area north of the rail spur has been used for steel forging and offices since 1978.

### Previous Investigations and Black Sand Removal Action

Several assessments and investigations have been conducted at the Site. A brief summary of these investigations follows; a map showing boring locations installed during these investigations and data tables summarizing results are included in Appendix B for reference.

**Sweet/Edwards Investigation – 1988.** In 1988, prior to its acquisition of the property, Manufacturing Management, Inc. (MMI) retained Sweet-Edwards/Emcon to perform an environmental investigation of the area of the Site south of the rail spur (South Area) (Sweet-Edwards/Emcon, 1988). The investigation included the following:

- Historical review including Sanborn Fire Insurance Map review and an interview with an unnamed, former onsite worker.
- Water sampling from pipes protruding from the ground surface.
- Geophysical survey for subsurface features (e.g., underground storage tanks).
- Five test pits to assess subsurface features suggested as possible concerns from the geophysical survey.
- Removal of an underground storage tank identified from the geophysical survey and test pits in the eastern portion of the South Area.
- Seven test pits and one soil boring exploration to assess subsurface conditions in the area of black sand fill in the western portion of the South Area.
- One soil boring exploration to assess a possible septic drain and drain field area in the east portion of the South Area.
- Soil and groundwater sample laboratory analysis for petroleum hydrocarbons, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and Extraction Procedure Toxicity (EP Tox) metals.

The study identified and assessed the following possible environmental issues (Sweet/Edwards, 1988):

- Up to about 6 feet of black sand fill was identified in the western portion of the Site in the area of the former sawmill and along portions of the bank above the Willamette River shoreline. Based on an interview with a former site employee, the fill was reportedly placed during the demolition of the sawmill in 1977-1978. The sand was reportedly spent sandblast material.
- A former septic system was identified in the northeast portion of the Site. Soil and groundwater sampling conducted in the area of the former septic system did not identify significant impacts.
- An underground storage tank was identified from a geophysical survey in the southeastern portion of the South Area. The tank was removed and properly disposed offsite.

**Preliminary Assessment – 1999 to 2002.** In October 1999, DEQ requested that Crawford Street Corporation (CSC), the owner of the Site at that time, perform a Preliminary Assessment (PA) at the

Site. The PA was performed by reviewing available historical information, performing a site reconnaissance, and interviewing available persons familiar with the current and past site operations. The PA identified two primary potential environmental concerns: (1) stormwater runoff from the Columbia Forge yard, and (2) the black sand previously noted at the Site (Bridgewater, 2000).

DEQ requested the PA be expanded to include soil and groundwater sampling and analysis. The soil and groundwater samples were collected and analyzed in early 2001 (Bridgewater, 2002a). The results of the PA sampling and analysis indicated the presence of petroleum hydrocarbons and metals concentrations above background levels in the black sand found on the Site (Bridgewater, 2002a). On August 28, 2001, DEQ issued a letter to CSC requesting that the black sand be removed from the beach and from the top of the bank to prevent potential future migration of hazardous substances from the black sand to the river.

A removal action was performed in October 2001 (Bridgewater, 2002b). The objective of the removal action was to remove visible black sand from the beach area and remove black sand from the top of the riverbank sufficiently to cover and stabilize any remaining black sand. Approximately 381 tons of black sand were removed during the removal action, including the removal of approximately 65 in-place cubic yards from the beach and approximately 190 in-place cubic yards of black sand from the top of the bank. The aerial extent of the black sand removal is shown on Figure 3.

The removal area along the top of the bank was backfilled with 262 tons of imported clean granular fill material. The backfilled area was then seeded with native grass and covered with an erosion protection blanket. In accordance with the approved work plan, no backfill was placed in the beach removal area (Bridgewater, 2002b).

**Soil and Groundwater Characterization – 2006.** Evergreen Environmental Management (EEM) conducted a Phase I Environmental Assessment in 2005 and recommended soil and groundwater characterization at the Site. Soil and groundwater sampling was conducted in January 2006 (Evergreen, 2006) and included the installation of seven borings across the Site. Two borings were installed in the area of the proposed wells for this work plan (borings GP-1 and GP-2; see map in Appendix B for locations). There were no field indications of COPCs in the soil at these two boring locations. Soil samples were collected from two depth intervals: 0 to 4 feet bgs and 4 to 8 feet bgs and analyzed for presence of gasoline, diesel, and oil range petroleum hydrocarbons. Petroleum hydrocarbons were not identified, with the exception of 445 milligrams per kilogram (mg/kg) of heavy petroleum hydrocarbons characterized as lube oil in the 0- to 4-foot sample from GP-2.

Grab groundwater samples were collected from the seven borings and analyzed for petroleum hydrocarbons, VOCs, and PAHs. With the exception of naphthalene detected at 0.0885 micrograms per liter (µg/L) at location GP-1, total petroleum hydrocarbons (TPH), VOCs, and polycyclic aromatic hydrocarbons (PAHs) were not detected above method reporting limits in groundwater samples at any of the seven locations.

Data tables summarizing these results are included in Appendix B for reference.

**Soil and Groundwater Investigation – 2015.** EvrenNorthwest (ENW) conducted a soil and groundwater investigation at the Site in 2015. The investigation consisted of installing 16 test pits, 13 push-probe borings, and 13 hand auger borings for visual and photo ionization detector (PID) field screening of soil cores, and collection of soil and groundwater samples for chemical analysis (ENW, 2016). Investigation sampling locations are shown on the map contained in Appendix B.

Eleven of the test pit installations (TP4 - TP7, and TP-9 - TP16) were located in the central portion of the Site, in the area of the proposed monitoring wells. Field indications of COPCs were not observed with the exception of low PID measurements (less than 1.7 parts per million volume [ppmv]) from test pits TP10 and TP14 that was attributed to woody debris (ENW, 2016). Soil samples from these 11 test pits were analyzed for metals, VOCs, PAHs, and/or TPH. Results are summarized on the tables contained in Appendix B.

Groundwater samples were collected from five of the push-probe locations (B3, B8, B11, B12, and B13; see map in Appendix B) for VOC and TPH analyses. Borings B3 and B8 were located north of the rail spur at the Site, and borings B11, B12, and B13 were located at the top of the riverbank. TPH were not detected in the grab groundwater samples; VOCs were either non-detect or were below applicable screening criteria (ENW, 2016).

### Recent Riverbank Sampling

To support potential sale of the property, the concept of designing a Riverbank Source Control Measure (RBSCM) to stabilize the riverbank and conducting sampling to characterize the anticipated leave surface of the RBSCM design was discussed with and approved by the DEQ and U.S. Environmental Protection Agency (EPA) in April 2018. Phase I and II riverbank sampling was performed in accordance with approved Leave Surface Sampling and Analysis Plans (LSSAPs) in fall of 2018 and spring of 2019, respectively (Rieke Consulting, 2018; Cascadia, 2019).

More than 130 soil samples were collected from 61 riverbank locations and analyzed for PCBs, PAHs, VOCs, TPH, organochlorine pesticides, tributyltins, metals, and phthalates. Selected samples were also analyzed for dioxin/furans. Results were compared to cleanup levels (CULs), Remedial Action Levels (RALs), and principle threat waste (PTW) levels from the Portland Harbor Superfund Site (PHSS) Record of Decision (ROD; EPA, 2017). A report of results was submitted in January 2020 (Cascadia, 2020).

## SCOPE OF WORK

As requested, nine monitoring wells will be installed at the Site; proposed locations for the wells are shown on Figure 3. Three locations are proposed adjacent and south of the railroad tracks that bisect the Site; two locations are proposed in the center of the Site; and four locations are proposed along the top of the riverbank. Methods and procedures for site preparation, well installation, soil

and groundwater sampling, and the proposed analytical suite are presented in the following subsections. A QAPP is provided in Appendix A.

### Preparatory Activities

Prior to the investigation, the public utility notification center will be contacted, and a private utility locator will be contracted to check for the presence of buried utilities or infrastructure in the work area. It should be noted that the presence of buried utilities or infrastructure, or other access issues, may result in the relocation of the proposed borehole locations from those presented on Figure 3.

### Soil Sampling

Soil borings will be advanced using a direct push rig at the locations shown on Figure 3. A licensed drilling subcontractor will be retained to advance the borings and a representative from Cascadia will oversee the installation. Soil boring advancement will be conducted in accordance with Cascadia standard operating procedures (SOPs) for direct-push explorations, included in Appendix C. Continuous soil samples will be collected during push-probe activities to document lithologic descriptions and for field screening. The lithology will be described using the Unified Soil Classification System ASTM 2488. Sampling equipment that encounters site soil will be cleaned between each sampling location using a Liquinox or similar detergent solution and rinsed in deionized water. One equipment rinsate blank will be collected from the sampling tools as a part of the quality assurance program for the sampling event. Upon collection, the samples will be placed in a chilled cooler and transported to the analytical laboratory under chain-of-custody procedures. Soil lithology and general site surface conditions at the sampling locations will be noted in field notes.

Field screening will consist of sheen testing and using a photoionization detector (PID); these procedures are detailed in the field screening SOP in Appendix C.

Soil samples will be collected from depths of 2 feet, 10 feet, and 20 feet[1] bgs for possible chemical analysis. As described above, previous investigations in the central portion of the Site (the area of the proposed monitoring wells) have characterized shallow and subsurface soil. With the exception of a few metals detected above background concentrations, field and chemical analysis results did not indicate the presence of significant (if any) soil impacts. Additionally, soil at 2 feet and below does not present a potential source to the river (unless COPCs in soil leach to groundwater, which is being assessed via the monitoring wells). Therefore, the collected soil samples will be held for possible chemical analysis pending the results of groundwater sampling from the wells. If the groundwater sampling results indicate the presence of COPCs at concentrations indicative of a nearby source in Site soil, the archived soil samples may be analyzed to better assess the groundwater conditions. In addition, if field screening indicates the potential presence of COPCs in

[1] DEQ has requested a soil sample be collected from the depth just above seasonal high groundwater. Based on groundwater monitoring conducted at the adjacent Willamette Cove site, seasonal high groundwater is anticipated to be approximately 21 feet bgs (Apex, 2020).

Site soil, soil samples will be collected from the indicated depth interval, and these samples will be submitted for chemical analysis in accordance with the analytical program detailed further below.

It is acknowledged that surface soil (e.g., 0 to 6 inches) could represent a complete pathway to the river if it becomes entrained in stormwater runoff. However, as identified above, previous investigations have not identified significant shallow soil impacts in the area of the proposed monitoring wells, with the exception of the black sand fill encountered in the area of the former sawmill. The black sand has been thoroughly analyzed for COPCs (Bridgewater, 2002a), and a removal action was performed to remove it from the riverbank and beach (Bridgewater, 2002b). Because the Site is proposed for imminent redevelopment which will regrade and cap the upland soil beneath buildings and other structures, regrade and stabilize the riverbank, and include a stormwater collection system that will prevent direct runoff of surface soil entrained in stormwater into the river, further sampling of surface soil is not proposed.

### Well Installation and Monitoring

Monitoring wells will be installed in each of the borings. The wells will be constructed of 2-inch PVC casing, with a screened interval of 0.01-inch slotted PVC. The screened interval will be 20 feet in length to extend across the water table encountered during drilling and the anticipated highest and lowest groundwater elevations at the Site.

The anticipated highest and lowest groundwater elevations have been estimated based on the groundwater investigations previously conducted at the Site and monitoring well data from the adjacent Willamette Cove site. Borings installed at the Site in 2006 encountered groundwater at about 22 feet bgs. At Willamette Cove, groundwater elevations have ranged between 7 and 15 feet (relative to NAVD88) between 2002 and 2016 (Apex, 2020). Groundwater elevations at the Site are anticipated to be comparable to the Willamette Cove site. Groundwater elevations of 7 to 15 feet NAVD88 at the Site would equate to groundwater depths of approximately 21 to 29 feet bgs[2], which is consistent with the depths encountered during previous site investigations. Therefore, the screened interval for the proposed wells will be from 15 to 35 feet bgs to screen across the anticipated range in groundwater elevations and maintain the water table within the screened interval.

A sand well pack will be installed in the annular space between the formation and the well screen and will extend 2 feet above the screened interval. One foot of bentonite will be placed above the sand pack and the remainder of the annular space will be filled with a cement -bentonite slurry to within 1 foot of the ground surface. The well will be completed with an approximate 6-inch stick-up above the ground surface and a stick-up well monument will be installed over the well for

[2] Based on a survey of the riverbank conducted by David Evans & Associates, the top of the riverbank elevation at the Site is approximately 36 feet NAVD88, and the topography of the Site is relatively flat. Therefore, a Site elevation of 36 feet NAVD88 was used to estimate the depths to groundwater.

protection and security. In addition, three 2-foot-high steel bollards will be placed around each well monument to provide further protection of the well.

Before the field crew leaves the Site and following the completion of monitoring well installation, the temporary well cap will be removed from the top of the well and replaced with a locking cap and padlock. Well installation details will be accurately recorded on the boring log.

The monitoring wells will be allowed to set for at least 24 hours prior to well development. The wells will be developed via surging and/or overpumping. Surging will be completed by vigorously moving a surge block upwards and downwards over the entire length of the screened interval. The purpose of the surging is to: (1) break up accumulations of fine materials in the bottom of well casing, (2) force water back and forth to remove any potential screen blockage or build-up, and (3) increase porosity and permeability of the filter pack materials surrounding the well screen. Overpumping will be completed by placing a submersible pump or other appropriate pump in the well, near the bottom of the well. The well will be pumped aggressively until it is pumped dry or until discharge is clear. The drawdown of the groundwater and an approximate average pumping rate are noted during and at the completion of the development.

A minimum of five well volumes of water will be removed from the well during development. Down-hole equipment (e.g., surge block, pump, cable) will be decontaminated before and after use. Water removed during development and decontamination water will be contained and handled according to investigation-derived waster (IDW) management procedures.

The wells will be allowed to equilibrate for at least 48 hours following development prior to being accessed for gauging and sampling. Well sampling will be conducted using low flow sampling procedures as detailed in the SOPs in Appendix C.

Following the initial groundwater event, the wells will be monitored quarterly for three additional quarters for a total of four quarterly monitoring events. The scope for each monitoring event will include:

- Gauging depth to water at each well;
- Collecting a groundwater sample from each well; and
- Chemical analysis of the collected sample.

The chemical analysis program is described below.

### Location Control

A licensed surveyor will be retained to survey the top of casing elevation of each well relative to NAVD88, and the horizontal position relative to Oregon State Plane North Zone.

## Chemical Analysis

Groundwater samples collected during the first groundwater sampling event and soil samples submitted for chemical analysis will be analyzed for Site COIs, which are:

- PCBs;
- PAHs (plus carbazole);
- Arsenic, cadmium, copper, lead, mercury and zinc;
- VOCs;
- Organochlorine pesticides (including DDx compounds);
- Phthalates;
- Petroleum hydrocarbons; and
- Butyltins.

In addition, per the DEQ request, groundwater samples from the first groundwater sampling event will be analyzed for dioxin/furans.

The analytical program for the remaining three monitoring events will be developed based on the results of the first groundwater monitoring event. Analytical suites (e.g., VOCs, pesticides, etc.) that are not detected or for which the constituent concentrations are below PHSS ROD CULs or Joint Source Control Strategy (JSCS) screening level values (SLVs) will not be included in the quarterly monitoring analytical program for the remaining events. Dioxin/furans will only be included in the first groundwater monitoring event, unless it is deemed that further dioxin/furan analyses are necessary to complete a groundwater source control evaluation[3].

The QAPP (Appendix A) describes the specific analytical methods, laboratory containers, holding times, and preservatives to be used for each parameter in the analytical program, the proposed screening levels to be used, and laboratory detection limits for each chemical relative to the screening level where available.

## Schedule and Reporting

Field work can be implemented within 30 days of receipt of DEQ approval of this work plan. A report presenting the results of the field program and the first groundwater monitoring event will be submitted to DEQ within 45 days of receipt of the final analytical laboratory report. The data report will include a description of the field methods and procedures used to complete the investigation; figures and tables presenting and summarizing the collected data; and copies of the analytical laboratory reports. Additionally, the report will present the proposed analytical program for the remaining three groundwater monitoring events. Following completion of the four quarters of monitoring, a groundwater source control evaluation will be prepared and submitted.

Please call or email if you have any questions.

[3] It is noted that the PHSS ROD does not include cleanup levels for dioxin/furans in groundwater (EPA, 2017).

## ATTACHMENTS:

| | |
|---|---|
| Figure 1 | Site Location Map |
| Figure 2 | Site Plan |
| Figure 3 | Proposed Monitoring Well Locations |
| | |
| Appendix A | Quality Assurance Plan |
| Appendix B | Sampling Location Map and Data Tables from Previous Investigations |
| Appendix C | Standard Operating Procedures |

## REFERENCES


Apex Companies, LLC. 2020. *Revised Groundwater Source Control Evaluation and Alternatives Analysis*, Willamette Cove Upland Facility, Portland, Oregon. January 20, 2020.

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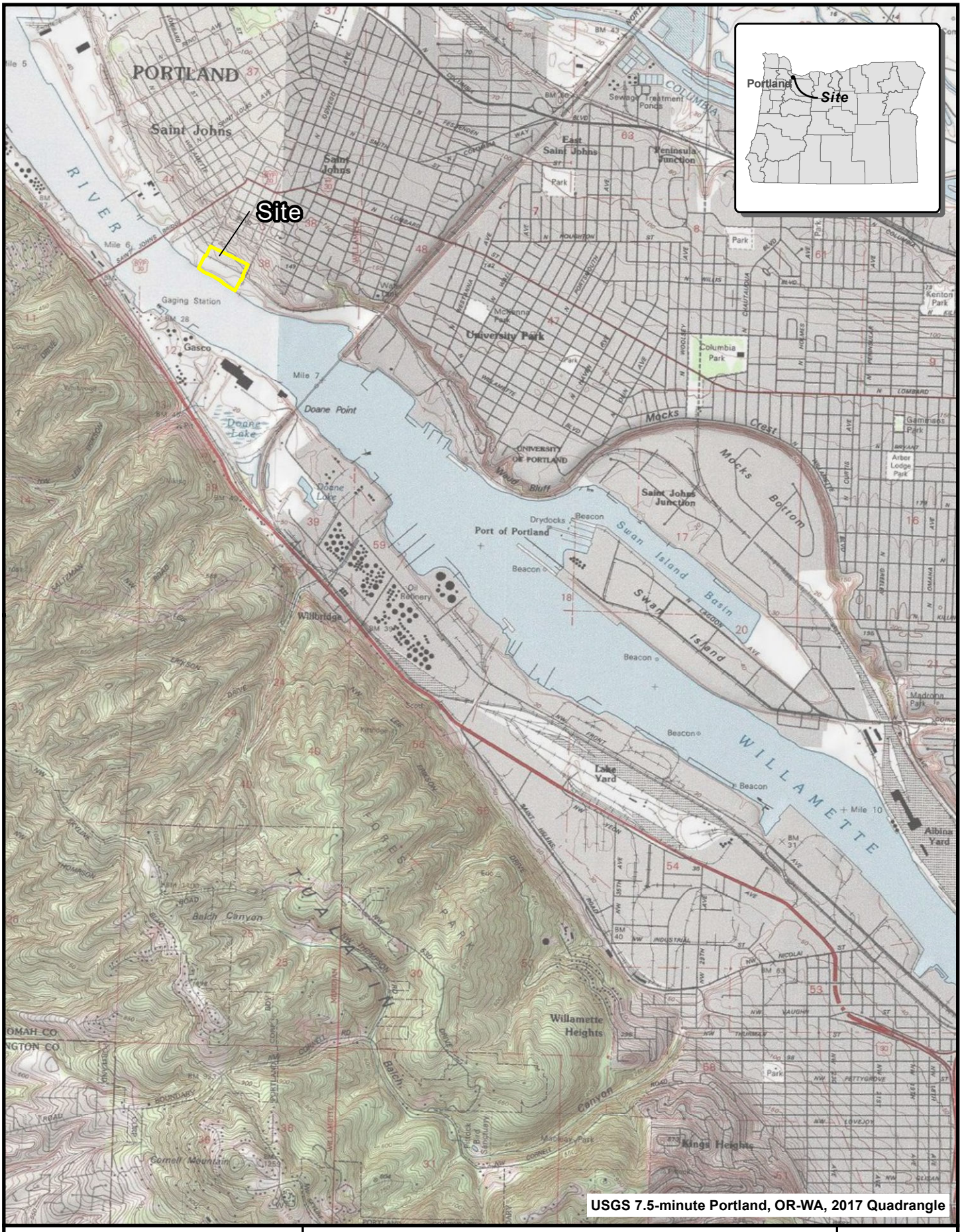
# FIGURES

