Investigation Work Plan
Chelan Public Utility District Substation Site
500 South Worthen Street
Wenatchee, Washington

June 13, 2023

Prepared for

Puget Sound Energy
Bellevue, Washington

LANDAU ASSOCIATES

155 NE 100th St, Ste 302
Seattle, WA 98125
206.631.8680

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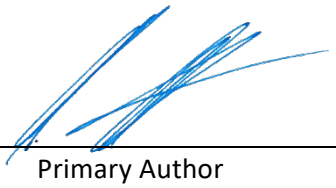
This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by:  Shane Kostka, LG

Primary Author

Document reviewed by:  Piper Roelen, PE

Quality Reviewer

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Project Coordinator:	Christopher C. Young

LANDAU ASSOCIATES

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TABLE OF CONTENTS

FIGURES

APPENDICES

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LIST OF ABBREVIATIONS AND ACRONYMS

Apex	Apex Laboratories, LLC
Aspect	Aspect Consulting
ASTM	ASTM International
bgs	below ground surface
BNSF	BNSF Railway Company
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTEXN	BTEX and naphthalene
CUL	cleanup level
DNAPL	dense non-aqueous phase liquid
Ecology	Washington State Department of Ecology
EIM	Ecology's Environmental Information Management system
EPA	US Environmental Protection Agency
ft	foot/feet
HASP	health and safety plan
IDW	investigation-derived waste
Landau	Landau Associates, Inc.
LNAPL	light non-aqueous phase liquid
MGP	manufactured gas plant
MTCA	Model Toxics Control Act
NAD83	North American Datum of 1983
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NWTPH-Dx	Northwest TPH extended-range diesel analytical method
NWTPH-Gx	Northwest TPH extended-range gasoline analytical method
PAH	polycyclic aromatic hydrocarbon
PSE	Puget Sound Energy
PUD	Chelan Public Utility District
QAPP	quality assurance project plan
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SAP	sampling and analysis plan
SIM	selected ion monitoring
Site	500 South Worthen Street in Wenatchee, Washington
SL	screening level
SPLP	synthetic precipitation leaching procedure
SPT	
TPH	total petroleum hydrocarbon
TPH-D	diesel-range total petroleum hydrocarbons

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

TPH-G ..... gasoline-range total petroleum hydrocarbons
TPH-O ..... heavy oil-range total petroleum hydrocarbons
UST ..... underground storage tank
VOC ..... volatile organic compound
WAC ..... Washington Administrative Code

1.0 INTRODUCTION

This document was prepared on behalf of Puget Sound Energy (PSE) by Landau Associates, Inc. (Landau) and presents a work plan for implementing investigation and characterization activities at the Chelan Public Utility District (PUD) Substation site located at 500 South Worthen Street (Facility ID 44830; Cleanup Site ID 14795) in Wenatchee, Washington (Site; Figure 1). The purpose of the Site investigation and characterization activities are to better define the nature and extent of contamination that may be associated with the Site.

1.1 Site Description/Background

The Site was originally developed around 1913 by Wenatchee Valley Gas & Electric Company as a steam plant powered by natural gas from the manufactured gas plant (MGP) facility also located on the property. Based on historical Sanborn® Fire Insurance maps, operations of the steam plant were assumed by Puget Sound Power & Light, a predecessor company of PSE, between 1921 and 1928. Around 1958/1959, the steam plant and MGP were removed, and the facility was converted to a substation that has since been operated by the PUD.

The local geology at, and proximate to, the Site generally consists of alluvial deposits and/or fill materials overlying the Chumstick Formation. In local near-surface geology, the Chumstick Formation presents as interbedded sandstone and siltstone bedrock; the uppermost layers generally consist of highly weathered sandstone with more competent siltstone slightly deeper. Much of Worthen Street is built on fill material placed along the riverbank in the 1920s and 1930s. Properties west of Worthen Street appear to be built mostly on native soil, but there may also be varying amounts of fill.

The depth to groundwater beneath the Site is generally at approximately 20 to 26 feet (ft) below ground surface (bgs). Groundwater has been encountered in both the fill material and weathered sandstone formation. Groundwater flow direction and gradient appears to be highly influenced by the slope of the underlying bedrock, which tends to slope to the northeast in the vicinity of the Site; however, at the shoreline, there appears to be a bedrock “topographic” low off the northeast corner of the PUD property.

The Columbia River flows to the south through Wenatchee. The local river elevation is highly influenced by water level management at the Rocky Reach Dam and Rock Island Dam, located upstream and downstream of the Site, respectively. Recent river stage data indicate that the river level varies by as much as 10 ft.

The Site is bounded by Worthen Street and the Columbia River to the east, BNSF Railway Company (BNSF) railroad tracks to the west, Chehalis Street and the Coleman Oil Company property to the south, and a commercial business (SC Fresh) to the north. SC Fresh currently leases the northernmost portion of the PUD property. As identified in available historical records, the history of properties

adjacent to the Site with potentially pertinent environmental issues or ownership/operator histories include:

- A former City of Wenatchee dump is present proximate to the northeast of the Site, beneath and east of where Worthen Street is now present. The nature and extent of the dump are not clearly defined, and the dates and duration of dump operations are not known.
- Based on Washington State Department of Ecology (Ecology) files,[1] documented diesel releases from underground storage tanks (USTs) at the BNSF railyard were identified during UST closure activities in 1991. Groundwater monitoring at the railyard continued at least through 2018. The former USTs are potentially upgradient of the Site.
- A number of petroleum releases have been documented at the adjacent Coleman Oil Company property to the south, including gasoline releases in 2010 and 2013, and a significant release of R99 biodiesel from underground piping in 2017, resulting in a light non-aqueous phase liquid (LNAPL) plume that migrated north-northeast across Chehalis Street, apparently under the southeastern portion of the PUD property, across Worthen Street, and ultimately discharged to the Columbia River.
- Based on Sanborn Fire Insurance maps, a gasoline service station and oil storage facility operated by Cascade Oil & Gas Company were located on the adjacent property to the north of the Site (SC Fresh) in 1921. In 1928 and 1947, the facilities were operated by Continental Oil.

In April 2018 during subsurface investigation activities related to a release of R99 biodiesel at the Coleman Oil Company property, apparent dense non-aqueous phase liquid (DNAPL) coal tar or other tar-like substances were encountered in a subsurface boring north of the Coleman Oil Company site, proximate to the historical MGP site.

1.2 Initial Investigation

PSE conducted initial investigation activities in October 2021 and April 2022 in the Worthen Street right-of-way (ROW), including drilling and sampling eight soil borings (WB-1 through WB-4 and WMW-1 through WMW-4) and installing monitoring wells in four of the borings (WMW-1 through WMW-4). Groundwater was also sampled from the monitoring wells during four quarterly monitoring events.

