# Remedial Investigation Work Plan

**UW Mount Baker Laundry Site/**
**Mount Baker Station Development**
**2901 27th Avenue South**
**Seattle, Washington**
**Grant Number OTGP-2025-MHNW-00084**

*for*
**Washington State Department of Ecology**
**on behalf of Mercy Housing**

January 31, 2025

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GeoEngineers

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January 31, 2025

Prepared for:

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# List of Acronyms and Abbreviations

| ACRONYM/ ABBREVIATION | DESCRIPTION |
|---|---|
| AHP Grant | Affordable Housing Planning Grant |
| ASTM | ASTM International |
| bgs | below ground surface |
| CAP | cleanup action plan |
| City | City of Seattle |
| COC | chain-of-custody |
| cPAHs | carcinogenic polycyclic hydrocarbons |
| CSID | Cleanup Site Identification |
| CSM | conceptual site model |
| CUL | cleanup level |
| DNAPL | dense nonaqueous phase liquid |
| DO | dissolved oxygen |
| DP | direct push |
| Ecology | Washington State Department of Ecology |
| EDD | electronic data deliverable |
| EIM | Ecology Environmental Information Management |
| EPA | United States Environmental Protection Agency |
| ESA | Environmental Site Assessment |
| FS | feasibility study |
| FSID | Facility Site Identification |
| GeoEngineers | GeoEngineers, Inc. |
| GPR | ground-penetrating radar |
| HASP | Health and Safety Plan |
| HPLC | high performance liquid chromatography |
| HSA | hollow-stem auger |
| IDL | instrument detection limit |
| IDP | Inadvertent Discovery Plan |
| IDW | investigation-derived waste |
| LCS/LCSD | laboratory control spikes/laboratory control spike duplicate |

| | |
|---|---|
| LNAPL | light nonaqueous phase liquid |
| MDL | method detection limit |
| mg/kg | milligram per kilogram |
| µg/L | microgram per liter |
| mm | millimeter |
| MRL | method reporting limit |
| MS/MSD | matrix spike/matrix spike duplicates |
| MTCA | Model Toxics Control Act |
| NAVD88 | North American Vertical Datum of 1988 |
| NTU | nephelometric turbidity units |
| ORP | oxidation-reduction potential |
| PAHs | polycyclic aromatic hydrocarbons |
| PARCC | precision, accuracy, representativeness, completeness and comparability |
| PID | photoionization detector |
| PQL | practical quantitation limit |
| PVC | polyvinyl chloride |
| QA/QC | quality assurance/quality control |
| QAPP | Quality Assurance Project Plan |
| RCRA | Resource Conservation and Recovery Act |
| REC | recognized environmental concern |
| RI | remedial investigation |
| RPD | relative percent difference |
| SAP | Sampling and Analysis Plan |
| SF | square feet |
| SOP | standard operating procedure |
| SVOC | semivolatile organic compounds |
| TEE | terrestrial ecological evaluation |
| TPH-G | total petroleum hydrocarbons- diesel |
| TPH-D | total petroleum hydrocarbons- gasoline |
| TPH-O | total petroleum hydrocarbons- oil-range |
| TRL | target reporting limits |
| USCS | Unified Soil Classification System |

| | |
|---|---|
| UST | underground storage tank |
| UW | University of Washington |
| VOC | volatile organic compound |
| WAC | Washington Administrative Code |

# 1.0 Introduction

This Remedial Investigation (RI) Work Plan (Work Plan) has been prepared for the University of Washington (UW) Mount Baker Laundry Site (Site), also referred to as the Mount Baker Station Development Property (Property), located at 2901 27th Avenue South. The Property is currently occupied by asphalt parking lots and two vacant commercial buildings. The Property is owned by the City of Seattle (City) and is being redeveloped by Mercy Housing Northwest (Mercy) into an affordable housing/transit-oriented development. The City of Seattle was the recipient of funding from a legislative proviso during the 2021-2023 budget for the Property, and the funding is being transferred to Mercy Housing for the RI, Feasibility Study (FS) and Cleanup Actions planned as part of Property redevelopment.

Prior uses at the Site/Property include a single-family residence, a bowling alley, industrial laundry facility, grocery and retail businesses and an event space. The City of Seattle conducted a Phase I Environmental Site Assessment (ESA) and a Phase II ESA for the Property in 2019. The Phase II ESA identified soil and groundwater contamination in the northern portion of the Property related to prior uses.

The Property is listed on the Washington State Department of Ecology (Ecology) Confirmed and Suspected Contaminated Sites list with Facility Site Identification (FSID) number 19911937, Cleanup Site Identification (CSID) number 17017, and status of "Awaiting Cleanup." The RI activities detailed in this RI Work Plan are intended to assess and document the extent of contamination in soil and groundwater at the Site consistent with the Ecology Model Toxics Control Act (MTCA) requirements.

## 1.1 REMEDIAL INVESTIGATION PURPOSE

Pursuant to the Washington State MTCA Cleanup Regulation (Chapter 173-340 Washington Administrative Code [WAC]) and the Grant Agreement between Mercy and Ecology, the purpose the RI is to collect sufficient data and information to define the extent of contamination, characterize the Site, and inform the selection of cleanup action alternatives in the FS.

## 1.2 WORK PLAN ORGANIZATION

The remaining sections of this Work Plan are organized as follows:

- **Section 2.0 – Background.** Describes the Site/Property setting and history, current and future land use, regulatory framework, and previous remedial actions and regulatory actions.
- **Section 3.0 – Existing Site Conditions.** Describes the Site geology and hydrogeology, surface water and ecological habitat in the Site vicinity, and the nature and extent of contamination at the Site based on currently available data.
- **Section 4.0 – Preliminary Conceptual Site Model (CSM).** Describes the preliminary conceptual model for the Site.
- **Section 5.0 – Identification of Data Gaps.** Describes the known Site characterization data gaps to be addressed.
- **Section 6.0 – Remedial Investigation Field Program.** Describes the investigations that will be conducted to complete the next phase of RI.

- **Section 7.0 – Data Evaluation and RI Reporting.** Describes generally how the data collected during the RI field activities will be evaluated and how the RI activities and results will be reported.
- **Section 8.0 – Schedule.** Provides the schedule for the RI field activities and reporting.
- **Section 9.0 – References.** Lists references cited in this Work Plan.

# 2.0 Background

This section summarizes background information for the Site.

## 2.1 SITE SETTING

The Property is in the City of Seattle and identified as King County Tax Parcel Nos. 308500-2100, 713830-0015, and 713880-0025. The Property comprises approximately 144,680 square feet (SF) and is occupied by a 63,136 SF building situated on the northern half of the Property (herein identified as Building 1), and a 15,397 SF building (herein identified as Building 2) situated on the southern half of the Property, and associated asphalt parking areas (see Site Plan, Figure 2). The Property is at an elevation of approximately 50 to 100 feet (North American Vertical Datum of 1988[1] [NAVD88]) and slopes gently downward to the east.

The area surrounding the Property is primarily developed with commercial buildings, associated paved parking, roads, and landscaping. Elevated tracks for the Sound Transit Link Light Rail are located to the north and east of the Property. The Mount Baker Light Rail Station is situated to the east of the Property, across 27th Avenue South.

## 2.2 UTILITY INFRASTRUCTURE

Underground utilities located on or in the vicinity of the Property include water, electric, storm sewer, sanitary or combined sewer, natural gas, and fiber optics (Utility Infrastructure – City of Seattle ArcGIS Online). The rights-of-way of South Forest Street and 27th Avenue South serve as major utility corridors for the developments on the surrounding properties.

## 2.3 SITE HISTORY

GeoEngineers reviewed available information regarding the history of the Site/Property, and surrounding area, and the results of previous investigations from reports provided to us by the City of Seattle. Pertinent figures from prior site investigation reports that show the configurations of previous historical structures are presented in Appendix A.

The Property was initially developed by 1916 with a single-family residence in the northeastern portion of the Property. The residence was demolished by 1950. A bowling alley was constructed on the northern portion of the Property in 1957 (Building 1) and operated as Rainier Lanes until 1983 when the Property was purchased by the UW and the building was converted to the UW consolidated laundry facility. The laundry operated as an industrial-sized laundry facility from at least 1983 until 2009. The facility reportedly

[1] NAVD88 is the reference elevation used throughout this Work Plan unless noted otherwise.

never included dry cleaning operations; however, available records document that large quantities of solvents and other hazardous materials were removed from the Property for disposal approximately 10 years after the bowling alley ceased operations.

A second building was constructed on the central portion of the Property in 1963 (Building 2) and was occupied by A and P Food Stores until at least 1970. The commercial building was subsequently occupied by Value Village for clothing sales from 1975 to at least 1996 and by Grocery Outlet from 2003 until at least 2014, when the UW occupied the commercial building as the Kings Hall which hosted events and receptions.

The Phase II ESA completed at the Property in 2019 on behalf of the City of Seattle identified diesel- and oil-range total petroleum hydrocarbons (TPH-D and TPH-O) in soil and groundwater in the north and northeastern portions of the Property at concentrations greater than the MTCA Method A Cleanup Levels (CULs) (SoundEarth 2019b). In 2024, Ecology listed the Property as the UW Mt Baker Laundry Site with FSID number 19911937 and CSID number 17017. The results of past site investigations are discussed further in Section 2.6.

## 2.4 CURRENT AND FUTURE LAND USE

The Property is currently owned by the City of Seattle and is occupied by asphalt parking lots and two vacant buildings. Mercy Housing Northwest and El Centro de la Raza intend to redevelop the Property into a mixed-use affordable family rental housing development. The project will be developed over two phases and will include 400 to 450 total units, 100 percent of which will be affordable at 60 percent Area Median Income and below. The first phase is targeted to start construction in 2026 and will include 2 buildings containing 238 units, studio through 4 bedrooms. The first phase will also contain roughly 35,000 SF of space developed for the UW for their Rainier Valley Early Learning Campus, as well as community space serving residents and the wider community. It is anticipated that the cleanup will occur during the first phase of construction.

Surrounding land use in the immediate vicinity is generally mixed commercial and residential comprising retail, restaurants, office buildings, high-density residential buildings and Sound Transit Light Rail.

## 2.5 REGULATORY FRAMEWORK

The Property is listed by Ecology as the UW Mount Baker Laundry Site (FSID 19911937; CSID 17017). The City of Seattle was the recipient of legislative proviso funding for the Property to complete an RI/FS as part of redevelopment for affordable housing. The funding is being transferred to Mercy Housing for the RI, FS and Cleanup Actions planned as part of Property redevelopment. The RI, FS and cleanup activities will be conducted under Ecology oversight as part of the Affordable Housing Cleanup Grant process.

## 2.6 PREVIOUS REMEDIAL ACTIONS AND REGULATORY ACTIONS

This section summarizes the results of the Phase I and II ESAs completed at the Site/Property in 2019. The following sections summarize the environmental subsurface investigations that inform the nature and extent of contamination at the Property. Exploration locations, cross sections and sample analytical data are shown in the report excerpts provided in Appendix A.

### 2.6.1 Phase I ESA (2019)

The 2019 Phase I ESA identified the following recognized environmental concerns (RECs):

- **Fuel Oil Underground Storage Tank (UST) on the Property**. A 4,000-gallon fuel oil UST is present on the northern portion of the Property. No records of decommissioning were found. Database records list the installation date as January 1964, which is the default date for an unknown installation. Building records list that the UST was used to fuel two boilers located in the northern portion of Building 1; an interviewee indicated that the tank was used to store fuel for an offsite generator. The use and storage of fuel oil on the Property is considered a REC for the Site.
- **Bowling alley operations on the Property**. Between 1957 and at least 1980, Building 1 was occupied by a bowling alley. During this era, chlorinated solvents and petroleum-based solvents were commonly used to clean equipment in bowling alleys. The possibility of a release during the use and storage of these materials is considered a REC for the Site.
- **Laundry facility operations on the Property**. Building 1 was converted to an industrial laundry facility in 1983, operating until 2019. Interviewees state that no dry-cleaning operations occurred on the Property; however, records confirm that hazardous waste was removed from the Property while the laundry was operational. The former laundry operations are considered a REC for the Site.
- **Fill material beneath the Property.** Records indicate that 5,200 cubic yards of fill material were used during grading of the Property in approximately 1983. The source of this fill material is unknown and constitutes a REC for the Property.

Potential off-Property sources of contamination were noted and evaluated in the Phase I ESA. Off-property sources of contamination are identified as a data gap, as discussed in Section 5.0.

### 2.6.2 Phase II ESA (2019)

A Phase II ESA was completed in 2019 to investigate the RECs identified in the Phase I ESA. Eighteen soil borings (identified as P01 through P18) were advanced to depths of 15 to 25 feet below ground surface (bgs). Soil samples were collected from each boring at depths of 5 to 20 feet bgs and analyzed for volatile organic compounds (VOCs), metals, carcinogenic polycyclic hydrocarbons (cPAHs) and petroleum hydrocarbons. Eleven grab groundwater samples were collected and analyzed for VOCs and petroleum hydrocarbons. A focused ground-penetrating radar (GPR) survey was completed in an attempt to locate the UST situated on the northern portion of the Property, but the GPR survey did not identify the UST location.

#### 2.6.2.1 SOIL

TPH-O was detected in the soil sample collected from 10 feet bgs in boring P13, located in the northeast corner of the Property, at a concentration (3,700 milligrams per kilogram [mg/kg]) greater than the MTCA Method A CUL of 2,000 mg/kg. TPH-D and TPH-O and lead were detected in several other soil samples at concentrations less than MTCA CULs. No other analytes were detected at concentrations above the laboratory reporting limits.

#### 2.6.2.2 GROUNDWATER

TPH-D and TPH-O were detected in the groundwater sample collected from boring P13 at concentrations (910 and 520 micrograms per liter [µg/L], respectively) greater than the MTCA Method A CULs of 500 µg/L. TPH-D was detected in the groundwater sample collected from boring P16, located adjacent to the

4,000-gallon fuel oil UST, at a concentration (1,800 µg/L) greater than the MTCA CUL of 500 µg/L. TPH was detected in several other groundwater samples, but at concentrations less than the applicable cleanup levels. No other analytes were detected in the 2019 Phase II ESA groundwater samples at concentrations greater than the laboratory reporting limits.

The TPH-impacted soil and groundwater in the northeastern portion of the Property may be associated with the fill material placed at the Property in approximately 1983. The TPH-impacted groundwater at the location of boring P16 may be related to the adjacent UST.

A copy of excerpts from the Phase II report is included in Appendix A (SoundEarth 2019b).

### 2.7 CULTURAL RESOURCES

Ecology performed a cultural resources consultation with tribal contacts. A project-specific Inadvertent Discovery Plan (IDP) was prepared for the project to support their determination of a low potential to impact cultural resources. The IDP is included in Appendix B.

## 3.0 Existing Site Conditions

The existing site conditions are described previously in Section 2.1. The remainder of this section describes the Site geology and hydrogeology, surface water and ecological habitat in the Site vicinity, and the nature and extent of contamination at the Site.

### 3.1 SOIL CONDITIONS

Soils at the Property are generally comprised of fill overlying alluvium. Fill material consists of variable sand, gravel, and silt to approximately 10 feet bgs, and the alluvium consists of interbedded silts and sands with organics. Anthropogenic fill materials, including wood and brick fragments, were observed during drilling at depths between 5 and 17.5 feet bgs (SoundEarth 2019b). The Property is underlain by Vashon-age deposits, consisting of silt, sand, gravel, and clay.

### 3.2 GROUNDWATER CONDITIONS

Groundwater at the Property was encountered during drilling at depths ranging from approximately 9.5 to 20 feet bgs (SoundEarth 2019b). Groundwater has been encountered at depths from approximately 10 to 16 feet bgs in the Property vicinity.

### 3.3 SURFACE WATER AND TERRESTRIAL HABITAT

The Site is located approximately 0.7 mile west of Lake Washington, which is hydraulically downgradient of the Site. Shallow perched groundwater at the Site is inferred to flow in an easterly direction, based upon local topography, drainage patterns, and surface water flow (SoundEarth 2019a). The shallow groundwater on the Property is unlikely to contribute directly to the surface water in Lake Washington due to the distance of separation and local topographic barriers.

The Cheasty Boulevard green space is located upgradient and to the west of the Site; however, soil at the Site is and will be covered by pavement and/or buildings that prevent exposure to plants and wildlife. A Terrestrial Ecological Evaluation (TEE) is presented in Appendix C.

## 3.4 NATURE AND EXTENT OF CONTAMINATION

The results of environmental sampling conducted at the Property in 2019 indicate the presence of TPH-D and TPH-O in soil and/or groundwater at concentrations greater than the MTCA CULs (SoundEarth 2019b). The nature and extent of soil and groundwater contamination is summarized below.

### *3.4.1 Soil*

Soil sampling conducted during the 2019 Phase II ESA indicates that TPH-D and TPH-O are present in soil in the northern and northeastern portions the Property (see Appendix A). TPH-O was detected at a concentration greater than the MTCA CUL at a depth of 10 feet bgs in boring P13, located at the approximate location of the former residence on the northeastern portion of the Property.

### *3.4.2 Groundwater*

Based on the results the 2019 Phase II ESA, TPH-D and TPH-O are present in groundwater at concentrations greater than the MTCA Method A CULs in the northern and northeastern portions of the Property (see Appendix A). TPH-D was detected in the grab groundwater sample collected from the boring situated near the UST in the northern portion of the Property (boring P16) at a concentration (1,800 µg/L) greater than the MTCA Method A CUL of 500 µg/L. TPH-D and TPH-O were detected in the grab groundwater sample collected from the northeastern portion of the Property (boring P13): TPH-D at a concentration (910 µg/L) greater than the MTCA Method A CUL of 500 µg/L, and TPH-O at a concentration (520 µg/L) greater than the MTCA Method A CUL of 500 µg/L. These data were collected from temporary wells; groundwater samples have not been collected from permanent wells installed and developed in accordance with Chapter 173-160 WAC and Ecology/EPA guidance. In addition, data have not been collected to evaluate if TPH-contaminated groundwater has migrated off the Property.

# 4.0 Preliminary Conceptual Site Model

This section presents the preliminary conceptual site model (CSM) based on the investigations and interim cleanup actions completed to date.

## 4.1 SOURCES OF CONTAMINATION

Sources of contamination for the Property include:

- **Fuel Oil UST.** TPH-D was detected in groundwater at concentrations greater than the MTCA CUL at a location adjacent to the 4,000-gallon UST located to the north of Building 1.
- **Fill Soil of Unknown Origin.** TPH-O was detected in soil collected from boring P13, located in the northeastern portion of the Property, at a concentration greater than the MTCA CUL. The depth/vertical extent of the TPH-D and TPH-O detections in soil in this and other borings completed at the Property in 2019 is within range where fill soils were encountered. The TPH-D and TPH-O may be associated with fill material from undocumented sources placed at the Property in approximately 1983.
- **Potential Off-Property Sources.** Between 1956 and 1960, the Red, White, and Blue Cleaners, a dry-cleaning business, operated approximately 300 feet southeast of the Property and was identified as a REC in the Phase I ESA (SoundEarth 2019a).

## 4.2 CONTAMINANT FATE AND TRANSPORT

The available information indicates that petroleum hydrocarbons released from the Property USTs likely migrated downward through dispersion and to the groundwater table. The highest TPH concentration observed in the Phase II ESA groundwater samples were in the sample collected from boring P16 located downgradient of the fuel oil UST on the Property.

## 4.3 CONTAMINATED MEDIA

Based on the results of previous environmental investigations, soil and groundwater beneath the Property are contaminated due to releases from historical operations. Soil vapor has not been evaluated to date and will be evaluated during a subsequent phase of work if the initial phase of the RI indicates vapor intrusion is a pathway of concern.

## 4.4 POTENTIAL EXPOSURE PATHWAYS AND RECEPTORS

The following potential exposure pathways and receptors have been identified based on the current and anticipated future land use at the Property:

- **Direct Contact.** Contaminated soil is located beneath paved and/or improved surfaces; therefore, the direct contact pathway is not complete. Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities that disturb the overlying improved/paved surfaces.
- **Groundwater Beneficial Use as Drinking Water.** Groundwater beneath the Property is not considered to be a current source of drinking water. Drinking water in the Property area is supplied by the City of Seattle. However, groundwater beneficial use is still considered a potential exposure pathway as required by MTCA.
- **Surface Water.** Surface water is not a potential receptor because the Site ground surface is mostly capped with improved/paved hardscapes and surface water is not present at the Property.
- **Indoor Air.** Soil vapor to indoor air is considered a potential exposure pathway based on the detected contaminants of concern concentrations in soil and groundwater at the Property. However, the planned Property redevelopment will include removal of soil across a broad portion of the Property concurrent with Site cleanup. Therefore, the soil vapor to indoor air pathway, the potential for vapor intrusion, and the need for vapor mitigation will be evaluated following completion of the initial phase of RI work and soil removal.

Ecological receptors such as aquatic organisms, terrestrial wildlife, plants and soil biota are unlikely to be exposed to Site contaminants due to the depth of the soil and groundwater contamination (i.e., greater than 15 feet bgs) and the asphalt/concrete surfaces at the Property.

# 5.0 Identification of Data Gaps

This section identifies the Site characterization data gaps. Addressing these data gaps is the basis for the RI field program described in Section 6.0.