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# Site Location Map

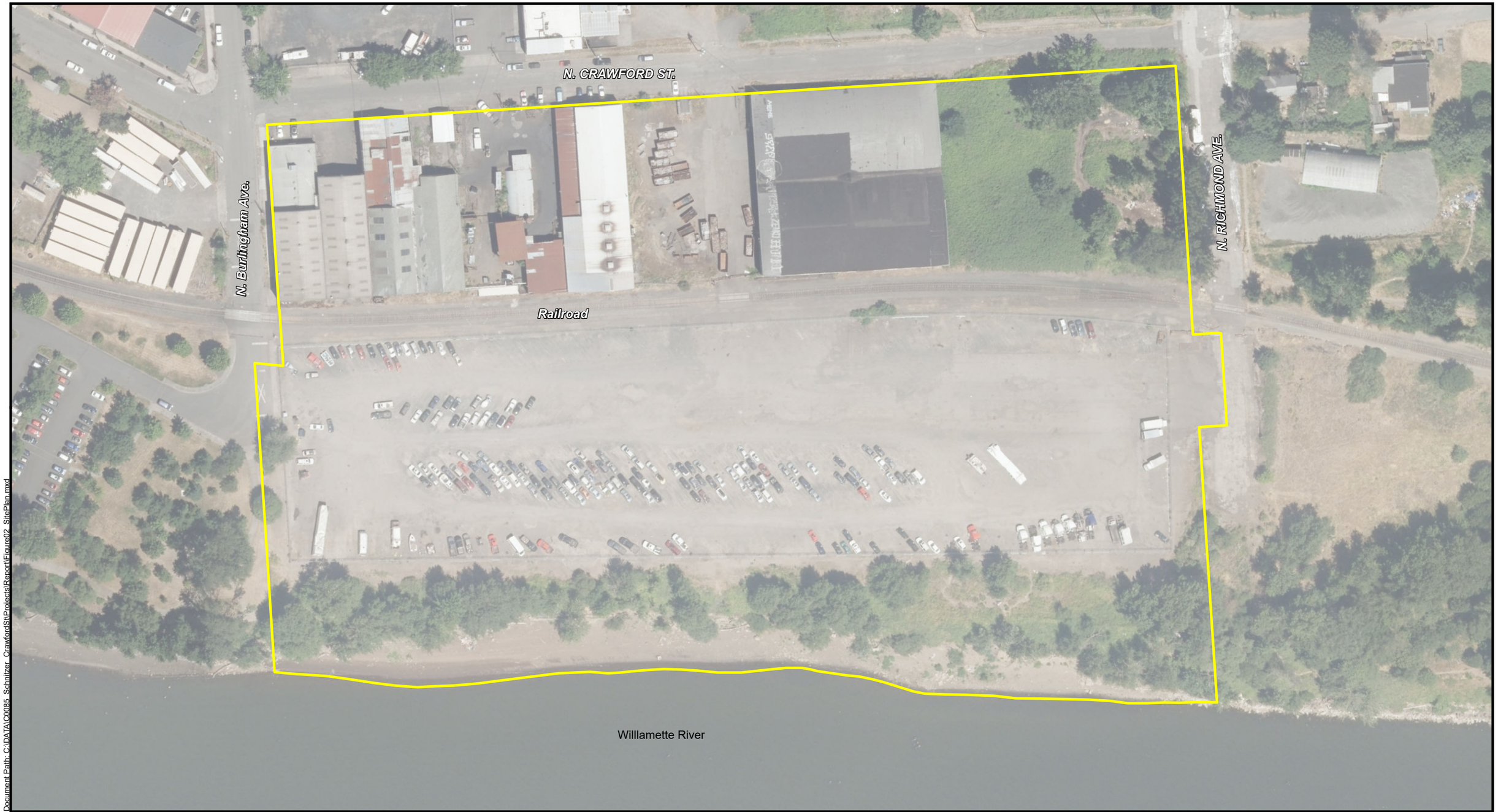
Monitoring Well Installation Work Plan
Crawford Street Site, Portland, Oregon

Figure 1

PREPARED BY: ES

DATE: 2/21/2020

PROJECT: 0085-001-001




Approximate Site Boundary

0 50 100
Feet

# Site Plan

Monitoring Well Installation Work Plan
Crawford Street Site, Portland, Oregon

Cascadia Associates, LLC

Figure 2

PREPARED BY: ErikStrandhagen | DATE: 2/20/2020 | PROJECT: 0085-001-001

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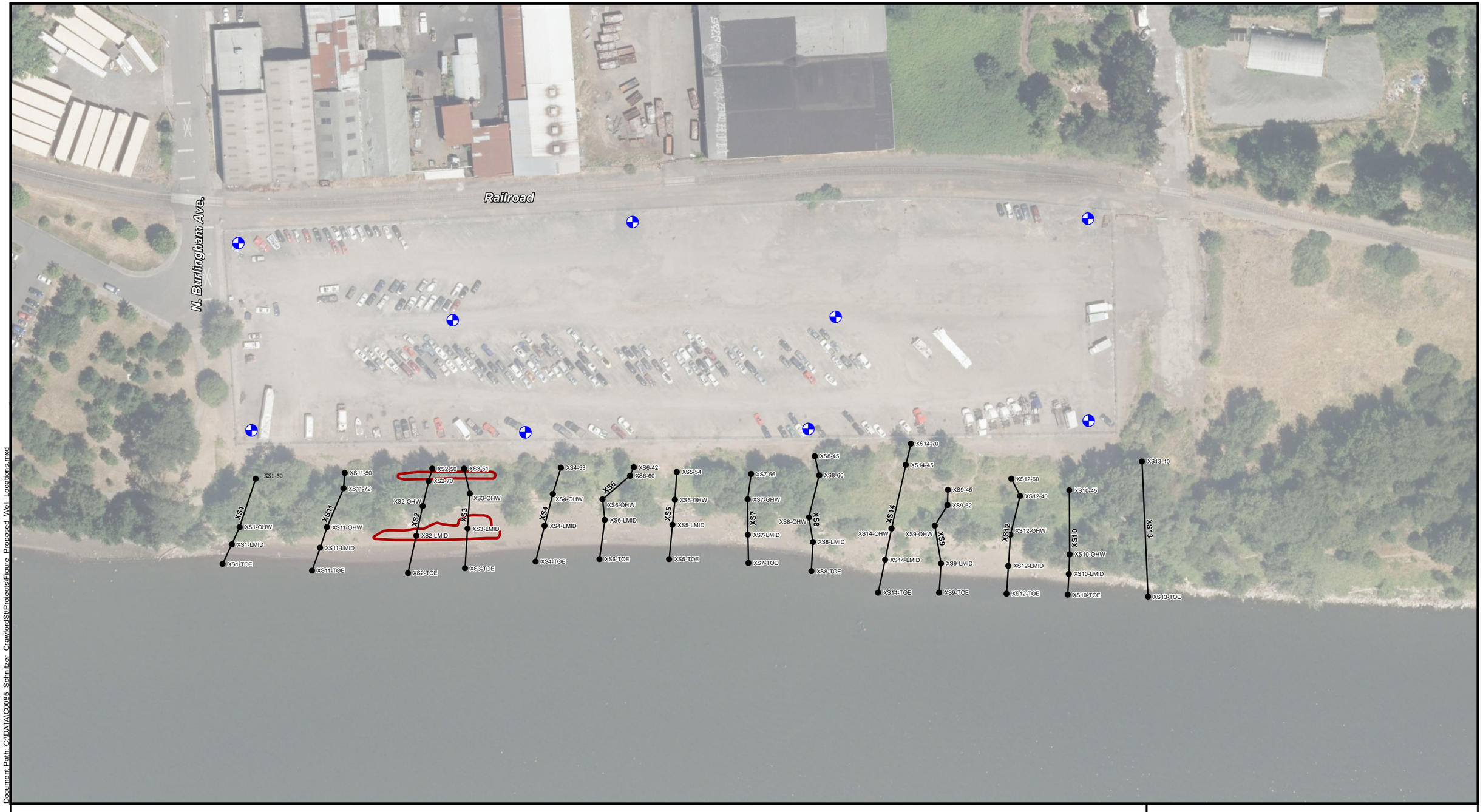


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Proposed Monitoring Well Location

Riverbank Sample Location

Black Sand Removal Action Extent

0 20 40

Feet

# Proposed Monitoring Well Locations

Monitoring Well Installation Work Plan
Crawford Street Site Portland, Oregon

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Figure 3

PREPARED BY: ErikStrandhagen | DATE: 2/28/2020 | PROJECT: 0085-001-001

# APPENDIX A

QUALITY ASSURANCE PLAN

# APPENDIX A

## Quality Assurance Project Plan
## Monitoring Well Installation Work Plan
## Crawford Street Site
## Portland, Oregon

**Prepared by:**

**Cascadia Associates, LLC**

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# 1.0 INTRODUCTION

This appendix presents the quality assurance and quality control (QA/QC) procedures that will be used to support the field and analytical work for this project.

# 2.0 QUALITY ASSURANCE PLAN

The quality assurance objectives for this project are to collect and evaluate data that can be used to evaluate the possible presence, nature, and extent of potential constituents of concern. Therefore, the analytical data must have an appropriate degree of accuracy and reproducibility, samples must be representative of field conditions, and samples must be collected using unbroken chain-of-custody procedures.

Table A-1 shows the specific analytical methods, laboratory containers, holding times, and preservatives to be used for each parameter for soil analysis. Table A-2 shows the analytical laboratory detection limits for each chemical for soil analysis and compares the limits to the Portland Harbor Cleanup Levels (CULs; Table 17, January 6, 2017 Portland Harbor Record of Decision, River Bank Soil/Sediment) and Screening Level Values (SLVs; Table 3.1 December 2008 Portland Harbor Joint Source Control Strategy [JSCS] Upland Soil/Stormwater Sediment). Table A-3 shows the specific analytical methods, laboratory containers, holding times, and preservatives to be used for each parameter for the groundwater analysis. Table A-4 shows the analytical laboratory detection limits for each chemical for the groundwater analysis and compares the limits to the groundwater cleanup levels in the Portland Harbor Record of Decision (Table 17; EPA, 2017). As noted in Tables A-2 and A-4, the laboratory detection limits are less than the applicable CULs and/or SLVs.

Data quality will be evaluated based on precision, accuracy, representativeness, completeness, and comparability. These parameters and the tests used to evaluate these parameters are discussed below.

## 2.1 QUALITY ASSURANCE OBJECTIVES

Data quality assurance objectives are discussed below.

### 2.1.1 Precision

Precision is a measure of the reproducibility of the data under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed as relative percent difference (RPD) between duplicate samples. Laboratory duplicate measurements will be performed for approximately 10% of laboratory samples. Field duplicate measurements will be performed on 5% of groundwater samples.

### 2.1.2 Accuracy

Accuracy is a measure of error between the reported test results and the true sample concentration. Specifically, accuracy is the closeness of agreement between a measured value and the true value. Error is the difference between a measurement and the true value of the measurand (the quantity being measured). True sample concentration is never known due to analytical limitations (e.g., method reporting limits) and error (systematic and random). Consequently, accuracy is normally inferred from the recovery of a known concentration "spiked" or included in the samples.

The laboratory will perform analyses on a sufficient number of spiked samples of a similar sample matrix to allow evaluation of accuracy. Surrogate spike analyses may be performed by the laboratory on a batch basis.

### 2.1.3 Representativeness

Representativeness is a measure of how closely the results reflect the actual concentration of the chemical parameters in the medium sampled. Sampling procedures and sample-handling protocols for storage, preservation, and transportation are designed to preserve the representativeness of the samples collected. Proper documentation will confirm that protocols are followed. Laboratory method blanks will be analyzed in accordance with established laboratory protocols to ensure that samples are not contaminated during sample preparation in the laboratory.

### 2.1.4 Completeness

Completeness is defined as the percentage of measurements that are judged valid. The completeness goal is that a sufficient amount of valid data is generated to allow for the assessment of the presence of constituents of concern in environmental media.

### 2.1.5 Comparability

Comparability is a qualitative parameter expressing confidence with which one data set can be compared with another. The objective of the quality assurance program is to assure that data developed during the investigation are comparable. Data comparability will be assured by using EPA defined procedures for sample collection, handling, and analytical methods.

### 2.1.6 Documentation

The project laboratory shall deliver Level II final results and electronic data deliverables (EDDs) by email or CD no more than 14 days after receipt of the final sample for a particular sampling event. Hardcopy or portable document format (PDF) Level IV data packages shall be received by Cascadia no later than 30 days after receipt of the samples by the laboratory. Documentation in the laboratory report will include:

- Holding times;
- Laboratory method blank data;
- Sample data;
- Matrix/surrogate spike data; and
- Duplicate sample data.

## 2.2 FIELD QUALITY CONTROL SAMPLES

Evaluation of field sampling procedures requires the collection and evaluation of field QC samples. Equipment blanks and field replicates will be collected and submitted to the laboratory to provide a means of assessing the quality of data resulting from the field sampling program. Equipment blanks are collected to evaluate the potential for cross-contamination of samples during collection. Equipment blanks will be collected at a rate of one per day when non-dedicated or non-disposable sampling equipment is used. Equipment blanks will be obtained by passing organic-free water through or over the decontaminated sampling equipment and collecting the water in appropriate sample containers.

Equipment blanks will be analyzed for the same parameters as the associated field samples. Equipment blanks should not contain detectable concentrations of target analytes greater than the method reporting limit (MRL) for the compound. Any detection of target analytes in an equipment blank will result in an investigation to determine effect on overall data usability, and affected results will be qualified as estimates or as non-detects at an elevated reporting limit (RL) as appropriate.

Field replicates are collocated samples that are collected simultaneously in separate containers. The purpose of field replicates is to allow evaluation of the contribution of random error from sampling to the total error associated with the data. One set of field replicates will be collected and submitted for every groundwater sampling event including the nine new wells. Field replicate precision will be evaluated as described in Section 2.1.1 above.

## 2.3 LABORATORY QUALITY CONTROL

Laboratory QC samples are used to monitor the laboratory's precision and accuracy of the analytical procedure results. Laboratory QC samples are analyzed as part of the standard laboratory QC protocols and are accomplished through analyzing method blanks, laboratory control samples (LCSs) (blank spikes), surrogate spikes, and internal standards. Not all analyses require the above QC sample types. Typically, these QC samples are not required for non-SW-846 methods.

### 2.3.1 Method Blanks

Method blanks will be used to check the level of laboratory background contamination. Laboratory method blanks will be analyzed with each sample batch. Results will be compared to all samples in the analytical batch.

QC criteria require that no contaminants be detected in the blank(s) above the MRL. If an analyte is detected, the action taken will follow the laboratory standard operating procedures (SOPs) and Quality Assurance Manual (QAM). Blank samples will be analyzed for the same parameters as the associated field samples.

### 2.3.2 Laboratory Control Samples

LCS, also known as blank spikes, are used to monitor the laboratory's day-to-day performance of routine analytical methods, independent of matrix effects. LCS are prepared by spiking reagent water with standard solutions prepared independently from those used in establishing instrument calibration. LCS must undergo the same preparation, cleanup (if used), and analyses as the associated field samples. Results are compared on a per-batch basis to pre-established control limits and are used to evaluate laboratory performance for precision and accuracy.

### 2.3.3 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS and MSDs are used to evaluate analytical (preparation and analysis) precision and accuracy. MS/MSD samples measure the effect of a specific sample matrix on analyte recovery, only MS/MSD samples from this investigation will be analyzed, and not samples from other projects. The MS/MSD will be collected on a frequency of 1 per 20 field samples collected. The MS/MSD samples will be analyzed for the same parameters as the primary samples in the same QC analytical batch. Results will be expressed as a percent recovery (%R) of the known spiked amount and as an RPD for the MS/MSD pairs.

### 2.3.4 Laboratory Duplicates

Precision of the analytical system is evaluated by using laboratory duplicates. Laboratory duplicates are two portions of a single homogeneous sample analyzed for the same parameters. Laboratory duplicates will be prepared and analyzed for all analytical batches requiring duplicates as specified per method in the laboratory QAM. Not all methods require laboratory duplicates, and MSDs are preferred for many organic methods. LCS duplicates will be prepared and analyzed for all batched when insufficient sample is collected for MSD.

### 2.3.5 Surrogate Spikes

Surrogate spikes are used to evaluate accuracy, method performance, and extraction efficiency. Surrogate compounds are compounds not normally found in environmental samples; however, they are similar to the target analytes in chemical composition and behavior in the analytical process. Samples for organic analysis will be spiked with surrogate compounds consistent with the requirements described in the laboratory SOPs and QAM.

Since sample characteristics will affect the %R, %R is a measurement of accuracy of the overall analytical method on each individual sample. The %R of surrogates is calculated concurrently with the analytes of interest.

### 2.3.6 Internal Standards

Internal standards are used in gas chromatography/mass spectrometer (GC/MS) and inductively coupled plasma (ICP)/MS analyses. A constant amount of internal standard is added to all standards, samples, extracts, or digestates. The ratio of the peak area, height, or intensity of the target analyte to the peak area, height, or intensity of the internal standard in the sample, extract, or digestate is compared to a similar ratio derived for each calibration standard. The target analyte response is calculated relative to that of the internal standard.

For GC/MS analyses internal standard areas or heights for all blanks, samples, and spikes must be 50 to 200% of the internal standard areas or heights from the last passing continuing calibration (CCAL). The laboratory must re-prepare and/or reanalyze any blank, sample, or spike that does not meet this Measurement Quality Objective (MQO) goal. If the internal standard area or height does not meet the MQO goal upon reanalysis, the laboratory must include a discussion of the possible cause and effect on data usability in the case narrative.

For ICP/MS analyses, the intensity of each internal standard must fall between 60% and 125% of the intensity of that internal standard in the initial calibration standard. If the intensity is outside of acceptance limits, then the sample must be diluted twofold and reanalyzed with the addition of appropriate amounts of internal standard. This procedure must be repeated until the internal standard intensities are within acceptance limits. If the internal standard intensity level for any calibration blank or instrument check standard is outside of acceptance limits, analysis must be terminated, the problem corrected, the system recalibrated, the calibration verified, and all affected samples must be reanalyzed.

## 2.4 QUALITY ASSURANCE OBJECTIVES

Sampling procedures are presented in the Monitoring Well Installation Work Plan. Sampling procedures are intended to ensure:

- Samples are collected consistent with project objectives.
- Samples are identified, handled, and transported in a manner that does not alter the representativeness of the data.

Quality assurance objectives for sample collection will be accomplished through laboratory quality assurance procedures and chain of custody. Laboratory duplicate measurements will be performed on at least 10% of laboratory samples.

## 2.5 SAMPLE AND DOCUMENT CUSTODY PROCEDURES

Field and laboratory custody procedures are discussed below.

### 2.5.1 Field Chain of Custody

Sample chain of custody is the process of tracking the possession of a sample from the time it is collected in the field through the laboratory analysis. A sample is considered to be under a person's chain of custody if it is:

- In a person's physical possession;
- In view of the person after possession has been taken; or
- Secured by that person such that no one can tamper with the sample, or secured by that person in a restricted area.

A chain-of-custody form is used to record possession of a sample and to document the requested analyses. Each time the sample containers are transferred between individuals, both the sender and receiver sign and date the chain-of-custody form. When a sample shipment is transported to the laboratory, a copy of the chain-of-custody form is included in the transport container.

The chain-of-custody form is used to record:

- Sample identification;
- Sample collector's name and signature;
- Date and time of sample collection;
- Description of sample;
- Requested analyses;
- Shipper's name and address;
- Recipient's name and address; and
- Signatures of individuals listed on the chain of custody.

### 2.5.2 Laboratory Operations and Custody Procedures

The analytical laboratory will document the following information:

- Calibration procedures;
- Analytical procedures;
- Computational procedures;
- Quality control procedures;
- Bench data;
- Operating procedures and changes to these procedures; and
- Laboratory documentation policies.

Laboratory chain-of-custody procedures include:

- Identification of the responsible party authorized to sign for incoming samples and a log consisting of sequential tracking numbers; and

- Specification of laboratory sample custody procedures for sample handling, storage, and internal distribution for analysis.

### 2.5.3 Corrections

Data are recorded in field notes and on chain-of-custody forms. Documents will be retained even if they are illegible or contain inaccuracies that require correction. If a documentation error occurs, the individual making the error will correct the document by crossing out the error, entering the correct information, and initialing and dating the correction. Subsequently discovered errors will be corrected, initialed, and dated by the person making the notation.

## 2.6 DATA REDUCTION, QUALITY REVIEW, AND REPORTING

A QA review will be performed on the laboratory analytical data. The laboratory report will include sufficient quality assurance/quality control data to enable the reviewer to determine the quality of the data. The validity of the data will be evaluated based on the objectives outlined in Sections 2.1 through 2.3.

## 2.7 PERFORMANCE AUDITS

The analytical laboratory completes performance audits routinely. Results of performance audits are available upon request.

## 2.8 CORRECTIVE ACTIONS

If unacceptable conditions or data are identified during the data quality review, the project manager will initiate corrective actions, which may include one or more of the following:

- Reanalysis of samples;
- Re-sampling and analysis;
- Modifying the sampling and analytical procedures; and
- Noting the uncertainty or inaccuracy of data by flagging those data.

## 2.9 QUALITY ASSURANCE REPORTS

The quality of the data collected during the investigation will be evaluated. The evaluation will include:

- A description of adverse conditions or deviations from the Work Plan;
- An assessment of analytical data for precision, accuracy, and completeness;
- A discussion of significant quality assurance problems and recommended solutions; and
- A summary of corrective actions taken to address quality assurance problems.