Soil and groundwater samples were analyzed for total petroleum hydrocarbons (TPH) in the gasoline (TPH-G), diesel (TPH-D), and heavy oil ranges (TPH-O); benzene, toluene, ethylbenzene, and xylenes (BTEX); and semivolatile organic compounds including polycyclic aromatic hydrocarbons (PAHs). Total cyanide and pH were also analyzed for in soil samples collected from borings where monitoring wells were installed. Total metals (arsenic, barium, cadmium, chromium [unspeciated], copper, lead, mercury, nickel, selenium, silver, and zinc) were analyzed for in soil samples collected from boring locations where monitoring wells were not installed. Free cyanide and weak acid dissociable cyanide

[1] Ecology. Cleanup and Tank Search: BNSF Wenatchee Railyard – Wenatchee, Chelan County; Facility Site ID: 28673212; Cleanup Site ID: 5820. Washington State Department of Ecology. https://apps.ecology.wa.gov/cleanupsearch/site/5820.

were analyzed for in groundwater samples collected during three of the four quarterly monitoring events (along with total cyanide).

Soil analytical results were compared to regulatory screening levels (based on Model Toxics Control Act [MTCA] Method A and Method B cleanup levels [CULs] as applicable). Screening levels (SLs) for soil incorporating laboratory reporting limits and practical quantitation limits and a terrestrial ecological evaluation were not developed. Detections of TPH, BTEX, and PAHs were reported at concentrations above CULs at various depths in all boring locations. TPH was reported at concentrations above 10,000 milligrams per kilogram in soil samples collected from soil borings WB-2 (43 to 44 ft bgs), WB-3 (36 to 37 ft bgs), WB-4 (19 to 20 ft bgs) and monitoring well locations WMW-1 (46 to 47 ft bgs), WMW-2 (34 to 35 ft bgs), WMW-3 (23 to 24 ft bgs), and WMW-4 (36 to 37 ft bgs), indicating that non-aqueous phase liquid (NAPL) may be present in those locations. Observed NAPL was noted in boring logs for soil boring location WB-2 and monitoring well locations WMW-1 and WMW-4. Arsenic was reported at concentrations above CULs in soil samples collected from boring WB-3, cadmium was detected at concentrations above CULs at WB-1, and lead was detected at concentrations above CULs at WB-1 and WB-3. Boring logs have also indicated the presence of buried debris adjacent to the east/northeast of the Site (Geoengineers 2023),[2] which may be from dumping activities, but may have resulted from general filling along the shoreline.

Groundwater analytical results were compared to regulatory SLs. Groundwater SLs take into consideration surface water criteria and drinking water criteria, and are adjusted to account for practical quantitation limits. TPH-G, TPH-D, benzene, ethylbenzene, PAHs, and total cyanide were reported at concentrations above SLs in groundwater samples collected from WMW-3 and WMW-4 during each of the monitoring events (total cyanide was analyzed in three of the four monitoring events) and total xylenes were detected at concentrations above SLs during one of the monitoring events at WMW-3 and two events at WMW-4. Benzene was detected at concentrations above SLs in all samples collected from WMW-1 and during three of the four monitoring events at WMW-2. Chrysene (a PAH) was reported at a concentrations above the SL in one groundwater sample collected from WMW-1 and ethylbenzene and 1-methylnaphthalene and naphthalene (PAHs) were detected at concentrations above SLs in one sample collected from WMW-2 (GeoEngineers 2023).[2]

Copies of laboratory soil and groundwater analytical data tables, boring and well completion details, and boring logs from the initial investigation are provided in Appendix A.

1.3 Investigation Approach

The Site investigation will consist of advancing up to 14 soil borings (Figure 2) to a depth of 45 to 50 ft bgs using sonic drilling and sampling techniques, including up to 2 borings completed in the Worthen Street ROW, to evaluate and document subsurface conditions, further delineate the extent of known DNAPL impacts to soil around the Site, and assess the potential presence of contamination

[2] GeoEngineers. 2023. Tables 1-5: Soil and Groundwater Analytical Results,. GeoEngineers, Inc. February.

at locations outside of the area of the initial investigation. Up to eight monitoring wells will be installed at selected boring locations. The depth of the soil borings is below the previously identified depth of groundwater and below the typical static water level of the Columbia River. It is also below the maximum depth where DNAPL has been encountered in previous Site investigations. The borings are anticipated to penetrate the siltstone bedrock of the Chumstick Formation, which appears to be a competent and consolidated material and that appears to act as an aquitard and barrier to vertical migration of DNAPL. Soil samples for laboratory analysis will be collected from each boring location. Borings that are not converted to monitoring wells will be designated sequentially starting at WB-5; borings that will be converted to monitoring wells will be identified with the same designation as the monitoring wells starting sequentially at WMW-5. No borings or monitoring wells are anticipated to be completed within the footprint (secure fenced area) of the existing substation.

Up to eight monitoring wells will be installed in soil borings that will add to and establish a wider monitoring network at the Site (Figure 2). The expanded monitoring network will provide data on the extent of contamination resulting from known historical locations where releases are most likely to have occurred. The locations of the monitoring wells will be within or downgradient of the footprint of historical structures where releases may have occurred or generally downgradient in the direction of previously observed contaminant migration patterns at the Site and the adjacent Coleman Oil Company site to the south. The proposed monitoring well locations are subject to change based on identified locations of utilities and other field conditions observed during the investigation, and may be altered at the discretion of the project field geologist and project manager. Monitoring wells will generally not be installed in soil borings where field-screening results identify the presence of DNAPL below the groundwater table to a) avoid creating vertical conduits for DNAPL migration, and b) to avoid biased high dissolved-phase contaminants in samples where DNAPL is in contact with water in the annular space of the well.[3]

Selected areas of the Site that will be investigated and where monitoring wells are anticipated to be installed are outlined below and shown on Figure 2:

- **Former Steam Electric Generation Plant:** One soil boring will be advanced in the apparent downgradient direction (northeast) of the former location of the steam plant. It is anticipated that a monitoring well (WMW-5) will be installed in this location.
- **Former Gas Holder:** One soil boring will be advanced within the footprint of the former MGP gas holder. It is anticipated that a monitoring well (WMW-6) will be installed in this location. One soil boring (WB-5) will be advanced in the apparent downgradient direction (northeast) of the former gas holder.
- **Former Oil Tank/Gas Tank/Compression Tank:** Two soil borings will be advanced in the apparent downgradient direction of several former tanks associated with the MGP gas works operations. Soil boring WB-6 will be proximate to the northeast of the former oil tank and

[3] Landau may elect to install monitoring wells if the boring location is in a critical location for monitoring and/or if the DNAPL location is below the proposed screened interval of the well and can be sealed off from the well with hydrated bentonite backfill.

compression tank, and it is anticipated that a monitoring well (WMW-8) will be installed in the boring farther to the northeast near the eastern PUD property line.