- **Lateral and Vertical Extent of Contamination.** In 2019, TPH-D and TPH-O were detected in soil and groundwater within the northern and northeastern portions of the Property. The extent of TPH contamination in soil and groundwater has not been documented. The soil and groundwater sampling proposed in this RI Work Plan are intended to address this data gap.
- **Shallow Groundwater Presence and Gradient.** Perched groundwater was encountered on the Property at depths between 9.5 and 20 feet bgs during the 2019 Phase II ESA. Groundwater was interpreted to flow toward the east based on local topography (SoundEarth 2019b), but monitoring wells were not installed during the investigation. The groundwater monitoring wells proposed in this RI Work Plan are intended evaluate shallow groundwater gradients and flow direction at the Site and the extent of contamination in groundwater. Additional monitoring wells may be installed during a subsequent phase of RI work to further evaluate the extent of contamination in groundwater, if warranted.
- **Soil and groundwater conditions beneath Building 1.** Soil and groundwater conditions beneath Building 1, which previously housed the UW Laundry facility and a bowling alley, have not been evaluated.
- **Soil Physiochemical Properties and Groundwater Geochemical Conditions.** Physiochemical properties of Site soil (grain size distribution, pH, soil bulk density, and total organic carbon content) and groundwater geochemical conditions have not been evaluated. These properties may inform the evaluation of cleanup action alternatives in the FS and/or influence the performance of remediation technologies that may be applicable to the Site. This data gap will be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of the RI.
- **Preferential Pathways for Contamination.** There have been no studies to date to assess whether underground utilities on the Property and in adjacent City of Seattle rights-of-way are preferential pathways for contaminant migration. This data gap may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of RI.
- **Soil Vapor/Indoor Air Pathway.** Prior studies completed on the Property did not include soil vapor sampling and the potential for vapor intrusion has not been evaluated on the Property or at locations downgradient that have potentially been affected by the groundwater contaminant plume. A subsequent phase of the RI may include soil vapor sampling to evaluate the potential for vapor intrusion, if warranted based on the results of the initial phase of RI work.
- **Potential Off-Property Sources.** Between 1956 and 1960, the Red, White, and Blue Cleaners, a dry-cleaning business, operated on a Property approximately 300 feet southeast of the Property and was identified as a REC in the Phase I ESA (SoundEarth 2019a). The potential for this former dry-cleaning business to be a source of contamination migration to the subject property is a data gap that may be partially addressed by the RI activities proposed herein but may also require additional assessment during a subsequent phase of the RI.

# 6.0 Remedial Investigation Field Program

The RI field program is designed to address the data gaps identified in Section 5.0. If warranted, subsequent phases of RI will be performed to address remaining data gaps. The planned exploration locations are shown in the Site Plan, Figure 2.

The elements of the RI field program are described further below. Details regarding field sampling procedures are provided in the Sampling and Analysis Plan (SAP, Appendix D). Quality control procedures for field activities and laboratory analyses are described in the Quality Assurance Project Plan (QAPP, Appendix E). The investigation to evaluate and document the extent of contaminated soil and groundwater is described in the sections below.

## 6.1 UTILITY LOCATE AND GPR SURVEY

In addition to a review of available information on underground utilities, a GPR survey will be completed to identify buried utilities at the planned direct-push boring locations. We anticipate that buried utilities will be present beneath the building slab and that the concrete building slab will require coring prior to drilling.

## 6.2 DIRECT PUSH SOIL AND GRAB GROUNDWATER SAMPLING

Five (5) direct-push (DP) borings (RI-DP-1 through RI-DP-5) will be drilled inside Building 1 at the approximate locations shown in Figure 2. The actual boring locations will be determined based on utility locations and site conditions. An environmental representative will be present during drilling to log and field screen soils and to collect soil samples for possible laboratory analysis.

Soil samples will be collected at approximate 5-foot depth intervals during drilling of the borings. Soil types will be identified using the Unified Soil Classification System (USCS). In addition, soil will be field screened for evidence of potential contamination using visual screening (e.g., observations of soil staining), water sheen screening, and headspace vapor screening with a photoionization detector (PID). Soil field screening and sampling methods are described in the SAP (Appendix D).

Selected soil samples will be submitted for laboratory chemical analysis based on field observations, sample depth in relation to depth to groundwater and the RI objectives. Up to two (2) soil samples per boring will be collected and submitted for laboratory chemical analysis for one or more of the following analytes:

- Gasoline-range total petroleum hydrocarbons (TPH-G) by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method, with and without silica gel cleanup
- VOCs by United States Environmental Protection Agency (EPA) Method 8260D;
- Polycyclic aromatic hydrocarbons (PAHs) by EPA 8270; and
- Metals (Resource Conservation and Recovery Act [RCRA] 8) by EPA Method 6000/7000 series.

Where groundwater is encountered, temporary wells will be installed, and groundwater grab samples will be collected for possible laboratory chemical analysis for one or more of the following analytes:

- TPH-G by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method, with and without silica gel cleanup; and
- VOCs by EPA Method 8260D.

Following the completion of drilling, the investigation-derived waste (IDW), which will be contained in drums, will be sampled for disposal profiling, and the samples will be submitted for laboratory chemical analysis for the following:

- RCRA 8 metals by EPA Method 6000/7000 series.

## 6.3 HOLLOW-STEM AUGER DRILLING AND GROUNDWATER MONITORING WELL INSTALLATION

Up to seven (7) borings (RI-MW-1 through RI-MW-7) will be drilled outside of the buildings at the approximate locations shown in Figure 2 using hollow-stem auger drilling methods and completed as groundwater monitoring wells. The monitoring well depths will range between 15 and 30 feet bgs. Two off-property wells (RI-MW-6 and RI-MW-7) are presented as contingency wells, which may be installed if needed based on the results of the initial phase of RI work. The actual boring locations will be determined based on utility locations and site conditions. An environmental representative will be present during drilling to log and field screen soils and to collect soil samples for possible laboratory analysis.

Soil samples will be collected at approximate 5-foot depth intervals during drilling of the borings. Soil types will be identified using the USCS. In addition, soil will be field screened for evidence of potential contamination using visual screening (e.g., observations of soil staining), water sheen screening, and headspace vapor screening with a PID. Soil field screening and sampling methods are described in the SAP (Appendix D).

A 2-inch-diameter groundwater monitoring well will be installed in borings RI-MW-1 through RI-MW-5. The wells will be constructed in accordance with Washington State well construction standards (WAC 173-160); resource protection well notification and construction documents will be submitted to Ecology. The well casing will consist of Schedule 40 polyvinyl chloride (PVC) blank casing and machine-slotted screens with 0.010-inch slot width.

Groundwater conditions at Property have been described as perched groundwater at depths ranging from 9.5 to 20 feet bgs. The depth and screen intervals for the RI monitoring wells are anticipated to be consistent with observed groundwater on the Property, to inform the nature and extent of contamination documented in Site soil and groundwater. However, the planned depth and screen intervals for the RI wells may be adjusted based on observations during drilling.

The annular space between the well screen and the borehole wall will be filled with a clean sand filter pack to approximately 2 feet above the top of the well screen. The annular space above the filter pack will be filled with hydrated bentonite. Each well will be fitted with a locking well cap and completed at the surface with a flush steel monument set in a concrete surface seal.

After all monitoring wells are installed, the wells will be developed as described in the SAP to stabilize the sand filter pack and formation materials surrounding the well screen and to establish a hydraulic connection between the well screen and the surrounding soil. Monitoring well casing rim and monument elevations will be surveyed relative to the City of Seattle datum.

Selected soil samples will be submitted for laboratory chemical analysis based on field observations, sample depth in relation to depth to groundwater and the RI objectives. Up to two (2) soil samples per

boring will be collected and submitted for laboratory chemical analysis for one or more of the following analytes:

- TPH-G by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method, with and without silica gel cleanup;
- VOCs by EPA Method 8260D;
- PAHs by EPA 8270; and
- Metals (RCRA 8) by EPA Method 6000/7000 series.

Following the completion of drilling and soil sampling, the IDW, which will be contained in drums, will be sampled for disposal profiling, and the samples will be submitted for laboratory chemical analysis for the following:

- RCRA 8 metals by EPA Method 6000/7000 series.

## 6.4 GROUNDWATER MONITORING AND SAMPLING

The RI groundwater monitoring will be conducted on a quarterly basis for up to 12 months, or until Property redevelopment begins, at which time the RI wells will be decommissioned. The need for additional, post redevelopment sampling and analysis will be evaluated based on the results of the preconstruction monitoring and discussions with Ecology. During each monitoring event, groundwater levels will be measured in the RI monitoring wells and groundwater samples will be collected for analysis from each well as described in the SAP. The groundwater samples will be submitted for laboratory chemical analysis for one or more of the following analytes:

- TPH-G by NWTPH-Gx Method;
- TPH-D and TPH-O by NWTPH-Dx Method, with and without silica gel cleanup; and
- VOCs by EPA Method 8260D.

## 6.5 INVESTIGATION-DERIVED WASTE MANAGEMENT

IDW will include drill cuttings, well development water, sampling equipment decontamination water, pre-sampling purge water from monitoring wells, and incidental waste such as disposable gloves, paper towels, plastic bags, etc.

Drill cuttings, well development water and pre-sampling purge water will be segregated by boring or monitoring well and stored on site in labeled drums pending waste classification and subsequent disposal. Solids (i.e., drill cuttings) and liquids (i.e., well development water and pre-sampling purge water) will be stored in separate drums. Well development water and pre-sampling purge water from the same monitoring well can be combined in the same drum. Decontamination water will be stored on site in labeled drums separate from other IDW. Between 10 and 20 drums are anticipated to be generated during RI drilling and sampling activities. Incidental waste (disposable gloves, etc.) will be disposed of in a trash receptacle.

Drill cuttings and decontamination water will be characterized for disposal by submitting a representative sample of the drill cuttings from each soil boring and a representative sample of the decontamination water

for analysis of petroleum and related compounds. Well development water and pre-sampling purge water will be characterized for disposal based on the groundwater analytical results from the quarterly groundwater monitoring events.

If chlorinated solvents or other F-listed compounds are detected in any IDW samples, the associated IDW will be designated as a hazardous waste under the Washington State dangerous waste regulations (WAC 173-303) and disposed of off-site at a facility permitted to receive hazardous waste. Hazardous waste manifests will be prepared for IDW designated as dangerous waste, and the IDW will be transported to the permitted disposal facility by a licensed hazardous waste hauler. IDW samples that are non-detect for these or other F-listed compounds will be disposed of off-Property at a permitted facility.

### 6.6 DATA VALIDATION AND SUBMITTAL TO EIM DATABASE

Laboratory analytical data from the RI field investigation will be validated using the EPA National Functional Guidelines, and in accordance with Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (https://apps.ecology.wa.gov/publications/documents/0403030.pdf) and Establishing Ecology Guidelines for Verification and Validation of Chemical Data (https://apps.ecology.wa.gov/publications/documents/2403023.pdf).

Chemical analytical results for soil and groundwater samples collected will be submitted to the Ecology Environmental Information Management (EIM) database, in accordance with Ecology's Toxic Cleanup Program Policy 840.

## 7.0 Data Evaluation and RI Reporting

The results of soil and groundwater sampling will be used to evaluate and document the lateral and vertical extent of contamination at concentrations relative to the Ecology MTCA Method A CULs, which are the preliminary cleanup levels for the Site. Cleanup standards will be presented in the FS and Cleanup Action Plan (CAP).

Quarterly groundwater monitoring data will be used to further evaluate groundwater gradient and flow direction and evaluate the seasonal variability of dissolved petroleum and other contaminants of concern concentrations. The RI activities and results will be documented in an RI report prepared in accordance with applicable MTCA requirements and associated regulatory guidance. The preliminary CSM presented in this Work Plan will be refined as necessary based on the results of the RI, and an updated CSM will be presented in the RI report.

An evaluation of remedial alternatives for the Property will be presented in the FS. The selected remedial alternative will be consistent with MTCA requirements and compatible with future proposed Property development that may be affected by the Site.

## 8.0 Schedule

The RI drilling, soil sampling, and groundwater monitoring well construction activities described in this Work Plan are anticipated to be completed in February 2025. Quarterly groundwater monitoring events are anticipated to occur in February 2025, May 2025, August 2025, and November 2025. The draft RI/FS report and remedial cost estimate are anticipated to be provided to Ecology for review in December 2025.

# 9.0 References

City of Seattle, 2025, Development Services Office Water and Sewer Map, DSO Water & Sewer Map (seattle.gov), accessed January 2025.

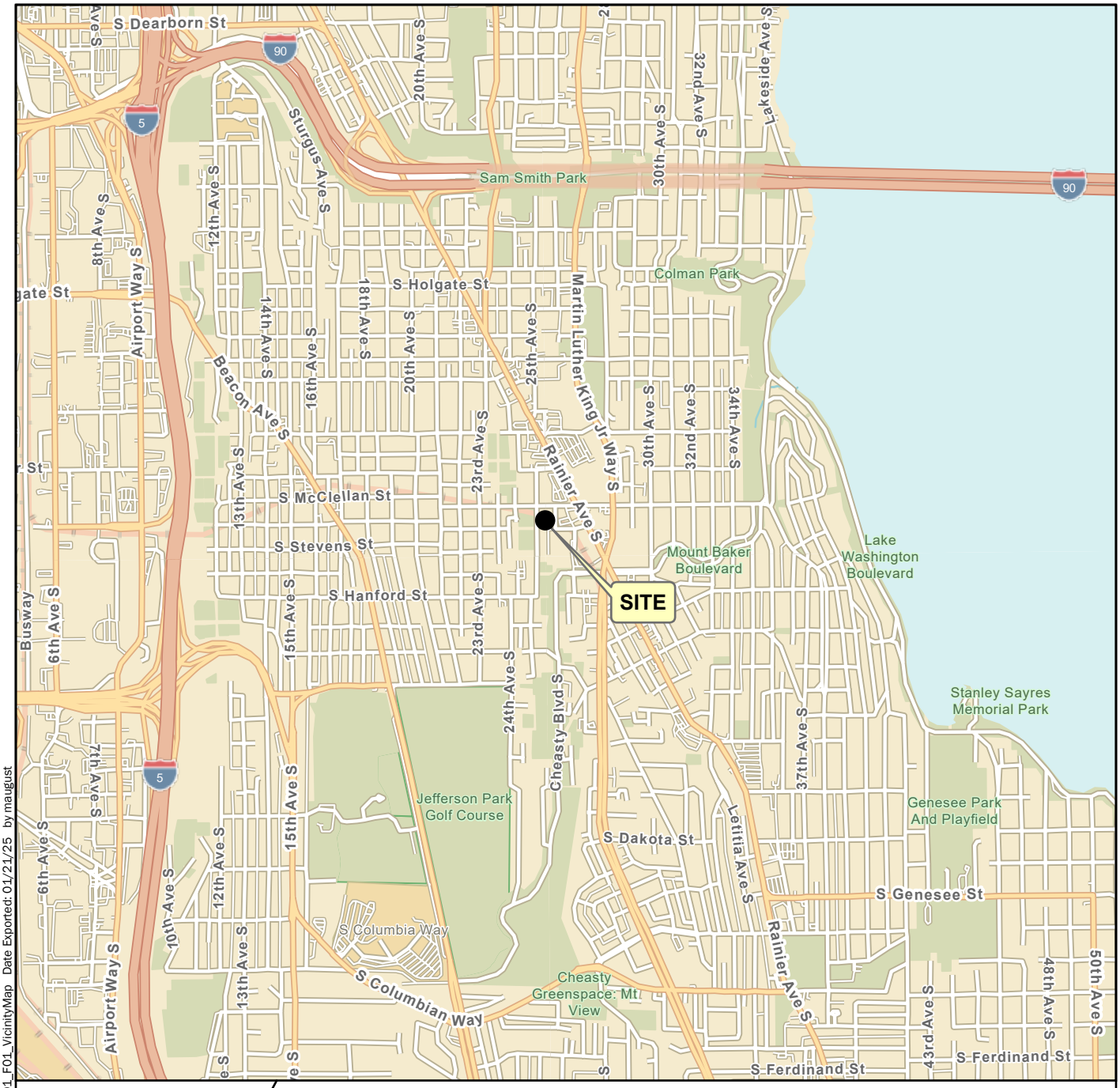
SoundEarth Strategies, 2019a. Phase I Environmental Site Assessment, UW Laundry Property, 2901 27th Avenue South, Seattle, Washington. Prepared for City of Seattle. October 8, 2019.

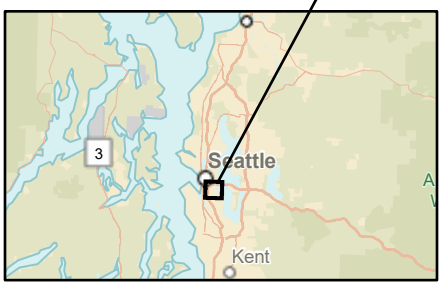
SoundEarth Strategies, 2019b. Phase II Environmental Site Assessment, UW Laundry Property, 2901 27th Avenue South, Seattle, Washington. Prepared for City of Seattle. December 16, 2019.

# 10.0 Limitations

We have prepared this Work Plan for use by Mercy Housing Northwest and the Washington State Department of Ecology for the remedial investigation to be performed at 2901 27th Avenue South in Seattle, Washington. Within the limitations of scope, schedule and budget, our services are being executed in accordance with generally accepted environmental science practices in this area at the time this Work Plan was prepared. No warranty or other conditions, express or implied, should be understood. This document (email, text, table and/or figure) and any attachments are only a copy of a master document. The master hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.

# Figures




N

0 2,000

Feet

## Vicinity Map

Mount Baker Station Development/UW Laundry Site
2901 27th Avenue South
Seattle, Washington

GeoEngineers

Figure 1

Source(s):
- ESRI

Coordinate System: NAD 1983 UTM Zone 10N



P:\17\17613012\GIS\17613012_Project\17613012_Project.aprx\1761301201_F01_VicinityMap Date Exported: 01/21/25 by maugust


Not to Scale

Note(s):

- Proposed RI Auger Boring with Monitoring Well
- Proposed RI Direct-Push Boring (inside building)

**Proposed Remedial Investigation Exploration Locations**

UW Mount Baker Laundry Site
Seattle, Washington

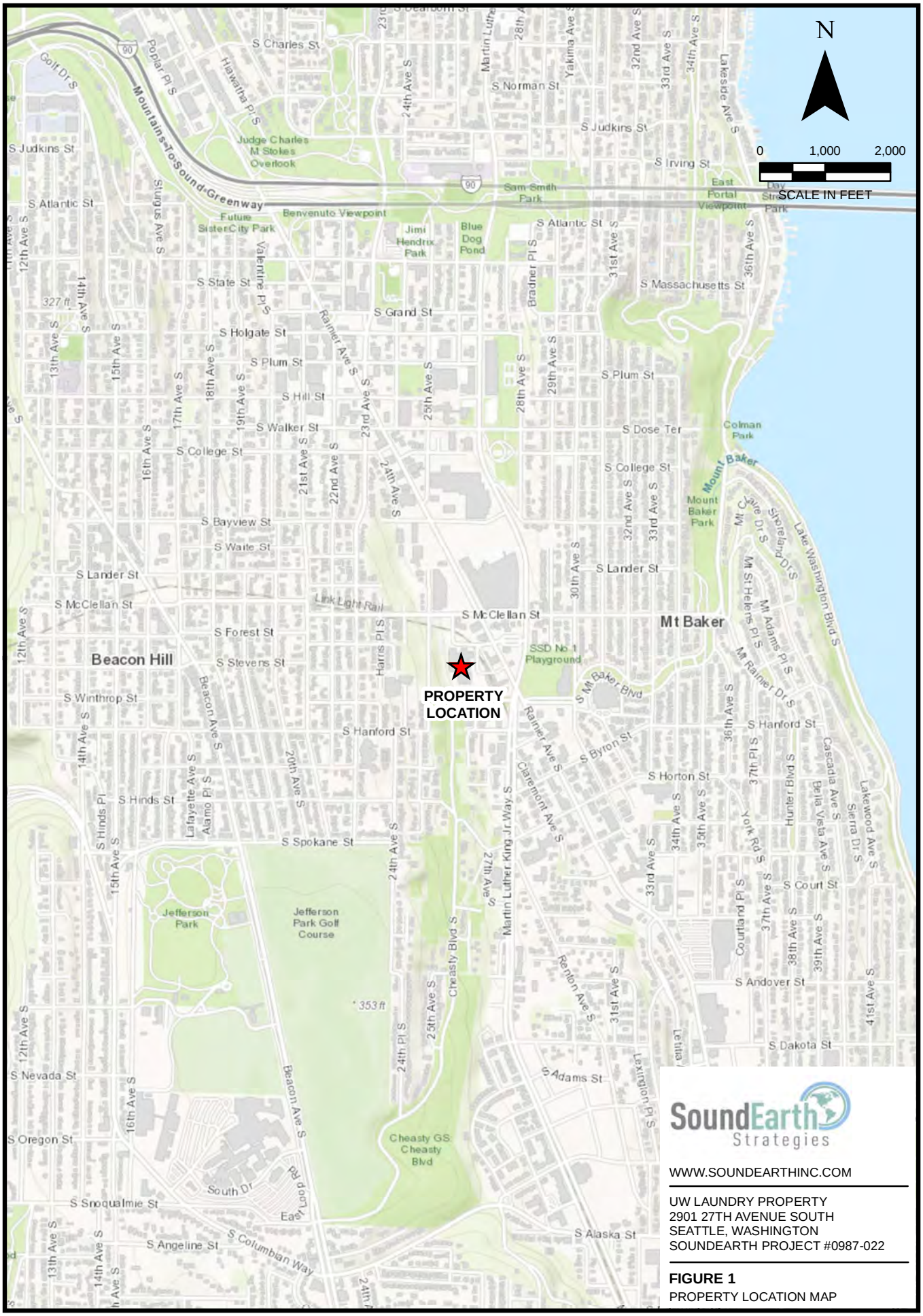
GeoEngineers

**Figure 2**

17613-012-00 Date Exported: 12/20/2024

# Appendices

# Appendix A
## Excerpts from Prior Environmental Reports




Document Path: P:\0987 City of Seattle\0987-022 UW Laundry Bldg Property\Technical\CAD\Figure 1\0987-022_FIG1.mxd