**Table A-1**
**Soil Analytical Laboratory Methods, Sample Containers, Holding Times, and Preservation**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analytical Parameter | Analytical Method | Container | Minimum Mass Req'd for Analysis | Holding Time | Preservation |
|---|---|---|---|---|---|
| Arsenic, Cadmium, Copper, Lead, Mercury, Zinc | EPA 6020 | 8-oz glass jar | 5 grams | 6 months<br>28 days for Hg | 4 ±2°C |
| HxCDF, PeCDD, PeCDF, TCDF, TCDD | EPA 1613 | 8-oz glass jar | 10 grams | 30 day extract<br>45 days analysis | 4 ±2°C |
| Butyltins | KRONE | 8-oz glass jar | 30 grams | 14 day extract<br>40 days analysis | 4 ±2°C |
| PCBs aroclors | EPA 8082 | 8-oz glass jar | 30 grams | 1 year | 4 ±2°C |
| PAHs/Phthalates (plus Carbazole) | EPA 8270 | 8-oz glass jar | 30 grams | 14 day extract<br>40 days analysis | 4 ±2°C |
| Organochlorine Pesticides/DDx | EPA 8081 | 8-oz glass jar | 30 grams | 14 day extract<br>40 days analysis | 4 ±2°C |
| Total Petroleum Hydrocarbons-Gx | EPA 5035/NW-TPH Methods | 40-mil glass | 5 grams | 2 day extract<br>14 days analysis | Methanol, 4 ±2°C |
| Total Petroleum Hydrocarbons-Dx | NW-TPH Methods | 8-oz glass jar | 20 grams | 14 day extract<br>40 days analysis | 4 ±2°C |

***Abbreviations***

(HxCDF) = 1,2,3,4,7,8-hexachlorodibenzofuran
(PeCDD) = 1,2,3,7,8-pentachlorodibenzo-p-dioxin
(PeCDF) = 2,3,4,7,8-pentachlorodibenzofuran
(TCDF) = 2,3,7,8-tetrachlorodibenzofuran
(TCDD) = 2,3,7,8-tetrachlorodibenzo-p-dioxin
(PCBs) = Polychlorinated biphenyls
(DDx) = Sum of dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), and dichlorodiphenyldichloroethane (DDD)



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**Table A-2**
**Soil Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Chemical | Screening Level | | Analytical Laboratory Detection Limit Goal |
|---|---|---|---|
| | JSCS[1] | ROD CL[2] | |
| ***Dioxins and Furans (ng/kg)*** | | | |
| 1,2,3,4,7,8-hexachlorodibenzofuran (HxCDF) | 2.7 | 0.4 | 0.111 |
| 1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD) | 2.6 | 0.2 | 0.105 |
| 2,3,4,7,8-pentachlorodibenzofuran (PeCDF) | 0.03 | 0.3 | 0.101 |
| 2,3,7,8-tetrachlorodibenzofuran (TCDF) | 0.77 | 0.40658 | 0.100 |
| 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) | 0.0091 | 0.2 | 0.111 |
| ***PAHs (µg/kg)*** | | | |
| 2-Methylnaphthalene | 200 | | 2.67 |
| Acenaphthene | 300 | | 1.33 |
| Acenaphthylene | 200 | | 1.33 |
| Anthracene | 845 | | 1.33 |
| Benzo(a)anthracene | 1,050 | | 1.33 |
| Benzo(a)pyrene | 1,450 | | 2.00 |
| Benzo(b)fluoranthene | | | 2.00 |
| Benzo(g,h,i)perylene | 300 | | 1.33 |
| Benzo(k)fluoranthene | 13,000 | | 1.33 |
| Carbazole | 1,600 | | 1.33 |
| Chrysene | 1,290 | | 1.33 |
| Dibenzo(a,h)anthracene | 1,300 | | 1.33 |
| Fluoranthene | 2,230 | | 1.33 |
| Fluorene | 536 | | 1.33 |
| Indeno(1,2,3-cd)pyrene | 100 | | 1.33 |
| Naphthalene | 561 | | 2.67 |
| Phenanthrene | 1,170 | | 1.33 |
| Pyrene | 1,520 | | 1.33 |
| Detected CPAHs (BaP TEF) | | 12 | |
| Detected PAHs | | 23,000 | |
| ***PCBs (µg/kg)*** | | | |
| Aroclor 1016 | 530 | | 0.67 |
| Aroclor 1221 | | | 0.67 |
| Aroclor 1232 | | | 0.67 |
| Aroclor 1242 | | | 0.67 |
| Aroclor 1248 | 1,500 | | 0.67 |
| Aroclor 1254 | 300 | | 0.67 |
| Aroclor 1260 | 200 | | 0.67 |
| Aroclor 1262 | | | 0.67 |
| Aroclor 1268 | | | 0.67 |
| Total PCBs | 0.4 | 9 | |

***Please refer to notes at end of table.***



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**Table A-2**
**Soil Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Chemical | Screening Level | | Analytical Laboratory Detection Limit Goal |
|---|---|---|---|
| | JSCS[1] | ROD CL[2] | |
| ***Phthalates (µg/kg)*** | | | |
| Bis(2-ethylhexyl) phthalate | 330 | 135 | 20.00 |
| Butylbenzyl phthalate | | | 13.3 |
| Dibutyl phthalate | | | 13.3 |
| Diethyl phthalate | 600 | | 13.3 |
| Dimethyl phthalate | | | 13.3 |
| Di-n-octyl phthalate | 60 | | 13.3 |
| ***Organochlorine Pesticides (µg/kg)*** | | | |
| 2,4'-DDD | 0.33 | 114 | 0.33 |
| 2,4'-DDE | 0.33 | 226 | 0.33 |
| 2,4'-DDT | 0.33 | 246 | 0.33 |
| 4,4'-DDD | 0.33 | 114 | 0.33 |
| 4,4'-DDE | 0.33 | 226 | 0.33 |
| 4,4'-DDT | 0.33 | 246 | 0.33 |
| Detected DDx | | 6.1 | 1.98 |
| Aldrin | 40 | 2 | 0.33 |
| alpha-Endosulfan | | | 0.33 |
| alpha-Hexachlorocyclohexane | | | 0.33 |
| beta-Endosulfan | | | 0.33 |
| beta-Hexachlorocyclohexane | | | 0.33 |
| cis-Chlordane | 0.37 | 1.4 | 0.33 |
| cis-Nonachlor | | | 0.33 |
| delta-Hexachlorocyclohexane | 5.0 | | 0.33 |
| Dieldrin | 0.01 | 0.07 | 0.33 |
| Endosulfan sulfate | | | 0.33 |
| Endrin | 207 | | 0.33 |
| Endrin aldehyde | | | 0.33 |
| Endrin ketone | | | 0.33 |
| gamma-Hexachlorocyclohexane | | 5 | 0.33 |
| Heptachlor | 10 | | 0.33 |
| Heptachlor epoxide | 16 | | 0.33 |
| Hexachlorobenzene | 19 | | 1.0 |
| Hexachlorobutadiene | 600 | | 0.33 |
| Hexachloroethane | | | 0.33 |
| Methoxychlor | | | 1.0 |
| Mirex | | | 0.33 |
| Oxychlordane | | | 0.33 |
| Toxaphene | | | 10 |
| trans-Chlordane | 0.37 | 1.4 | 0.33 |
| trans-Nonachlor | | | 0.33 |

***Please refer to notes at end of table.***

**Table A-2**
**Soil Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Chemical | Screening Level | | Analytical Laboratory Detection Limit Goal |
|---|---|---|---|
| | JSCS[1] | ROD CL[2] | |
| ***Butyltins (µg/kg)*** | | | |
| Butyltin ion | | | 0.70 |
| Dibutyltin ion | | | 1.4 |
| Tetrabutyltin | | | 0.70 |
| Tributyltin ion | 2.3 | 3,080 | 1.5 |
| ***Metals (mg/kg)*** | | | |
| Aluminum | | | 25 |
| Antimony | 64 | | 0.50 |
| Arsenic | 7.0 | 3.0 | 0.50 |
| Cadmium | 1.0 | 0.51 | 0.10 |
| Chromium | 111 | | 0.50 |
| Copper | 149 | 359 | 0.50 |
| Lead | 17 | 196 | 0.10 |
| Manganese | 1,100 | | 0.50 |
| Mercury | 0.07 | 0.09 | 0.04 |
| Nickel | 49 | | 0.50 |
| Selenium | 2.0 | | 0.50 |
| Silver | 5.0 | | 0.10 |
| Zinc | 459 | 459 | 2.0 |
| ***Petroleum Hydrocarbons (mg/kg)*** | | | |
| Gasoline | | | 2.5 |
| Diesel (NWTPH Method) | | 91 | 10 |
| Oil | | | 20 |

***Notes:***

1. DEQ Table 3-1 Portland Harbor JSCS Guidance, 7/16/2007 revision
2. EPA Table 17 January 2017 Portland Harbor ROD. Riverbank/Soil Cleanup Level.

ng/kg = nanograms per kilogram

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

**Table A-3**
**Water Analytical Laboratory Methods, Sample Containers, Holding Times, and Preservation**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analytical Parameter | Analytical Method | Container | Holding Time | Water Sample Preservation |
|---|---|---|---|---|
| Arsenic, Cadmium, Copper, Lead, Mercury, Zinc | EPA 6020 | 500-ml HDPE bottle | 6 months<br>Hg 28-days | $HNO_3$ pH<2, 4 ±2°C |
| Butyltins | KRONE | 1-liter amber | 7 day extract<br>40 days analysis | 4 ±2°C |
| PCBs Aroclors | EPA 8082 | 1-liter amber | 1 year | 4 ±2°C |
| PAHs/Phthalates (plus carbazole) | EPA 8270 | 1-liter amber | 7 day extract<br>40 days analysis | 4 ±2°C |
| Volatile Organic Compounds | EPA 8260/8260 SIM | (3) 40-ml VOAs | 14 days analysis | HCl pH,2, 4 ±2°C |
| Organochlorine Pesticides | EPA 8081 | 1-liter amber | 7 day extract<br>40 days analysis | 4 ±2°C |
| Diesel and Oil Hydrocarbons | NWTPH-Dx | 1-liter amber | 14 day extract<br>40 days analysis | 4 ±2°C |
| Gasoline Hydrocarbons | NWTPH-Gx | (3) 40-ml VOAs | 14 days analysis | HCl pH,2, 4 ±2°C |
| HxCDF, PeCDD, PeCDF, TCDF, TCDD | EPA 1613 | 1-liter amber | 30 day extract<br>45 days analysis | 4 ±2°C |
| Total Organic Carbon | SM 5310 | 250-ml HDPE bottle | 28 days | $H_2SO_4$ pH<2, 4 ±2°C |
| Total Suspended Solids | SM 2540D | 250-ml HDPE bottle | 7 days | 4 ±2°C |

Samples for dissolved metals analysis will be field filtered using a 0.45 micron filter prior to placement in the preserved laboratory container.



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**Table A-4**
**Water and SPLP Extract Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analyte | Portland Harbor SLVs GW CL | Analytical Laboratory Detection Limits Water/SPLP Extract |
|---|---|---|
| ***PAHs (µg/L)*** | | |
| 2-Methylnaphthalene | | 2.00E-02 |
| Carbazole | | 2.00E-02 |
| Acenaphthene | 2.30E+01 | 1.00E-02 |
| Acenaphthylene | | 1.00E-02 |
| Anthracene | 7.30E-01 | 1.00E-02 |
| Benzo(a)anthracene | 1.20E-03 | 1.00E-02 |
| Benzo(a)pyrene | 1.20E-04 | 1.50E-02 |
| Benzo(b)fluoranthene | 1.20E-03 | 1.50E-02 |
| Benzo(k)fluoranthene | 1.30E-03 | 1.50E-02 |
| Benzo(b+k)fluoranthene | 1.20E-03 | 1.50E-02 |
| Benzo(g,h,i)perylene | | 1.00E-02 |
| Chrysene | 1.30E-03 | 1.00E-02 |
| Dibenzo(a,h)anthracene | 1.20E-04 | 1.00E-02 |
| Fluoranthene | | 1.00E-02 |
| Fluorene | | 1.00E-02 |
| Indeno(1,2,3-cd)pyrene | 1.20E-03 | 1.00E-02 |
| Naphthalene | | 2.00E-02 |
| Phenanthrene | | 1.00E-02 |
| Pyrene | | 1.00E-02 |
| ***PCBs Aroclors (µg/L)*** | | |
| Aroclor 1016 | | 1.00E-02 |
| Aroclor 1221 | | 1.00E-02 |
| Aroclor 1232 | | 1.00E-02 |
| Aroclor 1242 | | 1.00E-02 |
| Aroclor 1248 | | 1.00E-02 |
| Aroclor 1254 | | 1.00E-02 |
| Aroclor 1260 | | 1.00E-02 |
| Aroclor 1262 | | 1.00E-02 |
| Aroclor 1268 | | 1.00E-02 |
| Total PCBs | 1.40E-02 | |
| ***Phthalates (µg/L)*** | | |
| Bis(2-ethylhexyl) phthalate | | 2.00E-01 |
| Butylbenzyl phthalate | | 2.00E-01 |
| Dibutyl phthalate | | 2.00E-01 |
| Diethyl phthalate | | 2.00E-01 |
| Dimethyl phthalate | | 2.00E-01 |
| Di-n-octyl phthalate | | 2.00E-01 |

***Please refer to notes at end of table.***



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**Table A-4**
**Water and SPLP Extract Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analyte | Portland Harbor SLVs GW CL | Analytical Laboratory Detection Limits Water/SPLP Extract |
|---|---|---|
| ***Organochloride Pesticides (µg/L)*** | | |
| 2,4'-DDD | 3.10E-05 | 5.00E-03 |
| 2,4'-DDE | 1.80E-05 | 5.00E-03 |
| 2,4'-DDT | 2.20E-05 | 5.00E-03 |
| 4,4'-DDD | 3.10E-05 | 5.00E-03 |
| 4,4'-DDE | 1.80E-05 | 5.00E-03 |
| 4,4'-DDT | 2.20E-05 | 5.00E-03 |
| Total DDx | 1.00E-03 | 3.00E-02 |
| Aldrin | | 5.00E-03 |
| alpha-Endosulfan | | 5.00E-03 |
| alpha-Hexachlorocyclohexane | | 5.00E-03 |
| beta-Endosulfan | | 5.00E-03 |
| beta-Hexachlorocyclohexane | | 5.00E-03 |
| cis-Chlordane | | 5.00E-03 |
| cis-Nonachlor | | 5.00E-03 |
| delta-Hexachlorocyclohexane | | 5.00E-03 |
| Dieldrin | | 5.00E-03 |
| Endosulfan sulfate | | 5.00E-03 |
| Endrin | | 5.00E-03 |
| Endrin aldehyde | | 1.00E-02 |
| Endrin ketone | | 5.00E-03 |
| gamma-Hexachlorocyclohexane | | 5.00E-03 |
| Heptachlor | | 5.00E-03 |
| Heptachlor epoxide | | 5.00E-03 |
| Hexachlorobenzene | | 1.50E-02 |
| Hexachlorobutadiene | | 5.00E-03 |
| Hexachloroethane | | 2.50E-02 |
| Methoxychlor | | 1.50E-02 |
| Mirex | | 5.00E-03 |
| Oxychlordane | | 5.00E-03 |
| Toxaphene | | 1.88E-01 |
| trans-Chlordane | | 5.00E-03 |
| trans-Nonachlor | | 5.00E-03 |

***Please refer to notes at end of table.***

**Table A-4**
**Water and SPLP Extract Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analyte | Portland Harbor SLVs GW CL | Analytical Laboratory Detection Limits Water/SPLP Extract |
|---|---|---|
| ***Butyltins (µg/L)*** | | |
| Butyltin ion | | 2.50E-02 |
| Dibutyltin ion | | 2.50E-02 |
| Tributyltin ion | | 2.50E-02 |
| Tetrabutyltin | | 2.50E-02 |
| ***Metals (µg/L)*** | | |
| Arsenic | 1.80E-02 | 3.50E-02 |
| Cadmium | 9.10E-02 | 4.00E-02 |
| Copper | 2.74E+00 | 5.00E-01 |
| Lead | 5.40E-01 | 1.00E-01 |
| Mercury | | 4.00E-02 |
| Zinc | 3.65E+01 | 2.00E+00 |
| ***VOCs (µg/L)*** | | |
| 1,1,1,2-Tetrachloroethane | | 2.50E-01 |
| 1,1,1-Trichloroethane | | 2.50E-01 |
| 1,1,2,2-Tetrachloroethane | | 2.50E-01 |
| 1,1,2-Trichloroethane | | 2.50E-01 |
| 1,1-Dichloroethane | | 2.50E-01 |
| 1,1-Dichloroethene | 7.00E+00 | 2.50E-01 |
| 1,1-Dichloropropene | | 5.00E-01 |
| 1,2,3-Trichloropropane | | 5.00E-02 |
| 1,2-Dichloroethane | | 2.50E-01 |
| 1,2-Dichloropropane | | 2.50E-01 |
| 1,2,3-Trichlorobenzene | | 1.00E+00 |
| 1,2,3-Trichloropropane | | 5.00E-01 |
| 1,2,4-Trichlorobenzene | | 1.00E+00 |
| 1,4-Dichlorobenzene | | 2.50E-01 |
| 1,2,4-Trimethylbenzene | | 5.00E-01 |
| 1,2-Dibromo-3-chloropropane | | 2.50E+00 |
| 1,2-Dibromoethane (EDB) | | 1.00E-02 |
| 1,2-Dichlorobenzene | | 2.50E-01 |
| 1,2-Dichloroethane (EDC) | | 2.50E-01 |
| 1,2-Dichloropropane | | 2.50E-01 |
| 1,3,5-Trimethylbenzene | | 5.00E-01 |

***Please refer to notes at end of table.***

**Table A-4**
**Water and SPLP Extract Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analyte | Portland Harbor SLVs GW CL | Analytical Laboratory Detection Limits Water/SPLP Extract |
|---|---|---|
| ***VOCs (µg/L) continued*** | | |
| 1,3-Dichlorobenzene | | 2.50E-01 |
| 1,3-Dichloropropane | | 5.00E-01 |
| 2,2-Dichloropropane | | 5.00E-01 |
| 2-Butanone (MEK) | | 5.00E+00 |
| 2-Chlorotoluene | | 5.00E-01 |
| 2-Hexanone (Methyl N-butyl ketone) | | 5.00E+00 |
| 4-Chlorotoluene | | 5.00E-01 |
| 4-Isopropyltoluene | | 5.00E-01 |
| 4-Methyl-2-pentanone (MiBK) | | 5.00E+00 |
| Acetone | | 1.00E+01 |
| Acrylonitrile | | 1.00E+00 |
| Benzene | 4.40E-01 | 1.00E-01 |
| Bromobenzene | | 2.50E-01 |
| Bromochloromethane | | 5.00E-01 |
| Bromodichloromethane | | 5.00E-01 |
| Bromoform | | 5.00E-01 |
| Bromomethane | | 5.00E+00 |
| Carbon disulfide | | 2.50E-01 |
| Carbon tetrachloride | | 5.00E-01 |
| Chlorobenzene | 6.40E+01 | 2.50E-01 |
| Chlorodibromomethane | | 2.50E-01 |
| Chloroethane | | 5.00E+00 |
| Chloroform | | 5.00E-02 |
| Chloromethane | | 2.50E+00 |
| cis-1,2-Dichloroethene | 9.90E+00 | 2.50E-01 |
| cis-1,3-Dichloropropene | | 1.00E-02 |
| Dibromochloromethane | | 5.00E-01 |
| Dibromomethane | | 5.00E-01 |
| Dichlorodifluoromethane | | 5.00E-01 |
| Ethylbenzene | 7.30E+00 | 2.50E-01 |
| Ethylene dibromide | | 2.50E-01 |
| Hexachlorobutadiene | | 2.50E+00 |
| Isopropylbenzene | | 5.00E-01 |

***Please refer to notes at end of table.***

**Table A-4**
**Water and SPLP Extract Analytical Laboratory Detection Limits**
**Leave Surface Sampling and Analysis**
**Crawford Street, Portland, Oregon**

| Analyte | Portland Harbor SLVs GW CL | Analytical Laboratory Detection Limits Water/SPLP Extract |
|---|---|---|
| ***VOCs (µg/L) continued*** | | |
| m,p-Xylene | 1.30E+01 | 5.00E-01 |
| Methyl iodide | | 2.50E-01 |
| Methyl isobutyl ketone | | 2.50E-01 |
| Methyl tert-butyl ether | | 5.00E-01 |
| Methylene bromide | | 2.50E-01 |
| Methylene chloride | | 1.50E+00 |
| Methylethyl ketone | | 2.50E-01 |
| Naphthalene | | 1.00E+00 |
| n-Butylbenzene | | 5.00E-01 |
| n-Propylbenzene | | 2.50E-01 |
| o-Xylene | 1.30E+01 | 2.50E-01 |
| sec-Butylbenzene | | 5.00E-01 |
| Styrene | | 5.00E-01 |
| tert-Butylbenzene | | 5.00E-01 |
| Tetrachloroethene | 2.40E-01 | 1.00E-02 |
| Toluene | 9.80E+00 | 5.00E-01 |
| trans-1,2-Dichloroethene | | 2.50E-01 |
| trans-1,3-Dichloropropene | | 1.00E-02 |
| trans-1,4-Dichloro-2-butene | | 2.50E-01 |
| Trichloroethene | 6.00E-01 | 1.00E-02 |
| Trichlorofluoromethane | | 1.00E+00 |
| Vinyl chloride | 2.20E-02 | 1.00E-02 |
| ***Petroleum Hydrocarbons (µg/L)*** | | |
| Gasoline | | 5.00E-02 |
| Diesel (NWTPH Method) | | 1.00E-01 |
| | | |
| ***TSS (mg/L)*** | | 5.00E+00 |