- **Former Gas Works Building:** One soil boring will be advanced within the footprint of the former MGP gas works building (WB-7) and three other soil borings (WB-8, WB-9, WB-10) will be installed in the apparent downgradient direction (northeast) of the former gas works building.
- **Former Coal Storage:** One soil boring will be advanced proximate to the west of the former MGP coal storage area. It is anticipated that a monitoring well (WMW-7) will be installed in this boring location. This location is also near the western PUD property line on the apparent upgradient side (west) of the Site.
- **North End of PUD Property:** Two soil borings will be advanced near the northwest and northeast corners of the PUD property currently leased by SC Fresh. Monitoring wells will be installed in these two locations (WMW-9 and WMW-10, respectively). WMW-9 should provide information about upgradient/crossgradient groundwater conditions for the Site. WMW-10 should provide information about groundwater conditions at the downgradient end/northeast corner of the PUD property.
- **Downgradient of PUD Property:** One soil boring will be advanced to the northeast or north of WMW-1, which is the northernmost investigation location to date that has identified the presence of DNAPL. It is anticipated that a monitoring well (WMW-11) will be installed in this location. Note if the location shown for WMW-11 is not sufficiently distant from the overhead power lines in this location to safely drill, the location will be moved to the west side of Worthen Street as shown on Figure 2. Further, a contingent boring/monitoring well location (WMW-12) may be completed north/northeast of WMW-11 only if DNAPL or other significant indication of contamination is identified at WMW-11 indicating the need for further delineation of the northern extent of contamination potentially associated with the Site. Similar to WMW-11, an alternate location on the west side of Worthen Street may be used for WMW-12 if the distance to overhead power lines is not sufficient to safely drill.

2.0 INVESTIGATION AND CHARACTERIZATION ACTIVITIES

This section describes investigation and characterization activities, including permitting coordination, utility locating and utility clearance, completing soil borings and collecting soil samples, monitoring well installation and development, groundwater monitoring, equipment decontamination, and management of residual wastes. A Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), Site-specific Health and Safety Plan (HASP), and Inadvertent Discovery Plan (of archaeological resources) are included with this work plan as Appendices B through E, respectively. Samples for chemical analysis will be collected based on the procedures and methodologies described in the SAP and analytical results will be managed based on the information provided in the QAPP. Laboratory analytical services will be provided by Apex Laboratories, LLC (Apex) in Tigard, Oregon, an Ecology-accredited laboratory.

2.1 Permitting Coordination

Up to two soil borings/monitoring wells will be completed in the Worthen Street ROW (Figure 2). Landau will apply for necessary permits and submit traffic control plans as needed for work in the City of Wenatchee ROW and will arrange for traffic control for partial road closures, as necessary. TBMM, LLC of Wenatchee, Washington will provide traffic control and the traffic control plan.

The drilling contractor will submit a Notice of Intent to Ecology for each planned soil boring or monitoring well at least 72 hours prior to commencing drilling activities in accordance with Washington Administrative Code (WAC) 173-160-151.

2.2 Utility Locating and Utility Clearance

Prior to commencing drilling activities, any available utility maps provided by Chelan PUD and/or PSE will be reviewed to identify utilities in the vicinity of the proposed exploration locations. In addition, drilling locations will adhere to minimum clearance distances from overhead transmission lines in accordance with WAC 296-24-960. A public utility locating service will be contacted to mark public utilities in the vicinity of proposed drilling locations. Landau will visit the Site with Utilities Plus, LLC, a private utility locator, to mark the proposed boring/monitoring well locations and private conductible utilities on the Site using electromagnetic and radio frequency transmission locating equipment. Ground-penetrating radar will also be used to attempt to locate any subsurface structures or other impediments (e.g., former building locations, unknown underground storage tanks, non-conductive utilities, large boulders, etc.) in the proposed drilling areas.

Due to the known high density of underground utilities at the PUD property and in the ROW, an air knife/vactor truck, operated by Anderson Environmental Contracting, LLC (AEC) will be used to clear each soil boring location to a depth of at least 5 ft to ensure the absence of shallow utility or other obstructions at each drilling location. Soils on the edges of each air-knife hole will be observed for evidence of DNAPL or other obvious contamination. Soil samples will be collected by hand or hand-

auger from the air-knife hole sidewalls for field screening and/or laboratory analysis if DNAPL or other obvious contamination is observed.

If any overhead transmission lines, subsurface utilities, or other subsurface impediments are identified at or proximate to the proposed boring locations during the utility locates, the borings will be moved a safe distance from such locations. If air knifing provides visual indications of utilities at the boring location, the boring will be backfilled with bentonite (and patched at the surface with similar materials to current surface conditions as needed; e.g., asphalt, concrete, or gravel) and an alternate location for the boring will be chosen. Any alternate boring locations will also be cleared with the air knife.

2.3 Advancement of Soil Borings and Soil Screening

After utility clearance at each soil boring location, up to 14 soil borings will be advanced to 45 to 50 ft bgs (or refusal if encountered at shallower depths) at the Site using sonic drilling techniques at the general locations described above. All drilling activities will be conducted by AEC and observed by Landau field personnel. Sonic drilling methods are recommended based on the subsurface conditions encountered during prior Site work. At each location, a continuous soil core will be collected, and soils will be logged in the field in accordance with the Unified Soil Classification System. Soils will also be field-screened for the presence volatile organic compounds (VOCs) and DNAPL. Field-screening techniques include observing the soil for staining, sheen, discoloration, odor, and other evidence of impact, using a photoionization detector to evaluate whether VOCs are present in soil, and performing sheen testing to evaluate the potential presence of petroleum hydrocarbons.

Munson Engineering, Inc. (Munson Engineering), a licensed land surveyor will survey the ground surface elevation of borings not converted to wells relative to the North American Vertical Datum of 1988 (NAVD88) and the horizontal location relative to the North American Datum of 1983 (NAD83).

2.4 Soil and Free Product Sample Collection

Based on the field-screening results, up to two samples of soil from each boring will be selected for laboratory analysis. Soil samples will be collected from the interval where screening identifies the greatest likelihood of contamination as well as from below the contaminated interval (if present), or from the interval immediately above competent bedrock if no contamination is indicated through screening. If free product DNAPL is encountered, soil samples will be collected from above and below the DNAPL-impacted interval and additional soil and/or DNAPL samples will be collected from within the DNAPL-impacted interval for leachability and fingerprinting analysis. All samples will be submitted to Apex Laboratories, LLC (Apex) of Tigard, Oregon for analysis.

Soil samples selected for analysis will be submitted to a laboratory and analyzed for:

- TPH-G by the Northwest TPH extended-range gasoline (NWTPH-Gx) analytical method, and TPH-D and TPH-O by the Northwest TPH extended-range diesel (NWTPH-Dx) analytical method

- BTEX by US Environmental Protection Agency (EPA) Method 8260D
- Total metals – Resource Conservation and Recovery Act (RCRA) 8 (arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver) by EPA Method 6020B
- PAHs by EPA Method 8270E (reporting limits for 8270 scan meet project screening levels; however, samples may be run with selected ion monitoring [SIM] if screening levels are not achieved)
- Total cyanide by ASTM International (ASTM) Method D7511
- To determine the mobility of organic constituents present in soil, up to six soil samples will be selected for synthetic precipitation leaching procedure (SPLP) analysis for BTEX and naphthalene (BTEXN) from sampling locations with detections of one or more of these analytes.

In addition to the samples selected for laboratory analyses, additional samples may be submitted to the laboratory for archival purposes in case future analyses are needed.