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SOUNDEARTH PROJECT #0987-022

**FIGURE 1**
PROPERTY LOCATION MAP

11/19/2019

P:\0987 CITY OF SEATTLE\0987-022 UW LAUNDRY BLDG PROPERTY\TECHNICAL\CAD\2019\2019 PHASE II\0987-022_2019_EXPLR.DWG

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH HEATING OIL USE

SOUND TRANSIT PARCEL: 3085002065

RETAIL/RESTAURANT 2609 SOUTH MCCLELLAN STREET PARCEL: 7138300035

26TH AVENUE SOUTH

PARKING LOT 2600 SOUTH FOREST STREET PARCEL B: 7138300015

P17

P18

PARKING LOT 2620 SOUTH FOREST STREET PARCEL: 7138300005

PAWN SHOP 2825 RAINIER AVENUE SOUTH PARCEL: 7138300090

APPROXIMATE LOCATION OF 4,000-GALLON UST AND FILL PORT

TRANSFORMER

P16

P15

P14

P06

P13

SOUTH FOREST STREET

MARTIN LUTHER KING JUNIOR WAY SOUTH

25TH AVENUE SOUTH

APPROXIMATE LOCATION OF VENT PIPE FOR 4,000-GALLON UST

APPROXIMATE LOCATION OF SUMP

P07

APPROXIMATE LOCATION OF FORMER BOWLING ALLEY

APPROXIMATE LOCATION OF FORMER RESIDENCE

BUILDING 1 FORMER UW LAUNDRY/ FORMER BOWLING ALLEY

27TH AVENUE SOUTH

P12

SOUND TRANSIT PARCEL: 7138800010

RAINIER AVENUE SOUTH

N

0 50 100

APPROXIMATE SCALE IN FEET

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH OIL-BURNING FURNACES

SOUND TRANSIT SOUTH STEVENS STREET PARCEL: 3085002085

P08

P03

P01

P02

APPROXIMATE LOCATIONS OF FILL

2901 27TH AVENUE SOUTH PARCEL A: 3085002100

P05

BUILDING 2 EVENT CENTER

P04

PARKING

P10

SOUND TRANSIT PARCEL: 7138800030

GRAVEL ROAD

PARKING LOT 2700 SOUTH WINTHROP STREET PARCEL C: 7138800025

VACANT PARCEL: 3085002160

P09

P11

UNDEVELOPED LAND

SOUTH WINTHROP STREET

VACANT 2723 SOUTH WINTHROP STREET PARCEL: 5058300080

VACANT 2711 SOUTH WINTHROP STREET PARCEL: 5058300100

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH OIL-BURNING FURNACES

3101 MARTIN LUTHER KING JUNIOR WAY SOUTH

VACANT PARCEL: 3085002225

VACANT PARCEL: 3085002300

CLOTHING WAREHOUSE 3111 27TH AVENUE SOUTH PARCEL: 3085002295

WORKSHOP 2705 SOUTH WINTHROP STREET PARCEL: 5058300110

APPROXIMATE LOCATION OF FORMER RED, WHITE, AND BLUE DRY CLEANERS

## LEGEND

- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SS — SEWER LINE
- SD — STORMDRAIN LINE
- MANHOLE
- CATCH BASIN
- P18 — SOIL BORING
- INFERRED DIRECTION OF GROUNDWATER FLOW
- UST — UNDERGROUND STORAGE TANK

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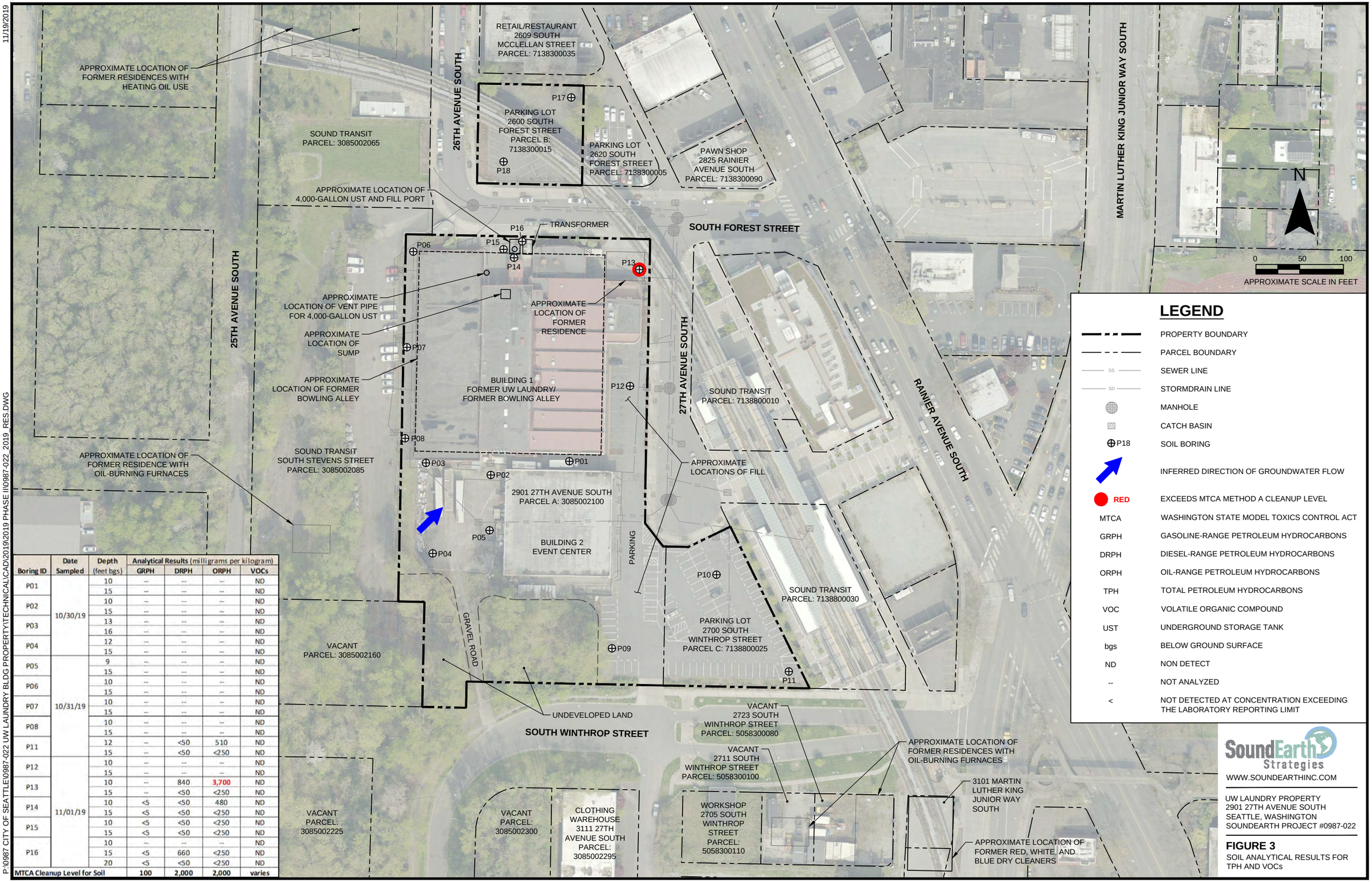
**FIGURE 2**
EXPLORATION LOCATION PLAN

11/19/2019

P:\0987 CITY OF SEATTLE\0987-022 UW LAUNDRY BLDG PROPERTY\TECHNICAL\CAD\2019\2019 PHASE II\0987-022_2019_RES.DWG




| Boring ID | Date Sampled | Depth (feet bgs) | Analytical Results (milligrams per kilogram) GRPH | DRPH | ORPH | VOCs |
|---|---|---|---|---|---|---|
| P01 | 10/30/19 | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P02 | | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P03 | | 13 | -- | -- | -- | ND |
| | | 16 | -- | -- | -- | ND |
| P04 | | 12 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P05 | 10/31/19 | 9 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P06 | | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P07 | | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P08 | | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P11 | | 12 | -- | <50 | 510 | ND |
| | | 15 | -- | <50 | <250 | ND |
| P12 | 11/01/19 | 10 | -- | -- | -- | ND |
| | | 15 | -- | -- | -- | ND |
| P13 | | 10 | -- | 840 | 3,700 | ND |
| | | 15 | -- | <50 | <250 | ND |
| P14 | | 10 | <5 | <50 | 480 | ND |
| | | 15 | <5 | <50 | <250 | ND |
| P15 | | 10 | <5 | <50 | <250 | ND |
| | | 15 | <5 | <50 | <250 | ND |
| P16 | | 10 | -- | -- | -- | ND |
| | | 15 | <5 | 660 | <250 | ND |
| | | 20 | <5 | <50 | <250 | ND |
| MTCA Cleanup Level for Soil | | | 100 | 2,000 | 2,000 | varies |

## LEGEND

- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SS — SEWER LINE
- SD — STORMDRAIN LINE
- MANHOLE
- CATCH BASIN
- P18 — SOIL BORING
- INFERRED DIRECTION OF GROUNDWATER FLOW
- RED — EXCEEDS MTCA METHOD A CLEANUP LEVEL
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT
- GRPH — GASOLINE-RANGE PETROLEUM HYDROCARBONS
- DRPH — DIESEL-RANGE PETROLEUM HYDROCARBONS
- ORPH — OIL-RANGE PETROLEUM HYDROCARBONS
- TPH — TOTAL PETROLEUM HYDROCARBONS
- VOC — VOLATILE ORGANIC COMPOUND
- UST — UNDERGROUND STORAGE TANK
- bgs — BELOW GROUND SURFACE
- ND — NON DETECT
- -- — NOT ANALYZED
- < — NOT DETECTED AT CONCENTRATION EXCEEDING THE LABORATORY REPORTING LIMIT

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**FIGURE 3**

SOIL ANALYTICAL RESULTS FOR TPH AND VOCs

11/19/2019

P:\0987 CITY OF SEATTLE\0987-022 UW LAUNDRY BLDG PROPERTY\TECHNICAL\CAD\2019\2019 PHASE II\0987-022_2019_RES.DWG

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH HEATING OIL USE

SOUND TRANSIT PARCEL: 3085002065

APPROXIMATE LOCATION OF 4,000-GALLON UST AND FILL PORT

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH OIL-BURNING FURNACES

SOUND TRANSIT SOUTH STEVENS STREET PARCEL: 3085002085

VACANT PARCEL: 3085002160

RETAIL/RESTAURANT 2609 SOUTH MCCLELLAN STREET PARCEL: 7138300035

PARKING LOT 2600 SOUTH FOREST STREET PARCEL B: 7138300015

PARKING LOT 2620 SOUTH FOREST STREET PARCEL: 7138300005

PAWN SHOP 2825 RAINIER AVENUE SOUTH PARCEL: 7138300090

26TH AVENUE SOUTH

25TH AVENUE SOUTH

SOUTH FOREST STREET

MARTIN LUTHER KING JUNIOR WAY SOUTH

TRANSFORMER

APPROXIMATE LOCATION OF VENT PIPE FOR 4,000-GALLON UST

APPROXIMATE LOCATION OF SUMP

APPROXIMATE LOCATION OF FORMER BOWLING ALLEY

APPROXIMATE LOCATION OF FORMER RESIDENCE

BUILDING 1 FORMER UW LAUNDRY/ FORMER BOWLING ALLEY

2901 27TH AVENUE SOUTH PARCEL A: 3085002100

BUILDING 2 EVENT CENTER

PARKING

GRAVEL ROAD

UNDEVELOPED LAND

SOUTH WINTHROP STREET

27TH AVENUE SOUTH

SOUND TRANSIT PARCEL: 7138800010

APPROXIMATE LOCATIONS OF FILL

SOUND TRANSIT PARCEL: 7138800030

PARKING LOT 2700 SOUTH WINTHROP STREET PARCEL C: 7138800025

VACANT 2723 SOUTH WINTHROP STREET PARCEL: 5058300080

VACANT 2711 SOUTH WINTHROP STREET PARCEL: 5058300100

WORKSHOP 2705 SOUTH WINTHROP STREET PARCEL: 5058300110

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH OIL-BURNING FURNACES

3101 MARTIN LUTHER KING JUNIOR WAY SOUTH

APPROXIMATE LOCATION OF FORMER RED, WHITE, AND BLUE DRY CLEANERS

VACANT PARCEL: 3085002300

CLOTHING WAREHOUSE 3111 27TH AVENUE SOUTH PARCEL: 3085002295

P01 P02 P03 P04 P05 P06 P07 P08 P09 P10 P11 P12 P13 P14 P15 P16 P17 P18

N

0 50 100

APPROXIMATE SCALE IN FEET

## LEGEND

- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SS — SEWER LINE
- SD — STORMDRAIN LINE
- MANHOLE
- CATCH BASIN
- P18 — SOIL BORING
- INFERRED DIRECTION OF GROUNDWATER FLOW
- cPAH — CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
- TEQ — TOXICITY EQUIVALENT QUOTIENT
- **BOLD** — LABORATY REPORTING LIMIT EXCEEDS MTCA METHOD A CLEANUP LEVEL
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT
- UST — UNDERGROUND STORAGE TANK
- bgs — BELOW GROUND SURFACE
- < — NOT DETECTED AT CONCENTRATION EXCEEDING THE LABORATORY REPORTING LIMIT

| Boring ID | Sample ID | Date Sampled | Depth (feet bgs) | Analytical Results (milligrams per kilogram) Arsenic | Cadmium | Chromium | Lead | Mercury | cPAH TEQ |
|---|---|---|---|---|---|---|---|---|---|
| P04 | P04-05 | 10/30/19 | 5 | 3.12 | <1 | 25.6 | 2.93 | <1 | 0.01 |
| P09 | P09-05 | | 5 | 7.13 | <1 | 33.8 | 7.26 | <1 | 0.01 |
| P10 | P10-05 | 10/31/19 | 5 | 5.13 | <1 | 52.1 | 7.47 | <1 | 0.01 |
| P11 | P11-12 | | 12 | 5.59 | <1 | 23.8 | 101 | <1 | **0.38** |
| P12 | P12-05 | | 5 | 3.09 | <1 | 17.0 | 2.46 | <1 | 0.01 |
| P13 | P13-10 | | 10 | 3.55 | <1 | 21.9 | 80.0 | <1 | 0.09 |
| P16 | P16-15 | 11/01/19 | 15 | 5.25 | <1 | 24.6 | 6.56 | <1 | 0.01 |
| P17 | P17-05 | | 5 | 4.86 | <1 | 49.3 | 34.8 | <1 | 0.02 |
| P18 | P18-05 | | 5 | 2.21 | <1 | 13.5 | 4.31 | <1 | 0.04 |
| **MTCA Cleanup Level for Soil** | | | | **20** | **2** | **2,000** | **250** | **2** | **0.1** |

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**FIGURE 4**

SOIL ANALYTICAL RESULTS FOR METALS AND cPAHs

11/19/2019

P:\0987 CITY OF SEATTLE\0987-022 UW LAUNDRY BLDG PROPERTY\TECHNICAL\CAD\2019\2019 PHASE II\0987-022_2019_RES.DWG

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH HEATING OIL USE

SOUND TRANSIT PARCEL: 3085002065

RETAIL/RESTAURANT 2609 SOUTH MCCLELLAN STREET PARCEL: 7138300035

26TH AVENUE SOUTH

PARKING LOT 2600 SOUTH FOREST STREET PARCEL B: 7138300015

PARKING LOT 2620 SOUTH FOREST STREET PARCEL: 7138300005

PAWN SHOP 2825 RAINIER AVENUE SOUTH PARCEL: 7138300090

MARTIN LUTHER KING JUNIOR WAY SOUTH

APPROXIMATE LOCATION OF 4,000-GALLON UST AND FILL PORT

TRANSFORMER

SOUTH FOREST STREET

25TH AVENUE SOUTH

APPROXIMATE LOCATION OF VENT PIPE FOR 4,000-GALLON UST

APPROXIMATE LOCATION OF SUMP

APPROXIMATE LOCATION OF FORMER BOWLING ALLEY

APPROXIMATE LOCATION OF FORMER RESIDENCE

BUILDING 1 FORMER UW LAUNDRY/ FORMER BOWLING ALLEY

27TH AVENUE SOUTH

SOUND TRANSIT PARCEL: 7138800010

RAINIER AVENUE SOUTH

APPROXIMATE LOCATION OF FORMER RESIDENCE WITH OIL-BURNING FURNACES

SOUND TRANSIT SOUTH STEVENS STREET PARCEL: 3085002085

APPROXIMATE LOCATIONS OF FILL

2901 27TH AVENUE SOUTH PARCEL A: 3085002100

BUILDING 2 EVENT CENTER

PARKING

SOUND TRANSIT PARCEL: 7138800030

PARKING LOT 2700 SOUTH WINTHROP STREET PARCEL C: 7138800025

GRAVEL ROAD

VACANT PARCEL: 3085002160

UNDEVELOPED LAND

SOUTH WINTHROP STREET

VACANT 2723 SOUTH WINTHROP STREET PARCEL: 5058300080

VACANT 2711 SOUTH WINTHROP STREET PARCEL: 5058300100

APPROXIMATE LOCATION OF FORMER RESIDENCES WITH OIL-BURNING FURNACES

3101 MARTIN LUTHER KING JUNIOR WAY SOUTH

APPROXIMATE LOCATION OF FORMER RED, WHITE, AND BLUE DRY CLEANERS

VACANT PARCEL: 3085002225

VACANT PARCEL: 3085002300

CLOTHING WAREHOUSE 3111 27TH AVENUE SOUTH PARCEL: 3085002295

WORKSHOP 2705 SOUTH WINTHROP STREET PARCEL: 5058300110

P01 P02 P03 P04 P05 P06 P07 P08 P09 P10 P11 P12 P13 P14 P15 P16 P17 P18

N

0 50 100

APPROXIMATE SCALE IN FEET

## LEGEND

| | |
|---|---|
| | PROPERTY BOUNDARY |
| | PARCEL BOUNDARY |
| SS | SEWER LINE |
| SD | STORMDRAIN LINE |
| | MANHOLE |
| | CATCH BASIN |
| P18 | SOIL BORING |
| | INFERRED DIRECTION OF GROUNDWATER FLOW |
| RED | EXCEEDS MTCA METHOD A CLEANUP LEVEL |
| MTCA | WASHINGTON STATE MODEL TOXICS CONTROL ACT |
| GRPH | GASOLINE-RANGE PETROLEUM HYDROCARBONS |
| DRPH | DIESEL-RANGE PETROLEUM HYDROCARBONS |
| ORPH | OIL-RANGE PETROLEUM HYDROCARBONS |
| TPH | TOTAL PETROLEUM HYDROCARBONS |
| VOC | VOLATILE ORGANIC COMPOUND |
| UST | UNDERGROUND STORAGE TANK |
| ND | NON DETECT |
| -- | NOT ANALYZED |
| < | NOT DETECTED AT CONCENTRATION EXCEEDING THE LABORATORY REPORTING LIMIT |

| Boring ID | Date Sampled | Analytical Results (micrograms per liter) GRPH | DRPH | ORPH | VOCs |
|---|---|---|---|---|---|
| P01 | 10/30/19 | -- | -- | -- | ND |
| P02 | | -- | -- | -- | ND |
| P03 | | -- | -- | -- | ND |
| P11 | 10/31/19 | -- | 190 | <250 | ND |
| P12 | | -- | -- | -- | ND |
| P13 | | -- | **910** | **520** | ND |
| P14 | 11/01/19 | <100 | 480 | <250 | ND |
| P16 | | <100 | **1,800** | 290 | ND |
| MTCA Cleanup Level | | 1,000 | 500 | 500 | varies |

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**FIGURE 5**

RECONNAISSANCE GROUNDWATER ANALYTICAL RESULTS FOR TPH AND VOCs

# TABLES

**Table 1**
**Soil Analytical Results for Chlorinated VOCs**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Sampled By | Date Sampled | Depth (feet bgs) | Analytical Results[1] (milligrams per kilogram) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Tetrachloroethene | Trichloroethene | Cis-1,2-Dichloroethene | Trans-1,2-Dichloroethene | 1,1-Dichloroethene | Vinyl Chloride |
| P01 | P01-10 | SoundEarth | 10/30/19 | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P01-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P02 | P02-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P02-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P03 | P03-13 | | | 13 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P03-16 | | | 16 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P04 | P04-12 | | | 12 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P04-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P05 | P05-09 | | 10/31/19 | 9 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P05-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P06 | P06-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P06-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P07 | P07-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P07-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P08 | P08-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P08-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P11 | P11-12 | | | 12 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P12 | P12-10 | | 11/01/19 | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P12-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P13 | P13-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P13-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P14 | P14-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P14-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| P16 | P16-10 | | | 10 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P16-15 | | | 15 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| | P16-20 | | | 20 | <0.025 | <0.02 | <0.05 | <0.05 | <0.05 | <0.05 |
| **MTCA Cleanup Level for Soil** | | | | | **0.05**[2] | **0.03**[2] | **160**[3] | **1,600**[3] | **4,000**[3] | **0.67**[4] |

NOTES:

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Samples analyzed by EPA Method 8260C.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, Unrestricted Land Uses, revised November 2007.