**Notes:**
SLVs = screening level values
GW CL = Groundwater Cleanup Levels
SPLP = Synthetic Precipitation Leaching Procedure
PAHs = polycyclic aromatic hydrocarbons
µg/L = micrograms per liter
PCBs = polychlorinated biphenyls
VOCs = volatile organic compounds
TSS = total suspended solids
mg/L = milligrams per liter

# APPENDIX B

SAMPLING LOCATION MAP AND
DATA TABLES FROM PREVIOUS INVESTIGATIONS

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | Tank 1 | Tank 2 | Tank 3 | TP-1 | TP-4 | TP-7 | | B-1 | B-2 | B-3 | | B-4 | B-5 | B-6 | B-7 | P-01 | P-02 | P-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | Sample #1 | Sample #2 | Sample #3 | TP-1/S-1 | TP-4/S-1 | TP-7/S-1 | TP-7/S-2 | B-1 | B-2 | B-3 | B-3D | B-4 | B-5 | B-6 | B-7 | P-01 | P-02 | P-03 |
| Date Sampled | | 3/13/1987 | 3/13/1987 | 3/13/1987 | 1/6/1988 | 1/6/1988 | 1/6/1988 | 1/6/1988 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 |
| Depth Sampled (feet) | | | | | | | 3 | 6 | 1 | 2 | 1 | 1 | 2 | 1 | 0.8 | 1 | 1 | 0.5 | 0.2 |
| Sampled By | | Crosby Overton | Crosby Overton | Crosby Overton | SE/E | SE/E | SE/E | SE/E | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | Envirocon | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ |
| Location | | Beneath Skookum 5,000-gal diesel tank formerly located next to the warehouse at the NW corner of the site | Beneath the 1,000-gal gasoline yard tank, located at the north end of the yard. | Beneath the 1,000-gal bunker oil weld-shop tank, located at the south end of the welding shop. | Middle blocks, NE corner of the west-central block | South blocks, NE corner of the east block (drainfield) | South blocks, NE corner of the west block (black sand area) | | Bridgewater Group<br>Beach removal area (bottom - east end) | Beach removal area (bottom - northwest of B-1) | Beach removal area (bottom - west of B-1) | | Beach removal area (bottom - west of B-3) | Beach removal area (bottom - west of B-4) | Beach removal area (bottom - west of B-5) | Beach removal area (bottom - west end) | Beach removal area (south side - east end) | Beach removal area (east side) | Beach removal area (north side - east end) |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | <0.2 (ND) | <0.2 (ND) | <0.2 (ND) | <0.2 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | **0.14** | **0.09** | 0.085 | 0.055 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) |
| Propylbenzene, iso | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | --- | --- | --- | <0.1 (ND) | <0.1 (ND) | 0.31 | 0.31 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | Tank 1 | Tank 2 | Tank 3 | TP-1 | TP-4 | TP-7 | | B-1 | B-2 | B-3 | | B-4 | B-5 | B-6 | B-7 | P-01 | P-02 | P-03 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | Sample #1 | Sample #2 | Sample #3 | TP-1/S-1 | TP-4/S-1 | TP-7/S-1 | TP-7/S-2 | B-1 | B-2 | B-3 | B-3D | B-4 | B-5 | B-6 | B-7 | P-01 | P-02 | P-03 |
| Date Sampled | | 3/13/1987 | 3/13/1987 | 3/13/1987 | 1/6/1988 | 1/6/1988 | 1/6/1988 | 1/6/1988 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 |
| Depth Sampled (feet) | | | | | | | 3 | 6 | 1 | 2 | 1 | 1 | 2 | 1 | 0.8 | 1 | 1 | 0.5 | 0.2 |
| Sampled By | | Crosby Overton | Crosby Overton | Crosby Overton | SE/E | SE/E | SE/E | SE/E | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ |
| Location | | Beneath Skookum 5,000-gal diesel tank formerly located next to the warehouse at the NW corner of the site | Beneath the 1,000-gal gasoline yard tank, located at the north end of the yard. | Beneath the 1,000-gal bunker oil weld-shop tank, located at the south end of the welding shop. | Middle blocks, NE corner of the west-central block | South blocks, NE corner of the east block (drainfield) | South blocks, NE corner of the west block (black sand area) | | Bridgewater Group<br>Beach removal area (bottom - east end) | Beach removal area (bottom - northwest of B-1) | Beach removal area (bottom - west of B-1) | | Beach removal area (bottom - west of B-3) | Beach removal area (bottom - west of B-4) | Beach removal area (bottom - west of B-5) | Beach removal area (bottom - west end) | Beach removal area (south side - east end) | Beach removal area (east side) | Beach removal area (north side - east end) |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Barium | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cadmium Ψ | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (III) | nc, nv | --- | --- | --- | --- | --- | --- | --- | 50.8 | 75.9 | **99.3** | **100** | **139** | **144** | **79.2** | 33.2 | **104** | **92.7** | **137** |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | **396** | **558** | **764** | **968** | **1390** | **1380** | **1130** | **292** | **745** | **760** | **1260** |
| Lead | NA, nv | --- | 30 | --- | --- | --- | --- | --- | **46.5** | **1890** | **240** | **84.6** | **265** | **45.6** | **36.3** | **30.6** | 20.5 | **48.3** | **404** |
| Mercury | nc, nv | --- | --- | --- | --- | --- | --- | --- | <0.1 (ND) | 0.21 | <0.1 (ND) | 0.12 | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) |
| Nickel | c, nv | --- | --- | --- | --- | --- | --- | --- | 28.1 | **129** | 44.4 | **67.3** | **72.8** | **104** | **54** | 24.5 | **73.1** | **59.2** | **75.9** |
| Silver | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | 152 | 262 | 282 | 384 | 302 | 246 | 183 | 132 | 107 | 157 | 279 |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | --- | --- | --- | --- | --- | <0.2 (ND) | --- | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | --- | --- | --- | --- | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | 0.105 | 0.105 | 0.095 | 0.075 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) |
| Anthracene | nc, v | --- | --- | --- | --- | --- | --- | --- | 0.1 | 0.05 | 0.575 | 0.51 | 0.445 | 0.225 | 0.13 | 0.05 | <0.05 (ND) | 0.13 | 0.205 |
| Benz[a]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | 0.08 | 0.07 | 0.405 | 0.5 | 0.435 | **0.24** | 0.115 | 0.08 | <0.05 (ND) | **0.22** | **0.19** |
| Benzo[a]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | **0.095** | **0.095** | **0.495** | **0.585** | **0.525** | **0.28** | **0.175** | **0.135** | <0.05 (ND) | **0.230** | **0.210** |
| Benzo[b]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | 0.065 | 0.06 | **0.315** | **0.385** | **0.37** | **0.205** | 0.115 | 0.09 | <0.05 (ND) | **0.180** | **0.155** |
| Benzo[k]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | 0.1 | 0.09 | 0.435 | 0.645 | 0.485 | 0.275 | 0.155 | 0.105 | <0.05 (ND) | 0.215 | 0.23 |
| Chrysene | c, nv | --- | --- | --- | --- | --- | --- | --- | 0.12 | 0.11 | 0.48 | 0.595 | 0.545 | 0.305 | 0.165 | 0.12 | <0.05 (ND) | 0.285 | 0.26 |
| Dibenz[a,h]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | 0.09 | <0.05 (ND) | 0.1 | **0.065** | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) |
| Fluoranthene | nc, nv | --- | --- | --- | --- | --- | --- | --- | 0.215 | 0.165 | 1.060 | 1.210 | 1.040 | 0.690 | 0.265 | 0.160 | 0.065 | 0.605 | 0.47 |
| Fluorene | nc, v | --- | --- | --- | --- | --- | --- | --- | <0.05 (ND) | <0.05 (ND) | 0.2 | 0.17 | 0.17 | 0.11 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.05 |
| Indeno[1,2,3-cd]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | <0.05 (ND) | 0.055 | **0.235** | **0.35** | **0.275** | **0.19** | 0.105 | 0.1 | <0.05 (ND) | 0.13 | <0.05 (ND) |
| Pyrene | nc, nv | --- | --- | --- | --- | --- | --- | --- | 0.205 | 0.017 | 1.01 | 1.54 | 1 | 0.585 | 0.28 | 0.185 | 0.07 | 0.515 | 0.54 |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | <1 (ND) | 16 | <4 (ND) | --- | --- | --- | --- | <22.2 (ND) | <22.2 (ND) | <25 (ND) | <23.3 (ND) | <22.5 (ND) | <22 (ND) | <21.7 (ND) | <23.5 (ND) | <20.6 (ND) | <20.8 (ND) | <21.7 (ND) |
| DRO | nc, nv | <1 (ND) | <1 (ND) | <4 (ND) | --- | --- | --- | --- | <55.6 (ND) | <55.6 (ND) | <62.5 (ND) | <58.1 (ND) | <56.2 (ND) | <54.9 (ND) | <54.3 (ND) | 53.4 | <51.5 (ND) | <52.1 (ND) | <54.3 (ND) |
| RRO | nc, nv | --- | --- | --- | --- | --- | --- | --- | <111 (ND) | <111 (ND) | <125 (ND) | <116 (ND) | <112 (ND) | <110 (ND) | <109 (ND) | 179 | <103 (ND) | <104 (ND) | <109 (ND) |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | P-04 | P-05 | P-06 | P-07 | | P-08 | P-09 | P-10 | P-11 | P-15 | P-17 | P-18 | P-19 | P-20 | GP-1 | GP-2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | P-04 | P-05 | P-06 | P-07 | P-07D | P-08 | P-09 | P-10 | P-11 | P-15 | P-17 | P-18 | P-19 | P-20 | GP-1 0-4' | GP-2 0-4' | GP-2 4-8' |
| Date Sampled | | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 1/19/2006 | 1/19/2006 | 1/19/2006 |
| Depth Sampled (feet) | | 1 | 1 | 1 | 0.8 | 0.8 | 0.8 | 0.8 | 1 | 1 | 0.2 | 0.25 | 2 | 0.2 | 0.2 | 0-4' | 0-4' | 4-8' |
| Sampled By | | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Evergreen~~ | Evergreen | Evergreen |
| Location | | Bridgewater Group<br>Beach removal area (south side - west of P-01) | Beach removal area (south side - west of P-04) | Beach removal area (south side - west of P-05) | Beach removal area (south side - west of P-06) | | Beach removal area (south side - west of P-07) | Beach removal area (south side - west of P-08) | Beach removal area (south side - west end) | Beach removal area (north side - west end) | Beach removal area (north side - opposite of P-07 and P-08) | Beach removal area (north side - opposite of P-06) | Beach removal area (north side - opposite of P-05) | Beach removal area (west side of B-2 sample area) | Beach removal area (north side -north of B-2 sample area) | West side of the site near the former planing mill building | Middle section of the site just south of the railroad tracks | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.06 | <0.05 (ND) | <0.05 (ND) | **0.095** | <0.05 (ND) | --- | --- | --- |
| Propylbenzene, iso | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | P-04 | P-05 | P-06 | P-07 | | P-08 | P-09 | P-10 | P-11 | P-15 | P-17 | P-18 | P-19 | P-20 | GP-1 | GP-2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | P-04 | P-05 | P-06 | P-07 | P-07D | P-08 | P-09 | P-10 | P-11 | P-15 | P-17 | P-18 | P-19 | P-20 | GP-1 0-4' | GP-2 0-4' | GP-2 4-8' |
| Date Sampled | | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 10/20/2001 | 1/19/2006 | 1/19/2006 | 1/19/2006 |
| Depth Sampled (feet) | | 1 | 1 | 1 | 0.8 | 0.8 | 0.8 | 0.8 | 1 | 1 | 0.2 | 0.25 | 2 | 0.2 | 0.2 | 0-4' | 0-4' | 4-8' |
| Sampled By | | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | ~~Envirocon~~ | Evergreen | Evergreen | Evergreen |
| Location | | Bridgewater Group<br>Beach removal area (south side - west of P-01) | Beach removal area (south side - west of P-04) | Beach removal area (south side - west of P-05) | Beach removal area (south side - west of P-06) | | Beach removal area (south side - west of P-07) | Beach removal area (south side - west of P-08) | Beach removal area (south side - west end) | Beach removal area (north side - west end) | Beach removal area (north side - opposite of P-07 and P-08) | Beach removal area (north side - opposite of P-06) | Beach removal area (north side - opposite of P-05) | Beach removal area (west side of B-2 sample area) | Beach removal area (north side -north of B-2 sample area) | West side of the site near the former planing mill building | Middle section of the site just south of the railroad tracks | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Barium | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cadmium Ψ | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (III) | nc, nv | **95.5** | 61.1 | **111** | **89.6** | **86.5** | **98.6** | **84.2** | **111** | 87.4 | **120** | **116** | **101** | **179** | **142** | --- | --- | --- |
| Copper | nc, nv | **752** | **581** | **926** | **784** | **718** | **897** | **846** | **801** | **857** | **1240** | **1730** | **1200** | **1890** | **1330** | --- | --- | --- |
| Lead | NA, nv | 14.4 | **50.7** | 20.5 | 18.5 | 13.9 | 11.6 | 15.4 | 14.3 | **48.5** | 26.1 | **55.9** | **3130** | **656** | **434** | --- | --- | --- |
| Mercury | nc, nv | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | <0.1 (ND) | --- | --- | --- |
| Nickel | c, nv | 34.6 | 26.9 | **50.2** | 43.7 | 34.9 | 33.4 | 34.1 | **58.3** | 37.6 | **77.8** | **144** | **285** | **140** | **50.8** | --- | --- | --- |
| Silver | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc | 0.0E+00 | 94.7 | 139 | 102 | 111 | 106 | 98.6 | 103 | 101 | 111 | 146 | 167 | 314 | 312 | 269 | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.075 | 0.065 | --- | --- | --- |
| Anthracene | nc, v | <0.05 (ND) | 0.18 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.07 | 0.21 | <0.05 (ND) | 0.05 | 0.5 | 0.16 | --- | --- | --- |
| Benz[a]anthracene | c, nv | <0.05 (ND) | 0.085 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.075 | 0.11 | <0.05 (ND) | 0.055 | **0.6** | **0.195** | --- | --- | --- |
| Benzo[a]pyrene | c, nv | <0.05 (ND) | **0.080** | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | **0.14** | **0.115** | <0.05 (ND) | **0.065** | **0.885** | **0.275** | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | <0.05 (ND) | 0.055 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.11 | 0.07 | <0.05 (ND) | 0.05 | **0.56** | **0.21** | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | <0.05 (ND) | 0.09 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.085 | 0.145 | <0.05 (ND) | 0.085 | 0.78 | 0.285 | --- | --- | --- |
| Chrysene | c, nv | <0.05 (ND) | 0.115 | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.05 | <0.05 (ND) | <0.05 (ND) | 0.15 | 0.145 | <0.05 (ND) | 0.075 | 0.845 | 0.245 | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | --- | --- | --- |
| Fluoranthene | nc, nv | <0.05 (ND) | 0.25 | 0.070 | 0.050 | 0.065 | 0.110 | 0.050 | <0.05 (ND) | 0.195 | 0.310 | 0.065 | 0.135 | 1.49 | 0.490 | --- | --- | --- |
| Fluorene | nc, v | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | 0.065 | <0.05 (ND) | <0.05 (ND) | 0.15 | 0.09 | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | <0.05 (ND) | **0.47** | **0.185** | --- | --- | --- |
| Pyrene | nc, nv | <0.05 (ND) | 0.25 | 0.07 | 0.055 | 0.08 | 0.115 | 0.06 | <0.05 (ND) | 0.26 | 0.415 | 0.08 | 0.16 | 2.06 | 0.57 | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | <20.8 (ND) | <21.7 (ND) | <20.4 (ND) | <20.2 (ND) | <20.4 (ND) | <20.2 (ND) | <21.5 (ND) | <20.4 (ND) | <21.3 (ND) | <20.4 (ND) | <20.2 (ND) | <21.5 (ND) | <20.6 (ND) | <21.5 (ND) | <26.8 (NP) | <22.5 (NP) | <27.3 (NP) |
| DRO | nc, nv | <52.1 (ND) | <21.7 (ND) | <51 (ND) | <50.5 (ND) | <51 (ND) | <50.5 (ND) | <21.5 (ND) | <51 (ND) | <21.3 (ND) | <51 (ND) | <50.5 (ND) | <53.8 (ND) | <30.1 (ND) | <53.8 (ND) | <67 (NP) | <16.9 (ND) | <68.3 (NP) |
| RRO | nc, nv | <104 (ND) | 87 | <102 (ND) | <101 (ND) | <102 (ND) | <101 (ND) | <53.8 (ND) | <102 (ND) | 56.9 | <102 (ND) | <101 (ND) | <108 (ND) | 68.6 | <108 (ND) | <134 (NP) | 445 | <137 (NP) |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | GP-3 | | GP-4 | | GP-5 | | GP-6 | | GP-7 | | B1 | | | B2 | | B3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | GP-3 4-8' | GP-3 28-32' | GP-4 4-8' | GP-4 28-32' | GP-5 4-8' | GP-5 28-32' | GP-6 4-8' | GP-6 28-32' | GP-7 4-8' | GP-7 28-32' | B1-12 | B1-19 | B1-22 | B2-1 | B2-4.5 | B3-2.5 | B3-SWI-17 | B3-SWI-36 |
| Date Sampled | | 1/19/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2015 | 1/20/2006 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 |
| Depth Sampled (feet) | | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 12 | 19 | 22 | 1 | 4.5 | 2.5 | 17 | 36 |
| Sampled By | | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Northwest corner of the site near the office and the receiving warehouse | | Northern section of the site near the former 1,000-gallon yard UST | | Northwest section of the site at the south end of the forge building (former machine shop) | | Vacant lot at the northeast section of the site near the former machine shop | | North-central section of the site near the north end of the storage yard between the machine shop and the reclaimed wood warehouse | | Northeast corner of site (tank) | | | Next to floor drain, forge building | | South side of N. Crawford down-gradient of the railroad's former diesel pipeline | | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Propylbenzene, iso | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | GP-3 | | GP-4 | | GP-5 | | GP-6 | | GP-7 | | B1 | | | B2 | | B3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | GP-3 4-8' | GP-3 28-32' | GP-4 4-8' | GP-4 28-32' | GP-5 4-8' | GP-5 28-32' | GP-6 4-8' | GP-6 28-32' | GP-7 4-8' | GP-7 28-32' | B1-12 | B1-19 | B1-22 | B2-1 | B2-4.5 | B3-2.5 | B3-SWI-17 | B3-SWI-36 |
| Date Sampled | | 1/19/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 1/20/2015 | 1/20/2006 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 |
| Depth Sampled (feet) | | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 4-8' | 28-32' | 12 | 19 | 22 | 1 | 4.5 | 2.5 | 17 | 36 |
| Sampled By | | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Northwest corner of the site near the office and the receiving warehouse | | Northern section of the site near the former 1,000-gallon yard UST | | Northwest section of the site at the south end of the forge building (former machine shop) | | Vacant lot at the northeast section of the site near the former machine shop | | North-central section of the site near the north end of the storage yard between the machine shop and the reclaimed wood warehouse | | Northeast corner of site (tank) | | | Next to floor drain, forge building | | South side of N. Crawford down-gradient of the railroad's former diesel pipeline | | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **33.5** | --- | --- | --- | --- |
| Barium | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 78.6 | --- | --- | --- | --- |
| Cadmium Ψ | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **2.92** | --- | --- | --- | --- |
| Chromium (III) | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **195** | --- | --- | --- | --- |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead | NA, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 10.4 | 11.1 | --- | **660** | --- | --- | --- | --- |
| Mercury | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **0.596** | --- | --- | --- | --- |
| Nickel | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Silver | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.490 | --- | --- | --- | --- |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | | | | | | | | | | | | | | | | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benz[a]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[a]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chrysene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | <25.1 (NP) | <27.3 (NP) | <25.9 (NP) | <28.4 (NP) | <25 (NP) | <28.1 (NP) | <23.9 (NP) | <27.2 (NP) | <25.2 (NP) | <28.1 (NP) | <23.6 (NP) | <27.2 (NP) | --- | <20.9 (NP) | <23 (NP) | --- | --- | --- |
| DRO | nc, nv | <18.8 (ND) | <68.3 (NP) | <64.9 (NP) | <70.9 (NP) | <62.6 (NP) | <70.3 (NP) | <59.7 (NP) | <67.9 (NP) | <62.9 (NP) | <70.3 (NP) | <59 (NP) | <68.1 (NP) | --- | <25 (ND) | <57.5 (NP) | --- | --- | --- |
| RRO | nc, nv | 91.5 | <137 (NP) | <130 (NP) | <142 (NP) | <125 (NP) | <141 (NP) | <119 (NP) | <136 (NP) | <126 (NP) | <141 (NP) | <118 (NP) | <136 (NP) | --- | 482 | <115 (NP) | --- | --- | --- |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | B4 | | B5 | | | B6 | | | B7 | | B8 | | | B8 | B9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | B4-1.5 | B4-4.5 | B5-2 | B5-4 | B5-17 | B6-3 | B6-12 | B6-16 | B7-1.5 | B7-4.5 | B8-4.5 | B8-10.5 | B8-SWI-28 | B8-SWI-34 | B9-4.5 | B9-SWI-12 |
| Date Sampled | | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/14/2015 |
| Depth Sampled (feet) | | 1.5 | 4.5 | 2 | 4 | 17 | 3 | 12 | 16 | 1.5 | 4.5 | 4.5 | 10.5 | 28 | 34 | 4.5 | 12 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Inside Forge builging, southwest corner | | Yard between buildings | Yard between buildings | Yard between buildings | South end of Machine shop near UST | | | Inside machine shop building | | Northeast of Machine shop building | | | Northeast of Machine shop building | Northeast of Machine shop building | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | |
| Benzene | c, v | <0.223 (ND) H | --- | **0.0237** | <0.017 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | <0.677 (ND) | <0.678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | <0.0677 (ND) | <0.136 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | <0.677 (ND) | <0.678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | <0.338 (ND) | <0.339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | <0.338 (ND) | <0.339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | <0.0447 (ND) H | --- | **0.250** | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | --- | --- | <0.135 (ND) | <0.136 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Propylbenzene, iso | nc, v | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | <0.0893 (ND) H | --- | 0.218 | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | <0.0338 (ND) | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | <0.135 (ND) | <0.136 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | 0.173 | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | <0.0677 (ND) | <0.0678 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | **0.0379** | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | <0.134 (ND) H | --- | 2.748 | <0.0339 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | B4 | | B5 | | | B6 | | | B7 | | B8 | | | B8 | B9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | B4-1.5 | B4-4.5 | B5-2 | B5-4 | B5-17 | B6-3 | B6-12 | B6-16 | B7-1.5 | B7-4.5 | B8-4.5 | B8-10.5 | B8-SWI-28 | B8-SWI-34 | B9-4.5 | B9-SWI-12 |
| Date Sampled | | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/14/2015 |
| Depth Sampled (feet) | | 1.5 | 4.5 | 2 | 4 | 17 | 3 | 12 | 16 | 1.5 | 4.5 | 4.5 | 10.5 | 28 | 34 | 4.5 | 12 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Inside Forge builging, southwest corner | | Yard between buildings | Yard between buildings | Yard between buildings | South end of Machine shop near UST | | | Inside machine shop building | | Northeast of Machine shop building | | | Northeast of Machine shop building | Northeast of Machine shop building | |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | 1.87 | --- | **15.2** | **14.5** | --- | --- | --- | --- | 7.20 | --- | **16.3** | 4.02 | --- | --- | **10.6** | **9.04** |
| Barium | nc, nv | 18.5 | --- | 243 | --- | --- | --- | --- | --- | 230 | --- | 170 | --- | --- | --- | --- | 168 |
| Cadmium Ψ | c, nv | 0.0965 | --- | **1.43** | <0.26 (ND) | --- | --- | --- | --- | 0.349 | --- | 0.263 | --- | --- | --- | --- | 0.346 |
| Chromium (III) | nc, nv | 4.25 | --- | 49.0 | --- | --- | --- | --- | --- | 33.0 | --- | 29.7 | --- | --- | --- | --- | 18.8 |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead | NA, nv | **169** | --- | **135** | 17.0 | --- | --- | --- | --- | **56.6** | 18.5 | 18.2 | --- | --- | --- | --- | 12.0 |
| Mercury | nc, nv | 0.427 | --- | <0.104 (ND) | --- | --- | --- | --- | --- | <0.0998 (ND) | --- | <0.105 (ND) | --- | --- | --- | --- | <0.115 (ND) |
| Nickel | c, nv | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Silver | nc, nv | <0.0877 (ND) | --- | <0.26 (ND) | --- | --- | --- | --- | --- | <0.25 (ND) | --- | <0.263 (ND) | --- | --- | --- | --- | <0.289 (ND) |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | | | | | | | | | | | | | | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | <0.117 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | nc, v | <0.117 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benz[a]anthracene | c, nv | **0.152** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[a]pyrene | c, nv | **0.132** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | **0.211** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | <0.117 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chrysene | c, nv | 0.273 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | <0.117 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | nc, nv | 0.247 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | nc, v | <0.117 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | **0.15** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | nc, nv | 0.284 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | <22.1 (NP) | <23.5 (NP) | **50.3** | <6.78 (ND) H | --- | --- | <21.8 (NP) | --- | <22.9 (NP) | --- | --- | --- | --- | --- | --- | <28.7 (NP) |