If free product DNAPL is encountered in soil borings, DNAPL samples will be collected for specific analyses that may be useful for the following:

- Evaluating cleanup alternatives,
- Informing the leachability and mobility of free product present at the Site, and
- Potentially creating an analytical standard to quantify dissolved constituents detected in Site groundwater samples that may not be attributable to Site DNAPL and that may originate from an offsite source not related to former MGP operations.

Samples of free product DNAPL will be collected at the first two locations DNAPL is encountered as well as at any additional locations where the observed characteristics of encountered DNAPL differ as described in the SAP (Appendix B).

If present, DNAPL samples will be submitted for specialty physical characteristic and fingerprinting analyses, including:

- Water-soluble fraction for TPH-D by NWTPH-Dx, forensic VOCs by NWTPH-Gx/EPA Method 8260, and PAHs by EPA Method 8270 to determine the quantities and ratios of the water-soluble fractions of free product DNAPL
- DNAPL forensic fingerprinting with simulated distillation by ASTM Method D2887-14
- SPLP for BTEXN by EPA Methods 1312/8260.

Based on the results of the above-noted leachability and fingerprinting analyses, all or a subset of the DNAPL samples will be analyzed for specialty physical characteristics. Selected DNAPL samples will be analyzed for:

- Viscosity by ASTM Method D445: The viscosity of free product DNAPL will be determined at up to three elevated temperatures. Data from the viscosity analyses can then be plotted on a log, which may inform viscosity at additional temperatures.
- Density by ASTM Method D4052.
- Interfacial tension by ASTM Method D971.

Apex will provide a narrative describing the results of the leachability and DNAPL analysis, which will accompany the laboratory analytical report.

If LNAPL is encountered in soil in any of the borings, soil samples will be collected and analyzed for Hydrocarbon Identification (HCID). Based on HCID results, additional quantitative analysis may be performed (e.g., for TPH-D, TPH-G, and/or TPH-O) with approval from PSE.

2.5 Monitoring Well Installation and Development

Up to eight monitoring wells will be installed at selected boring locations (Figure 2). The monitoring wells will be constructed in accordance with Ecology regulations (WAC 173-160-420) and be constructed of 2-inch Schedule 40 PVC. Each well will be screened below the identified groundwater table (anticipated to be encountered at approximately 20 to 25 ft bgs based on existing monitoring wells at the Site) with 10 ft of 0.020-inch slot-size screen. The bottom depth of the monitoring well will be placed on top of competent bedrock (siltstone or sandstone) observed during borehole drilling (anticipated to be from 40 to 45 ft bgs based on prior drilling in the vicinity of the Site). A filter pack (10/20 sand or equivalent) will extend from the base of the boring to a minimum of 2 ft above the screen. A bentonite seal will be placed above the filter pack material and extend to 1 ft below grade. The well casing will be capped with a locking expansion cap and completed flush with the ground surface. Wells completed within or near the Worthen Street ROW will be completed with high-density runway-rated monuments set in concrete. The remainder of the wells will be completed with traffic-rated steel vaults set in concrete.

After at least 24 hours following installation (to allow the monuments to properly set and bentonite seals to fully hydrate), each of the newly installed wells will be developed by using surging and pumping methods to ensure hydraulic continuity between the well screen and formation materials. Munson Engineering will survey the ground surface and top of casing elevations of the wells relative to NAVD88 and horizontal location relative to NAD83.

2.6 Geotechnical Data Collection

Landau will also collect specific geotechnical information from a selected group of boring locations (WB-5, WB-7, WB-8, WB-9, WMW-6, and WMW-7) during drilling that will be limited to collecting soil samples using Standard Penetration Test (SPT) split-spoon sampling techniques (2-inch outer diameter) in general accordance with ASTM D1586. Larger-diameter sampling equipment (3-inch outer diameter) will be available for use if conventional SPT methods are ineffective to collect soil

samples (most common in gravel soils). SPT sampling is considered an "*in situ*" test from which engineering parameters can be correlated to blow count values ("N value"), which are the recorded number of blows per 12 inches of penetration into the soil when hit with a 140-pound weight free-falling from a 30-inch height. SPT depth intervals will be 2.5 ft to a total depth of 15 ft bgs, then 5 ft to the bottom of the boring. Aspect Consulting (Aspect), the PUD's geotechnical subcontractor, will be on Site during advancement of those borings and may collect soil samples for grain-size or other geotechnical analyses. Soil samples will be collected for environmental purposes, as needed, prior to any geotechnical sample collection. Boring logs generated by Landau will include blow count information.

Landau understands that Aspect intends to advance additional borings near the substation for geotechnical purposes following completion of characterization and investigation borings and monitoring wells described in this work plan. Landau will observe the advancement of each Aspect-directed boring and will visually assess soil conditions and screen for evidence of DNAPL or other obvious contamination in soil cores. If necessary, Landau will collect soil and/or free product DNAPL samples from these borings for analysis described in Section 2.4.

2.7 Groundwater Sampling and Analysis

Groundwater samples will be collected from new and existing monitoring wells to determine the nature and extent of groundwater contamination (primarily consisting of or related to DNAPL coal tar or other tar-like substances) that have been identified in the vicinity of the Site and that appear to originate from historical MGP operations at the Site that preceded construction of the Worthen Street Substation. After at least 72 hours following well development (to allow for post-development equilibrium conditions to establish), groundwater samples will be collected from each of the newly installed monitoring wells and the four existing monitoring wells (WMW-1 through WMW-4) and submitted for laboratory analysis.

Prior to sampling, Landau personnel will measure the depths to groundwater in the 12 Site monitoring wells using an electronic oil/water interface probe to assess the potential presence of LNAPL or DNAPL petroleum product. Landau will use either a peristaltic pump or bladder pump[4] with new tubing to purge and sample each of the Site wells using low-flow purging methods. The pump intake will be set at approximately 2 ft below the top of the screen in each of the monitoring wells if the groundwater level is above the top of the screen or 2 ft below the measured groundwater table if the groundwater level is within the screened interval. Based on the depth to groundwater and competent bedrock observed during previous investigations and the proposed monitoring well construction, the groundwater level is anticipated to be generally above the top of the screen elevation.[5] During the

[4] Bladder pumps are used if the static water level is deeper than 28 ft bgs.

[5] If evidence of LNAPL is observed in soil borings (e.g., sheen in soil above the water table) where a monitoring well is planned, Landau will evaluate whether the well should be screened across the water table to be able to monitor for free-phase LNAPL. Landau will discuss with PSE prior to well construction.

purging of each well, the pH, conductivity, temperature, oxidation-reduction potential, dissolved oxygen, and turbidity of the extracted water will be measured and well drawdown will be monitored and documented. After stabilization of the field parameter measurements, one groundwater sample will be collected from each well. One blind duplicate sample for all analytes will be collected during each sampling event.