[3]MTCA Cleanup Regulation, Chapter 173-340 of WAC, CLARC, Soil, Method B, Noncancer, Direct Contact, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

[4]MTCA Cleanup Regulation, Chapter 173-340 of WAC, CLARC, Soil, Method B, Cancer, Direct Contact, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = not detected at a concentration exceeding the laboratory reporting limit
bgs = below ground surface
CLARC = Cleanup Levels and Risk Calculations
EPA = US Environmental Protection Agency
MTCA = Washington State Model Toxics Control Act
SoundEarth = SoundEarth Strategies, Inc.
VOC = volatile organic compound
WAC = Washington Administrative Code

**Table 2**
**Soil Analytical Results for TPH and BTEX**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Sampled By | Date Sampled | Depth (feet bgs) | Analytical Results (milligrams per kilogram) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | GRPH[1] | DRPH[2] | ORPH[2] | Benzene[3] | Toluene[3] | Ethylbenzene[3] | Total Xylenes[3] |
| P11 | P11-12 | SoundEarth | 10/31/19 | 10 | -- | <50 | 510 | -- | -- | -- | -- |
| | P11-15 | | | 15 | -- | <50 | <250 | -- | -- | -- | -- |
| P13 | P13-10 | | 11/01/19 | 10 | -- | 840 | **3,700** | -- | -- | -- | -- |
| | P13-15 | | | 15 | -- | <50 | <250 | -- | -- | -- | -- |
| P14 | P14-10 | | | 10 | <5 | <50 | 480 | <0.02 | <0.02 | <0.02 | <0.06 |
| | P14-15 | | | 15 | <5 | <50 | <250 | <0.02 | <0.02 | <0.02 | <0.06 |
| P15 | P15-10 | | | 10 | <5 | <50 | <250 | <0.02 | <0.02 | <0.02 | <0.06 |
| | P15-15 | | | 15 | <5 | <50 | <250 | <0.02 | <0.02 | <0.02 | <0.06 |
| P16 | P16-15 | | | 15 | <5 | 660 | <250 | <0.02 | <0.02 | <0.02 | <0.06 |
| | P16-20 | | | 20 | <5 | <50 | <250 | <0.02 | <0.02 | <0.02 | <0.06 |
| **MTCA Cleanup Level for Soil[4]** | | | | | **100** | **2,000** | **2,000** | **0.03** | **7** | **6** | **9** |

NOTES:

**Red** denotes concentration exceeds MTCA cleanup level for soil.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analyzed by Method NWTPH-Gx.

[2]Analyzed by Method NWTPH-Dx.

[3]Analyzed by EPA Method 8021B.

[4]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, Unrestricted Land Uses, revised November 2007.

-- = no data

< = not detected at a concentration exceeding the laboratory reporting limit

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and total xylenes

DRPH = diesel-range petroleum hydrocarbons

EPA = US Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

SoundEarth = SoundEarth Strategies, Inc.

TPH = total petroleum hydrocarbons

WAC = Washington Administrative Code

**Table 3**
**Soil Analytical Results for MTCA 5 Metals**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Date Sampled | Depth (feet bgs) | Analytical Results[1] (milligrams per kilogram) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Arsenic | Cadmium | Chromium | Lead | Mercury |
| P04 | P04-05 | 10/30/19 | 5 | 3.12 | <1 | 25.6 | 2.93 | <1 |
| P09 | P09-05 | 10/31/19 | 5 | 7.13 | <1 | 33.8 | 7.26 | <1 |
| P10 | P10-05 | | 5 | 5.13 | <1 | 52.1 | 7.47 | <1 |
| P11 | P11-12 | | 12 | 5.59 | <1 | 23.8 | 101 | <1 |
| P12 | P12-05 | 11/01/19 | 5 | 3.09 | <1 | 17.0 | 2.46 | <1 |
| P13 | P13-10 | | 10 | 3.55 | <1 | 21.9 | 80.0 | <1 |
| P16 | P16-15 | | 15 | 5.25 | <1 | 24.6 | 6.56 | <1 |
| P17 | P17-05 | | 5 | 4.86 | <1 | 49.3 | 34.8 | <1 |
| P18 | P18-05 | | 5 | 2.21 | <1 | 13.5 | 4.31 | <1 |
| **MTCA Cleanup Level for Soil** | | | | **20**[2] | **2**[2] | **2,000**[2] | **250**[2] | **2**[2] |

NOTES:

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Samples analyzed by EPA Method 6020B.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, Unrestricted Land Uses, revised November 2007.

< = not detected at a concentration exceeding the laboratory reporting limit

bgs = below ground surface

EPA = US Environmental Protection Agency

MTCA = Washington State Model Toxics Control Act

WAC = Washington Administrative Code

**Table 4**
**Soil Analytical Results for cPAHs**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Date Sampled | cPAHs Toxicity Equivalency[1] (milligrams per kilogram) | | | | | | | | | | | | TEQ[1] (milligrams per kilogram) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Benzo(a)-anthracene TEF: 0.1 | | Chrysene TEF: 0.01 | | Benzo(a)pyrene TEF: 1 | | Benzo(b)-fluoranthene TEF: 0.1 | | Benzo(k)-fluoranthene TEF: 0.1 | | Indeno(1,2,3-cd)-pyrene TEF: 0.1 | | Dibenz(a,h)-anthracene TEF: 0.1 | | |
| P04 | P04-05 | 10/30/19 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | 0.01 |
| P09 | P09-05 | 10/31/19 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | 0.01 |
| P10 | P10-05 | | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | 0.01 |
| P11 | P11-12[d] | | < | 0.5 | < | 0.5 | **<** | **0.5** | < | 0.5 | < | 0.5 | < | 0.5 | < | 0.5 | **0.38** |
| P12 | P12-05 | 11/01/19 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | 0.01 |
| P13 | P13-10 | | | 0.097 | | 0.47 | | 0.052[J] | | 0.11[J] | | 0.085[J] | < | 0.05[J] | < | 0.05[J] | 0.09 |
| P16 | P16-15 | | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | < | 0.01 | 0.01 |
| P17 | P17-05 | | | 0.013 | | 0.015 | | 0.012 | | 0.016 | < | 0.01 | < | 0.01 | < | 0.01 | 0.02 |
| P18 | P18-05 | | < | 0.05 | | 0.18 | < | 0.05[J] | | 0.052[J] | < | 0.05[J] | < | 0.05[J] | < | 0.05[J] | 0.04 |
| **MTCA Cleanup Level for Soil** | | | **NE** | | **NE** | | **0.1**[2] | | **NE** | | **NE** | | **NE** | | **NE** | | **0.1**[2] |

NOTES:

**Bold** denotes reporting limit exceeds MTCA cleanup level for soil.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

Samples analyzed by GC/MS-SIM or EPA Method 8270D.

[1]Analytical result for each individual cPAH is multiplied by the TEF and all seven cPAH values are added. When analytical results are reported as less than the LRL, one-half of the LRL is multiplied by the TEF to calculate the TEQ.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, Unrestricted Land Uses, revised November 2007.

Laboratory Notes:

[d]The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

[J]The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

< = not detected at a concentration exceeding the laboratory reporting limit

cPAH = carcinogenic polycyclic aromatic hydrocarbon

EPA = US Environmental Protection Agency

LRL = laboratory reporting limit

MTCA = Washington State Model Toxics Control Act

NE = not established

TEF = toxicity equivalency factor

TEQ = toxicity equivalent

WAC = Washington Administrative Code

**Table 5**
**Groundwater Analytical Results for Chlorinated VOCs**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Sampled By | Date Sampled | Analytical Results[1] (micrograms per liter) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Tetrachloroethene | Trichloroethene | Cis-1,2-Dichloroethene | Trans-1,2-Dichloroethene | 1,1-Dichloroethene | Vinyl Chloride |
| P01 | P01-20191030 | SoundEarth | 10/30/19 | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P02 | P02-20191030 | | | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P03 | P03-20191030 | | | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P11 | P11-20191031 | | 10/31/19 | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P12 | P12-20191101 | | 11/01/19 | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P13 | P13-20191101 | | | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P14 | P14-20191101 | | | <1 | <1 | <1 | <1 | <1 | <0.2 |
| P16 | P16-20191101 | | | <1 | <1 | <1 | <1 | <1 | <0.2 |
| **MTCA Cleanup Level for Groundwater** | | | | **5**[2] | **5**[2] | **16**[3] | **160**[3] | **400**[3] | **0.2**[2] |

NOTES:

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Samples analyzed by EPA Method 8260C.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

[3]MTCA Cleanup Regulation, Chapter 173-340 of WAC, CLARC, Groundwater, Method B Standard Formula, Non cancer, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = not detected at a concentration exceeding the laboratory reporting limit

CLARC = Cleanup Levels and Risk Calculations

EPA = US Environmental Protection Agency

MTCA = Washington State Model Toxics Control Act

SoundEarth = SoundEarth Strategies, Inc.

VOC = volatile organic compound

WAC = Washington Administrative Code

**Table 6**
**Groundwater Analytical Results for TPH and BTEX**
**UW Laundry Property**
**2901 27th Avenue South**
**Seattle, Washington**

| Boring ID | Sample ID | Sampled By | Date Sampled | Analytical Results (micrograms per liter) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GRPH[1] | DRPH[2] | ORPH[2] | Benzene[3] | Toluene[3] | Ethylbenzene[3] | Total Xylenes[3] |
| P11 | P11-20191031 | SoundEarth | 10/31/19 | -- | 190[x] | <250 | -- | -- | -- | -- |
| P13 | P13-20191101 | | 11/01/19 | -- | **910** | **520** | -- | -- | -- | -- |
| P14 | P14-20191101 | | | <100 | 480[x] | <250 | <1 | <1 | <1 | <3 |
| P16 | P16-20191101 | | | <100 | **1,800**[x] | 290[x] | <1 | <1 | <1 | <3 |
| **MTCA Cleanup Level for Groundwater[4]** | | | | **1,000** | **500** | **500** | **5** | **1,000** | **700** | **1,000** |

NOTES:

**Red** denotes concentration exceeds MTCA cleanup level for groundwater.

Sample analyses conducted by Friedman & Bruya, Inc. of Seattle, Washington.

[1]Analyzed by Method NWTPH-Gx.

[2]Analyzed by Method NWTPH-Dx.

[3]Analyzed by EPA Method 8021B.

[4]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

Laboratory Note:

[x]The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

-- = no data

< = not detected at a concentration exceeding the laboratory reporting limit

BTEX = benzene, toluene, ethylbenzene, and total xylenes

DRPH = diesel-range petroleum hydrocarbons

EPA = US Environmental Protection Agency

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

SoundEarth = SoundEarth Strategies, Inc.

TPH = total petroleum hydrocarbons

WAC = Washington Administrative Code

# ATTACHMENT A
# BORING LOGS

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/30/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 9' S of Building 1 SE corner |
| **Location E/W:** | 43' W of Building 1 SE corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/30/19 |

# BORING LOG | P01

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 13 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 50 | 0.0 | | | SM | | **0.0-0.4 feet bgs: 3 inches of asphalt at surface.** **0.4-5.0 feet bgs: Silty SAND with gravel, brown, no hydrocarbon or solvent odor, moist, fill (20-60-20).** | |
| 5 | | | 50 | 0.0 | P01-05 | | SP | | **5.0-10.0 feet bgs: Poorly graded, medium SAND with gravel, trace silt, brown, no hydrocarbon or solvent odor, moist, fill (5-80-15).** | |
| 10 | | | 75 | 0.0 | P01-10 | X | SP | | **10.0-12.0 feet bgs: Poorly graded, medium SAND with gravel, trace silt, brown, no hydrocarbon or solvent odor, moist (5-55-40).** | |
| 15 | | | 15 | 0.0 | P01-15 | X | ML | | **12.0-15.0 feet bgs: SILT with sand, gray, no hydrocarbon or solvent odor, moist (90-10-0).** | |
| 20 | | | | 0.0 | | | GP | | **15.0-20.0 feet bgs: Poorly graded GRAVEL with sand, gray/brown, no hydrocarbon or solvent odor, wet (0-10-90).** **Boring terminated at 20 feet bgs. Collect reconnaissance groundwater sample P01-20191030. Boring backfilled with bentonite.** | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

bgs = below ground surface

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/30/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 24' S of Building 1 south wall |
| **Location E/W:** | 22' W of Building 2 NW corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/30/19 |

# BORING LOG | P02

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 15 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of concrete at surface.** | |
| | | | | | | | ML | | **0.5-5.0 feet bgs: Sandy SILT, brown, no hydrocarbon or solvent odor, moist (70-30-0).** | |
| | | | 90 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P02-05 | | SM | | **5.0-8.0 feet bgs: Silty fine SAND, trace fine gravel, brown, no hydrocarbon or solvent odor, moist (35-60-5).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **8.0-15.0 feet bgs: Sandy SILT, trace gravel, gray, no hydrocarbon or solvent odor, moist (65-30-5).** | |
| 10 | | | | 0.0 | P02-10 | X | | | | |
| | | | 100 | 0.0 | | | | | | |
| 15 | | | | 0.0 | P02-15 | X | SP | | **15.0-16.5 feet bgs: Poorly graded, medium SAND with silt, gray, no hydrocarbon or solvent odor, wet (10-90-0).** | ▽ |
| | | | | | | | ML | | **16.5-20.0 feet bgs: SILT, trace fine sand and gravel, gray, no hydrocarbon or solvent odor, moist (90-5-5).** | |
| | | | 100 | 0.0 | | | | | | |
| 20 | | | | 0.0 | P02-20 | | | | **Boring terminated at 20 feet bgs. Collect reconnaissance groundwater sample P02-20191030. Boring backfilled with bentonite.** | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

bgs = below ground surface

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/30/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 5.5' S of Building 1 south wall |
| **Location E/W:** | 15' E of retaining wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/30/19 |

# BORING LOG | P03

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** 18.5 feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.4 feet bgs: 3 inches of asphalt at surface.** | |
| | | | | | | | ML | | **0.4-5.0 feet bgs: Sandy SILT with fine gravel, gray, no hydrocarbon or solvent odor, moist (55-35-10).** | |
| | | | 100 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P03-05 | | ML | | **5.0-10.0 feet bgs: Sandy SILT with fine gravel, gray, no hydrocarbon or solvent odor, moist (75-15-10).** | |
| | | | 100 | 0.0 | | | | | | |
| 10 | | | | 0.0 | P03-10 | | ML | | **10.0-13.0 feet bgs: Sandy SILT with fine gravel, gray, no hydrocarbon or solvent odor, moist (65-25-10).** | |
| | | | 166 | | | | | | | |
| | | | | 0.0 | P03-13 | X | ML | | **13.0-19.0 feet bgs: Sandy SILT, trace gravel, gray, no hydrocarbon or solvent odor, wet at 18.5 feet bgs (70-25-5).** | |
| | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| 15 | | | | 0.0 | | | | | | |
| | | | | | P03-16 | X | | | | |
| | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| | | | | 0.0 | P03-19 | | | | **Refusal at 19 feet bgs. Collect reconnaissance groundwater sample P03-20191030. Boring backfilled with bentonite.** | ▽ |
| 20 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** | |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** | |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | | |
| **Total Boring Depth:** | 19 | feet bgs | **Surface Seal:** | -- | | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/30/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 103' S of Building 1 south wall |
| **Location E/W:** | 15.5' E of retaining wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/30/19 |

# BORING LOG | P04

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.4 feet bgs: 3 inches of asphalt at surface.** | |
| | | | 100 | 0.0 | | | SM | | **0.4-5.0 feet bgs: Silty SAND with gravel, gray, no hydrocarbon or solvent odor, moist (30-60-10).** | |
| 5 | | | | 0.0 | P04-05 | X | ML | | **5.0-9.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist (45-15-40).** | |
| | | | 125 | 0.0 | | | | | | |
| | | | | 0.0 | P04-09 | | ML | | **9.0-12.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist (60-15-25).** | |
| 10 | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| | | | | 0.0 | P04-12 | X | ML | | **12.0-15.0 feet bgs: Sandy SILT, trace gravel, gray, no hydrocarbon or solvent odor, moist (70-25-5).** | |
| | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| 15 | | | | 0.0 | P04-15 | X | ML | | **15.0-20.0 feet bgs: SILT with sand, trace gravel, gray, no hydrocarbon or solvent odor, moist (85-10-5).** | |
| | | | 166 | | | | | | | |
| | | | | | P04-18 | | | | | |
| | | | 100 | | | | | | **Refusal at 20 feet bgs. Boring backfilled with bentonite.** | |
| 20 | | | | 0.0 | P04-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

bgs = below ground surface

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 86' S of Building 1 central south wall |
| **Location E/W:** | 23' E of Building 2 west wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P05

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of concrete at surface.** | |
| | | | | | | | ML | | **0.5-3.0 feet bgs: Sandy SILT, trace fine gravel, brown, no hydrocarbon or solvent odor, moist (60-35-5).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **3.0-9.0 feet bgs: Sandy SILT, trace fine gravel, gray, no hydrocarbon or solvent odor, moist (75-20-5).** | |
| 5 | | | | 0.0 | P05-05 | | | | | |
| | | | 125 | | | | | | | |
| | | | | 0.0 | | | | | | |
| | | | | 0.0 | P05-09 | X | | | | |
| | | | | | | | ML | | **9.0-12.0 feet bgs: Sandy SILT, trace fine gravel, gray, no hydrocarbon or solvent odor, moist (65-30-5).** | |
| 10 | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| | | | | 0.0 | P05-12 | | | | | |
| | | | | | | | ML | | **12.0-15.0 feet bgs: Sandy SILT, trace fine gravel, gray, no hydrocarbon or solvent odor, moist (70-25-5).** | |
| | | | | 0.0 | | | | | | |
| | | | 166 | | | | | | | |
| 15 | | | | 0.0 | P05-15 | X | | | | |
| | | | | | | | ML | | **15.0-18.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist (50-35-15).** | |
| | | | 166 | | | | | | | |
| | | | | | P05-18 | | | | | |
| | | | | | | | ML | | **18.0-20.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist (70-20-10).** | |
| | | | 100 | | | | | | **Refusal at 20 feet bgs. Boring backfilled with bentonite.** | |
| 20 | | | | | P05-20 | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 6' S of Building 1 NW corner |
| **Location E/W:** | 12' W of Building 1 NW corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P06

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | GP | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | | | **0.5-1.0 feet bgs: 1/2-inch-diameter GRAVEL (fill).** | |
| | | | | | | | SP-SM | | **1.0-5.0 feet bgs: Fine to medium SAND with silt and fine gravel, brown, no hydrocarbon or solvent odor, moist, fill (10-70-20).** | |
| | | | 60 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P06-05 | | ML | | **5.0-8.0 feet bgs: Sandy SILT, trace fine gravel, brown, no hydrocarbon or solvent odor, moist (55-40-5).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **8.0-10.0 feet bgs: Sandy SILT, trace fine gravel, gray, no hydrocarbon or solvent odor, moist (75-20-5).** | |
| 10 | | | | 0.0 | P06-10 | X | ML | | **10.0-15.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (80-20-0).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | 0.0 | P06-15 | X | | | | |
| 15 | | | | | | | | | **Boring terminated at 15 feet bgs. Boring backfilled with bentonite.** | |
| 20 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** | |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** | |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | | |
| **Total Boring Depth:** | 15 | feet bgs | **Surface Seal:** | -- | | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 114' S of Building 1 NW corner |
| **Location E/W:** | 12' W of Building 1 NW corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P07

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | GP | | **0.5-1.0 feet bgs: 1/2-inch-diameter GRAVEL (fill).** | |
| | | | | | | | ML | | **1.0-5.0 feet bgs: Sandy SILT with gravel, brown, no hydrocarbon or solvent odor, moist (55-30-15).** | |
| | | | 50 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P07-05 | | ML | | **5.0-13.0 feet bgs: Fine to coarse sandy SILT with gravel, brown, no hydrocarbon or solvent odor, moist (55-30-15).** | |
| | | | 100 | 0.0 | | | | | | |
| 10 | | | | 0.0 | P07-10 | X | | | | |
| | | | 100 | 0.0 | | | | | | |
| | | | | 0.0 | P07-15 | X | ML | | **13.0-15.0 feet bgs: Sandy SILT with fine gravel, brown, no hydrocarbon or solvent odor, moist (70-20-10).** | |
| 15 | | | | | | | | | **Boring terminated at 15 feet bgs. Boring backfilled with bentonite.** | |
| 20 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** | |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** | |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | | |
| **Total Boring Depth:** | 15 | feet bgs | **Surface Seal:** | -- | | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 31' N of Building 1 SW corner |
| **Location E/W:** | 12.5' W of Building 1 SW corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P08