| DRO | nc, nv | <234 (ND) | <58.8 (NP) | 35.5 | <25.0 (ND) | --- | --- | <25.0 (ND) | <25.0 (ND) | <57.2 (NP) | --- | --- | --- | --- | --- | --- | <71.7 (NP) |
| RRO | nc, nv | **797** | <118 (NP) | **520** | <50.0 (ND) | --- | --- | 440 | <50.0 (ND) | <114 (NP) | --- | --- | --- | --- | --- | --- | <143 (NP) |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | B10 | | | | B11 | | | B12 | | | | | B13 | | | | NCS3 | NCS4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | B10-2.5 | B10-4.5 | B10-SWI-24 | B10-SWI-33 | B11-3.5 | B11-5.5 | B11-SWI-23 | B12-1 | B12-4.5 | B12-12 | B12-22 | B12-SWI-28 | B13-2 | B13-4.5 | B13-SWI-24 | B13-SWI-28 | NCS3-Comp | NCS4-Comp |
| Date Sampled | | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 |
| Depth Sampled (feet) | | 2.5 | 4.5 | 24 | 33 | 3.5 | 5.5 | 23 | 1 | 4.5 | 12 | 22 | 28 | 2 | 4.5 | 24 | 28 | | |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Vacant lot, northeast corner of site | | | | Near west property boundary, on the river bank. | | | Southeast area of site, near old mill | | | | | Southeast area of site, near old mill, top of the bank | | | | Composite sample Soil Pile west | Composite sample Soil Pile east |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | --- | --- | --- | --- | --- | <0.0139 (ND) H | --- | --- | --- | --- | <0.0133 (ND) H | --- | --- | --- | <0.014 (ND) H | <0.0131 (ND) H |
| Bromodichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | --- | --- | --- | --- | --- | <0.0278 (ND) H | --- | --- | --- | --- | <0.0265 (ND) H | --- | --- | --- | <0.028 (ND) H | <0.0262 (ND) H |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.0117 | **0.11** |
| Propylbenzene, iso | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | --- | --- | --- | --- | --- | --- | --- | <0.0557 (ND) H | --- | --- | --- | --- | <0.0531 (ND) H | --- | --- | --- | <0.056 (ND) H | <0.0524 (ND) H |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | --- | --- | --- | --- | --- | --- | --- | <0.0835 (ND) H | --- | --- | --- | --- | <0.0796 (ND) H | --- | --- | --- | <0.0839 (ND) H | <0.0786 (ND) H |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | B10 | | | | B11 | | | B12 | | | | | B13 | | | | NCS3 | NCS4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | B10-2.5 | B10-4.5 | B10-SWI-24 | B10-SWI-33 | B11-3.5 | B11-5.5 | B11-SWI-23 | B12-1 | B12-4.5 | B12-12 | B12-22 | B12-SWI-28 | B13-2 | B13-4.5 | B13-SWI-24 | B13-SWI-28 | NCS3-Comp | NCS4-Comp |
| Date Sampled | | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 |
| Depth Sampled (feet) | | 2.5 | 4.5 | 24 | 33 | 3.5 | 5.5 | 23 | 1 | 4.5 | 12 | 22 | 28 | 2 | 4.5 | 24 | 28 | | |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Vacant lot, northeast corner of site | | | | Near west property boundary, on the river bank. | | | Southeast area of site, near old mill | | | | | Southeast area of site, near old mill, top of the bank | | | | Composite sample Soil Pile west | Composite sample Soil Pile east |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | **19.1** | **11.0** | --- | --- | **16.0** | 7.95 | --- | 2.42 | --- | --- | --- | --- | 6.88 | --- | --- | --- | **12.9** | **15.7** |
| Barium | nc, nv | 231 | --- | --- | --- | 188 | --- | --- | 93.6 | --- | --- | --- | --- | 202 | --- | --- | --- | 160 | 156 |
| Cadmium Ψ | c, nv | 0.277 | --- | --- | --- | <0.253 (ND) | --- | --- | 0.401 | --- | --- | --- | --- | 0.568 | --- | --- | --- | 0.586 | **0.878** |
| Chromium (III) | nc, nv | 24.2 | --- | --- | --- | 22.8 | --- | --- | 24.6 | --- | --- | --- | --- | 18.6 | --- | --- | --- | 60.0 | **97.9** |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead | NA, nv | 22.1 | 17.1 | --- | --- | 24.2 | --- | --- | **106** | --- | --- | --- | --- | **182** | 10.9 | --- | --- | 22.5 | **58.4** |
| Mercury | nc, nv | <0.101 (ND) | --- | --- | --- | <0.101 (ND) | --- | --- | <0.0973 (ND) | --- | --- | --- | --- | **0.364** | <0.103 (ND) | --- | --- | <0.0976 (ND) | <0.0937 (ND) |
| Nickel | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Silver | nc, nv | <0.252 (ND) | --- | --- | --- | <0.253 (ND) | --- | --- | <0.243 (ND) | --- | --- | --- | --- | <0.223 (ND) | --- | --- | --- | <0.244 (ND) | <0.234 (ND) |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | | | | | | | | <0.01 (ND) | | | | | <0.0107 (ND) | | | | 0.0907 | **0.1732** |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | --- | --- | --- | --- | --- | --- | --- | 0.392 | --- | --- | --- | --- | 0.107 | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Anthracene | nc, v | --- | --- | --- | --- | --- | --- | --- | 2.67 | --- | --- | --- | --- | 0.177 | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Benz[a]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | **9.15** | --- | --- | --- | --- | **1.22** | --- | --- | --- | <0.00955 (ND) | <0.0558 (ND) |
| Benzo[a]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | **11.6** | --- | --- | --- | --- | **1.96** | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Benzo[b]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | **12.8** | --- | --- | --- | --- | **2.98** | --- | --- | --- | <0.00955 (ND) | 0.0779 |
| Benzo[k]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | **2.51** | --- | --- | --- | --- | 0.919 | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Chrysene | c, nv | --- | --- | --- | --- | --- | --- | --- | **20.6** | --- | --- | --- | --- | 1.61 | --- | --- | --- | <0.00955 (ND) | 0.219 |
| Dibenz[a,h]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | **2.24** | --- | --- | --- | --- | **0.472** | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Fluoranthene | nc, nv | --- | --- | --- | --- | --- | --- | --- | 18.8 | --- | --- | --- | --- | 1.96 | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Fluorene | nc, v | --- | --- | --- | --- | --- | --- | --- | 0.526 | --- | --- | --- | --- | 0.0646 | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Indeno[1,2,3-cd]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | **5.93** | --- | --- | --- | --- | **1.77** | --- | --- | --- | <0.00955 (ND) | <0.0507 (ND) |
| Pyrene | nc, nv | --- | --- | --- | --- | --- | --- | --- | 33.10 | --- | --- | --- | --- | 1.73 | --- | --- | --- | 0.00989 | 0.289 |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | --- | --- | --- | --- | <25.1 (NP) | <25.1 (NP) | --- | <221 (NP) | --- | --- | --- | --- | <22.6 (NP) | <22.6 (NP) | --- | --- | <20.8 (NP) | <210 (NP) |
| DRO | nc, nv | --- | --- | --- | --- | <62.7 (NP) | <62.7 (NP) | --- | <430 (ND) H | --- | --- | --- | --- | <108 (ND) H | --- | --- | --- | <25 (ND) H | <433 (ND) H |
| RRO | nc, nv | --- | --- | --- | --- | <125 (NP) | <125 (NP) | --- | **3010 H** | --- | --- | --- | --- | 377 H | --- | --- | --- | **2470 H** | **4540 H** |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | NCHA1 | NCHA2 | NCHA3 | NCSS1-SS2 | NCSS3-SS4 | NCSS5-SS6 | NCSS7-SS8 | NCSS9-SS10 | NCSS9 | NCSS10 | TP1/2/3 | TP4/6/7 | TP5/8/10 | TP9/11/12 | TP13/14/15/16 | NCTP1 | NCTP2 | NCTP3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | NCHA1-2.0-2.5 | NCHA2-2.0-2.5 | NCHA3-2.0-2.5 | NCSS1-SS2-Comp-0.5-1.3 | NCSS3-SS4-Comp-0.5-1.0 | NCSS5-SS6-Comp-0.5-1.0 | NCSS7-SS8-Comp-0.2-1.0 | NCSS9-SS10-Comp-0.3-1.0 | NCSS9-0.3-0.6 | NCSS10-0.5-1.0 | TP1/2/3-Comp | TP4/6/7-Comp | TP5/8/10-Comp | TP9/11/12-Comp | TP13/14/15/16-Comp | NCTP1-1 | NCTP2-1 | NCTP3-1 |
| Date Sampled | | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/11/2015 | 9/10/2015 | 9/10/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 |
| Depth Sampled (feet) | | 2.0-2.5 | 2.0-2.5 | 2.0-2.5 | 0.5-1.3 | 0.5-1.0 | 0.5-1 | 0.2-1 | 0.3-1 | 0.3-0.6 | 0.5-1.0 | | | | | | 1 | 1 | 1 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Inside Oil storage building | West blow down catchment | East blow down catchment | Composite of sandy beach SS1 and SS2 | Composite of sandy beach SS3 and SS4 | Composite of sandy beach SS5 and SS6 | Composite of sandy beach SS7 and SS8 | Composite of sandy beach SS9 and SS10 | Sandy beach discrete sample SS9 | Sandy beach discrete sample SS10 | Test Pits 1,2,3 - in the northeast corner of the property. | Test Pits 4,6,7 - west side of the site south of the site buildings | Test Pits 5,8,10 - along west end of sandy beach | Test pits 9, 11, 12 - Middle area on bench above beach | Test Pits 13, 14, 15, 16 - located on the east end of the bench above the beach | Test Pit 1, located in northeast corner of property | Test Pit 2, located in the northeast portion of the property | Test Pit 3, located in the northeast portion of the property |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | <0.0121 (ND) H | --- | --- | --- | --- | <0.0134 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | <0.0242 (ND) H | --- | --- | --- | --- | <0.0269 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | c, v | --- | --- | --- | **0.0884** | **0.103** | <0.0104 (ND) | 0.0171 | 0.0475 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Propylbenzene, iso | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene | nc, v | --- | --- | <0.0484 (ND) H | --- | --- | --- | --- | <0.0538 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylenes | nc, v | --- | --- | <0.0727 (ND) H | --- | --- | --- | --- | <0.0807 (ND) H | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | NCHA1 | NCHA2 | NCHA3 | NCSS1-SS2 | NCSS3-SS4 | NCSS5-SS6 | NCSS7-SS8 | NCSS9-SS10 | NCSS9 | NCSS10 | TP1/2/3 | TP4/6/7 | TP5/8/10 | TP9/11/12 | TP13/14/15/16 | NCTP1 | NCTP2 | NCTP3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | NCHA1-2.0-2.5 | NCHA2-2.0-2.5 | NCHA3-2.0-2.5 | NCSS1-SS2-Comp-0.5-1.3 | NCSS3-SS4-Comp-0.5-1.0 | NCSS5-SS6-Comp-0.5-1.0 | NCSS7-SS8-Comp-0.2-1.0 | NCSS9-SS10-Comp-0.3-1.0 | NCSS9-0.3-0.6 | NCSS10-0.5-1.0 | TP1/2/3-Comp | TP4/6/7-Comp | TP5/8/10-Comp | TP9/11/12-Comp | TP13/14/15/16-Comp | NCTP1-1 | NCTP2-1 | NCTP3-1 |
| Date Sampled | | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/11/2015 | 9/10/2015 | 9/10/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 |
| Depth Sampled (feet) | | 2.0-2.5 | 2.0-2.5 | 2.0-2.5 | 0.5-1.3 | 0.5-1.0 | 0.5-1 | 0.2-1 | 0.3-1 | 0.3-0.6 | 0.5-1.0 | | | | | | 1 | 1 | 1 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Inside Oil storage building | West blow down catchment | East blow down catchment | Composite of sandy beach SS1 and SS2 | Composite of sandy beach SS3 and SS4 | Composite of sandy beach SS5 and SS6 | Composite of sandy beach SS7 and SS8 | Composite of sandy beach SS9 and SS10 | Sandy beach discrete sample SS9 | Sandy beach discrete sample SS10 | Test Pits 1,2,3 - in the northeast corner of the property. | Test Pits 4,6,7 - west side of the site south of the site buildings | Test Pits 5,8,10 - along west end of sandy beach | Test pits 9, 11, 12 - Middle area on bench above beach | Test Pits 13, 14, 15, 16 - located on the east end of the bench above the beach | Test Pit 1, located in northeast corner of property | Test Pit 2, located in the northeast portion of the property | Test Pit 3, located in the northeast portion of the property |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | **14.5** | --- | 1.44 | **13.8** | **10.3** | **9.08** | 7.16 | 5.29 | 4.82 | 5.13 | 7.75 | 7.52 | **28.8** | **69.1** | 5.51 | --- | --- | --- |
| Barium | nc, nv | 181 | --- | 42.9 | 204 | 174 | 162 | 111 | 115 | --- | --- | 324 | 176 | **815** | 322 | 156 | --- | --- | --- |
| Cadmium Ψ | c, nv | 0.595 | --- | 0.236 | 0.400 | **1.15** | 0.419 | 0.324 | 0.265 | --- | --- | 0.505 | 0.336 | **0.654** | **0.683** | 0.407 | --- | --- | --- |
| Chromium (III) | nc, nv | 23.4 | --- | 5.73 | **122** | **85.1** | 30.4 | 15.9 | 20.9 | 12.4 | 17.2 | 61.5 | 20.7 | **167** | 25.8 | 15.2 | --- | --- | --- |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead | NA, nv | **48.8** | --- | 3.35 | **58.8** | 28.6 | **53.8** | 19.9 | **43.5** | 22.8 | **46.8** | **52.2** | 12.0 | **179** | **170** | **76.4** | **66.9** | 16.1 | **41.4** |
| Mercury | nc, nv | **0.757** | --- | <0.0899 (ND) | 0.102 | <0.0985 (ND) | <0.093 (ND) | <0.0927 (ND) | **6.61** | **0.372** | **5.77** | 0.101 | <0.103 (ND) | <0.0918 (ND) | **0.276** | 0.200 | **0.261** | <0.0991 (ND) | <0.0965 (ND) |
| Nickel | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Silver | nc, nv | <0.264 (ND) | --- | <0.225 (ND) | 0.412 | 0.283 | <0.233 (ND) | <0.232 (ND) | <0.231 (ND) | --- | --- | <0.24 (ND) | <0.258 (ND) | **0.987** | 0.314 | <0.22 (ND) | --- | --- | --- |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | | 0.0515 | 0.029 | | | | | <0.0093 (ND) | | | | | | | | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | --- | --- | <0.0107 (ND) | <0.0554 (ND) | 0.0209 | <0.0104 (ND) | <0.0102 (ND) | <0.0106 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | nc, v | --- | --- | <0.0107 (ND) | <0.0554 (ND) | 0.0517 | <0.0104 (ND) | <0.0102 (ND) | 0.0217 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benz[a]anthracene | c, nv | --- | --- | <0.0107 (ND) | 0.082 | 0.0734 | 0.0329 | 0.0375 | 0.113 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[a]pyrene | c, nv | --- | --- | <0.0107 (ND) | **0.100** | **0.104** | **0.0354** | **0.0630** | **0.242** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | --- | --- | <0.0107 (ND) | 0.133 | 0.119 | 0.0741 | 0.0946 | **0.250** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | --- | --- | <0.0107 (ND) | <0.0554 (ND) | 0.043 | 0.0181 | 0.0238 | 0.0659 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chrysene | c, nv | --- | --- | <0.0107 (ND) | 0.108 | 0.0953 | 0.0586 | 0.0564 | 0.179 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | --- | --- | <0.0107 (ND) | <0.0554 (ND) | 0.0126 | <0.0104 (ND) | <0.0102 (ND) | **0.0259** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | nc, nv | --- | --- | <0.0107 (ND) | 0.147 | 0.148 | 0.0412 | 0.0610 | 0.186 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | nc, v | --- | --- | <0.0107 (ND) | <0.0554 (ND) | 0.0262 | <0.0104 (ND) | <0.0102 (ND) | <0.0106 (ND) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | --- | --- | <0.0107 (ND) | 0.075 | 0.0716 | 0.0329 | 0.0536 | **0.180** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | nc, nv | --- | --- | <0.0107 (ND) | 0.137 | 0.153 | 0.0388 | 0.0625 | 0.223 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | <22.6 (NP) | --- | --- | <22 (NP) | <21.4 (NP) | <20.7 (NP) | <20.9 (NP) | <20 (NP) | --- | --- | <21.5 (NP) | <23.2 (NP) | <21.5 (NP) | <24.5 (NP) | <22.2 (NP) | --- | --- | --- |
| DRO | nc, nv | <56.6 (NP) | <25 (ND) | <25 (ND) | <54.9 (NP) | <53.5 (NP) | <51.7 (NP) | <52.3 (NP) | <25 (ND) H | --- | --- | <53.7 (NP) | <58.1 (NP) | <53.6 (NP) | <61.1 (NP) | <55.4 (NP) | <25 (ND) | <25 (ND) | <25 (ND) |
| RRO | nc, nv | <113 (NP) | 94.1 | **654** | 110 DET | 107 DET | <103 (NP) | <105 (NP) | 121 H | --- | --- | DET | <116 (NP) | DET | DET | DET | <50 (ND) | <50 (ND) | 76.8 |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | NCTP4 | NCTP5 | | NCTP8 | NCTP9 | | NCTP10 | | NCTP11 | | NCTP12 | NCTP13 | | NCTP14 | | NCTP15 | NCTP16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | NCTP4-1 | NCTP5-1.5 | NCTP5-2.5 | NCTP8-1.5 | NCTP9-1.5 | NCTP9-2.5 | NCTP10-1.5 | NCTP10-4 | NCTP11-1.5 | NCTP11-2.5 | NCTP12-1.5 | NCTP13-1.5 | NCTP13-4 | NCTP14-1 | NCTP14-7.5 | NCTP15-1 | NCTP16-1 |
| Date Sampled | | 9/11/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 |
| Depth Sampled (feet) | | 1 | 1.5 | 2.5 | 1.5 | 1.5 | 2.5 | 1.5 | 4 | 1.5 | 2.5 | 1.5 | 1.5 | 4 | 1 | 7.5 | 1 | 1 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Test Pit 4, located on the western property boundary on the bench above the beach. | Test Pit 5, located in the southwest portion of the property, on the sandy beach | | Test Pit 8, located in the southwest portion of the property, on the sandy beach | Test Pit 9, located on the bench above the sandy beach, west to central end | | Test Pit 10, located at the edge of the bench above the beach, central portion. | | Test Pit 11, located middle of the bench above the beach, central portion. | | Test Pit 12, Central portion of the bench above the sandy beach | Test Pit 13, located at the edge of the bench above the sandy beach, east end. | | Test Pit 14, located at the edge of the bench above the sandy beach, east end. | | Test Pit 15, located at the east property boundary, on the bench above the beach. | Test Pit 16, located in the back of the bench above the sandy beach, east end. |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0121 (ND) | --- | --- | --- |
| Bromodichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Bromoform | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Bromomethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.484 (ND) | --- | --- | --- |
| Carbon tetrachloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Chlorobenzene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Chlorodibromomethane | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.484 (ND) | --- | --- | --- |
| Chloroethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Chloroform | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Chloromethane | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.242 (ND) | --- | --- | --- |
| Dichlorobenzene, 1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichlorobenzene, 1,4- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichloroethane, 1,1- | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichloroethene, 1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichloroethene, cis-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichloroethene, trans-1,2- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Dichloromethane | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.242 (ND) | --- | --- | --- |
| EDB (1,2-dibromoethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| EDC (1,2-dichloroethane) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Ethylbenzene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| MTBE (methyl t-butyl ether) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Naphthalene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **0.126** | --- | --- | --- |
| Propylbenzene, iso | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Tetrachloroethene (PCE) | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Toluene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Trichloroethane, 1,1,1- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Trichloroethane, 1,1,2- Ψ | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Trichloroethene | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Trichlorofluoromethane (Freon 11) | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0967 (ND) | --- | --- | --- |
| Trimethylbenzene, 1,2,4- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Trimethylbenzene, 1,3,5- | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |
| Vinyl chloride | c, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0242 (ND) | --- | --- | --- |
| Xylenes | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0484 (ND) | --- | --- | --- |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | NCTP4 | NCTP5 | | NCTP8 | NCTP9 | | NCTP10 | | NCTP11 | | NCTP12 | NCTP13 | | NCTP14 | | NCTP15 | NCTP16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | NCTP4-1 | NCTP5-1.5 | NCTP5-2.5 | NCTP8-1.5 | NCTP9-1.5 | NCTP9-2.5 | NCTP10-1.5 | NCTP10-4 | NCTP11-1.5 | NCTP11-2.5 | NCTP12-1.5 | NCTP13-1.5 | NCTP13-4 | NCTP14-1 | NCTP14-7.5 | NCTP15-1 | NCTP16-1 |
| Date Sampled | | 9/11/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/10/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 | 9/11/2015 |
| Depth Sampled (feet) | | 1 | 1.5 | 2.5 | 1.5 | 1.5 | 2.5 | 1.5 | 4 | 1.5 | 2.5 | 1.5 | 1.5 | 4 | 1 | 7.5 | 1 | 1 |
| Sampled By | | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | Test Pit 4, located on the western property boundary on the bench above the beach. | Test Pit 5, located in the southwest portion of the property, on the sandy beach | | Test Pit 8, located in the southwest portion of the property, on the sandy beach | Test Pit 9, located on the bench above the sandy beach, west to central end | | Test Pit 10, located at the edge of the bench above the beach, central portion. | | Test Pit 11, located middle of the bench above the beach, central portion. | | Test Pit 12, Central portion of the bench above the sandy beach | Test Pit 13, located at the edge of the bench above the sandy beach, east end. | | Test Pit 14, located at the edge of the bench above the sandy beach, east end. | | Test Pit 15, located at the east property boundary, on the bench above the beach. | Test Pit 16, located in the back of the bench above the sandy beach, east end. |
| Constituent of Interest | Note | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) | mg/Kg (ppm) |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | --- | **25.3** | **10.6** | **29.2** | **164** | **14.6** | 5.37 | **14.2** | **29.7** | **9.59** | **16.8** | --- | --- | --- | --- | --- | --- |
| Barium | nc, nv | --- | --- | --- | **1020** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cadmium Ψ | c, nv | --- | **0.688** | 0.264 | **0.631** | **0.720** | <0.259 (ND) | 0.395 | 0.619 | **0.988** | <0.241 (ND) | 0.250 | --- | --- | --- | --- | --- | --- |
| Chromium (III) | nc, nv | --- | **79.1** | 22.5 | **257** | --- | --- | 20.1 | 21.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead | NA, nv | --- | **74.8** | **106** | **260** | **250** | 16.8 | **32.8** | **140** | **194** | 12.2 | 18.5 | 22.5 | **106** | **60.9** | 14.3 | **133** | 18.5 |
| Mercury | nc, nv | --- | --- | --- | <0.0828 (ND) | **1.38** | <0.104 (ND) | --- | --- | --- | <0.0962 (ND) | <0.0951 (ND) | <0.0977 (ND) | 0.107 | **0.38** | <0.0945 (ND) | 0.105 | <0.0939 (ND) |
| Nickel | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Silver | nc, nv | --- | --- | --- | **1.03** | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc | 0.0E+00 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | | | | | | | | | | | | | | 0.0318 | | | |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.0584 | --- | --- | --- |
| Anthracene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.169 | --- | --- | --- |
| Benz[a]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **0.955** | --- | --- | --- |
| Benzo[a]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **1.50** | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **2.20** | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 0.681 | --- | --- | --- |
| Chrysene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1.35 | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **0.320** | --- | --- | --- |
| Fluoranthene | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1.68 | --- | --- | --- |
| Fluorene | nc, v | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.0506 (ND) | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **1.45** | --- | --- | --- |
| Pyrene | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1.82 | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | |
| GRO | nc, nv | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | <20.4 (NP) | --- | --- | --- |
| DRO | nc, nv | --- | <108 (ND) | --- | <25 (ND) | <109 (ND) | --- | <25 (ND) | --- | <27.9 (ND) | --- | <25 (ND) | <25 (ND) | --- | <108 (ND) | <25 (ND) | <110 (ND) | <25 (ND) |
| RRO | nc, nv | --- | 299 | --- | 217 | 350 | --- | <50 (ND) | --- | 67.0 | --- | 81.2 | 148 | --- | **864** | <50 (ND) | 400 | <50 (ND) |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