Groundwater samples will be submitted to a laboratory and analyzed for:

- TPH-G by NWTPH-Gx.
- TPH-D and TPH-O by NWTPH-Dx.
- BTEX by EPA Method 8260D.
- Dissolved metals – RCRA 8 by EPA Method 6020B.
- PAHs (will be analyzed for only in samples with low turbidity; <5 nephelometric turbidity units) by EPA Method 8270E (reporting limits for 8270 scan meet project screening levels; however, samples may be run with SIM if screening levels are not achieved).
- Free cyanide by ASTM Method D7237-10.
- If soil borings completed at upgradient locations (WMW-7 and WMW-9) show no indications of impacts from free product DNAPL, additional dissolved-phase "fingerprinting" analysis may be run on groundwater samples collected from those monitoring wells to further characterize and quantify dissolved constituents in groundwater potentially entering the Site. Additionally, selected groundwater samples collected downgradient or within areas of the Site known to have DNAPL with detections of dissolved-phase constituents will be submitted for fingerprinting analysis. PAH homolog analysis by EPA Method 8270m may be conducted on selected groundwater samples.

After the initial groundwater monitoring event, quarterly groundwater monitoring will be conducted at the 12 Site monitoring wells for a minimum of 3 quarters.

2.8 Equipment Decontamination

All non-dedicated sampling and drilling equipment will be decontaminated according to the procedures described in the HASP (Appendix D). This includes downhole drilling equipment, sample tubing, and any other equipment that comes into contact with Site soil or groundwater. Dedicated equipment will be used to the extent possible to reduce the potential for cross-contamination.

2.9 Investigation-Derived Waste Management

Investigation-derived waste (IDW) from the investigation (e.g., soil cuttings, purge water, decontamination water) will be stored in Washington State Department of Transportation-approved 55-gallon drums. Procedures for IDW storage will be as follows:

- Segregate soils into separate drums based on field-screening results (e.g., evidence of DNAPL, sheen, or heavy staining) and/or boring locations so the source of materials in each drum can be easily identified.
- Depending on volumes produced, IDW water (e.g., purge water, decontamination water) may be segregated by wells or combined and stored in the same drum(s).
- Leave about 3 to 4 inches of headspace in each drum.
- When full or when not in active use, confirm the lid and ring are securely closed and attached to each drum and cover the drums with plastic that extends to the ground.
- Drums will be stored on a hard, flat surface, at a pre-approved temporary storage location at the Site. Soil drums can be stored directly on the ground. Drums containing liquids will be stored within a plastic temporary secondary containment area (berms can be created with sandbags, clean soil, lumber (e.g., 4x4 posts) with heavy plastic sheeting covering the storage area and berms and secured by wrapping the plastic around the berm material or otherwise securing the plastic in place.

Upon initial placement of IDW into a drum, each drum will be labeled with "Investigation-Derived Waste – Pending Analysis" and the following information:

- A description of the media (i.e., soil or water)
- Origin of the media (i.e., boring or well number; including depth interval for soil from borings if divided between multiple drums)
- Accumulation start date (i.e., date the medium was first placed in the drum)
- Site identification (i.e., 500 South Worthen Street, Wenatchee, WA)
- Generator name (i.e., Puget Sound Energy)
- Contact person (i.e., Suzanne Dolberg, phone: (425) 462-3593)
- Drum ID number corresponding to Landau drum inventory form
- Any other pertinent information
- Ensure information on Landau drum inventory form matches information on waste labels.

Once characterization has been completed, drums will then be labeled with Hazardous/Dangerous Waste or Non-Hazardous/Non-Dangerous Waste labels, as appropriate. Placement of these labels will occur no later than 30 days after receipt of the final analytical results used for waste characterization and classification.

After analytical results are received, Landau will arrange for the appropriate offsite disposal of the drums and their contents at an appropriately licensed and permitted disposal facility. Able Clean-up Technologies, Inc. of Spokane, Washington will transport the waste drums to the appropriate disposal facility.

3.0 DATA EVALUATION AND REPORTING

Field and analytical data collected following completion of the work described above will be tabulated and evaluated. Where applicable, analytical data will be compared to regulatory screening levels based on MTCA Method A and Method B CULs or SLs, as applicable. Landau will prepare an investigation report that details the completed fieldwork, including drilling, soil sampling, well installation, and quarterly groundwater sampling activities. The report will also include:

- Results and findings of the work, including data figures
- Identified data gaps or recommendations for additional investigation or data collection activities for initial Site characterization
- Tables comparing soil and groundwater sampling results to applicable MTCA cleanup levels
- Discussion of data validation and data quality
- Well logs, site plans and maps, and analytical reports.

As necessary to facilitate conversations and planning with project stakeholders and/or Ecology, preliminary data submittals such as tables and figures will be prepared after the initial soil and groundwater investigation activities and after each quarterly groundwater monitoring event.

Laboratory data generated during the investigation will be uploaded to Ecology's Environmental Information Management (EIM) system following approval of the final investigation report.

4.0 USE OF THIS WORK PLAN

This Work Plan has been prepared for the exclusive use of Puget Sound Energy, Chelan Public Utility District, and applicable regulatory agencies for specific application to the Site. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

N

0 0.5 1

Miles

Data Source: Esri 2012.

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Worthen Substation Site Wenatchee, Washington	**Vicinity Map**	Figure 1

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Legend

- Proposed Monitoring Well
- Proposed Boring
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (HydroCon)
- Monitoring Well (EPI 2017)
- Soil Boring (GeoEngineers 2022)
- Soil Boring (Kennedy Jenks 1993)
- Soil Boring (SEACOR 1991)
- Soil Boring
- Recovery Well (FARALLON)
- TPH soil (>CUL)
- TPH NAPL (>10,000 mg/kg TPH)
- TPH gw (>CUL)
- BTEX gw (>CUL)

- Worthen Substation Property
- Chelan County Parcels
- Sanborn Locations in 1949
- Water Fitting
- Water Meter
- Water Service Tap
- Water Meter Chamber
- Controllable Valve
- Manhole and Vault
- PUD FiberNode
- PUD Pole
- Sewer Manhole and Vault
- PUD Light
- PUD Electric Network Junctions
- PUD elecSwitchBank
- PUD Transformer Bank
- PUD Fiber Service Point
- PUD FIBER Underground Structure
- PUD Riser
- Approximate Gas Main Line
- Approximate Water Line
- PUD Fiber
- PUD elecUnderground Line
- PUD elecSecondary Underground Line
- PUD elecOverhead Line
- PUD elecSecondary Overhead Line
- Storm Water Lateral
- Culvert
- PUD Miscellaneous Line

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon.