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | SM | | **0.5-1.0 feet bgs: Silty SAND with gravel, brown, no hydrocarbon or solvent odor, moist, fill (25-40-35).** | |
| | | | | | | | ML | | **1.0-5.0 feet bgs: Sandy SILT with fine gravel, gray, no hydrocarbon or solvent odor, moist (55-35-10).** | |
| | | | 60 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P08-05 | | ML | | **5.0-13.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (60-40-0).** | |
| | | | 100 | 0.0 | | | | | | |
| 10 | | | | 0.0 | P08-10 | X | | | | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **13.0-15.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (75-25-0).** | |
| | | | | 0.0 | P08-15 | X | | | | |
| 15 | | | | | | | | | **Boring terminated at 15 feet bgs. Boring backfilled with bentonite.** | |
| 20 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | |
| **Total Boring Depth:** | 15 | feet bgs | **Surface Seal:** | -- | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 41' N of south parking lot curb |
| **Location E/W:** | 13.5' E of west parking lot curb |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P09

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 20 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | SP | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | ML | | **0.5-1.0 feet bgs: SAND with gravel, trace silt, brown, no hydrocarbon or solvent odor, moist, fill (5-60-35).** | |
| | | | 100 | 0.0 | | | | | **1.0-5.0 feet bgs: Sandy SILT with gravel, gray/brown, no hydrocarbon or solvent odor, moist (60-30-10).** | |
| 5 | | | | 0.0 | P09-05 | X | ML | | **5.0-13.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor (65-25-10).** | |
| | | | 70 | 0.0 | | | | | | |
| 10 | | | | 0.0 | P09-10 | | | | | |
| | | | 60 | 0.0 | | | | | | |
| | | | | | | | ML | | **13.0-15.0 feet bgs: SILT, trace sand, brown, no hydrocarbon or solvent odor, moist (95-5-0).** | |
| 15 | | | | 0.0 | P09-15 | | ML | | **15.0-19.0 feet bgs: Sandy SILT, gray/brown, no hydrocarbon or solvent odor, moist (80-20-0).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | 0.0 | P09-20 | | ML | | **19.0-20.0 feet bgs: Sandy SILT, gray/brown, no hydrocarbon or solvent odor, wet (60-40-0).** | ▽ |
| 20 | | | | | | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P09-20191031 collected. Boring backfilled with bentonite.** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 90' N of SE light post |
| **Location E/W:** | 43' W of east curb |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P10

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 10.7 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | GP | | **0.5-1.0 feet bgs: 1/2-inch-diameter GRAVEL (fill).** | |
| | | | | | | | ML | | **1.0-5.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (65-35-0).** | |
| | | | 60 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P10-05 | X | ML | | **5.0-8.0 feet bgs: Sandy SILT, trace gravel, gray, no hydrocarbon or solvent odor, moist (65-30-5).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **8.0-11.5 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist to wet at 10.7 feet bgs (75-25-0).** | |
| 10 | | | | 0.0 | P10-10 | | | | | ▽ |
| | | | | | | | ML | | **11.5-13.0 feet bgs: Sandy SILT with organics, brown, no hydrocarbon or solvent odor, moist (70-30-0).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **13.0-15.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (80-20-0).** | |
| 15 | | | | 0.0 | P10-15 | | ML | | **15.0-20.0 feet bgs: SILT with sand, gray, no hydrocarbon or solvent odor, wet (90-10-0).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P10-20191031 collected. Boring backfilled with bentonite.** | |
| 20 | | | | 0.0 | P10-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 10/31/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 4.5' N of south curb |
| **Location E/W:** | 23' W of SE parking lot corner |
| **Reviewed by:** | CJT |
| **Date Completed:** | 10/31/19 |

# BORING LOG | P11

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 11.4 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | ML | | **0.5-5.0 feet bgs: Sandy SILT with gravel, gray/brown, no hydrocarbon or solvent odor, moist (70-20-10).** | |
| | | | 90 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P11-05 | | ML | | **5.0-11.5 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist to wet at 11.4 feet bgs (65-20-15).** | |
| | | | 100 | 0.0 | | | | | | |
| 10 | | | | 0.1 | P11-10 | | | | | |
| | | | | | P11-12 | X | ML | | **11.5-12.5 feet bgs: Sandy SILT with gravel, organics and brick fragments, black/brown, no hydrocarbon or solvent odor, moist (50-35-15).** | |
| | | | 100 | 0.6 | | | ML | | **12.5-15.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, moist (70-30-0).** | |
| 15 | | | | 0.0 | P11-15 | | SM | | **15.0-16.5 feet bgs: Silty SAND, gray, no hydrocarbon or solvent odor, wet (35-65-0).** | |
| | | | | | | | ML | | **16.5-20.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, wet (65-35-0).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P11-20191031 collected. Boring backfilled with bentonite.** | |
| 20 | | | | 0.0 | P11-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 48' S of Building 1 entrance |
| **Location E/W:** | 27' W of Building 1 east wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P12

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** 12.0 feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | ML | | **0.5-1.0 feet bgs: 1/2-inch-diameter gravel.** | |
| | | | | | | | SM | | **1.0-13.0 feet bgs: Silty, fine to medium SAND with fine gravel, brown, no hydrocarbon or solvent odor, moist (15-75-10).** | |
| | | | 70 | 0.0 | | | | | | |
| 5 | | | | 0.0 | P12-05 | X | | | | |
| | | | 60 | 0.0 | | | | | | |
| 10 | | | | 0.0 | P12-10 | X | | | | |
| | | | 50 | 0.0 | | | | | | |
| | | | | | | | SM | | **13.0-15.0 feet bgs: Silty, fine SAND with gravel, brown/copper, no hydrocarbon or solvent odor, moist (30-40-30).** | |
| 15 | | | | 0.0 | P12-15 | X | SM | | **15.0-17.0 feet bgs: Silty, fine to medium SAND with gravel, gray, no hydrocarbon or solvent odor, moist (30-45-25).** | |
| | | | 100 | 0.0 | | | ML | | **17.0-20.0 feet bgs: Sandy SILT, gray, no hydrocarbon or solvent odor, wet (85-15-0).** | |
| 20 | | | | 0.0 | P12-20 | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P12-20191101 collected. Boring backfilled with bentonite.** | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 17' N of Building 1 north wall |
| **Location E/W:** | 0' E of Building 1 east wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P13

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** 12.7 feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.4 feet bgs: 4 inches of concrete at surface.** | |
| | | | | | | | SM | | **0.4-3.0 feet bgs: Silty SAND with gravel, gray, no hydrocarbon or solvent odor, moist (25-40-35).** | |
| | | | 80 | 0.0 | | | | | | |
| | | | | | | | ML | | **3.0-6.0 feet bgs: SILT with fine to coarse sand and gravel, gray, no hydrocarbon or solvent odor, moist (80-10-10).** | |
| 5 | | | | 0.0 | P13-05 | | | | | |
| | | | | | | | SM | | **6.0-8.0 feet bgs: Silty SAND with gravel, gray, no hydrocarbon or solvent odor, moist (30-40-30).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | ML | | **8.0-10.0 feet bgs: Sandy SILT with gravel, wood and brick debris, black/gray, faint sweet odor, moist, fill (50-30-20).** | |
| 10 | | | | 1.2 | P13-10 | X | SM | | **10.0-12.0 feet bgs: Silty SAND with gravel, gray/brown, no hydrocarbon or solvent odor, wet (30-45-25).** | |
| | | | | 0.0 | | | | | | |
| | | | | | | | ML | | **12.0-15.0 feet bgs: Sandy SILT, trace gravel, brown, no hydrocarbon or solvent odor, moist (75-20-5).** | ▽ |
| | | | 100 | 0.0 | | | | | | |
| | | | | 0.0 | P13-15 | X | | | | |
| 15 | | | | | | | | | **Boring terminated at 15 feet bgs. Reconnaissance groundwater sample P13-20191101 collected. Boring backfilled with bentonite.** | |
| 20 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** | |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | bgs = below ground surface | |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | | |
| **Total Boring Depth:** | 15 | feet bgs | **Surface Seal:** | -- | | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 10' N of container wall |
| **Location E/W:** | 20.5' W of Building 1 west wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P14

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 13.5 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 5 inches of concrete at surface.** | |
| | | | 20 | | | | SM | | **0.5-5.0 feet bgs: Silty SAND with gravel, brown, no hydrocarbon or solvent odor, moist, fill (20-60-20).** | |
| 5 | | | | 0.0 | P14-05 | | GP | | **5.0-9.0 feet bgs: 1/4-inch-diameter GRAVEL, no hydrocarbon or solvent odor, moist, fill (0-0-100).** | |
| | | | 30 | | | | | | | |
| | | | | | | | SM | | **9.0-10.0 feet bgs: Silty SAND with gravel, brown, no hydrocarbon or solvent odor, moist, fill (20-60-20).** | |
| 10 | | | | 0.0 | P14-10 | X | GP | | **10.0-13.5 feet bgs: 1/4-inch-diameter GRAVEL, no hydrocarbon or solvent odor, moist, fill (0-0-100).** | |
| | | | 100 | 0.0 | | | | | | |
| | | | | | | | SM | | **13.5-15.0 feet bgs: Silty SAND with gravel, gray, no hydrocarbon or solvent odor, wet (20-60-20).** | ▽ |
| 15 | | | | 0.2 | P14-15 | X | ML | | **15.0-20.0 feet bgs: Sandy SILT with fine gravel, brown, no hydrocarbon or solvent odor, wet (70-20-10).** | |
| | | | 30 | | | | | | | |
| | | | | | | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P14-20191101 collected. Boring backfilled with bentonite.** | |
| 20 | | | | 0.0 | P14-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 15" N of container wall |
| **Location E/W:** | 18' E of Building 1 loading dock |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P15

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 9.5 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of concrete at surface.** | |
| | | | 40 | 0.0 | | | SM | | **0.5-5.0 feet bgs: Silty, fine to medium SAND with gravel, brown, no hydrocarbon or solvent odor, moist (20-45-35).** | |
| 5 | | | | 0.0 | P15-05 | | SM | | **5.0-13.5 feet bgs: Silty, fine to medium SAND with gravel, brown, no hydrocarbon or solvent odor, moist to wet at 9.5 feet bgs (15-70-15).** | |
| | | | 60 | | | | | | | |
| 10 | | | | 0.0 | P15-10 | X | | | | ▽ |
| | | | 100 | | | | ML | | **13.5-15.0 feet bgs: SILT with fine to coarse sand and rootlets, gray, no hydrocarbon or solvent odor, wet (90-10-0).** | |
| 15 | | | | | P15-15 | X | SM | | **15.0-18.0 feet bgs: Silty, fine to coarse SAND, brown, no hydrocarbon or solvent odor, wet (30-70-0).** | |
| | | | 100 | 0.0 | | | ML | | **18.0-20.0 feet bgs: SILT with sand, trace fine gravel and rootlets, gray, no hydrocarbon or solvent odor, wet (85-10-5).** | |
| 20 | | | | 0.0 | P15-20 | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P15-20191101 collected. Boring backfilled with bentonite.** | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

bgs = below ground surface

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Concrete |
| **Location N/S:** | 22.5' N of north container wall |
| **Location E/W:** | 20.5' W of west loading dock wall |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG P16

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling:** 11 feet bgs

**Water Depth After Completion:** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of concrete at surface.** | |
| | | | 60 | 0.0 | | | SM | | **0.5-5.0 feet bgs: Silty, fine to medium SAND with gravel, brown, no hydrocarbon or solvent odor, moist, fill (20-50-30).** | |
| 5 | | | | 0.0 | P16-05 | | GP | | **5.0-6.0 feet bgs: 1/4-inch-diameter GRAVEL, no hydrocarbon or solvent odor, moist, fill (0-0-100).** | |
| | | | 40 | 0.0 | | | SM | | **6.0-10.0 feet bgs: Silty, fine to medium SAND with fine gravel and wood fragments, brown, no hydrocarbon or solvent odor, moist, fill (20-70-10).** | |
| 10 | | | | 0.0 | P16-10 | X | SM | | **10.0-15.0 feet bgs: Silty, fine SAND with gravel, wood debris, gray, faint sweet odor, wet at 11 feet bgs, fill (20-70-10).** | ▽ |
| | | | 60 | | | | | | | |
| 15 | | | | 6.1 | P16-15 | X | SM | | **15.0-17.5 feet bgs: Silty, fine to medium SAND with gravel and wood fragments, gray, no hydrocarbon or solvent odor, wet, fill (20-45-35).** | |
| | | | 100 | 0.1 | | | ML | | **17.5-20.0 feet bgs: Sandy SILT, brown, no hydrocarbon or solvent odor, moist (85-15-0).** | |
| 20 | | | | 0.0 | P16-20 | X | | | | |
| | | | | | | | | | **Boring terminated at 20 feet bgs. Reconnaissance groundwater sample P16-20191101 collected. Boring backfilled with bentonite.** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** | |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | bgs = below ground surface | |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | | |
| **Total Boring Depth:** | 20 | feet bgs | **Surface Seal:** | -- | | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 17' S of parking lot north boundary |
| **Location E/W:** | 18' W of parking lot east boundary |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P17

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | 90 | 0.0 | | | SM | | **0.5-7.0 feet bgs: Silty, fine SAND with gravel, brown, no hydrocarbon or solvent odor, moist (35-55-10).** | |
| 5 | | | | 0.0 | P17-05 | X | | | | |
| | | | 100 | 0.0 | | | SM | | **7.0-12.0 feet bgs: Silty, fine SAND with fine gravel and rootlets, brown, no hydrocarbon or solvent odor, moist (15-70-15).** | |
| 10 | | | | 0.0 | P17-10 | | | | | |
| | | | 100 | 0.0 | | | ML | | **12.0-17.5 feet bgs: Sandy SILT with fine gravel and rootlets, gray/brown, no hydrocarbon or solvent odor, moist (70-20-10).** | |
| 15 | | | | 0.0 | P17-15 | | | | | |
| | | | 100 | 0.0 | | | ML | | **17.5-20.0 feet bgs: SILT with sand and rootlets, gray, no hydrocarbon or solvent odor, moist (90-10-0).** | |
| 20 | | | | 0.0 | P17-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 25 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 17' S of parking lot north boundary |
| **Location E/W:** | 18' W of parking lot east boundary |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P17

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 100 | 0.0 | | | CL | | **20.0-25.0 feet bgs: CLAY, blue/gray, no hydrocarbon or solvent odor, moist (100-0-0).** | |
| 25 | | | | 0.0 | P17-25 | | | | **Boring terminated at 25 feet bgs. Boring backfilled with bentonite.** | |
| 30 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 40 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | |
| **Total Boring Depth:** | 25 | feet bgs | **Surface Seal:** | -- | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | |

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 22' N of parking lot south boundary |
| **Location E/W:** | 28' E of parking lot west boundary |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P18

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | **0.0-0.5 feet bgs: 6 inches of asphalt at surface.** | |
| | | | | | | | ML | | **0.5-7.0 feet bgs: Sandy SILT with gravel, gray, no hydrocarbon or solvent odor, moist (70-15-15).** | |
| | | | 10 | | | | | | | |
| 5 | | | | 0.0 | P18-05 | X | | | | |
| | | | 100 | 0.1 | | | ML | | **7.0-12.5 feet bgs: Sandy SILT with gravel, brown, no hydrocarbon or solvent odor, moist (65-20-15).** | |
| 10 | | | | 0.0 | P18-10 | | | | | |
| | | | 100 | 0.0 | | | ML | | **12.5-17.0 feet bgs: Sandy SILT, brown, no hydrocarbon or solvent odor, moist (70-30-0).** | |
| 15 | | | | 0.0 | P18-15 | | | | | |
| | | | 100 | 0.0 | | | ML | | **17.0-20.0 feet bgs: Sandy SILT, brown, no hydrocarbon or solvent odor, moist (85-15-0).** | |
| 20 | | | | 0.0 | P18-20 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | |
| **Total Boring Depth:** | 24 | feet bgs | **Surface Seal:** | -- | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | |

**Notes/Comments:**

**bgs = below ground surface**

SoundEarth Strategies

| | |
|---|---|
| **Project:** | UW Laundry Property |
| **Project Number:** | 0987-022 |
| **Logged by:** | KJL |
| **Date Started:** | 11/01/19 |
| **Surface Conditions:** | Asphalt |
| **Location N/S:** | 22' N of parking lot south boundary |
| **Location E/W:** | 28' E of parking lot west boundary |
| **Reviewed by:** | CJT |
| **Date Completed:** | 11/01/19 |

# BORING LOG | P18

**Site Address:** 2901 27th Avenue South, Seattle, Washington

**Water Depth At Time of Drilling** -- feet bgs

**Water Depth After Completion** -- feet bgs

| Depth (feet bgs) | Interval | Blow Count | % Recovery | PID (ppm) | Sample ID | Sample Analyzed | Group Symbol | Graphic | Lithologic Description (ASTM texture, density, color, odor, moisture, supplemental descriptors, estimated grain size distribution) Field-estimated grain size distribution by volume (% Fines - % Sand - % Gravel) | Well Detail/ Water Depth |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ML | | **20.0-22.0 feet bgs: Sandy SILT, brown, no hydrocarbon or solvent odor, moist (85-15-0).** | |
| | | | 125 | 0.0 | | | ML | | **22.0-24.0 feet bgs: SILT with fine to coarse sand, trace fine gravel, brown, no hydrocarbon or solvent odor, moist (85-10-5).** | |
| | | | | 0.0 | P18-24 | | | | | |
| 25 | | | | | | | | | **Boring terminated at 24 feet bgs. Boring backfilled with bentonite.** | |
| 30 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 40 | | | | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Drilling Co./Driller:** | ESN / Marty | | **Well/Auger Diameter:** | -- | inches | **Notes/Comments:** |
| **Drilling Equipment:** | Truck-mounted push probe | | **Well Screened Interval:** | -- | feet bgs | **bgs = below ground surface** |
| **Sampler Type:** | Plastic sleeve | | **Screen Slot Size:** | -- | inches | |
| **Hammer Type/Weight:** | -- | lbs | **Filter Pack Used:** | -- | | |
| **Total Boring Depth:** | 24 | feet bgs | **Surface Seal:** | -- | | |
| **Total Well Depth:** | -- | feet bgs | **Annular Seal:** | -- | | |
| **State Well ID No.:** | -- | | **Monument Type:** | -- | | |

# Appendix B
## Inadvertent Discovery Plan

# INADVERTENT DISCOVERY PLAN

## *PLAN AND PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS*

*To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6000 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.*

Site Name(s): UW Mount Baker Laundry Location: 2901 27th Ave S, Seattle, WA

Project Lead/Organization: Mercy Housing Northwest County: King

*If this Inadvertent Discovery Plan (IDP) is for multiple (batched) projects, ensure the location information covers all project areas.*

### 1. INTRODUCTION

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, as part of Agency Terms and Conditions for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive 21-02 or Section 106).

Once completed, **the IDP should always be kept at the project site** during all project activities. All staff, contractors, and volunteers should be familiar with its contents and know where to find it.

### 2. CULTURAL RESOURCE DISCOVERIES

A cultural resource discovery could be prehistoric or historic. Examples include (see images for further examples):

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.
- Old munitions casings. ***Always assume these are live and never touch or move.***
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items, toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource.

### 3. ON-SITE RESPONSIBILITIES

If any employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the project, take the following steps to ***Stop-Protect-Notify***. **If you suspect that the discovery includes human remains, also follow Sections 5 and 6.**

#### STEP A: Stop Work.

All work must stop immediately in the vicinity of the discovery.

#### STEP B: Protect the Discovery.

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary (30 feet or larger) with temporary fencing, flagging, stakes, or other clear markings. Provide protection and ensure integrity of the discovery until cleared by the Department of Archaeological and Historical Preservation (DAHP) or a licensed, professional archaeologist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until the requirements of this IDP are met.

#### STEP C: Notify Project Archaeologist (if applicable).

If the project has an archaeologist, notify that person. If there is a monitoring plan in place, the archaeologist will follow the outlined procedure.

#### STEP D: Notify Project and Washington Department of Ecology (Ecology) contacts.

**Project Lead Contacts**

| Primary Contact | | Alternate Contact | |
|---|---|---|---|
| Name: | Ellen Lohe | Name: | Jason Manges |
| Organization: | Mercy Housing Northwest | Organization: | Beacon Development Group |
| Phone: | 206-508-1655 | Phone: | 206-204-1968 |
| Email: | Ellen.Lohe@mercyhousing.org | Email: | JasonM@beacondevgroup.com |

**Ecology Contacts (completed by Ecology Project Manager)**

| Ecology Project Manager | | Alternate or Cultural Resource Contact | |
|---|---|---|---|
| Name: | Zak Wall, LG | Name: | Jon Klem, Archaeologist |
| Program: | NW Region Toxics Cleanup Program | Program: | NW Region Toxics Cleanup Program |
| Phone: | 425-758-5231 | Phone: | 206-556-5584 |
| Email: | ZWAL461@ecy.wa.gov | Email: | JONK461@ecy.wa.gov |

**STEP E: Ecology will notify DAHP.**

Once notified, the Ecology Cultural Resource Contact or the Ecology Project Manager will contact DAHP to report and confirm the discovery. To avoid delay, the Project Lead/Organization will contact DAHP if they are not able to reach Ecology.