**Table 1 - Summary of Analytical Data, Soil**

| Location ID / Sample ID / Date Sampled / Depth Sampled (feet) / Sampled By / Location | | Maximum Soil Concentration (remaining soil) | Soil Matrix Cleanup Level | ODEQs Screening-Level SLRBCs[1] (Soil) | Background Concentrations (Regional Default) — Portland Basin | Clean Fill Screening Levels or Background Concentrations (as applicable) | Exceeds ODEQs Screening-Level SLRBCs (Soil) and/or Soil Matrix Cleanup Level — TRUE OR Y / FALSE OR N | Exceeds Background Concentrations (metals) or Clean Fill Screening — TRUE OR Y / FALSE OR N |
|---|---|---|---|---|---|---|---|---|
| Constituent of Interest | Note | mg/Kg (ppm) | | | | | | |
| **Volatile Organic Constituents** | | | | | | | | |
| Benzene | c, v | **0.0237** | NE | 0.0093 | NE | 0.0093 | Y | **TRUE** |
| Bromodichloromethane | c, v | <0.0678 (ND) | NE | 0.0025 | NE | 0.0025 | (Y) | (TRUE) |
| Bromoform | c, nv | <0.0678 (ND) | NE | 0.084 | NE | 0.084 | N | FALSE |
| Bromomethane | nc, v | <0.678 (ND) | NE | 0.098 | NE | 0.098 | (Y) | (TRUE) |
| Carbon tetrachloride | c, v | <0.05 (ND) | NE | 0.028 | NE | 0.028 | (Y) | (TRUE) |
| Chlorobenzene | nc, v | <0.05 (ND) | NE | 6.5 | NE | 6.5 | N | FALSE |
| Chlorodibromomethane | c, nv | <0.484 (ND) | NE | 0.0033 | NE | 0.0033 | (Y) | (TRUE) |
| Chloroethane | nc, v | <0.678 (ND) | NE | 320 | NE | 320 | N | FALSE |
| Chloroform | c, v | <0.0678 (ND) | NE | 0.0033 | NE | 0.0033 | (Y) | (TRUE) |
| Chloromethane | nc, v | <0.339 (ND) | NE | 2.2 | NE | 2.2 | N | FALSE |
| Dichlorobenzene, 1,2- | nc, v | <0.05 (ND) | NE | 70 | NE | 70 | N | FALSE |
| Dichlorobenzene, 1,4- | c, v | <0.05 (ND) | NE | 0.081 | NE | 0.081 | N | FALSE |
| Dichloroethane, 1,1- | c, v | <0.05 (ND) | NE | 0.037 | NE | 0.037 | Y | (TRUE) |
| Dichloroethene, 1,1- | nc, v | <0.05 (ND) | NE | 11 | NE | 11 | N | FALSE |
| Dichloroethene, cis-1,2- | nc, v | <0.05 (ND) | NE | 1.2 | NE | 1.2 | N | FALSE |
| Dichloroethene, trans-1,2- | nc, v | <0.05 (ND) | NE | 2.5 | NE | 2.5 | N | FALSE |
| Dichloromethane | c, v | <0.339 (ND) | NE | 0.038 | NE | 0.038 | (Y) | (TRUE) |
| EDB (1,2-dibromoethane) | c, v | <0.05 (ND) | NE | 0.000081 | NE | 0.00081 | (Y) | (TRUE) |
| EDC (1,2-dichloroethane) | c, v | <0.05 (ND) | NE | 0.0014 | NE | 0.0014 | (Y) | (TRUE) |
| Ethylbenzene | c, v | **0.25** | NE | 0.16 | NE | 0.16 | Y | **TRUE** |
| MTBE (methyl t-butyl ether) | c, v | <0.0678 (ND) | NE | 0.092 | NE | 0.092 | N | FALSE |
| Naphthalene | c, v | **0.14** | NE | 0.087 | NE | 0.087 | Y | **TRUE** |
| Propylbenzene, iso | nc, v | <0.0678 (ND) | NE | 3500 | NE | 85.2 | N | FALSE |
| Tetrachloroethene (PCE) | c, v | <0.05 (ND) | NE | 0.64 | NE | 2.4 | N | FALSE |
| Toluene | nc, v | 0.218 | NE | 140 | NE | 200 | N | FALSE |
| Trichloroethane, 1,1,1- | nc, v | <0.05 (ND) | NE | 400 | NE | 400 | N | FALSE |
| Trichloroethane, 1,1,2- Ψ | c, v | <0.05 (ND) | NE | 0.0046 | NE | 0.0046 | (Y) | (TRUE) |
| Trichloroethene | c, v | <0.05 (ND) | NE | 0.02 | NE | 0.02 | (Y) | (TRUE) |
| Trichlorofluoromethane (Freon 11) | nc, v | <0.136 (ND) | NE | 72 | NE | 190 | N | FALSE |
| Trimethylbenzene, 1,2,4- | nc, v | 0.173 | NE | 16 | NE | 16 | N | FALSE |
| Trimethylbenzene, 1,3,5- | nc, v | <0.0678 (ND) | NE | 92 | NE | 92 | N | FALSE |
| Vinyl chloride | c, v | **0.0379** | NE | 0.00051 | NE | 0.00051 | Y | **TRUE** |
| Xylenes | nc, v | 2.748 | NE | 25 | NE | 25 | N | FALSE |

**Table 1 - Summary of Analytical Data, Soil**

| Location ID | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample ID | | | | Background Concentrations (Regional Default) | | Exceeds ODEQs Screening-Level SLRBCs (Soil) and/or Soil Matrix Cleanup Level | Exceeds Background Concentrations (metals) or Clean Fill Screening |
| Date Sampled | | | | | | | |
| Depth Sampled (feet) | | | | | | | |
| Sampled By | | | | | | | |
| Location | | Maximum Soil Concentration (remaining soil) | Soil Matrix Cleanup Level | ODEQs Screening-Level SLRBCs[1] (Soil) | Portland Basin | Clean Fill Screening Levels or Background Concentrations (as applicable) | TRUE OR Y<br>FALSE OR N | |
| Constituent of Interest | Note | mg/Kg (ppm) | | | | | | |
| **Metals** | | | | | | | | |
| Arsenic | c, nv | **164** | NE | 0.39 | 8.8 | 8.8 | Y | **TRUE** |
| Barium | nc, nv | **1020** | NE | 15000 | 790 | 790 | N | **TRUE** |
| Cadmium Ψ | c, nv | **2.92** | NE | 39 | 0.63 | 0.63 | N | **TRUE** |
| Chromium (III) | nc, nv | **257** | NE | 120000 | 76 | 76 | N | **TRUE** |
| Copper | nc, nv | **1890** | NE | 3100 | 79 | 33.75 | N | **TRUE** |
| Lead | NA, nv | **3130** | NE | 30 | 28 | 28 | Y | **TRUE** |
| Mercury | nc, nv | **6.61** | NE | 23 | 0.23 | 0.23 | N | **TRUE** |
| Nickel | c, nv | **285** | NE | 1500 | 47 | 47 | N | (TRUE) |
| Silver | nc, nv | **1.03** | NE | 390 | 0.82 | 4.2 | N | FALSE |
| Zinc | 0.0E+00 | **384** | NE | NE | NE | NE | NE | NE |
| **Semivolatile Organic Constituents** | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c, nv | **0.200** | NE | 0.11 | NE | 0.2 | Y | FALSE |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | |
| Acenaphthene | nc, v | 0.392 | NE | 4700 | NE | 29 | N | FALSE |
| Anthracene | nc, v | 2.670 | NE | 23000 | NE | 29 | N | FALSE |
| Benz[a]anthracene | c, nv | **9.15** | NE | 0.15 | NE | 0.15 | Y | **TRUE** |
| Benzo[a]pyrene | c, nv | **11.6** | NE | 0.015 | NE | 0.015 | Y | **TRUE** |
| Benzo[b]fluoranthene | c, nv | **12.8** | NE | 0.15 | NE | 0.15 | Y | **TRUE** |
| Benzo[k]fluoranthene | c, nv | **2.51** | NE | 1.5 | NE | 1.1 | Y | **TRUE** |
| Chrysene | c, nv | **20.6** | NE | 14 | NE | 14 | Y | **TRUE** |
| Dibenz[a,h]anthracene | c, nv | **2.24** | NE | 0.015 | NE | 0.015 | Y | **TRUE** |
| Fluoranthene | nc, nv | 18.8 | NE | 2300 | NE | 29 | N | FALSE |
| Fluorene | nc, v | 0.5260 | NE | 3100 | NE | 29 | N | FALSE |
| Indeno[1,2,3-cd]pyrene | c, nv | **5.93** | NE | 0.15 | NE | 0.15 | Y | **TRUE** |
| Pyrene | nc, nv | 33.10 | NE | 1700 | NE | 1700 | N | FALSE |
| **Total Petroleum Hydrocarbons** | | | | | | | | |
| GRO | nc, nv | **50.3** | 80 | 31 | NE | --- | TRUE | --- |
| DRO | nc, nv | **35.5** | 500 | 1100 | NE | --- | FALSE | --- |
| RRO | nc, nv | **4,540** | | 2800 | NE | --- | TRUE | --- |

Notes:

mg/Kg = milligram per kilogram or parts per million (ppm).

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established.

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

**Bolded** concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations. Bolded values for metals indicate concentrations exceed background concentrations.

(2) = the compounds were co-alluted and the lowest RBC screening level for the co-alluted compounds was used

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

H = analyzed after recommended hold time.

Pink shading indicates the previous sampling results may not be representative of current conditions since results are from 2001.

Table 2. Summary of Toxic Characteristic Leaching Procedure Data

| Sample ID | Depth | Date | Leachable Metals | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Arsenic | Barium | Cadmium | Chromium | Lead | Mercury | Selenium | Silver |
| | | | (mg/L) | | | | | | | |
| Tank #2 | --- | 3/9/1987 | <0.1 (ND) | 0.031 | <0.01 ND | <0.01 ND | <0.1 ND | <0.1 ND | <0.1 ND | <0.01 ND |
| Black Sand | --- | 11/11/1987 | <0.01 (ND) | 0.31 | <0.005 ND | <0.01 ND | <0.05 ND | <0.001 ND | <0.01 ND | <0.01 ND |
| B-2 | 2 | 10/20/2001 | --- | --- | --- | --- | **23** | --- | --- | --- |
| B-3 | 1 | 10/20/2001 | --- | --- | --- | --- | 0.06 | --- | --- | --- |
| P-03 | 0.2 | 10/20/2001 | --- | --- | --- | --- | 1.27 | --- | --- | --- |
| P-18 | 2 | 10/20/2001 | --- | --- | --- | --- | 3.9 | --- | --- | --- |
| B4-1.5 | 1.5 | 9/14/2015 | <0.1 (ND) | 0.749 | <0.05 ND | <0.1 ND | <0.05 ND | <0.004 ND | <0.1 ND | <0.05 ND |
| B5-2 | 2 | 9/14/2015 | --- | --- | --- | --- | 0.295 | --- | --- | --- |
| TP5/8/10 COMP | 1.5 | 9/10/2015 | --- | --- | --- | <0.1 (ND) | 0.674 | --- | --- | --- |
| TP9/11/12 Comp | 1.5 | 9/11/2015 | --- | --- | --- | --- | 0.121 | --- | --- | --- |
| NCTP8-1.5 | 1.5 | 9/11/2015 | --- | 3.91 | --- | 0.470 | 3.23 | --- | --- | --- |
| B12-1 | 1 | 9/15/2015 | --- | --- | --- | --- | <0.05 ND | --- | --- | --- |
| B13-2 | 2 | 9/15/2015 | --- | --- | --- | --- | 0.0570 | --- | --- | --- |
| **RCRA[1] Toxicity Characteristic** | | | 5 | 100 | 1 | 5 | 5 | 0.2 | 1 | 5 |

Pink shading indicates the previous sampling results may not be representative of current conditions.