0 70 140

Scale in Feet

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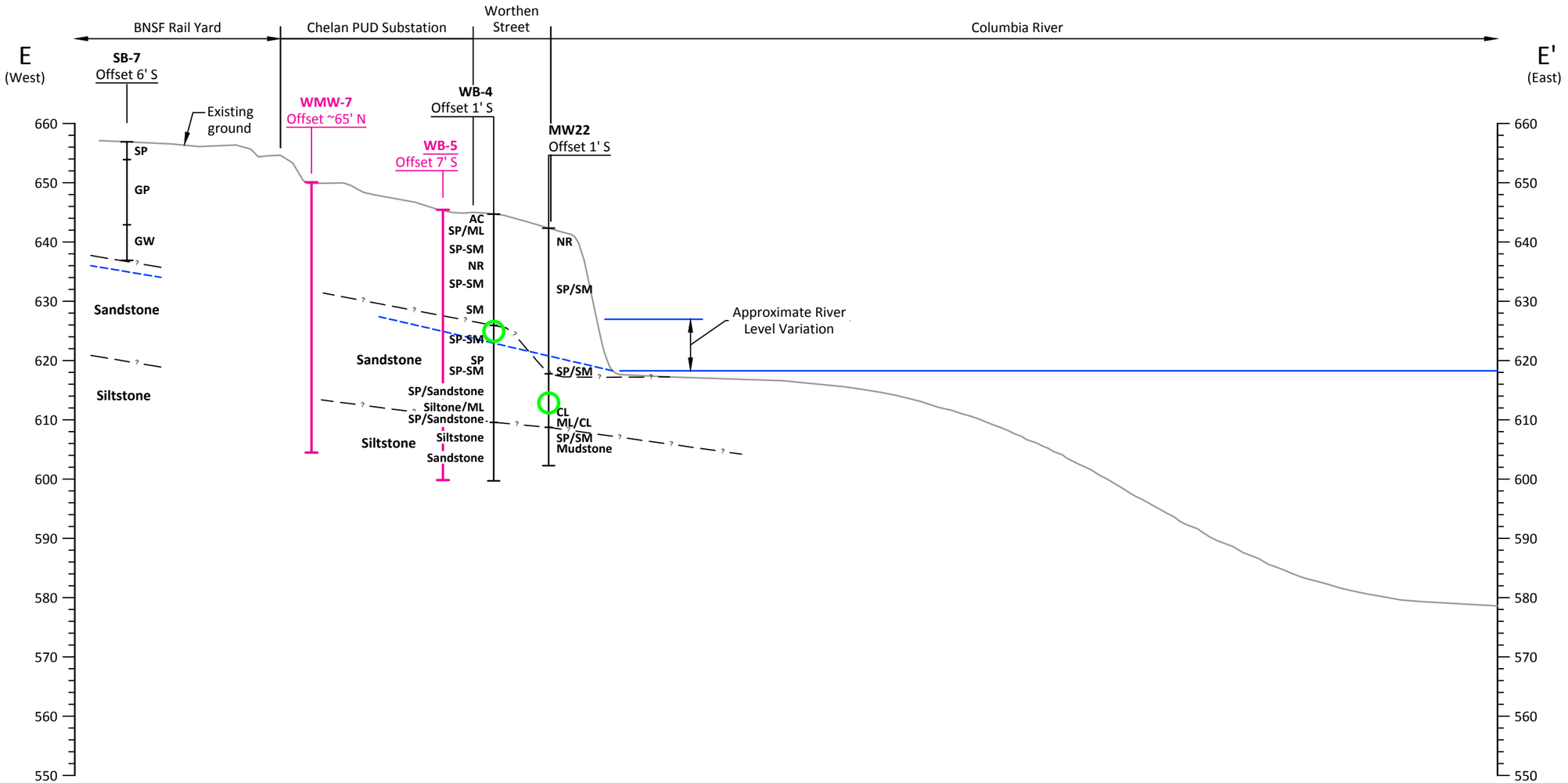
Worthen Substation Site
Wenatchee, Washington

Preliminary Draft
Proposed Boring and Monitoring Well Locations

Figure
2



Geologic Profile E-E'

Key

Proposed Boring/Monitoring Well

TPH NAPL (>10,000 mg/kg TPH)

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 100 200

Scale in Feet
5X vertical exaggeration

Sources: Navionics Bathymetry; GeoEngineers, SEACOR.

Worthen Substation Site Wenatchee, Washington	**Geologic Cross-Section E-E'**	Figure 3

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APPENDIX A

Soil/Groundwater Tables and Boring/Well Logs from Initial Investigation

Table 1

Summary of Explorations (Soil Borings and Monitoring Well Construction Details) [1]

Worthen Substation Site
Wenatchee, Washington

Location ID	Boring Type	Date Installed	X Coordinate (easting)	Y Coordinate (northing)	Drilling Method	Total Boring Depth (feet bgs)	Ground Surface Elevation (feet NAVD88)	Total Well Depth (feet bgs)	Well Diameter / Material (inches)	Length of Screen (feet)	Screen Interval Top (feet bgs)	Screened Interval Bottom (feet bgs)	Top of Casing Elevation (feet NAVD88)	Difference between ground surface and TOC (feet)
WB-1	Soil Boring	10/5/2021	1771546.287	153552.2687	Sonic	40	642.87	--	--	--	--	--	--	--
WB-2	Soil Boring	10/7/2021	1771540.963	153451.8972	Sonic	55	647.10	--	--	--	--	--	--	--
WB-3	Soil Boring	10/4/2021	1771627.141	153512.8549	Sonic	48.5	639.67	--	--	--	--	--	--	--
WB-4	Soil Boring	10/6/2021	1771624.317	153352.7605	Sonic	45	644.57	--	--	--	--	--	--	--
WMW-1	Monitoring well	4/4/2022	1771500.448	153649.0635	Sonic	60	642.84	36.80	2/PVC - Flush	10	26.40	36.40	642.59	0.24
WMW-2	Monitoring well	4/6/2022	1771568.812	153630.1687	Sonic	40	639.64	35.18	2/PVC - Flush	20	14.78	34.78	638.94	0.70
WMW-3	Monitoring well	4/6/2022	1771610.173	153554.9907	Sonic	40	639.54	36.75	2/PVC - Flush	20	16.35	36.35	638.64	0.90
WMW-4	Monitoring well	4/5/2022	1771625.294	153509.9315	Sonic	40	640.07	36.41	2/PVC - Flush	20	16.01	36.01	639.47	0.60

Notes

[1] Ground surface and top of casing elevations (ft NAVD88) were surveyed by Erlandsen in May 2022 for GeoEngineers' monitoring wells (WMW-1 through WMW-4). Ground surface of WB-1 through WB-4 was also surveyed.

feet bgs = feet below ground surface

TOC = top of casing

WB = Worthen Boring

WMW = Worthen Monitoring Well

NAVD88 - North American Vertical Datum of 1988

HORIZONTAL DATUM: WASHINGTON STATE PLANE COORDINATESYSTEM NORTH ZONE, GRID (NAD83-1996).