DAHP will provide the steps to assist with identification. DAHP, Ecology, and Tribal representatives may coordinate a site visit following any necessary safety protocols. DAHP may also inform the Project Lead/Organization and Ecology of additional steps to further protect the site.

**Do not continue work until DAHP has issued an approval for work to proceed in the area of, or near, the discovery.**

DAHP Contacts:

Name: Rob Whitlam, PhD
Title: State Archaeologist
Cell: 360-890-2615
Email: Rob.Whitlam@dahp.wa.gov
Main Office: 360-586-3065

**Human Remains/Bones**:

Name: Guy Tasa, PhD
Title: State Anthropologist
Cell: 360-790-1633 (24/7)
Email: Guy.Tasa@dahp.wa.gov

**4. TRIBAL CONTACTS**

In the event cultural resources are discovered, the following tribes will be contacted. See Section 10 for Additional Resources.

| | | | |
|---|---|---|---|
| Tribe: | Duwamish Tribe | Tribe: | Muckleshoot Indian Tribe |
| Name: | Nancy Sackman | Name: | Laura Murphy |
| Title: | Cultural Preservation Officer | Title: | Archaeologist |
| Phone: | 206-856-2564 | Phone: | 253-876-3272 |
| Email: | preservationdept@duwamishtribe.org | Email: | laura.murphy@muckleshoot.nsn.us |
| Tribe: | Snoqualmie Indian Tribe | Tribe: | Stillaguamish Tribe of Indians |
| Name: | Adam Osbekoff | Name: | Kerry Lyste |
| Title: | Cultural Resource Compliance Manager | Title: | THPO |
| Phone: | 425-753-0388 | Phone: | 360-652-7362 x226 |
| Email: | adam@snoqualmietribe.us | Email: | klyste@stillaguamish.com |

Please provide contact information for additional tribes within your project area, if needed, in Section 11.

**5. FURTHER CONTACTS (if applicable)**

If the discovery is confirmed by DAHP as a cultural or archaeological resource, or as human remains, and there is a partnering federal or state agency, Ecology or the Project Lead/Organization will ensure the partnering agency is immediately notified.

| Federal Agency: | | State Agency: | |
|---|---|---|---|
| Agency: | | Agency: | |
| Name: | | Name: | |
| Title: | | Title: | |
| Phone: | | Phone: | |
| Email: | | Email: | |

## 6. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Follow the steps under ***Stop-Protect-Notify.*** For specific instructions on how to handle a human remains discovery, see: *RCW 68.50.645: Skeletal human remains—Duty to notify—Ground disturbing activities—Coroner determination—Definitions*.

**Suggestion**: If you are unsure whether the discovery is human bone or not, contact Guy Tasa with DAHP, for identification and next steps. Do not pick up the discovery.

Guy Tasa, PhD State Physical Anthropologist
Guy.Tasa@dahp.wa.gov
(360) 790-1633 (Cell/Office)

For discoveries that are confirmed or suspected human remains, follow these steps:

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts below. **Do not call 911** unless it is the only number available to you.

   Enter contact information below (required):
   - Local Medical Examiner or Coroner name and phone: King Co Medical Examiner 206-731-3232
   - Local Law Enforcement main name and phone: Seattle Police Department 206-625-5011
   - Local Non-Emergency phone number (911 if without a non-emergency number): 206-625-5011
2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.
3. **DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.**
4. If the remains are determined to be non-forensic, Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

- Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation. Organizations may also participate in consultation.
- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.
- When consultation and documentation activities are complete, work in the discovery area may resume as described in Section 8.

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the Project Lead/Organization will comply with applicable state and federal laws, and the above protocol.

## 7. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological resources discovered during construction are protected by state law RCW 27.53 and assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

The Project Lead/Organization must ensure that proper documentation and field assessment are made of all discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and the archaeologist.

The archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. They will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures. They will document discovery locations on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units. They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below

surface and stratum association where applicable) for all recovered artifacts. They will draw a stratigraphic profile for at least one wall of each test excavation unit.

The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units. The ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology, and the affected tribe(s).

Within 90 days of concluding fieldwork, the archaeologist will provide a technical report describing any and all monitoring and resultant archaeological excavations to the Project Lead/Organization, who will forward the report to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s) for review and comment.

If assessment activities expose human remains (burials, isolated teeth, or bones), the archaeologist and Project Lead/Organization will follow the process described in **Section 6**.

## 8. PROCEEDING WITH WORK

The Project Lead/Organization shall work with the archaeologist, DAHP, and affected tribe(s) to determine the appropriate discovery boundary and where work can continue.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the federal agencies (if any) determine that compliance with state and federal laws is complete.

## 9. ORGANIZATION RESPONSIBILITY

The Project Lead/Organization is responsible for ensuring:

- This IDP has complete and accurate information.
- This IDP is immediately available to all field staff at the sites and available by request to any party.
- This IDP is implemented to address any discovery at the site.
- That all field staff, contractors, and volunteers are instructed on how to implement this IDP.

## 10. ADDITIONAL RESOURCES

### Informative Video

Ecology recommends that all project staff, contractors, and volunteers view this informative video explaining the value of IDP protocol and what to do in the event of a discovery. The target audience is anyone working on the project who could unexpectedly find cultural resources or human remains while excavating or digging. The video is also posted on DAHP's inadvertent discovery language website.

Ecology's IDP Video (https://www.youtube.com/watch?v=ioX-4cXfbDY)

**Informational Resources**

DAHP (https://dahp.wa.gov)

Washington State Archeology (DAHP 2003)
(https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

Association of Washington Archaeologists (https://www.archaeologyinwashington.com)

**Potentially Interested Tribes**

Interactive Map of Tribes by Area
(https://dahp.wa.gov/archaeology/tribal-consultation-information)

WSDOT Tribal Contact Website
(https://wsdot.wa.gov/tribal/TribalContacts.htm)

## 11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Suquamish Tribe
Stephanie Trudel, THPO
360-394-8533
strudel@suquamish.nsn.us

Tulalip Tribe
Richard Young, Cultural Resources Director
360-716-2652
ryoung@tulaliptribes-nsn.gov

Squaxin Island Tribe
Shaun Dinubilo, Archaeologist
sdinubilo@squaxin.us
360-432-3998

**Implement the IDP if you see…**

**Chipped stone artifacts.**

Examples are:

- Glass-like material.
- Angular material.
- “Unusual” material or shape for the area.
- Regularity of flaking.
- Variability of size.

*Stone artifacts from Oregon.*

*Stone artifacts from Washington.*

*Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.*

**Implement the IDP if you see…**

**Ground stone artifacts.**

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.

*Above: Fishing Weight - credit CRITFC Treaty Fishing Rights website.*

*Artifacts from unknown locations (left and right images).*

**Implement the IDP if you see…**

**Bone or shell artifacts, tools, or beads.**

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a “shoehorn”.
- Variability of size.
- Beads from shell (dentalium) or tusk.


Upper Left:*Bone Awls from Oregon.*

Upper Center: *Bone Wedge from California.*

Upper Right: *Plateau dentalium choker and bracelet, from Nez Perce National Historical Park, 19th century, made using Antalis pretiosa shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, Public Domain.*

Above: *Tooth Pendants. Right: Bone Pendants. Both from Oregon and Washington.*

**Implement the IDP if you see…**

**Culturally modified trees, fiber, or wood artifacts.**

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.


Left and Below: *Culturally modified tree and an old carving on an aspen (Courtesy of DAHP).*

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry*.

**Implement the IDP if you see…**

**Strange, different, or interesting looking dirt, rocks, or shells.**

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- "Unusual" accumulations of rock (especially fire-cracked rock).
- "Unusual" shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a "layer cake" appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the "unusual" or out of place (for example, rock piles in areas with otherwise few rocks).

*Shell Midden pocket in modern fill discovered in sewer trench.*

*Underground oven. Courtesy of DAHP.*

*Shell midden with fire cracked rock.*

*Hearth excavated near Hamilton, WA.*

**Implement the IDP if you see…**

**Historic period artifacts (historic archaeology considered older than 50 years).**

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.

Left: Top to Bottom: *Willow pattern serving bowl and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*

**Implement the IDP if you see…**

**Historic period artifacts (historic archaeology considered older than 50 years).**

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.

Main Image: *Dishes, bottles, workboot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.*

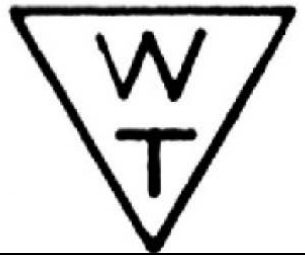
Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

**Implement the IDP if you see…**

- Old munition casings – if you see ammunition of any type – ***always assume they are live and never touch or move!***
- Tin cans or glass bottles with an older manufacturer's technique – maker's mark, distinct colors such as turquoise, or an older method of opening the container.

Far Left: .303 British cartridge found by a WCC planting crew on Skagit River. Don't ever touch something like this!
Left: Maker's mark on bottom of old bottle.


Right: *Old beer can found in Oregon. ACME was owned by Olympia Brewery. Courtesy of Heather Simmons.*




*Logo employed by Whithall Tatum & Co. between 1924 to 1938 (Lockhart et al. 2016).*


*Can opening dates, courtesy of W.M. Schroeder.*

**Implement the IDP if you see…**

**You see historic foundations or buried structures.**

Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.


Counter Clockwise, Left to Right: *Historic structure 45KI924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-KI-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

**Implement the IDP if you see...**

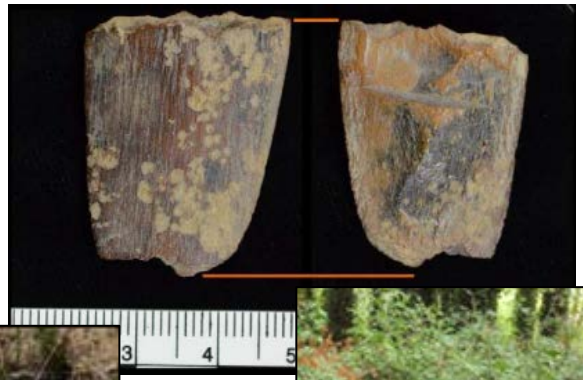
**Potential human remains.**

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation (45KI1200).*

*Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.*



Directly Above: This is a real discovery at an Ecology sewer project site.

*What would you do if you found these items at a site? Who would be the first person you would call?*

Hint: *Read the plan!*

# Appendix C
## Terrestrial Ecological Evaluation Form

# Voluntary Cleanup Program

**Washington State Department of Ecology**
**Toxics Cleanup Program**

# TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

***Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.***

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Terrestrial-ecological-evaluation.

| **Step 1: IDENTIFY HAZARDOUS WASTE SITE** | |
|---|---|
| Please identify below the hazardous waste site for which you are documenting an evaluation. | |
| Facility/Site Name: **UW Mount Baker Laundry Site/ Mount Baker Station Development** | |
| Facility/Site Address: 2901 27th Avenue South in Seattle, Washington 98144 | |
| Facility/Site No: 19911937 | VCP Project No.: n/a |

| **Step 2: IDENTIFY EVALUATOR** | | | |
|---|---|---|---|
| Please identify below the person who conducted the evaluation and their contact information. | | | |
| Name: Max-Henry Nelson | | | Title: Staff Geologist |
| Organization: GeoEngineers, Inc. | | | |
| Mailing address: 1101 South Fawcett Avenue, Suite 200 | | | |
| City: Tacoma | | State: WA | Zip code: 98402 |
| Phone: 253-383-4940 | Fax: | E-mail: mnelson@geoengineers.com | |

## Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

### A. Exclusion from further evaluation.

**1. Does the Site qualify for an exclusion from further evaluation?**

☒ Yes *If you answered **"YES,"** then answer **Question 2**.*

☐ No or Unknown *If you answered **"NO" or "UNKNOWN,"** then skip to **Step 3B** of this form.*

**2. What is the basis for the exclusion?** *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☒ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☐ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

[±] "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

[#] "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

**B. Simplified evaluation.**

**1. Does the Site qualify for a simplified evaluation?**

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

**2. Did you conduct a simplified evaluation?**

☐ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☐ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

**3. Was further evaluation necessary?**

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☐ No *If you answered **"NO,"** then answer **Question 5** below.*

**4. If further evaluation was necessary, what did you do?**

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

**5. If no further evaluation was necessary, what was the reason?** *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

**C. Site-specific evaluation.** A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

**1. Was there a problem?** *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

**2. What did you do to resolve the problem?** *See* WAC 173-340-7493(3).

- ☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*
- ☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

**3. If you conducted further site-specific evaluations, what methods did you use?**
*Check all that apply. See* WAC 173-340-7493(3).

- ☐ Literature surveys.
- ☐ Soil bioassays.
- ☐ Wildlife exposure model.
- ☐ Biomarkers.
- ☐ Site-specific field studies.
- ☐ Weight of evidence.
- ☐ Other methods approved by Ecology. If so, please specify:

**4. What was the result of those evaluations?**

- ☐ Confirmed there was no problem.
- ☐ Confirmed there was a problem and established site-specific cleanup levels.

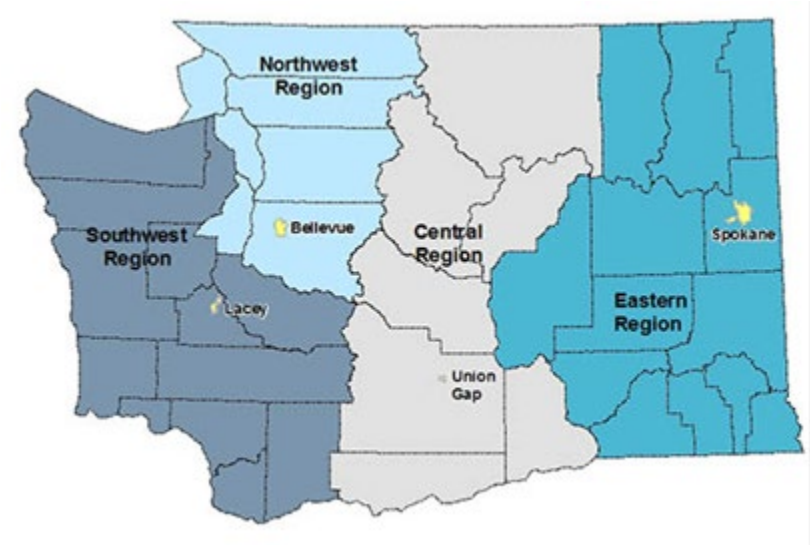
**5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?**

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

## Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.




| | |
|---|---|
| **Northwest Region:**<br>Attn: VCP Coordinator<br>3190 160th Ave. SE<br>Bellevue, WA 98008-5452 | **Central Region:**<br>Attn: VCP Coordinator<br>1250 West Alder St.<br>Union Gap, WA 98903-0009 |
| **Southwest Region:**<br>Attn: VCP Coordinator<br>P.O. Box 47775<br>Olympia, WA 98504-7775 | **Eastern Region:**<br>Attn: VCP Coordinator<br>N. 4601 Monroe<br>Spokane WA 99205-1295 |

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# Appendix D
## Sampling and Analysis Plan

# 1.0 Introduction

This Sampling and Analysis Plan (SAP) has been prepared for remedial investigation (RI) activities at the Mount Baker Station Development property located at 2901 27th Avenue South in Seattle, Washington (Site).

# 2.0 Remedial Investigation Purpose and Scope

The purpose of the RI is to characterize and document soil and groundwater conditions at the Site. Specific proposed investigation activities are described in the RI Work Plan.

# 3.0 Health and Safety

A Site-specific Health and Safety Plan (HASP) will be developed for use during the RI field activities. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASPs for use by their employees.

The Field Coordinator will be responsible for implementing the HASP during the field activities. The Field Coordinator will conduct a tailgate safety meeting prior to beginning daily field activities. The Field Coordinator has stop-work authority should field investigation activities fail to comply with the HASP. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during field activities.

# 4.0 Subsurface Investigation Methods

This section describes the following subsurface investigation methods to complete soil sampling, groundwater monitoring well installation, well development and surveying, groundwater level measurements, groundwater sampling and soil vapor sampling.

## 4.1 SOIL SAMPLING METHODOLOGY

Soil samples will be collected for laboratory chemical analysis during direct-push (DP) and hollow-stem auger (HSA) drilling based on the field screening results. Field screening methodology are described in Section 5.1 of this SAP. Soil samples will be collected at approximately 2.5 to 5-foot depth intervals. For HSA drilling, these samples will be collected with a 2-inch-diameter, 18-inch-long stainless steel split spoon sampler. The sampler will be driven with a 140-pound hammer dropped from a distance of 30 inches. The number of blows needed to advance the sampler the final 12 inches or other specified distance will be recorded on the boring log. For DP drilling, samples will be collected directly from the 5-foot plastic liners.

After the sampler is advanced in the boring, it will be retrieved and disassembled to allow access to the recovered soil for collecting samples for chemical analyses and lithologic logging.

Soil samples will be collected for chemical analysis as described in Section 6.0 of the RI Work Plan. Additional soil samples may be collected for chemical analysis based on field screening results. Field screening is described in Section 5.1.1 of this SAP.

Soil samples to be analyzed for select volatile organic compounds (VOCs) will be collected first following United States Environmental Protection Agency (EPA) Method 5035A. At boring locations where soil samples will be analyzed for additional parameters as described in the RI Work Plan, additional sample volume will be collected and placed in a plastic bag and homogenized following soil sample collection for VOCs. The homogenized soil will be placed into the remaining sample containers provided by the analytical laboratory for the additional analytical parameters.

An environmental representative will observe the drilling activities and will maintain a detailed log of soil and groundwater conditions encountered in each boring. The soil samples will be visually examined and classified in general accordance with Unified Soil Classification System (USCS).

The collected soil samples will be placed into a cooler with ice and logged on the chain-of-custody (COC) record. Drill cuttings will be stored in marked drums on the Site pending waste characterization and appropriate disposal.

## 4.2 GROUNDWATER MONITORING WELL INSTALLATION

Drilling and construction of groundwater monitoring wells will be performed by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 Washington Administrative Code [WAC]). Monitoring well installation will be observed by an environmental representative who will maintain a detailed log of the construction materials and well depths.

The monitoring wells will be constructed using 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010-inch slot width). Each well will be constructed with at least a 10-foot screen with the base of the well screen. Actual well screen intervals will be based on field conditions observed at the time of drilling. Additional details regarding monitoring well construction are provided in the RI Work Plan.

Drillers will submit resource protection well notification and construction documents to the Washington State Department of Ecology (Ecology).

## 4.3 GROUNDWATER MONITORING WELL DEVELOPMENT

Each groundwater monitoring well will be developed by surging the screened interval and purging the well. The turbidity of the purge water will be monitored during well development. Well development will continue until at least 5 well casing volumes of water are removed, and the turbidity of the purge water is less than 500 nephelometric turbidity units (NTU). In addition, if any potable water is added to the borehole to control heave during drilling, an additional volume of water equal to the amount added during drilling will be removed. The purge rate and total volume of groundwater removed from each well will be recorded on field forms during well development. Well development water will be segregated by monitoring well and stored in marked drums on the property, pending waste characterization and appropriate disposal.

## 4.4 GROUNDWATER MONITORING WELL SURVEYING

A licensed surveyor will perform an elevation and location survey of the new monitoring wells. Monitoring well elevations will be surveyed relative to NAVD88 to the nearest 0.01 foot.

### 4.5 SNAPSHOT WATER LEVEL MEASUREMENT

During each groundwater monitoring event, the depth to groundwater in each monitoring well will be measured to the nearest 0.01 foot relative to the top of the well casing using an electronic water level indicator. If present, dense nonaqueous phase liquid (DNAPL) and/or light nonaqueous phase liquid (LNAPL) thickness will be measured in all wells with product/water interface meters before any groundwater samples are collected. The Heron Interface meters and the Solinst interface meters are used to measure the thickness of the product layer as thin as 1 millimeter (mm). The groundwater level and DNAPL/LNAPL thickness measurements will be recorded on field logs.

### 4.6 GROUNDWATER SAMPLING

Groundwater samples from the monitoring wells, and any grab groundwater samples from the DP borings, will be collected using low-flow purging and sampling methods. The groundwater samples will be obtained using a decontaminated bladder pump with disposable bladder and sample tubing. The sample tubing inlet will be placed at the mid-point of the well screen interval or at the mid-point of the water column if the water column height is less than the screen length. Groundwater will be purged at approximately 0.5 liters per minute or less. Groundwater will be purged at a reduced rate to prevent groundwater drawdown greater than 10 percent of the water column height. The drawdown will be recorded on field logs if drawdown is necessary to obtain a groundwater sample.

A portable water quality measurement system equipped with a flow-through cell will be used to monitor purge water temperature, pH, electrical conductivity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). Purge water turbidity will be measured using a turbidimeter. Water quality measurements of the purge water will be recorded on field logs. Purging will continue until the purge water temperature, pH, electrical conductivity, DO, and ORP stabilize to within 10 percent for three consecutive measurements or until 3 well casing volumes are removed, and turbidity is less than 25 NTU.

Following well purging, the flow-through cell will be disconnected, and the groundwater sample will be collected in laboratory-prepared containers. Groundwater samples will be placed into a cooler with ice and logged on the COC record. The groundwater samples will be submitted to the analytical laboratory for the chemical analyses identified in Section 6.0 of the RI Work Plan.