**23** Concentration exceeds the Toxicity Characteristic

mg/L: milligrams per Liter

[1] Resource Conservation and Recovery Act, 1976

**Table 3 - Summary of Analytical Data, Reconnaissance Ground Water**

| Sample ID | | GP-1 GW | GP-2 GW | GP-3 GW | GP-4 GW | GP-5 GW | GP-6 GW | GP-7 GW | T-1 | T-2 | B3-GW-35 | B8-GW-35 | B11-GW-32 | B12-GW-29 | B13-GW-30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Sampled | | 1/19/2006 | 1/20/2006 | 1/19/2006 | 1/20/2015 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 |
| Depth Sampled (feet) | | | | | | | | | 35-40 | 35-40 | 35-40 | 30-40 | 32 | 29 | 30 |
| Sampled By | | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | West side of the site near the former planing mill building | Middle section of the site just south of the railroad tracks | Northwest corner of the site near the office and the receiving warehouse | Northern section of the site near the former 1,000-gallon yard UST | Northwest section of the site at the south end of the forge building (former machine shop) | Vacant lot at the northeast section of the site near the former machine shop | North-central section of the site near the north end of the storage yard between the machine shop and the reclaimed wood warehouse | East side of the site between the former woolen mills building and former marine / iron works building | Southwest corner of the site just north of black sand beach removal area | South side of N. Crawford down-gradient of the railroad's former diesel pipeline | Northeast of Machine shop building | Near west property boundary, on the river bank. | Southeast area of site, near old mill | Southeast area of site, near old mill, top of the bank |
| Constituent of Interest | Note | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | |
| Benzene | c, v | <3 (ND) | <3 (ND) | <3 (ND) | <3 (ND) | <3 (ND) | <3 (ND) | <3 (ND) | <0.25 (ND) | <0.25 (ND) | <0.25 (ND) | <0.25 (ND) | <0.25 (ND) | <0.25 (ND) | <0.25 (ND) |
| Bromodichloromethane | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Bromoform | c, nv | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Bromomethane | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) |
| Carbon tetrachloride | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Chlorobenzene | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Chlorodibromomethane | c, nv | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Chloroethane | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) |
| Chloroform | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Chloromethane | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) |
| Dichlorobenzene, 1,2- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichlorobenzene, 1,4- | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichloroethane, 1,1- | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichloroethene, 1,1- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichloroethene, cis-1,2- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichloroethene, trans-1,2- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Dichloromethane | c, v | <20 (ND) | <20 (ND) | <20 (ND) | <20 (ND) | <20 (ND) | <20 (ND) | <20 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) | <5 (ND) |
| EDB (1,2-dibromoethane) | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| EDC (1,2-dichloroethane) | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Ethylbenzene | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| MTBE (methyl t-butyl ether) | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Naphthalene | c, v | 0.0885 | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) |
| Propylbenzene, iso | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Tetrachloroethene (PCE) | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Toluene | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | 2.71 | 2.71 | 2.71 | 1.35 | 1.28 | 1.04 | <1 (ND) |
| Trichloroethane, 1,1,1- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Trichloroethane, 1,1,2- Ψ | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Trichloroethene | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Trichlorofluoromethane (Freon 11) | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) |
| Trimethylbenzene, 1,2,4- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Trimethylbenzene, 1,3,5- | nc, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |
| Vinyl chloride | c, v | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) | <0.5 (ND) |
| Xylenes | nc, v | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | <2 (ND) | 1.18 | 1.18 | 1.18 | <1 (ND) | <1 (ND) | <1 (ND) | <1 (ND) |

**Table 3 - Summary of Analytical Data, Reconnaissance Ground Water**

| Sample ID | | GP-1 GW | GP-2 GW | GP-3 GW | GP-4 GW | GP-5 GW | GP-6 GW | GP-7 GW | T-1 | T-2 | B3-GW-35 | B8-GW-35 | B11-GW-32 | B12-GW-29 | B13-GW-30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date Sampled | | 1/19/2006 | 1/20/2006 | 1/19/2006 | 1/20/2015 | 1/20/2006 | 1/20/2006 | 1/20/2006 | 9/14/2015 | 9/14/2015 | 9/14/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 | 9/15/2015 |
| Depth Sampled (feet) | | | | | | | | | 35-40 | 35-40 | 35-40 | 30-40 | 32 | 29 | 30 |
| Sampled By | | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | Evergreen | ENW | ENW | ENW | ENW | ENW | ENW | ENW |
| Location | | West side of the site near the former planing mill building | Middle section of the site just south of the railroad tracks | Northwest corner of the site near the office and the receiving warehouse | Northern section of the site near the former 1,000-gallon yard UST | Northwest section of the site at the south end of the forge building (former machine shop) | Vacant lot at the northeast section of the site near the former machine shop | North-central section of the site near the north end of the storage yard between the machine shop and the reclaimed wood warehouse | East side of the site between the former woolen mills building and former marine / iron works building | Southwest corner of the site just north of black sand beach removal area | South side of N. Crawford down-gradient of the railroad's former diesel pipeline | Northeast of Machine shop building | Near west property boundary, on the river bank. | Southeast area of site, near old mill | Southeast area of site, near old mill, top of the bank |
| Constituent of Interest | Note | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) | µg/L (ppb) |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | | | | | | | | | | |
| Acenaphthene | nc, v | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | nc, v | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Benz[a]anthracene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Benzo[a]pyrene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Benzo[b]fluoranthene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Benzo[k]fluoranthene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Chrysene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Dibenz[a,h]anthracene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | nc, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | nc, v | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Indeno[1,2,3-cd]pyrene | c, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | nc, nv | <0.0492 (ND) | <0.0512 (ND) | <0.0484 (ND) | <0.0494 (ND) | <0.0631 (ND) | <0.0487 (ND) | <0.0488 (ND) | --- | --- | --- | --- | --- | --- | --- |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | |
| GRO | nc, nv | <239 (NP) | <258 (NP) | <247 (NP) | <246 (NP) | <289 (NP) | <254 (NP) | <247 (NP) | <125 (NP) | <125 (NP) | <125 (NP) | <111 (NP) | <154 (NP) | <152 (NP) | <125 (NP) |
| DRO | nc, nv | <602 (NP) | <651 (NP) | <623 (NP) | <621 (NP) | <727 (NP) | <639 (NP) | <622 (NP) | <312 (NP) | <312 (NP) | <312 (NP) | <278 (NP) | <385 (NP) | <379 (NP) | <312 (NP) |
| RRO | nc, nv | <602 (NP) | <651 (NP) | <623 (NP) | <621 (NP) | <727 (NP) | <639 (NP) | <622 (NP) | <312 (NP) | <312 (NP) | <312 (NP) | <278 (NP) | <385 (NP) | <379 (NP) | <312 (NP) |

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).
— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
**Bolded** concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.
[1] Lowest Risk-Based Concentration for ground water (screening level).
(Y) indicates analyte not detected, but detection limit is above screening concentration.

**Table 3 - Summary of Analytical Data, Reconnaissance Ground Water**

| Sample ID / Date Sampled / Depth Sampled (feet) / Sampled By / Location | | Maximum Ground Water Concentration | ODEQs Screening-level RBCs [2] | Background Concentrations (metals) | Exceeds Background Concentrations (metals)? | COPC? |
|---|---|---|---|---|---|---|
| Constituent of Interest | Note | µg/L (ppb) | | | TRUE OR Y<br>FALSE OR N | |
| **Volatile Organic Constituents** | | | | | | |
| Benzene | c, v | <3 (ND) | 0.39 | NE | N | (Y) |
| Bromodichloromethane | c, v | <1 (ND) | 0.12 | NE | N | (Y) |
| Bromoform | c, nv | <1 (ND) | 2.7 | NE | N | N |
| Bromomethane | nc, v | <5 (ND) | 8.7 | NE | N | N |
| Carbon tetrachloride | c, v | <1 (ND) | 0.41 | NE | N | (Y) |
| Chlorobenzene | nc, v | <1 (ND) | 91 | NE | N | N |
| Chlorodibromomethane | c, nv | <1 (ND) | 0.14 | NE | N | (Y) |
| Chloroethane | nc, v | <5 (ND) | 21000 | NE | N | N |
| Chloroform | c, v | <1 (ND) | 0.19 | NE | N | (Y) |
| Chloromethane | nc, v | <5 (ND) | 190 | NE | N | N |
| Dichlorobenzene, 1,2- | nc, v | <1 (ND) | 370 | NE | N | N |
| Dichlorobenzene, 1,4- | c, v | <1 (ND) | 0.42 | NE | N | (Y) |
| Dichloroethane, 1,1- | c, v | <1 (ND) | 2.3 | NE | N | N |
| Dichloroethene, 1,1- | nc, v | <1 (ND) | 340 | NE | N | N |
| Dichloroethene, cis-1,2- | nc, v | <1 (ND) | 73 | NE | N | N |
| Dichloroethene, trans-1,2- | nc, v | <1 (ND) | 110 | NE | N | N |
| Dichloromethane | c, v | <20 (ND) | 4.4 | NE | N | (Y) |
| EDB (1,2-dibromoethane) | c, v | <1 (ND) | 0.0063 | NE | N | (Y) |
| EDC (1,2-dichloroethane) | c, v | <1 (ND) | 0.14 | NE | N | (Y) |
| Ethylbenzene | c, v | <1 (ND) | 1.4 | NE | N | N |
| MTBE (methyl t-butyl ether) | c, v | <1 (ND) | 12 | NE | N | N |
| Naphthalene | c, v | 0.0885 | 0.14 | NE | N | N |
| Propylbenzene, iso | nc, v | <1 (ND) | 680 | NE | N | N |
| Tetrachloroethene (PCE) | c, v | <1 (ND) | 11 | NE | N | N |
| Toluene | nc, v | 2.71 | 2300 | NE | N | N |
| Trichloroethane, 1,1,1- | nc, v | <1 (ND) | 9100 | NE | N | N |
| Trichloroethane, 1,1,2- Ψ | c, v | <1 (ND) | 0.23 | NE | N | (Y) |
| Trichloroethene | c, v | <1 (ND) | 0.43 | NE | N | (Y) |
| Trichlorofluoromethane (Freon 11) | nc, v | <2 (ND) | 1300 | NE | N | N |
| Trimethylbenzene, 1,2,4- | nc, v | <1 (ND) | 15 | NE | N | N |
| Trimethylbenzene, 1,3,5- | nc, v | <1 (ND) | 360 | NE | N | N |
| Vinyl chloride | c, v | <1 (ND) | 0.025 | NE | N | (Y) |
| Xylenes | nc, v | 1.18 | 200 | NE | N | N |

**Table 3 - Summary of Analytical Data, Reconnaissance Ground Water**

| Sample ID / Date Sampled / Depth Sampled (feet) / Sampled By / Location | Note | Maximum Ground Water Concentration | ODEQs Screening-level RBCs [2] | Background Concentrations (metals) | Exceeds Background Concentrations (metals)? | COPC? |
|---|---|---|---|---|---|---|
| Constituent of Interest | | µg/L (ppb) | | | TRUE OR Y<br>FALSE OR N | |
| **Semivolatile Organic Constituents** | | | | | | |
| **Polycyclic Aromatic Hydrocarbons** | | | | | | |
| Acenaphthene | nc, v | <0.0631 (ND) | 2200 | NE | N | N |
| Anthracene | nc, v | <0.0631 (ND) | >S | NE | N | N |
| Benz[a]anthracene | c, nv | <0.0631 (ND) | 0.029 | NE | N | (Y) |
| Benzo[a]pyrene | c, nv | <0.0631 (ND) | 0.0029 | NE | N | (Y) |
| Benzo[b]fluoranthene | c, nv | <0.0631 (ND) | 0.011 | NE | N | (Y) |
| Benzo[k]fluoranthene | c, nv | <0.0631 (ND) | 0.29 | NE | N | N |
| Chrysene | c, nv | <0.0631 (ND) | >S | NE | N | N |
| Dibenz[a,h]anthracene | c, nv | <0.0631 (ND) | 0.0029 | NE | N | (Y) |
| Fluoranthene | nc, nv | <0.0631 (ND) | >S | NE | N | N |
| Fluorene | nc, v | <0.0631 (ND) | 1500 | NE | N | N |
| Indeno[1,2,3-cd]pyrene | c, nv | <0.0631 (ND) | >S | NE | N | N |
| Pyrene | nc, nv | <0.0631 (ND) | >S | NE | N | N |
| **Total Petroleum Hydrocarbons** | | | | | | |
| GRO | nc, nv | <289 (NP) | 110 | NE | N | (Y) |
| DRO | nc, nv | <727 (NP) | 100 | NE | N | (Y) |
| RRO | nc, nv | <727 (NP) | 300 | NE | N | (Y) |

Notes:
ug/L = micrograms per Liter or parts per billion (ppb).
<# (ND) = not detected at or above the laboratory method reporting limit shown.
NE = not established.
NP = not present at or above the laboratory method reporting limit shown (HCID analysis).
— = not analyzed or not applicable.
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
**Bolded** concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.

[1] Lowest Risk-Based Concentration for ground water (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

Table 4. Further Evaluation of COPCs in Soil

| Contaminated Medium | | SOIL mg/Kg (ppm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Exposure Pathway | | Soil Ingestion, Dermal Contact, and Inhalation $RBC_{ss}$ | | | | | | | | | | Volatilization to Outdoor Air $RBC_{so}$ | | | | | | Vapor Intrusion into Buildings $RBC_{si}$ | | | | | | Leaching to Groundwater $RBC_{sw}$ | | | | | | Maximum Detected Concentration | Lowest Applicable RBC (Soil) | Constituent of Concern (COC)? |
| Receptor Scenario | | Residential | | Urban Residential | | Occupational | | Construction Worker | | Excavation Worker | | Residential | | Urban Residential | | Occupational | | Residential | | Urban Residential | | Occupational | | Residential | | Urban Residential | | Occupational | | | | | | | |
| Direct or Indirect Pathway (see notes) | | DC | | DC | | DC | | DC | | DC | | IVS | | IVS | | IVS | | IVS | | IVS | | IVS | | IS | | IS | | IS | | | | | | | |
| Contaminant of Concern | Note | | Note | | Note | | Note | | | | Note | | Note | | Note | | Note | | Note | | Note | | Note | | Note | | Note | | Note | mg/Kg (ppm) | mg/Kg (ppm) | Y/N |
| **Volatile Organic Constituents** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | c, v | 7.3 | | 24 | | 34 | | 340 | | 9,500 | >Csat | 10.0 | | 27 | | 50 | | 0.080 | | 0.22 | | 1.2 | | 0.0093 | | 0.042 | | 0.053 | | 0.0237 | 0.08 | N |
| Ethylbenzene | c, v | 30 | | 110 | | 140 | | 1,600 | >Csat | 44,000 | >Csat | 31 | | 85 | | 160 | | 0.82 | | 2.2 | | 12 | | 0.16 | | 0.77 | | 0.90 | | 0.25 | 0.82 | N |
| Naphthalene | c, v | 4.6 | | 25 | | 23 | | 580 | >Csat | 16,000 | >Csat | 6.5 | | 18 | | 99 | | 6.5 | | 18 | | 99 | | 0.087 | | 0.47 | | 0.44 | | 0.14 | 6.5 | N |
| Vinyl chloride | c, v | 0.34 | | 0.76 | | 3.9 | | 30 | | 830 | | 5.3 | | 6.5 | | 89 | | 0.043 | | 0.053 | | 2.2 | | 0.00051 | | 0.0012 | | 0.010 | | 0.0379 | 0.043 | N |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | c, nv | 0.39 | | 1.0 | | 1.7 | | 13 | | 370 | | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | * | | * | | * | | 164 | 370 | N |
| Lead | NA, nv | 400 | L | 400 | L | 800 | L | 800 | L | 800 | L | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | 30 | L | 30 | L | 30 | L | 3130 | 800 | Y |
| **Semivolatile Organic Constituents** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Polychlorinated biphenyls (PCBs) Ψ | c*, v | 0.20 | | 0.31 | | 0.56 | | 4.4 | >Csat | 120 | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | 0.11 | | 0.55 | | 0.62 | | 0.2 | 120 | N |
| Polycyclic Aromatic Hydrocarbons | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benz[a]anthracene | c, nv | 0.15 | | 0.34 | | 2.7 | | 21 | >Csat | 590 | >Csat | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | 3.5 | | 10 | | - | >Csat | 9.15 | 21 | N |
| Benzo[a]pyrene | c, nv | 0.015 | | 0.034 | | 0.27 | | 2.1 | | 59 | >Csat | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | 0.90 | | 2.7 | | - | >Csat | 11.6 | 2.1 | Y |
| Benzo[b]fluoranthene | c, v | 0.15 | | 0.34 | | 2.7 | | 21 | >Csat | 590 | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | - | >Csat | 4.0 | | - | >Csat | - | >Csat | 12.8 | 21 | N |
| Benzo[k]fluoranthene | c, nv | 1.5 | | 3.4 | | 27 | >Csat | 210 | >Csat | 5,900 | >Csat | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | - | >Csat | - | >Csat | - | >Csat | 2.51 | 210 | N |
| Dibenz[a,h]anthracene | c, nv | 0.015 | | 0.034 | | 0.27 | | 2.1 | | 59 | >Csat | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | 3.4 | | - | >Csat | - | >Csat | 2.24 | 2.1 | Y |
| Indeno[1,2,3-cd]pyrene | c, nv | 0.15 | | 0.34 | | 2.7 | >Csat | 21 | >Csat | 590 | >Csat | - | NV | - | NV | - | NV | - | NV | - | NV | - | NV | - | >Csat | - | >Csat | - | >Csat | 5.93 | 21 | N |
| **Total Petroleum Hydrocarbons** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GRO | nc, v | 1,200 | | 2,500 | | 20,000 | | 9,700 | | - | >Max | 5,900 | | 5,900 | | 69,000 | | 94 | | 94 | | - | >Max | 31 | | 31 | | 130 | | 50.3 | 94 | N |

Notes:
— = not analyzed or not applicable.
mg/Kg = milligrams per kilogram or parts per million (ppm)
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
<Csat = This soil RBC exceeds the limit of three-phase equilibrium partitioning.
<Max = The constituent RBC for this pathway is greater than 100,000 mg/kg. The Department believes it is highly unlikely that such concentrations will ever be encountered.

| DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER |
|---|---|---|---|
| J. BIGELOW 08/21/2015 | P. TRONE 10/19/2015 | L. GREEN 10/19/2015 | 847-15002(v01) |

ST JOHNS TRUCKING

ST JOHNS MARINE CENTER

N CRAWFORD ST

N BURLINGTON AVE

N RICHMOND AVE

COLUMBIA FORGE AND MACHINE WORKS

OFFICE

RECEIVING

WHEELABRATOR

CUTTING ROOM

STORAGE

FORGE

AIR COMPRESSORS

AIR TANK

OIL STORAGE

DROP FORGE

UPSETTER

INDUCTION HEATERS

COMPRESSOR BLOWDOWN

UPSETTER

SHEARS

MACHINE SHOP

4 FORGES

STORAGE YARD

VIRIDIAN RECLAIMED WOOD WAREHOUSE

VACANT LOT

MCKINNEY'S AUTO SERVICES

PORTLAND WATER POLLUTION CONTROL LAB

LAMPROSE STEEL PLATE SALES LOT

RIVER BANK

RIVER BANK

RIVER BANK

WILLAMETTE RIVER

LEGEND:

SUBJECT BUILDINGS

SUBJECT PROPERTY BOUNDARIES

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2012 AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.

APPROXIMATE SCALE

0 100 200 FEET

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FIGURE 2

SITE PLAN

STEEL HAMMER FACILITY
8424-8524 N CRAWFORD STREET
PORTLAND, OREGON

| DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER |
|---|---|---|---|
| J.BIGELOW 06/10/2015 | P. TRONE 10/19/2015 | L. GREEN 10/19/2015 | 847-15002(v01) |

N CRAWFORD ST

N BURLINGTON AVE

COLUMBIA FORGE AND MACHINE WORKS

OFFICE

RECEIVING

WHEELABRATOR

FORMER BLACKSMITHS SHOP

OIL STORAGE

THE SKOOKUM CO. LOGGING EQUIP. 1924

CUTTING ROOM

STORAGE

FORMER MACHINE SHOP

FORGE

AIR COMPRESSORS

AIR TANK

DROP FORGE

UPSETTER

INDUCTION HEATERS

4 FORGES

SHEARS

UPSETTER

MACHINE SHOP

STORAGE YARD

FORMER AUTO REPAIR 1950

VIRIDIAN RECLAIMED WOO

COMPRESSOR BLOWDOWN

GP-3 B3 GP-4 B8 GP-7 B1 B2 B5 HA1 SS-1 B7 B4 GP-5 HA2 SS-2 HA3 B6 SS-3 SS-4

TP7 TP6 GP-1 TP4 TP1 GP-2

LAMPROSE STEEL PLATE SALES LOT

PLANING MILL 1905-1969 (ST JOHNS LUMBER CO)

FORMER MACHINE SHOP 1905

STEAM DRY KILN (1911)

SAWMILL 1969

SAWMILL 1905

TP9 TP11 TP6 TP12 TP10 TP13

TP11 B11 TP5 SS-8 PP-1 TP8 SS-1 SS-9 TP10 TP9 TP8 TP7 T-2 CS-3 BS-1 SS-5 CS-4 CS-1 CS-2 PP-2 B12

BLACK SAND REMOVAL AREA

FORMER MACHINE SHOP 1969

RIVER BANK

SS1 SS2 SS3 SS4 SS5 SS6 SS-11

RIVER BANK

LEGEND:

- SUBJECT BUILDINGS
- SUBJECT PROPERTY BOUNDARIES
- BUILDING LOCATIONS
- UNDERGROUND STORAGE TANK
- B1 ENW HYDRAULIC-PUSH ASSESSMENT BORING LOCATION
- HA1 ENW HAND AUGER ASSESSMENT BORING LOCATION
- CS1 ENW COMPOSITE SAMPLE LOCATION
- SS1 ENW SURFACE SOIL SAMPLE LOCATION
- TP1 ENW TEST PIT LOCATION
- GP-1 EEM (2006) BORING LOCATIONS
- PP-1 BRIDGEWATER (2001) BORING LOCATIONS
- SS1 BRIDGEWATER (2001) SURFACE SAMPLE LOCATIONS
- CS-1 BRIDGEWATER (2001) CS SAMPLE LOCATIONS
- BS1 BRIDGEWATER (2001) BS SAMPLE LOCATIONS
- T-1 SWEET EDWARDS EMCON (1988) BORING LOCATIONS
- SWEET EDWARDS EMCON (1988) SURFACE GRAB SAMPLE LOCATIONS
- TP1 SWEET EDWARDS EMCON (1988) TEST PIT LOCATIONS
- 1905 BUILDINGS
- 1911 BUILDINGS
- 1924 BUILDINGS
- 1930s BUILDINGS
- 1930s PIER AND SHORELINE
- 1948 BUILDINGS
- 1970 BUILDINGS
- > SLRBCs
- METALS > BACKGROUND

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2015 AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, FEATURE, AND SAMPLE LOCATIONS ARE APPROXIMATE.