VERTICAL DATUM: NAVD 1988 BASED ON GPS OBSERVATIONS POINT # 90

Table 2

Phase 1 and Phase 2 Soil Analytical Data

Worthen Substation Site
Wenatchee, Washington

Location ID			WB-1				WB-2					WB-3				
Sample ID			WB-1-5-6	WB-1-22-22.5	WB-1-26-27	WB-1-31.5-32	WB-2-6-7	WB-2-23-24	WB-2-35-36	WB-2-43-44	WB-2-51-52	WB-3-24.5-25	WB-3-33-34	WB-3-36-37	WB-3-42-42.5	WB-3-48-48.5
Sample Date			10/5/2021	10/5/2021	10/5/2021	10/5/2021	10/6/2021	10/6/2021	10/6/2021	10/7/2021	10/7/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021
Start Depth (ft)			5	22	26	31.5	6	23	35	43	51	24.5	33	36	42	48
End Depth (ft)			6	22.5	27	32	7	24	36	44	52	25	34	37	42.5	48.5
Sheen			MS	SS	MS	MS	NS	MS	MS	NAPL	SS	NS	MS	HS	NS	SS
PID (ppm)			1.6	1.8	6.0	5.6	0.0	55.1	11.9	NR	1.4	0.5	1.1	34.7	21.1	1.2
HC Odor	MTCA A	MTCA B	Slight	Moderate	Moderate	None	None	None	Moderate	Strong	None	Slight	None	Moderate	None	None
Total Petroleum Hydrocarbons [1,2] (mg/kg)																
Gasoline-range hydrocarbons	30	NE	**33.9**	9.12 U	**688**	**101**	**8.45**	**586**	**23**	**7,480**	**49.4**	**76.6**	**54.9**	**3,380**	**65.3**	**26.6**
Diesel-range hydrocarbons	2,000	NE	**414 J**	**111**	**1,450**	**263**	53.4 U	**579**	54.4 U	**19,000**	**58.0**	**1,590 J**	**1,510**	**17,900**	72.8 U	54.6 U
Lube oil-range hydrocarbons	2,000	NE	**1,350**	**200**	**342**	**322**	107 U	111 U	109 U	**3,920**	104 U	**2,130**	**3,090**	**6,480**	146 U	109 U
Sum diesel+oil-range hydrocarbons[3]	2,000	NE	**1,764 J**	**311**	**1,792**	**585**	107 U	**579**	109 U	**22,920**	**58**	**3,720**	**4,600**	**24,380**	146 U	109 U
BTEX[4] (ug/kg)																
Benzene	30	18,000	**6.35**	**6.3**	**3,660**	**108 J**	**0.76 J**	**3.17**	**19.3**	**58,900**	**20.1**	**2,100**	**17.6**	**6,020**	**255**	**2.05**
Ethylbenzene	6,000	8,000,000	**3.32**	**0.53 J**	**7,850**	**7.91 J**	**1.58**	**18.6**	**34.1**	**172,000**	**6.58**	**2,290**	**2.76**	**7,120**	**213**	**7.04**
Toluene	7,000	6,400,000	**6.67**	**5.74**	**625**	**4.95 J**	0.99 U	**1.91**	**13.7**	**173,000**	**32.8**	**353**	**9.68**	**230 J**	**94.2 J**	1.13 U
Xylene, m-,p-	NE	NE	**5.53**	**1.38 J**	**2,640**	**6.98 J**	1.99 U	**10.4**	**37.5**	**213,000**	**18.2**	**1,430**	**3.52 J**	**3,330**	**244**	**4.13**
Xylene, o-	NE	NE	**2.40**	**0.52 J**	**3,360**	**2.59 J**	0.99 U	**81.4**	**18.7**	**100,000**	**7.35**	**318**	**1.52 J**	**1,820**	**836**	**2.11**
Total Xylenes	9,000	16,000,000	**7.93**	**1.9 J**	**6,000**	**9.57 J**	1.99 U	**91.8**	**56.2**	**313,000**	**25.6**	**1,750**	**5.04**	**5,140**	**1,080**	**6.24**
PAHs[5] (µg/Kg)																
1-Methylnaphthalene	NE	34,000	**54.4**	**396**	**19,300**	**232**	15.0 U	**5,400**	**1,850**	**509,000**	**660**	**253**	**1,720**	**271,000**	**866 J**	**219**
2-Methylnaphthalene	NE	320,000	**59.8**	**373**	**12,400**	**221**	15.0 U	4.99 U	**2,610**	200 U	**964**	**389**	**1,680**	8,020 U	**1,270 J**	**238**
Acenaphthene	NE	4,800,000	**8.79 J**	**9.46 J**	**9,880**	**143**	15.0 U	**1,170**	**225**	**65,400**	**60.7**	**49.3 J**	**8,940**	**180,000**	**205**	**48.7**
Acenaphthylene	NE	NE	15.0 U	**6.81 J**	**4,220**	5.00 U	15.0 U	**415**	**781**	**325,000**	**255**	**21.9 J**	50.0 U	**20,600**	**127**	**4.88 J**
Anthracene	NE	24,000,000	**13.8 J**	**5.77**	**9,380**	5.00 U	15.0 U	**1,460**	**360**	**129,000**	**162**	**27.3 J**	**567**	**73,200**	**109**	**23.2**
Benzo(a)anthracene	NE	NE	**57.7**	**31.6**	**5,740**	**43.2**	**9.17 J**	**770**	**202**	**68,800**	**106**	**70.2**	**119**	**42,100**	**62.7**	**18.2**
Benzo(a)pyrene	100	190	**77.5**	**25.0**	**4,530**	**38.4**	**11.6 J**	**399 J**	**168 J**	**53,400**	**98.4 J**	**57.6**	**80.7**	**34,500**	**50.8**	**19.7**
Benzo(b)fluoranthene	NE	NE	**68.9**	**35.7**	--	**37.5**	**15.4 J**	**188**	**77.8 J**	--	**58.0 J**	**61**	**82.7**	--	**25.9**	**11.2**
Benzo(g,h,i)perylene	NE	NE	**77.2**	**28.5**	**1,310 J**	**8.96**	**20.1**	**161**	**70.7**	**13,900 J**	**46.5**	**49.5 J**	50.0 U	**4,840 J**	**20.3**	**19.7**
Benzo(j)fluoranthene	NE	NE	**28.5**	**12.9**	--	**9.40**	**6.70 J**	**125**	**50.8**	--	**30.6**	**31.2 J**	**47.2 J**	--	**16.9**	**6.36**
Benzo(k)fluoranthene	NE	NE	**29.0**	**12.4**	--	**4.75 J**	**7.65 J**	**122**	**54.6 J**	--	**25.5 J**	**29.5 J**	**45.6 J**	--	**20.1**	**4.54 J**
Benzofluoranthenes (Total)	NE	NE	**100**	**56.2**	**4,800**	**42.3**	**26.7 J**	**392**	**162 J**	400 U	**107 J**	**112**	**171**	**36,000**	**56.7**	**20.4**
Chrysene	NE	NE	**118**	**59.9**	**6,150**	**226**	**25.0**	**966**	**219**	**70,000**	**138**	**179**	**164**	**48,600**	**65.3**	**26.0**
Dibenzo(a,h)anthracene	NE	NE	**15.0 J**	**9.59**	**529**	**5.26**	**7.60 J**	**58.7**	**26.5 J**	**5,740**	**17.9 J**	**14.4 J**	**15.8 J**	**1,830**	**7.06**	**2.98 J**
Dibenzofuran	NE	80,000	**13.1 J**	**90.2**	**1,700**	**38.7**	15.0 U	**115**	**118**	**33,200**	**47.9**	**19.3 J**	**813**	**12,400**	**35.3**	**13.1**
Fluoranthene	NE	3,200,000	**96.2**	**25.7**	**11,000 J**	**137**	**14.2 J**	**1,370**	**376 J**	**131,000**	**215 J**	**138**	**755**	**81,200 J**	**100**	**34.3**
Fluorene	NE	3,200,000	**15.5**	**4.84 J**	**12,100**	**478**	15.0 U	**1,340**	**576**	**123,000**	**310**	**95.4**	**4,560**	**94,300**	**135**	**64.8**
Indeno(1,2,3-c,d)pyrene	NE	NE	**36.0**	**20.1**	**1,320**	**9.12**	**14.1 J**	**140**	**63.4 J**	**15,100**	**41.9 J**	**25.8 J**	**72.3**	**4,980**	**19.1**	**8.70**
Naphthalene	5,000	1,600,000	**24.2**	**266**	**10,600**	**41.8**	15.0 U	**769**	**2,870**	**1,410,000**	**1,500**	**249**	**3,010**	**456,000**	**2,070 J**	**222**
Phenanthrene	NE	NE	**128**	**132**	**45,200**	**1320**	**24.9**	**6,470**	**1,480**	**545,000**	**1,080**	**191**	**3,860**	**326,000**	**468**	**207**
Pyrene	NE	2,400,000	**170**	**49.4**	**17,500 J**	**119**	**18.4**	**2,670**	**735**	**207,000**	**379**	**210**	**683**	**125,000 J**	**220**	**57.1**
cPAH TTEC (ND=0.5RL)	100	NE	**99.3 J**	**36.5**	**5,830**	**50.6 J**	**17.2 J**	**537 J**	**213 J**	**63,084**	**125 J**	**79.5 J**	**116 J**	**43,477**	**64.9**	**24.5 J**