Purge water will be segregated by monitoring well as necessary and stored on Sound Transit property in labeled drums pending waste characterization and appropriate disposal.

## 5.0 Soil Field Screening Protocols

### 5.1 GENERAL PROCEDURES

Soil samples will be collected for chemical analysis and to document lithology. An environmental representative will classify the soils encountered and prepare a detailed log of each exploration. The field representative will visually classify the soil in general accordance with ASTM International (ASTM) Method D 2488 and record soil descriptions and field screening information on the field log. ASTM Method D 2488 is the visual-manual soil description method that corresponds to laboratory ASTM Method D 2487 (USCS method).

Samples will be placed in a clean plastic-lined cooler with ice following collection. The objective of the cold storage will be to attain a sample temperature of 2 to 6 degrees Celsius to minimize potential for volatilization. An environmental representative will provide for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A COC form will be completed for each group of samples being delivered to the laboratory using standard COC protocol. Samples will be transported and delivered to the analytical laboratory in the sample coolers by field personnel, laboratory personnel, courier service or a commercial shipping company.

### *5.1.1 Field Screening*

Soil samples will be field screened for evidence of possible contamination. Field screening results will be recorded on field logs and the results will be used as a general guideline to delineate areas and depths of potential contamination. Field screening methods will consist of visual screening, water sheen screening and headspace vapor screening.

#### 5.1.1.1 VISUAL SCREENING

The soil will be observed for unusual color or staining or debris that may be indicative of contamination.

#### 5.1.1.2 WATER SHEEN SCREENING

This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of the soil sample will be placed in a plastic sheen pan containing water. The water surface will be observed for signs of sheen. The following sheen classifications will be used during field screening:

| CLASSIFICATION | IDENTIFIER | DESCRIPTION |
|---|---|---|
| No Sheen | (NS) | No visible sheen on the water surface |
| Slight Sheen | (SS) | Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly |
| Moderate Sheen | (MS) | Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface |
| Heavy Sheen | (HS) | Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen |

#### 5.1.1.3 HEADSPACE VAPOR SCREENING

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. A portion of the sample is placed in a resealable plastic bag for headspace vapor screening as soon as possible following sample collection. Ambient air is captured in the bag and the bag is sealed and left for approximately 5 minutes. The bag is then gently agitated for approximately 10 seconds to expose the soil to the air trapped in the bag. Vapors present within the sample bag's headspace are measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag.

# 6.0 Sample Handling and Field Documentation

## 6.1 SOIL AND GROUNDWATER SAMPLE CONTAINERS AND LABELING

The Field Coordinator will manage field protocols related to sample collection, handling, and documentation. Soil and groundwater samples will be placed in appropriate laboratory-prepared containers.

Sample containers will be labeled with the following information at the time of sample collection:

- Project number
- Sample name, which will include a reference to the sample location and sampling depth (if applicable)
- Date and time of collection
- Sampler's company and sampler's initials
- Preservative type (if applicable)

Sample collection activities will be noted on field logs. The Field Coordinator will monitor consistency between sample containers/labels, field logs and COC forms. Sample naming/labeling conventions are described below:

**Soil Samples** – Each sample will be labeled with the boring number (MB for "Mount Baker" followed by the exploration number), sample interval start depth, and sample interval end depth. For example, a soil sample collected from 15 to 16 feet bgs from boring MW-5 would be labeled MW5-15-16. Field duplicate soil samples collected per the Quality Assurance Project Plan (QAPP) will be labeled with "Soil Dup"; the date (year, month and day) of sample collection; and the sequential field blank number collected on that date. For example, the second field duplicate soil sample collected on August 05, 2024 would be labeled Soil Dup-240805-2.

**Groundwater Samples** – Each sample will be labeled with the monitoring well, or DP temp well, number and the year, month and day of sample collection. For example, a groundwater sample collected from monitoring well MW-5 on August 05, 2024 would be labeled MW5-240805. Field duplicate groundwater samples collected per the QAPP will be labeled with "GW Dup"; the date (year, month and day) of sample collection; and the sequential field blank number collected on that date. For example, the second field duplicate groundwater sample collected on December 1, 2024 would be labeled GW Dup-241201-2.

**Trip Blanks** – Trip blanks (see QAPP) will be labeled with "TB"; the date (year, month and day) the trip blank was labeled; and the sequential trip blank number labeled on that date. For example, the first trip blank labeled on August 5, 2024 would be labeled TB-240805-1.

## 6.2 SAMPLE HANDLING

Samples will be handled and delivered to the laboratory as described in the QAPP.

## 6.3 FIELD OBSERVATIONS DOCUMENTATION AND RECORDS

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will record soil and groundwater sampling information on field logs and will maintain a daily field report. Entries in the field logs will be made in pencil or water-resistant ink on water-resistant paper, and corrections will consist of line-out deletions. Field logs and field reports will become part of the project files at the conclusion of the field work.

The following information will be recorded during the collection of samples:

- Sample location and description.
- Site or sampling area sketch showing sample location and measured distances, as necessary.
- Sampler's Company and name(s).
- Date and time of sample collection.
- Designation of sample as composite or discrete.
- Type of sample (soil or water).
- Type of sampling equipment used.
- Field instrument readings.
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.).
- Sample descriptions (e.g., lithology, noticeable odors, color, field screening results).
- Sample preservation.
- Shipping arrangements (overnight air bill number).
- Name of recipient laboratory.

The following specific information will also be recorded in the field log for each day of sampling in addition to the sampling information:

- Team members and their responsibilities.
- Time of arrival/entry on Site and time of Site departure.
- Other personnel present at the Site.
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel.
- Deviations from sampling plans, Site safety plans and QAPP procedures.
- Changes in personnel and responsibilities with reasons for the changes.
- Levels of safety protection.
- Calibration readings for any equipment used and equipment model and serial number.

The Field Coordinator is responsible for the handling, use and maintenance of field logs.

### 6.4 SAMPLING EQUIPMENT DECONTAMINATION

Reusable sampling and measurement equipment that directly contacts samples or sampled media and could cause cross-contamination between different sampling locations or depths will be decontaminated before each use as follows:

- Equipment will be brushed with a nylon brush as needed to remove large particulate matter.
- Equipment will be rinsed with potable water as needed.
- Equipment will be washed with a solution of Alconox® (or Liquinox®) and potable water.
- Equipment will be rinsed with potable water.

## 7.0 Investigation-Derived Waste Management

Investigation-derived waste (IDW) will include drill cuttings, well development water, sampling equipment decontamination water, pre-sampling purge water from monitoring wells and incidental waste.

Drill cuttings, well development water, decontamination water and pre-sampling purge water will be stored in sealed drums. The drums will be temporarily stored on the Mount Baker Station Development Property pending waste designation and off-site disposal. The drums will be labeled with the following information:

- Material contained in the drum (e.g., drill cuttings, decontamination water, etc.).
- Source of the material (e.g., investigation locations and depths where applicable).
- Date material was generated.
- Name and telephone number of the appropriate contact person.

Incidental waste to be generated during sampling activities includes items such as disposable gloves, plastic sheeting, sample bags, paper towels, and similar expended and discarded field supplies. These materials are considered *de minimis* and will be disposed of in a trash receptacle or county disposal facility.

Additional details regarding IDW management are provided in the RI Work Plan.

# Appendix E
## Quality Assurance Project Plan

# 1.0 Introduction

This Quality Assurance Project Plan (QAPP) was prepared for remedial investigation (RI) activities at the Mount Baker Station Development Site located at 2901 27th Avenue South in Seattle, Washington. The RI is being conducted to characterize the nature and extent of contamination at the Site. Objectives of the RI are discussed in the Work Plan.

The RI sampling procedures are outlined in the Sampling and Analysis Plan (SAP). The QAPP serves as the primary guide to integrate Quality Assurance (QA) and Quality Control (QC) functions into the RI field sampling and analyses activities. The QAPP presents the objectives, procedures, organization, functional activities, and specific QA and QC activities designed to achieve data quality goals that have been established for the project. This QAPP is based on guidelines specified in Washington Administrative Code (WAC) 173-340-820 and United States Environmental Protection Agency (EPA) guidelines for quality assurance project plans (EPA 2004).

Environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

# 2.0 Project Organization, Roles and Responsibilities

Services completed under this QAPP will be in cooperation with the following key project personnel and representatives of Mercy Housing's contractor and their environmental consultant (names and roles will be designated separately).

| AFFILIATION | CONTACT INFORMATION |
|---|---|
| Ellen Lohe, Mercy Housing Northwest | Ellen Lohe<br>Ellen.Lohe@mercyhousing.org<br>206.508.1655<br>Seattle, Washington |
| Environmental Consultant (GeoEngineers, Inc.) | Jacob Letts,<br>JLetts@geoengineers.com<br>253.383.4940<br>Tacoma, Washington |
| Analytical Laboratories | OnSite Environmental, Inc.<br>425.883.3881<br>Redmond, Washington |

Descriptions of the responsibilities and communication for the key positions to QA/QC are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of QA issues before submittal.

## 2.1 PROJECT LEADERSHIP AND MANAGEMENT

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables.

## 2.2 FIELD COORDINATOR

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provides technical direction to the field staff.
- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Supervises the compilation of field data and laboratory analytical results.
- Assures that data are correctly and completely reported.
- Implements and oversees field sampling in accordance with project plans.
- Supervises field personnel.
- Coordinates work with on-site subcontractors.
- Schedules sample shipment with the analytical laboratory.
- Monitors that appropriate sampling, testing, and measurement procedures are followed.
- Coordinates the transfer of field data, sample tracking forms, and logbooks to the PM or other consultant representative for data reduction and validation.
- Participates in QA corrective actions as required.

## 2.3 QA LEADER

The QA Leader is responsible for the project's overall QA and coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.

- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct QC checks are implemented.
- Monitors subcontractor compliance with data quality requirements.

## 2.4 LABORATORY MANAGEMENT

The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensure implementation of the QA Plan.
- Serve as the laboratory point of contact.
- Activate corrective action for out-of-control events.
- Issue the final QA/QC report.
- Administer QA sample analysis.
- Comply with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

# 3.0 Data Quality Objectives

The QA objective for technical data is to collect environmental monitoring data of known, acceptable, and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for PARCC, and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness and reporting limits) and qualitative factors (representativeness and comparability).

Quantitative factors such as precision and accuracy will be assessed using control limits which are specific and internal to the individual laboratory used for this project. If laboratory QC parameters such as surrogates, laboratory control samples, or matrix spike samples are reported to have failed the laboratory's own statistical control limits or the reporting limits do not meet the requirements listed in this QAPP, then the associated batched sample(s) should be immediately re-extracted and re-analyzed by the laboratory. If the QC problem persists after re-extraction and re-analysis has taken place, re-sampling may be warranted.

## 3.1 ANALYTES AND MATRICES OF CONCERN

### 3.1.1 Chemical Analysis

The analyses to be performed for RI soil, groundwater and soil vapor samples are summarized in Table E-1, Soil Practical Quantitation Limits, and Table E-2, Water Practical Quantitation Limits.

### 3.1.2 Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL provide insight to site conditions, QA dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the method reporting limit (MRL) or undetected at the PQL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. The PQL for target analytes are presented in Table E-1 (soil), Table E-2 (groundwater) and Table E-3 (soil gas). These reporting limits were obtained from Ecology-certified laboratories (OnSite Environmental Inc., of Redmond, Washington and Friedman & Bruya of Seattle, Washington). The analytical methods and processes selected will provide PQLs less than the TRLs under ideal conditions. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value much higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize site conditions.

## 3.2 PRECISION

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD\,(\%) = \frac{|\,D_1 - D_2\,|}{(D_1 + D_2)/2}\,X\,100,$$

*Where:*

$D_1$ = Concentration of analyte in sample.

$D_2$ = Concentration of analyte in duplicate sample.

The calculation applies to split samples, field and laboratory duplicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (EPA 2009; EPA 2017a; EPA 2017b) that address criteria exceedances and courses of action. Relative percent difference goals for this effort are between 20 and 35 percent, depending on the analysis, unless the duplicate sample values are within 5 times the reporting limit.

## 3.3 ACCURACY

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as "system monitoring compound"), a matrix spike (MS) result, or from a standard reference material where:

$$Recovery\ (\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

Persons performing the evaluation must review one or more pertinent documents (EPA 2009; EPA 2017a; EPA 2017b) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, MS, and laboratory control spikes (LCS) are to meet the quality objective of the chosen laboratory. If a sample does not meet the laboratory's control standards, the data exception will need to be evaluated for its significance considering the purpose and use for the data collected.

## 3.4 REPRESENTATIVENESS, COMPLETENESS AND COMPARABILITY

Representativeness expresses the degree to which data accurately and precisely represent the actual site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the SAP and this QAPP.
- Comparing analytical results of field duplicates to evaluate variability due to field and/or laboratory handling.
- Invalidating non-representative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

### 3.5 HOLDING TIMES

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample was analyzed outside the holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents may have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual site conditions. Holding times are summarized in Test Methods, Sample Containers, Preservation and Hold Times, Table E-4.

### 3.6 BLANKS

According to the *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA 2017a), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)." Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

## 4.0 Sample Collection, Handling and Custody

### 4.1 SAMPLING EQUIPMENT AND SUPPLIES

One-time use sampling equipment and supplies will not be re-used. Care will be exercised when using sample containers, the photoionization detector (PID), and other instruments or supplies in order to ensure that contaminants from one sample will not be transferred to other samples. This will be achieved by not reusing one-time-use equipment and supplies, by regularly changing into clean, disposable nitrile gloves, by following field decontamination procedures and by preventing samples and used equipment from contacting other samples.

## 4.2 SAMPLING METHODS, CONTAINERS AND LABELING

The Field Coordinator will monitor consistency between the SAP, sample containers/labels, field logbooks, and the chain-of-custody (COC) form.

### *4.2.1 Sampling Methods and Containers*

The Field Coordinator will establish field protocol to manage field sample collection, handling, and documentation. Soil, groundwater and soil gas samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sufficient sample volume will be obtained for the laboratory to complete the method-specific QC analyses. Additional volumes of soil will need to be collected from appropriate borings for physical testing; the amount of sample needed to complete a given analyses will be provided by the project analytical laboratory. Sample containers and preservatives are listed in Table E-4.

### *4.2.2 Sample Labeling*

Sample containers will be labeled as described in the Sampling and Analysis Plan.

## 4.3 SAMPLE HANDLING

Soil and groundwater samples will be placed in a cooler with "blue ice" or double-bagged "wet ice" immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of 4 degrees Celsius. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table E-3.

The samples will be transported and delivered to the analytical laboratory in the coolers by field personnel, laboratory personnel, by courier service or shipping company. The Field Coordinator will monitor that the shipping container (cooler) has been properly secured using clear plastic tape and custody seals.

Measures will be implemented to minimize the potential for sample breakage, which includes packaging materials and placing sample bottles in the cooler in a manner intended to minimize damage. Sample bottles will be appropriately wrapped with bubble wrap or other protective material before being placed in coolers. Trip blanks will be included in coolers with samples.

## 4.4 COC RECORDS

The Field Coordinator is responsible for the security of samples from the time the samples are taken until the samples have been received by the shipper or laboratory. A COC form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the COC form include the following.

- Project name and number.
- Sample identification number.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Analyses to be performed.

- Names of sampling personnel and transfer of custody acknowledgment spaces.
- Shipping information including shipping container number.

The original COC record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall copy or scan the COC and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

### 4.5 LABORATORY CUSTODY PROCEDURES

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. The COC will be signed by the laboratory personnel, and the conditions of the samples will be recorded on the form. Documentation by the laboratory will include, at a minimum, the analyst's name or initials, and the time and date at which the samples are received, and the temperature of the samples at receipt. The original COC form will remain with the laboratory and copies will be returned to the relinquishing party.

### 4.6 FIELD DOCUMENTATION

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on site as described in the SAP. The Field Coordinator is responsible for the daily field logs as explained in the SAP.

## 5.0 Calibration Procedures

### 5.1 FIELD INSTRUMENTATION

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use and environmental conditions. The basic calibration frequencies are described below.

The PID used for vapor measurements will be calibrated daily, if required (based on the model used), for site safety monitoring purposes in general accordance with the manufacturer's specifications. If daily calibration is not required for a specific PID model, calibration of the PID will be checked to make sure it is up to date. The calibration results will be recorded in the daily field report.

The YSI water quality measuring system will be calibrated or calibration-checked prior to each monitoring event in general accordance with the manufacturer's specifications. Results will be recorded in the field report.

The Helium dielectric detector will be calibrated or calibration-checked prior to each sampling event in general accordance with the manufacturer's specification. Results will be recorded in the daily field report.

### 5.2 LABORATORY INSTRUMENTATION

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory SOPs. Calibration documentation will be retained at the laboratory and readily available for a period of at least 6 months after sample analyses.

## 6.0 Data Reporting and Laboratory Deliverables

Laboratory data reports will include internal laboratory quality control checks and sample results. Analytical data will be supplied in both electronic data deliverable (EDD) format and PDF format. The PDF will serve as the official record of laboratory results. The EDDs will contain only data reported in the hard copy reports (e.g., only reportable results).

## 7.0 Internal QC

The types and frequency of QC samples to be collected to represent both field QC samples and laboratory QC samples are summarized in Table E-4.

### 7.1 FIELD QC

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and the influence of off-site factors on environmental samples. Off-site factors include airborne volatile organic compounds (VOCs) and potable water used in drilling activities.

#### *7.1.1 Field Duplicates*

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Field duplicates (referred to as split samples) are created under ideal field conditions when a volume of the sample matrix is thoroughly mixed, placed in separate containers and identified as different samples. Field duplicates allow evaluation of both the precision and consistency of laboratory analytical procedures and methods, and the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected for every 20 groundwater samples or one per sampling event when less than 40 samples are collected. One field duplicate will be collected for every 20 soil samples or one per sampling event when less than 40 samples are collected.

#### *7.1.2 Trip Blanks*

Trip blanks accompany groundwater sample containers used for VOC analyses during shipment and sampling periods. One trip blank will be used per cooler when samples are tested for VOCs. Trip blanks will be submitted on hold and analyzed for VOCs if cross contamination is suspected.

### 7.2 LABORATORY QC

Laboratory QC procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include the following.

- Method blanks.
- Internal standards.
- Calibrations.
- Matrix spike/matrix spike duplicates (MS/MSD).
- Laboratory control spike/laboratory control spike duplicates (LCS/LCSD).
- Laboratory replicates or duplicates.
- Surrogate spikes.

Laboratory analytical data from the RI field investigation will be validated using the EPA National Functional Guidelines, and in accordance with Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (https://apps.ecology.wa.gov/publications/documents/0403030.pdf) and Establishing Ecology Guidelines for Verifcation and Validation of Chemical Data (https://apps.ecology.wa.gov/publications/documents/2403023.pdf).

### *Laboratory Blanks*

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or high performance liquid chromatography (HPLC) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following may have occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered “real,” and which ones are attributable to the analytical process. Furthermore, the guidelines state, “there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example.”

## *7.2.1 Calibrations*

Several types of calibrations are used, depending on the method, to determine whether the methodology was ‘in control’ by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations and continuing calibration verification.

### 7.2.2 MS/MSD

MS/MSD samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of semivolatile organic compounds (SVOCs), or the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data are reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. An MS is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount and multiplying by 100.

The samples for the MS and MSD analyses should ideally be from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be evaluated where contaminant levels are low. MS/MSD samples will be homogenized to achieve a level of representativeness and reproducibility in the data.

### 7.2.3 LCS/LCSD

Also known as blank spikes, LCSs are similar to MSs in that a known amount of one or more of the target analytes are spiked into a prepared media and the percent recovery of the spiked substances is calculated. The primary difference between a MS and LCS is that the LCS media is considered “clean” or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events have occurred.

### 7.2.4 Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

### 7.2.5 Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to but not one of the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument noting the surrogate recovery. Each surrogate used has an acceptable percent recovery range. Sample results may be biased low if a surrogate recovery is low. A possibility of false negatives may exist depending on the recovery value. Conversely, when recoveries are above the specified range of acceptance, a possibility of false positives exists, although non-detected results are considered accurate.

# 8.0 Data Reduction and Assessment Procedures

## 8.1 DATA REDUCTION

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the QA Leader and PM.

## 8.2 FIELD MEASUREMENT EVALUATION

Field data will be reviewed by the Field Coordinator at the end of each day by following the QC checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information.
- Field instrumentation and calibration.
- Sample collection protocol.
- Sample containers, preservation and volume.
- Field QC samples collected at the frequency specified.
- Sample documentation and COC protocols.
- Sample shipment.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The RI report will identify discrepancies that may affect data quality. Sample collection information will be reviewed for accuracy before inclusion in a final report.

## 8.3 FIELD QC EVALUATION

A field QC evaluation will be conducted by reviewing field logbooks and daily reports, discussing field activities with field staff, and reviewing field QC samples (trip blanks and field duplicates). Trip blanks will be evaluated using the same criteria as method blanks.

## 8.4 LABORATORY DATA QC EVALUATION

The laboratory data assessment will consist of a formal review of the following QC parameters:

- Holding times;
- Method blanks;
- MS/MSD;
- LCS/LCSD;
- Surrogate spikes; and
- Replicates.

Other documentation such as cooler receipt forms and case narratives will be reviewed to fully evaluate laboratory QA/QC in addition to these QC mechanisms.