N

APPROXIMATE SCALE

0 70 140 FEET

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FIGURE 3
SAMPLE LOCATION DIAGRAM
(WEST PORTION OF SITE)

STEEL HAMMER FACILITY
8424-8524 N CRAWFORD STREET
PORTLAND, OREGON

DRAWING NUMBER 847-15002(v01)
APPROVED BY L. GREEN 10/19/2015
CHECKED BY P. TRONE 10/19/2015
DRAWN BY J.BIGELOW 06/10/2015

FORMER AUTO REPAIR 1950
B9
VIRIDIAN RECLAIMED WOOD WAREHOUSE
RD
SS-4
B10
TP2
VACANT LOT
FORMER MACHINE SHOP
1911
CS3
CS4
TP3
1905
TP1
GP-6
N RICHMOND AVE
MCKINNEY'S AUTO SERVICES
GP-2
FORMER MACHINE SHOP
AMERICAN MARINE AND IRON WORKS 1924
TP16
PLYLOCK CORP. 1950
TP15
E SALES LOT
TP12
TP5
TP4
SAWMILL 1905
TP14
T-1
TP3
TP13
WOOLEN MILLS 1924-1950 (PORTLAND WOOLEN MILLS)
PP-2
B12
B13
TP2
PP-3
RIVER BANK
SS6
SS-11
SS7
RIVER
SS8
SS-7
SS9
SS-6
RIVER BANK
SS10

LEGEND:

- SUBJECT BUILDINGS
- SUBJECT PROPERTY BOUNDARIES
- BUILDING LOCATIONS
- UNDERGROUND STORAGE TANK
- B1 ENW HYDRAULIC–PUSH ASSESSMENT BORING LOCATION
- HA1 ENW HAND AUGER ASSESSMENT BORING LOCATION
- CS1 ENW COMPOSITE SAMPLE LOCATION
- SS1 ENW SURFACE SOIL SAMPLE LOCATION
- TP1 ENW TEST PIT LOCATION
- GP-1 EEM (2006) BORING LOCATIONS
- PP-1 BRIDGEWATER (2001) BORING LOCATIONS
- SS1 BRIDGEWATER (2001) SURFACE SAMPLE LOCATIONS
- CS-1 BRIDGEWATER (2001) CS SAMPLE LOCATIONS
- BS1 BRIDGEWATER (2001) BS SAMPLE LOCATIONS
- T-1 SWEET EDWARDS EMCON (1988) BORING LOCATIONS
- SWEET EDWARDS EMCON (1988) SURFACE GRAB SAMPLE LOCATIONS
- TP1 SWEET EDWARDS EMCON (1988) TEST PIT LOCATIONS
- 1905 BUILDINGS
- 1911 BUILDINGS
- 1924 BUILDINGS
- 1930s BUILDINGS
- 1930s PIER AND SHORELINE
- 1948 BUILDINGS
- 1970 BUILDINGS
- > SLRBCs
- METALS >RBC or As > BACKGROUND

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2015 AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, FEATURE, AND SAMPLE LOCATIONS ARE APPROXIMATE.

N

APPROXIMATE SCALE
0 70 140 FEET

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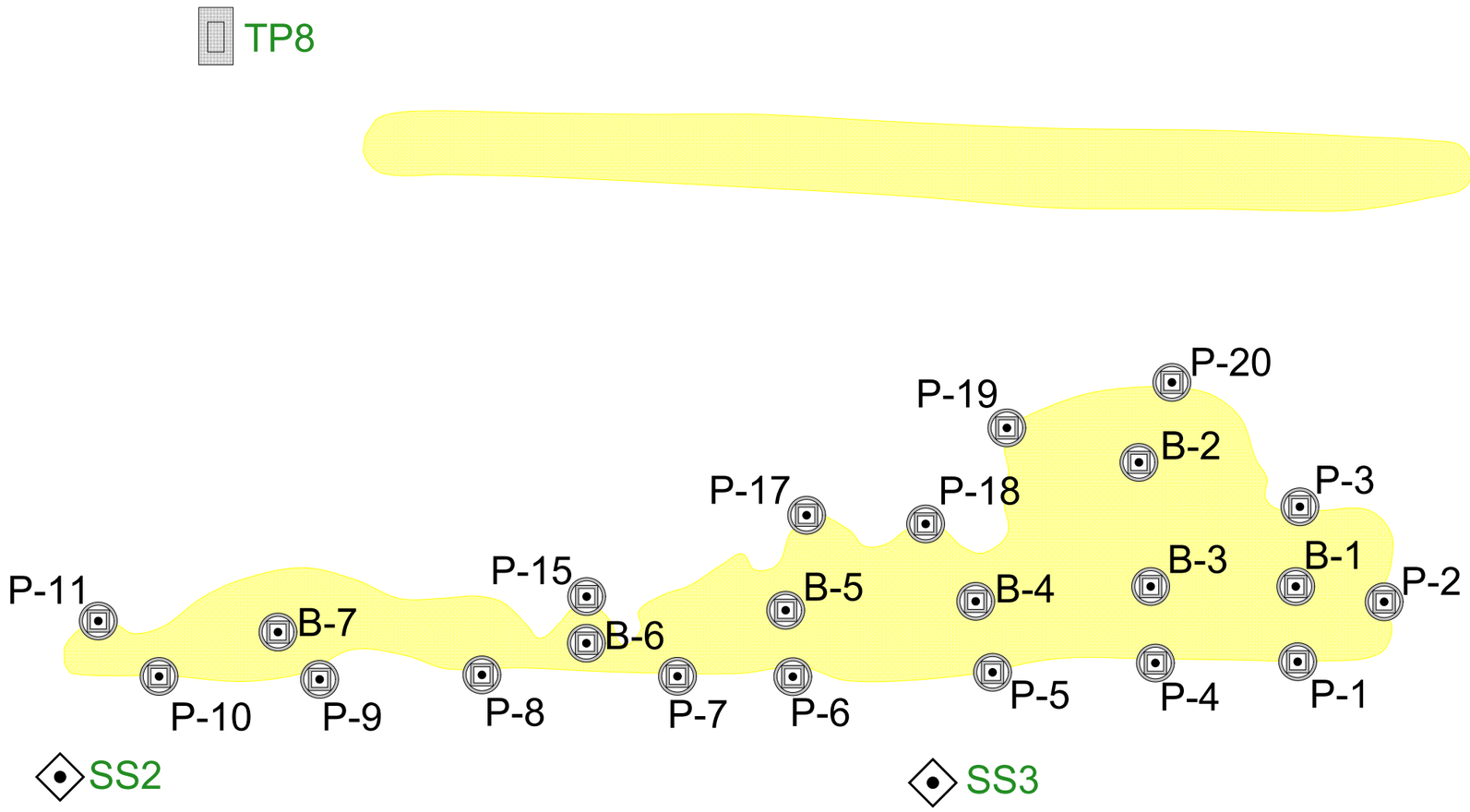
FIGURE 4
SAMPLE LOCATION DIAGRAM
(EAST PORTION OF SITE)
STEEL HAMMER FACILITY
8424-8524 N CRAWFORD STREET
PORTLAND, OREGON

| DRAWN BY | CHECKED BY | APPROVED BY | DRAWING NUMBER |
|---|---|---|---|
| J.BIGELOW 10/16/2015 | P. TRONE 02/18/2016 | L. GREEN 02/18/2016 | 847-15002(v01) |




LEGEND:

- SUBJECT PROPERTY BOUNDARIES
- BLACK SAND REMOVAL AREA
- B1 — BOTTOM POST-REMOVAL SOIL SAMPLE LOCATION (BRIDGEWATER)
- P1 — PERIMETER POST-REMOVAL SOIL SAMPLE LOCATION (BRIDGEWATER)
- SS1 — ENW SURFACE SOIL SAMPLE LOCATION
- TP1 — ENW TEST PIT LOCATION

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2015 AND ENW FIELD NOTES.
2. ALL FEATURE AND SAMPLE LOCATIONS ARE APPROXIMATE.
3. HISTORICAL BRIDGEWATER SAMPLE DATA MAY NOT BE REPRESENTATIVE OF CURRENT SITE CONDITIONS GIVEN ONGOING SEDIMENT SCOUR AND DEPOSITION ALONG THE RIVER BANK.

APPROXIMATE SCALE

0 16 32 FEET

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FIGURE 5
PREVIOUS SAMPLE LOCATION DIAGRAM
(BLACK SAND REMOVAL AREA)
STEEL HAMMER FACILITY
8424-8524 N CRAWFORD STREET
PORTLAND, OREGON

# APPENDIX C

STANDARD OPERATING PROCEDURES

## 1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for observing and sampling from push-probes (i.e., GeoProbe™, AMS PowerProbe™, or similar). Subsurface soil cores may be obtained using this system for purposes of determining subsurface soil conditions and for obtaining soil samples for physical and/or chemical evaluation. Grab groundwater samples may be collected using temporary well screens. Soil vapor samples may be obtained using temporary well points. Shallow (less than 50 feet), small-diameter (2-inch max) pre-packed wells may also be installed using push-probe equipment. This procedure is applicable during all Cascadia Associates, LLC (Cascadia) push-probe activities.

## 2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, tools, keys, and buckets/drums
- Water quality meter with calibration solutions (record daily calibration/calibration check in field notes)
- Sampling equipment (water level probe, pumps, tubing) and laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by project Health and Safety Plan)

## 3. METHODOLOGY

### Coring Procedure (Conducted by Drilling Subcontractor):

The sampling procedure includes driving a 2-inch outside-diameter, 5-foot-long, push-probe soil sampler to the desired depth using a combination of hydraulic pressure and mechanical hammer blows. When the sampling depth is reached, the pin attaching the sampler's tip is released (if a tip is used), which allows the tip to slide inside the sampler (Macro-Core Sampler with removable plastic liner). The sampler is driven the length of the sampler to collect a soil core, which is then withdrawn from the exploration. When the sampler is retrieved from the borehole the drive head/cutting shoe is detached and the liner is removed and the liner is cut open to expose the recovered soil core. Soil cores are collected continuously to the full depth of the exploration unless otherwise specified in a project-specific sampling and analysis plan (SAP). Verify that the subcontractor decontaminates the sampling device prior to its initial use and following collection of each soil sample.

### Logging and Soil Sample Collection:

Remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be collected for field screening and possible chemical analysis on two foot intervals unless otherwise specified in a project-specific SAP. The sampling interval will be determined in the field based on recovery, soil variability, and evidence of contamination.

Complete field screening as specified in the applicable SOP. Soil samples should be collected using different procedures for volatile on non-volatile analyses, as follows.

- Volatile Analyses. Sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace.
- Other Analyses. Soil samples for non-volatile analyses will be thoroughly homogenized in a stainless-steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil sample in the stainless-steel bowl with a clean sampling tool until a uniform mixture is achieved. The sample jar should be filled completely.

**Grab Groundwater Sample Collection:**

Collect grab groundwater samples using a sampling attachment with a 4 to 5-foot-long temporary screen (specify to drillers whether to use decontaminated stainless steel or disposable PVC. Also, specify whether a filter pack is necessary based on field observations). Obtain samples using a peristaltic pump unless otherwise specified in the SAP with new tubing for each boring. Record field parameters (e.g., temperature, conductivity, and pH) prior to sampling.

**Backfilling the Excavation (Conducted by Drilling Subcontractor):**

After sampling activities are completed, abandon each exploration in accordance with Oregon Water Resources Department (OWRD) regulations and procedures (or other regulatory authority if work is completed outside of the State of Oregon. The abandonment procedure typically consists of filling the exploration with granular bentonite and hydrating the bentonite with water. Match the surface completion to the surrounding materials.

## 1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Cascadia Associates, LLC (Cascadia) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs) and for the presence of separate-phase petroleum hydrocarbons using a sheen test. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture. Other field screening methods, such as screening for dense non-aqueous phase liquid (DNAPL) using dye or UV light, are not considered "standard" and will be detailed in the site-specific sampling and analysis plan (SAP).

## 2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes);
- Plastic resealable bags (for PID measurement); and
- Glass jars or stainless steel bowls (for sheen testing).

## 3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID and for the presence of separate-phase petroleum hydrocarbons using a sheen test.

PID lamps come in multiple sizes, typically 9.8, 10.6, and 11.7 electron volts (eV). The eV rating for the lamp must be greater than the ionization potential (in eV) of a compound for the PID to detect the compound. For petroleum hydrocarbons, a lamp of at least 9.8 eV should be used. For typical chlorinated alkenes (dichloroethene, trichloroethene, tetrachloroethene, or vinyl chloride), a lamp of at least 10.6 eV should be used. The compatibility of the lamp size with the site constituents should be verified prior to the field event and will be detailed in the site-specific SAP.

PID Calibration Procedure: The PID used on-site should be calibrated daily or more frequently if needed. Calibration of the PID should be documented in field notes. Calibrations procedures should be conducted per the manufacturer's instructions.

**PID Screening Procedure:**

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag.
- Seal the bag and break up the soil to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature. Note: Ambient temperature and

weather conditions/humidity should be recorded in field notes. Changes in ambient temperature and weather during the field work should also be recorded, as temperature and humidity can affect PID readings.

- Carefully insert the intake port of the PID into the plastic bag.
- Record the PID measurement in the field notes or boring logs.

**Sheen Test Procedure:**

- Following the PID screen, place approximately one ounce of freshly exposed, uncompacted soil into a clean glass jar or stainless steel bowl.
- Add enough water to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize based on the descriptions below.

| | |
|---|---|
| No Sheen (NS) | No visible sheen on the water surface |
| Biogenic Film (BF) | Dull, platy/blocky or foamy film. |
| Slight Sheen (SS) | Light sheen with irregular spread, not rapid. May have small spots of color/iridescence. Majority of water surface not covered by sheen. |
| Moderate Sheen (MS) | Medium to heavy coverage, some color/iridescence, spread is irregular to flowing. Sheen covering a large portion of water surface. |
| Heavy Sheen (HS) | Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface covered with sheen. Separate-phase hydrocarbons may be evident during sheen test. |

## 1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for documenting environmental field activities. The purpose of establishing SOPs for field notes and documentation is to establish a consistent method and format for the use and control of documentation generated during daily field activities. Field notes and records are intended to provide sufficient information that can be used to recreate the field activities, as well as, the collection of environmental data. Information placed in these documents and/or records shall be factual, detailed and objective.

## 2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Bound field books;
- Black waterproof and/or indelible ink pens; and
- Field forms.

## 3. METHODOLOGY

This SOP primarily includes the documentation procedures for the field logbooks. However, procedures discussed in this SOP are applicable to all other types of field documentation collected, and should be universal in application. Details of other field records and forms (e.g. boring logs, sample labels, chain of custody records, and waste containment labels are discussed in the specific SOP associated with that field activity (e.g. borehole drilling, sample handling, investigative derived waste), and not covered in detail in this SOP.

**Field Logbooks:**

Field personnel will keep accurate written records of their daily activities in a bound logbook that will be sufficient to recreate the project field activities without reliance on memory. This information will be recorded in chronological order. All entries will be legible, written in black waterproof or indelible ink, and contain accurate and inclusive documentation of field activities, including field data observations, deviations from project plans, problems encountered, and actions taken to solve the problem. Each page of the field logbook will be consecutively numbered, signed and dated by the field author(s). Pages should not be removed for any reason.

There should be no blank lines on a page. A single blank line or a partial blank line (such as at the end of a paragraph) should be lined to the end of the page. If only part of a page is used, the remainder of the page should have an "X" drawn across it.

In addition to documenting field activities, field logbooks will include the following:

- Date and time of activities,
- Site location,
- Purpose of site visit,
- Site and weather conditions,

- Personnel present, including sampling crew, facility/site personnel and representatives (including site arrival and departure times),
- Subcontractors present,
- Regulatory agencies and their representatives (including phone numbers, site arrival and departure times),
- Level of health and safety protection,
- Sampling methodology and information,
- Sample locations (sketches are helpful),
- Source of sample(s), sample identifications, sample container types and preservatives used, and lot numbers for bottles and preservatives (if applicable and if not recorded on other forms or in a sample control logbook),
- A chronological description of the field observations and events,
- Specific considerations associated with sample acquisition (e.g., field parameter measurements, field screening data, HASP monitoring data, etc.) (if not recorded on another form),
- Wastes generated, containment units (including volumes, matrix, etc), and storage location (if not recorded on another form),
- Field quality assurance/quality control samples collection, preparation, and origin (if not recorded on other forms or in a sample control logbook),
- The manufacturer, model and serial number of field instruments (e.g., PID, water quality, etc.) shall be recorded, if not using a calibration form. Also, source lot # and expiration date of standard shall be recorded if calibrated in the field.
- Well construction materials, water source(s), and other materials used on-site (if not recorded on another form).
- Sample conditions that could potentially affect the sample results,
- If deviating from plan, clearly state the reason(s) for deviation,
- Persons contacted and topics discussed,
- Documentation of exclusion zone set-up and location,
- Documentation of decontamination procedures, and
- Daily Summary.

Field situations vary widely. No general rules can specify the extent of information that must be entered in a logbook. However, records should contain sufficient information so that someone can reconstruct the field activity without relying on the collector's memory. Language used shall be objective, factual, and free of personal opinions. Hypothesis for observed phenomena may be

recorded, however, they must be clearly indicated as such and only relate to the subject observation.

Logbooks will be assigned to a specific sampling team. If it is necessary to transfer the log book to alternative team member during field work, the person relinquishing the log book will sign and date the log book at the time of transfer.

Field logbooks should consist of a bound book, in which the insertion or removal of pages will be visibly noticeable after the logbook has been assembled. Logbooks can be prepared by gluing or laminating pages together either at the left side or top of the page. If inclement weather is expected, logbooks may have plastic laminated front and back covers to protect the interior pages, and should not be broken apart for coping. Loose-leaf binding, such as comb binding is not considered hard binding. To maintain the integrity of the logbook, pages should be consecutively numbered prior to use. Logbook pages can be of any format, and may include blank pages for recording or field forms that are used for specific tasks. As an alternative, commercially bound and consecutive page numbered field logbooks may also be used.

**Additional Field Forms/Records:**

Additional field records may be required for each specific field event. The use of these records and examples are described in other SOPs specific for the activity (e.g. Borehole Logging SOP, Groundwater Sampling and Purging SOP, etc.). These other records may include:

- Borehole Logs during drilling,
- Well Construction and Development records,
- Groundwater Purge and Sample Collection Records,
- Water Level Monitoring,
- Investigation Derived Waste (IDW) Tracking Records,
- Instrument Calibration Records, and
- Health and Safety Monitoring Records and sign-off sheets.

Prior to field activities, the field sampling personnel will coordinate with the Project Manager, or designee, to determine which additional records will be required for the specific field task. These additional records will be maintained in a field file or a three-ring notebook throughout the duration of the field activities, or included in a specially prepared site-specific notebook. If the field notebook is being created, the forms may be part of the laminated book.

**Corrections:**

If an error is made in the field, logbook corrections will be made by drawing a single line through the error, entering the correct information, and initialing and dating the change. Materials that obliterate the original information, such as correction fluids and/or mark-out tapes, are prohibited. All corrections will be initialed and dated. Some projects require that a brief reason for the change must also be added where the correction was made. Ask the Project Manager, if this requirement is necessary.

**Documentation Reviews:**

Periodically, the Project Manager, or designee, will review the field logbooks pertaining to the activities under their supervision. The elements of this review will include technical content, consistency, and compliance with the project plans and SOPs. Discrepancies and errors identified during the review should be resolved between reviewer and author of the field documentation. Corrections and/or additions of information shall be initialed and dated by the field author or reviewer.

## 1. PURPOSE AND SCOPE

The objective of this standard operating procedure (SOP) is to define the methods and requirements for collection of groundwater samples from monitoring wells applying low flow protocols. Low flow sampling is a technique for collecting samples that does not require the removal of large volumes of water and therefore does not overly agitate the water, suspend particles, or potentially aspirate VOCs. Typical flow rates for low flow sampling should range from 0.1 L/min to 0.5 L/min depending on site characteristics. The groundwater monitoring activities will consist of measuring water levels, purging and sampling groundwater, and measuring groundwater field parameters. This procedure is applicable during all Cascadia Associates, LLC low flow groundwater sampling activities.

## 2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, tools, keys, and buckets/drums;
- Water quality meter with calibration solutions (record daily calibration/calibration check in field notes);
- Sampling equipment (water level indicator, pump, tubing);
- Laboratory-supplied sample containers (Consult the project-specific sampling and analysis plan (SAP) for sampling requirements);
- Field documentation materials;
- Decontamination materials; and
- Personal protective equipment (consult the site-specific Health and Safety Plan).

## 3. METHODOLOGY

### Water Levels:

Water levels in the wells will be measured and recorded for the purpose of determining groundwater elevations and gradient. The wells will be opened and the water level allowed to equilibrate before the measurements are taken. Measurements of the depth to water will be made to the nearest 0.01 foot using an electronic water level indicator.

### Purging:

Purge using low-flow sampling equipment (e.g., peristaltic or bladder pump) at a rate no greater than the recharge rate of the groundwater to prevent water table drawdown. Unless specified otherwise in the project-specific SAP the sample tubing/pump will be lowered to the middle of the screened interval. Groundwater field parameters (pH, electrical conductivity, and temperature) will be measured using a water quality meter and flow cell connected to the discharge tubing of the sample pump to assess the effectiveness of purging. Purging will be considered complete when the water quality parameters (i.e., pH, temperature, and specific conductance) stabilize within 10 percent for three consecutive 3-minute intervals. Consult the

project-specific SAP for additional parameters and stabilization criteria. Purge water will be placed in Department of Transportation (DOT) approved drums.

**Sample Collection:**

After the purging of each well is complete, collect groundwater samples for chemical analyses using the same pump used for the well purging.

**Low Yield Sampling Procedure:**

If a well pumps dry during purging discontinue measurement of water quality parameters. Collect groundwater samples once the water level recovers to 90 percent of the pre-purge water column. Contact project manager in the event of slow recharge conditions. Always collect samples for VOC analysis as soon after recharge as possible.