### 8.5 ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM SUBMITTAL

Chemical analytical results for soil and groundwater samples collected will be submitted to the Ecology Environmental Information Management (EIM) database.

## 9.0 References

United States Environmental Protection Agency (EPA). 1998. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). Revision 5. April.

United States Environmental Protection Agency (EPA). 2004. EPA Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. EPA 04-03-030.

United States Environmental Protection Agency (EPA). 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. EPA-540-R-08-005. January.

United States Environmental Protection Agency (EPA). 2017a. Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review," EPA-540-R-2017-002. January.

United States Environmental Protection Agency (EPA). 2017b. Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review," EPA-540-R-2017-001. January.

# Table E-1

## Soil Practical Quantitation Limits (PQLs)

### Quality Assurance Project Plan (QAPP)

### Mount Baker Station

### Seattle, Washington

| Analyte | CAS Number | PQL[1] | Units | Analytical Method |
|---|---|---|---|---|
| **Petroleum Hydrocarbons** | | | | |
| Gasoline Range Hydrocarbons | -- | 5.0 | mg/kg | NWTPH-Gx |
| Diesel Range Hydrocarbons | -- | 25 | mg/kg | NWTPH-Dx |
| Heavy Oil Range Hydrocarbons | -- | 50 | mg/kg | NWTPH-Dx |
| **Metals** | | | | |
| Arsenic | 7440-38-2 | 10 | mg/kg | 6010/200.7 |
| Barium | 7440-39-3 | 2.5 | mg/kg | 6010/200.7 |
| Cadmium | 7440-43-9 | 0.5 | mg/kg | 6010/200.7 |
| Chromium | 7440-47-3 | 0.5 | mg/kg | 6010/200.7 |
| Lead | 7439-92-1 | 5.0 | mg/kg | 6010/200.7 |
| Selenium | 7782-49-2 | 10 | mg/kg | 6010/200.7 |
| Silver | 7440-22-4 | 0.5 | mg/kg | 6010/200.7 |
| Mercury | 7439-97-6 | 0.25 | mg/kg | 7471B |
| **Volatile Organic Compounds (VOCs)** | | | | |
| Dichlorodifluoromethane | 75-71-8 | 1.0 | µg/kg | 8260D |
| Chloromethane | 74-87-3 | 5.0 | µg/kg | 8260D |
| Vinyl Chloride | 75-01-4 | 1.0 | µg/kg | 8260D |
| Bromomethane | 74-83-9 | 1.0 | µg/kg | 8260D |
| Chloroethane | 75-00-3 | 5.0 | µg/kg | 8260D |
| Trichlorofluoromethane | 75-69-4 | 1.0 | µg/kg | 8260D |
| 1,1-Dichloroethylene | 75-35-4 | 1.0 | µg/kg | 8260D |
| Acetone | 67-64-1 | 5.0 | µg/kg | 8260D |
| Methyl Iodide | 74-88-4 | 5.0 | µg/kg | 8260D |
| Carbon Disulfide | 75-15-0 | 1.0 | µg/kg | 8260D |
| Methylene Chloride | 75-09-2 | 5.0 | µg/kg | 8260D |
| Acrylonitrile | 107-13-1 | -- | µg/kg | 8260D |
| trans-1,2-Dichloroethylene | 156-60-5 | 1.0 | µg/kg | 8260D |
| Methyl tert-butyl ether | 1634-04-4 | 1.0 | µg/kg | 8260D |
| 1,1-Dichloroethane | 75-34-3 | 1.0 | µg/kg | 8260D |
| Vinyl Acetate | 108-05-4 | 5.0 | µg/kg | 8260D |
| 2,2-Dichloropropane | 594-20-7 | 1.0 | µg/kg | 8260D |
| cis-1,2-Dichloroethylene | 156-59-2 | 1.0 | µg/kg | 8260D |
| Methyl ethyl ketone (MEK) | 78-93-3 | 5.0 | µg/kg | 8260D |
| Bromochloromethane | 74-97-5 | 1.0 | µg/kg | 8260D |
| Chloroform | 67-66-3 | 1.0 | µg/kg | 8260D |
| 1,1,1-Trichloroethane | 71-55-6 | 1.0 | µg/kg | 8260D |
| Carbon Tetrachloride | 56-23-5 | 1.0 | µg/kg | 8260D |
| 1,1-Dichloropropene | 563-58-6 | 1.0 | µg/kg | 8260D |
| Benzene | 71-43-2 | 1.0 | µg/kg | 8260D |
| 1,2-Dichloroethane | 107-06-2 | 1.0 | µg/kg | 8260D |
| Trichloroethylene | 79-01-6 | 1.0 | µg/kg | 8260D |
| 1,2-Dichloropropane | 78-87-5 | 1.0 | µg/kg | 8260D |
| Dibromomethane | 74-95-3 | 1.0 | µg/kg | 8260D |
| Dichlorobromomethane | 75-27-4 | 1.0 | µg/kg | 8260D |

| Analyte | CAS Number | PQL[1] | Units | Analytical Method |
|---|---|---|---|---|
| 2-Chloroethyl Vinyl Ether | 110-75-8 | 5.0 | µg/kg | 8260D |
| cis-1,3-Dichloropropene | 10061-01-5 | 1.0 | µg/kg | 8260D |
| Methyl Isobutyl Ketone | 108-10-1 | 5.0 | µg/kg | 8260D |
| Toluene | 108-88-3 | 5.0 | µg/kg | 8260D |
| trans-1,3-Dichloropropylene | 10061-02-6 | 1.0 | µg/kg | 8260D |
| 1,1,2-Trichloroethane | 79-00-5 | 1.0 | µg/kg | 8260D |
| Tetrachloroethylene | 127-18-4 | 1.0 | µg/kg | 8260D |
| 1,3-Dichloropropane | 142-28-9 | 1.0 | µg/kg | 8260D |
| 2-Hexanone | 591-78-6 | 5.0 | µg/kg | 8260D |
| Dibromochloromethane | 124-48-1 | 1.0 | µg/kg | 8260D |
| 1,2-Dibromoethane | 106-93-4 | 1.0 | µg/kg | 8260D |
| Chlorobenzene | 108-90-7 | 1.0 | µg/kg | 8260D |
| 1,1,1,2-Tetrachloroethane | 630-20-6 | 1.0 | µg/kg | 8260D |
| Ethylbenzene | 100-41-4 | 1.0 | µg/kg | 8260D |
| Xylene, m-,p- | 179601-23-1 | 2.0 | µg/kg | 8260D |
| Xylene, o- | 95-47-6 | 1.0 | µg/kg | 8260D |
| Styrene | 100-42-5 | 1.0 | µg/kg | 8260D |
| Bromoform | 75-25-2 | 5.0 | µg/kg | 8260D |
| Isopropylbenzene | 98-82-8 | 1.0 | µg/kg | 8260D |
| Bromobenzene | 108-86-1 | 1.0 | µg/kg | 8260D |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1.0 | µg/kg | 8260D |
| 1,2,3-Trichloropropane | 96-18-4 | 1.0 | µg/kg | 8260D |
| trans-1,4-Dichloro-2-butene | 110-57-6 | -- | µg/kg | 8260D |
| n-Propylbenzene | 103-65-1 | 1.0 | µg/kg | 8260D |
| 2-Chlorotoluene | 95-49-8 | 1.0 | µg/kg | 8260D |
| 4-Chlorotoluene | 106-43-4 | 1.0 | µg/kg | 8260D |
| 1,3,5-Trimethylbenzene | 108-67-8 | 1.0 | µg/kg | 8260D |
| tert-Butylbenzene | 98-06-6 | 1.0 | µg/kg | 8260D |
| 1,2,4-Trimethylbenzene | 95-63-6 | 1.0 | µg/kg | 8260D |
| sec-Butylbenzene | 135-98-8 | 1.0 | µg/kg | 8260D |
| 1,3-Dichlorobenzene | 541-73-1 | 1.0 | µg/kg | 8260D |
| 4-Isopropyltoluene | 99-87-6 | 1.0 | µg/kg | 8260D |
| 1,4-Dichlorobenzene | 106-46-7 | 1.0 | µg/kg | 8260D |
| 1,2-Dichlorobenzene | 95-50-1 | 1.0 | µg/kg | 8260D |
| n-Butylbenzene | 104-51-8 | 1.0 | µg/kg | 8260D |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 5.0 | µg/kg | 8260D |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1.0 | µg/kg | 8260D |
| Hexachlorobutadiene | 87-68-3 | 5.0 | µg/kg | 8260D |
| Naphthalene | 91-20-3 | 1.0 | µg/kg | 8260D |
| 1,2,3-Trichlorobenzene | 87-61-6 | 1.0 | µg/kg | 8260D |

**Notes:**

[1] PQL is the lowest available value from OnSite Environmental, Inc. of Redmond, Washington.

CAS = Chemical Abstract Services

EPH = Extractable Petroleum Hydrocarbons

SIM = Selective Ion Monitoring

mg/kg = milligrams per kilogram

PQL = Practical Quantitation Limit

µg/kg = micrograms per kilogram

VOCs = volatile organic compounds

VPH = volatile petroleum hydrocarbons

"--" = not Available

# Table E-2

## Groundwater Practical Quantitation Limits (PQLs)

### Quality Assurance Project Plan (QAPP)

### Mount Baker Station

### Seattle, Washington

| Analyte | CAS Number | PQL | Units | Analytical Method |
|---|---|---|---|---|
| **Petroleum Hydrocarbons** | | | | |
| Gasoline Range Hydrocarbons | -- | 100 | µg/L | NWTPH-Gx |
| Diesel Range Hydrocarbons | -- | 0.1 | mg/L | NWTPH-Dx |
| Heavy Oil Range Hydrocarbons | -- | 0.2 | mg/L | NWTPH-Dx |
| **Metals** | | | | |
| Arsenic | 7440-38-2 | 200 | µg/L | 6010/200.7 |
| Cadmium | 7440-43-9 | 10 | µg/L | 6010/200.7 |
| Chromium | 7440-47-3 | 10 | µg/L | 6010/200.7 |
| Lead | 7439-92-1 | 100 | µg/L | 6010/200.7 |
| Mercury | 7439-97-6 | 0.50 | µg/L | 7470A |
| **Volatile Organic Compounds (VOCs)** | | | | |
| Dichlorodifluoromethane | 75-71-8 | 0.20 | µg/L | 8260D |
| Chloromethane | 74-87-3 | 1.0 | µg/L | 8260D |
| Vinyl Chloride | 75-01-4 | 0.20 | µg/L | 8260D |
| Bromomethane | 74-83-9 | 0.20 | µg/L | 8260D |
| Chloroethane | 75-00-3 | 1.0 | µg/L | 8260D |
| Trichlorofluoromethane | 75-69-4 | 0.20 | µg/L | 8260D |
| 1,1-Dichloroethylene | 75-35-4 | 0.20 | µg/L | 8260D |
| Acetone | 67-64-1 | 5.0 | µg/L | 8260D |
| Methyl Iodide | 74-88-4 | 1.0 | µg/L | 8260D |
| Carbon Disulfide | 75-15-0 | 0.20 | µg/L | 8260D |
| Methylene Chloride | 75-09-2 | 1.0 | µg/L | 8260D |
| Acrylonitrile | 107-13-1 | 0.50 | µg/L | 8260D |
| trans-1,2-Dichloroethylene | 156-60-5 | 0.20 | µg/L | 8260D |
| Methyl tert-butyl ether | 1634-04-4 | 0.20 | µg/L | 8260D |
| 1,1-Dichloroethane | 75-34-3 | 0.20 | µg/L | 8260D |
| Vinyl Acetate | 108-05-4 | 1.0 | µg/L | 8260D |
| 2,2-Dichloropropane | 594-20-7 | 0.20 | µg/L | 8260D |
| cis-1,2-Dichloroethylene | 156-59-2 | 0.20 | µg/L | 8260D |
| Methyl ethyl ketone (MEK) | 78-93-3 | 5.0 | µg/L | 8260D |
| Bromochloromethane | 74-97-5 | 0.20 | µg/L | 8260D |
| Chloroform | 67-66-3 | 0.20 | µg/L | 8260D |
| 1,1,1-Trichloroethane | 71-55-6 | 0.20 | µg/L | 8260D |
| Carbon Tetrachloride | 56-23-5 | 0.20 | µg/L | 8260D |
| 1,1-Dichloropropene | 563-58-6 | 0.20 | µg/L | 8260D |
| Benzene | 71-43-2 | 0.20 | µg/L | 8260D |
| 1,2-Dichloroethane | 107-06-2 | 0.20 | µg/L | 8260D |
| Trichloroethylene | 79-01-6 | 0.20 | µg/L | 8260D |
| 1,2-Dichloropropane | 78-87-5 | 0.20 | µg/L | 8260D |
| Dibromomethane | 74-95-3 | 0.20 | µg/L | 8260D |
| Dichlorobromomethane | 75-27-4 | 0.20 | µg/L | 8260D |
| 2-Chloroethyl Vinyl Ether | 110-75-8 | 1.0 | µg/L | 8260D |

| Analyte | CAS Number | PQL | Units | Analytical Method |
|---|---|---|---|---|
| cis-1,3-Dichloropropene | 10061-01-5 | 0.20 | µg/L | 8260D |
| Methyl Isobutyl Ketone | 108-10-1 | 2.0 | µg/L | 8260D |
| Toluene | 108-88-3 | 1.0 | µg/L | 8260D |
| trans-1,3-Dichloropropylene | 10061-02-6 | 0.20 | µg/L | 8260D |
| 1,1,2-Trichloroethane | 79-00-5 | 0.20 | µg/L | 8260D |
| Tetrachloroethylene | 127-18-4 | 0.20 | µg/L | 8260D |
| 1,3-Dichloropropane | 142-28-9 | 0.20 | µg/L | 8260D |
| 2-Hexanone | 591-78-6 | 2.0 | µg/L | 8260D |
| Dibromochloromethane | 124-48-1 | 0.20 | µg/L | 8260D |
| 1,2-Dibromoethane | 106-93-4 | 0.20 | µg/L | 8260D |
| Chlorobenzene | 108-90-7 | 0.20 | µg/L | 8260D |
| 1,1,1,2-Tetrachloroethane | 630-20-6 | 0.20 | µg/L | 8260D |
| Ethylbenzene | 100-41-4 | 0.20 | µg/L | 8260D |
| Xylene, m-,p- | 179601-23-1 | 0.40 | µg/L | 8260D |
| Xylene, o- | 95-47-6 | 0.20 | µg/L | 8260D |
| Styrene | 100-42-5 | 0.20 | µg/L | 8260D |
| Bromoform | 75-25-2 | 1.0 | µg/L | 8260D |
| Isopropylbenzene | 98-82-8 | 0.20 | µg/L | 8260D |
| Bromobenzene | 108-86-1 | 0.20 | µg/L | 8260D |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.20 | µg/L | 8260D |
| 1,2,3-Trichloropropane | 96-18-4 | 0.20 | µg/L | 8260D |
| trans-1,4-Dichloro-2-butene | 110-57-6 | 0.50 | µg/L | 8260D |
| n-Propylbenzene | 103-65-1 | 0.20 | µg/L | 8260D |
| 2-Chlorotoluene | 95-49-8 | 0.20 | µg/L | 8260D |
| 4-Chlorotoluene | 106-43-4 | 0.20 | µg/L | 8260D |
| 1,3,5-Trimethylbenzene | 108-67-8 | 0.20 | µg/L | 8260D |
| tert-Butylbenzene | 98-06-6 | 0.20 | µg/L | 8260D |
| 1,2,4-Trimethylbenzene | 95-63-6 | 0.20 | µg/L | 8260D |
| sec-Butylbenzene | 135-98-8 | 0.20 | µg/L | 8260D |
| 1,3-Dichlorobenzene | 541-73-1 | 0.20 | µg/L | 8260D |
| 4-Isopropyltoluene | 99-87-6 | 0.20 | µg/L | 8260D |
| 1,4-Dichlorobenzene | 106-46-7 | 0.20 | µg/L | 8260D |
| 1,2-Dichlorobenzene | 95-50-1 | 0.20 | µg/L | 8260D |
| n-Butylbenzene | 104-51-8 | 0.20 | µg/L | 8260D |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1.0 | µg/L | 8260D |
| 1,2,4-Trichlorobenzene | 120-82-1 | 0.20 | µg/L | 8260D |
| Hexachlorobutadiene | 87-68-3 | 1.0 | µg/L | 8260D |
| Naphthalene | 91-20-3 | 1.0 | µg/L | 8260D |
| 1,2,3-Trichlorobenzene | 87-61-6 | 0.20 | µg/L | 8260D |

**Notes:**

[1] PQL is the lowest available value from OnSite Environmental, Inc. of Redmond, Washington.

EPA = United States Environmental Protection Agency
NWTPH = Northwest Total Petroleum Hydrocarbon
SIM = Selective Ion Monitoring
CAS = Chemical Abstract Services

µg/L = micrograms per liter
mg/L = milligrams per liter
mg-N/L= milligrams of Nitrogen per liter
"--" = not available

# Table E-3

## Test Methods, Sample Containers, Preservation and Hold Times

**Quality Assurance Project Plan (QAPP)**
**Mount Baker Station**
**Seattle, Washington**

| Analysis | Method | Soil | | | | Groundwater | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Minimum Sample Size | Bottle Size | Preservation | Holding Times | Minimum Sample Size | Bottle Size | Preservation | Holding Times |
| Gasoline-Range Petroleum Hydrocarbons | NWTPH-Gx | 5 g | VOA Vials or 4 oz jar (if necessary) | ≤ 6°C (field preservation kit- 5 ml of methanol) | 14 days if properly preserved; 48 hours otherwise (frozen upon arrival) | 40 ml | 2 40-ml VOAs | ≤ 6°C (HCL Ph<2) | 14 days if properly preserved; 7 days otherwise |
| Diesel- and Heavy Oil-Range Petroleum Hydrocarbons | NWTPH-Dx | 15 g | 4 oz. CWM jar | ≤ 6°C | 14 days to laboratory extraction; 40 days to analysis | 500 ml | 500 ml Amber | ≤ 6°C (HCL Ph<2) | 14 days if properly preserved; 7 days otherwise |
| Extractable Petroleum Hydrocarbon (EPH) | NWTPH-EPH | 15 g | 4 oz. CWM jar | ≤ 6°C | 14 days to laboratory extraction | -- | -- | -- | -- |
| Volatile Petroleum Hydrocarbon (VPH) | NWTPH-VPH | 15 g | 4 oz. CWM jar | ≤ 6°C (field preservation kit- 5 ml of methanol) | 14 days to laboratory extraction | -- | -- | -- | -- |
| Volatile Organic Compounds (VOCs) | EPA 8260 D | Three 40 ml VOAs, 2 with stir bar | 4 oz glass with Teflon-lined lid, 40 ml VOA (pre-weighted) | ≤ 6°C | 48 Hours to Freeze/14 days | 40 ml | 2 40-ml VOAs | ≤ 6°C (HCL Ph<2) | 14 days to injection on Purge & Trap |
| MTCA Metals | EPA 6000/7000 Series | 100 g | 4 oz. CWM jar | ≤ 6°C | 6 months to analysis | 100 ml | 500 ml HDPE | ≤ 6°C ($HNO_3$ Ph<2) | 6 months to analysis |

**Notes:**

[1] The analytes '$NO_2$' and '$NO_3$' need to be listed out separately on the COC.

[2] The soil and groundwater test methods, sample containers, preservation and hold times are from Onsite Laboratory Located in Redmond, Washington.

Extraction holding time is based on elapsed time from date of sample collection.

Poly = polycarbonate

HDPE = high-density polyethylene
SM = standard method
EPA = United States Environmental Protection Agency
ASTM = ASTM International

SM = standard method
HCl = hydrochloric acid
HNO3 = nitric acid
VOA = volatile organic analysis

g = grams
˚C = degree Celsius
oz = ounce
ml = milliliter

# Table E-4

## Quality Control Samples - Type and Frequency

### Quality Assurance Project Plan (QAPP)

### Mount Baker Station

### Seattle, Washington

| Samples Collected for Chemical Analytical Testing | Field QC | | Laboratory QC | | | |
|---|---|---|---|---|---|---|
| | Field Duplicates | Trip Blank | Method Blanks | LCS | MS/MSD | Lab Duplicates |
| Soil | 1 in 20 samples | None | 1 per batch | 1 per batch[4] | 1 per batch[1] | 1 per batch[2] |
| Groundwater | 1 in 20 samples | One per sample storage cooler used for samples analyzed for VOCs | 1 per batch | 1 per batch[4] | 1 per batch[1 and 3] | 1 per batch[2] |

**Notes:**

[1] Matrix spike sample/matrix spike duplicate sample (MS/MSD) analyses are not completed on NWTPH-Gx and NWTPH-Dx analysis.

[2] Lab duplicates are not completed on volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) analysis because the MS/MSD serves as the lab duplicate sample.

[3] Two times the sample volume will be collected to provide adequate sample volume to perform MS/MSD analyses.

4 Laboratory control sample (LCS) analysis are not completed on NWTPH-Gx analysis.

An analytical batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/MSD (or MS and lab duplicate).

One batch will comprise no more than 30 field samples.

LCS = laboratory control sample

MS = matrix spike sample

MSD = matrix spike duplicate sample

NA = not applicable

VOCs = volatile organic compounds

PAHs = polycyclic aromatic hydrocarbons

QC = quality control