Location ID			WB-1				WB-2					WB-3				
Sample ID			WB-1-5-6	WB-1-22-22.5	WB-1-26-27	WB-1-31.5-32	WB-2-6-7	WB-2-23-24	WB-2-35-36	WB-2-43-44	WB-2-51-52	WB-3-24.5-25	WB-3-33-34	WB-3-36-37	WB-3-42-42.5	WB-3-48-48.5
Sample Date			10/5/2021	10/5/2021	10/5/2021	10/5/2021	10/6/2021	10/6/2021	10/6/2021	10/7/2021	10/7/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021
Start Depth (ft)			5	22	26	31.5	6	23	35	43	51	24.5	33	36	42	48
End Depth (ft)			6	22.5	27	32	7	24	36	44	52	25	34	37	42.5	48.5
Sheen			MS	SS	MS	MS	NS	MS	MS	NAPL	SS	NS	MS	HS	NS	SS
PID (ppm)			1.6	1.8	6.0	5.6	0.0	55.1	11.9	NR	1.4	0.5	1.1	34.7	21.1	1.2
HC Odor	MTCA A	MTCA B	Slight	Moderate	Moderate	None	None	None	Moderate	Strong	None	Slight	None	Moderate	None	None
SVOCs[6] (µg/Kg)																
1,2,4-Trichlorobenzene	NE	34,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
1,2-Dichlorobenzene	NE	7,200,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
1,3-Dichlorobenzene	NE	NE	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
1,4-Dichlorobenzene	NE	190,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	**8.7 J**	11.6 U	80.2 U	20.4 U	15.3 U
2,2'-Oxybis[1-chloropropane]	NE	14,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
2,4,5-Trichlorophenol	NE	8,000,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2,4,6-Trichlorophenol	NE	80,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2,4-Dichlorophenol	NE	240,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2,4-Dimethylphenol	NE	1,600,000	548 U	100 U	**15.5 J**	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	**47.5 J**	401 U	102 U	76.3 U
2,4-Dinitrophenol	NE	160,000	1100 UJ	200 U	199 U	200 U	199 U	200 U	200 U	2000 U	199 U	181 U	116 U	802 U	204 U	153 U
2,4-Dinitrotoluene	NE	3,200	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2,6-Dinitrotoluene	NE	670	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2-Chloronaphthalene	NE	6,400,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
2-Chlorophenol	NE	400,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
2-methylphenol	NE	4,000,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	**8.3 J**	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
2-Nitroaniline	NE	800,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
2-Nitrophenol	NE	NE	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
3,3'-Dichlorobenzidine	NE	2,200	548 UJ	100 U	99.7 U	99.8 UJ	99.6 U	100 UJ	99.8 U	1000 U	99.6 U	90.7 UJ	57.9 U	401 U	102 U	76.3 U
3-Nitroaniline	NE	NE	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
4,6-Dinitro-2-Methylphenol	NE	6,400	1100 UJ	200 U	199 U	200 U	199 U	200 U	200 U	2000 U	199 U	181 U	116 U	802 U	204 U	153 U
4-Bromophenyl phenyl ether	NE	NE	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
4-Chloro-3-Methylphenol	NE	8,000,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
4-Chloroaniline	NE	5,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 UJ	57.9 U	401 U	102 U	76.3 U
4-Chlorophenyl phenyl ether	NE	NE	274 U	50.0 U	49.9 U	49.9 U	49.8 U	50.0 U	49.9 U	500 U	49.8 U	45.4 U	29.0 U	200 U	50.9 U	38.1 U
4-methylphenol	NE	8,000,000	110 U	20.0 U	**18.3 J**	20.0 U	19.9 U	20.0 U	20.0 U	200 U	**10.6 J**	**485 J**	**636 J**	80.2 U	20.4 U	15.3 U
4-Nitroaniline	NE	50,000	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
4-Nitrophenol	NE	NE	548 U	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
Benzoic Acid	NE	320,000,000	1100 UJ	**480 J**	199 U	200 U	199 U	200 U	200.0 U	2000 U	199 U	181 U	116 U	802 U	204 U	153 U
Benzyl Alcohol	NE	8,000,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Bis(2-Chloroethoxy)Methane	NE	NE	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Bis(2-Chloroethyl)Ether	NE	910	274 U	50.0 U	49.9 U	49.9 U	49.8 U	50 U	49.9 U	500 U	49.8 U	45.4 U	29.0 U	**402**	50.9 U	38.1 U
Bis(2-Ethylhexyl) Phthalate	NE	71,000	**1,960**	50.0 U	49.9 U	49.9 U	**11.6 J**	**20.9 J**	**11.9 J**	500 U	**11.3 J**	45.4 U	29.0 U	200 U	**8.2 J**	**5.2 J**
Butyl benzyl Phthalate	NE	530,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Carbazole	NE	NE	**30.1 J**	**12.4 J**	**364**	20.0 U	19.9 U	**138**	**30.2**	**6,240**	**24.7**	18.1 U	11.6 U	**6,700 J**	**84.4**	**6.7 J**
Dibutyl Phthalate	NE	8,000,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Diethyl Phthalate	NE	64,000,000	274 U	50.0 U	49.9 U	**24.7 J**	49.8 U	50.0 U	49.9 U	500 U	49.8 U	45.4 U	29.0 U	200 U	50.9 U	38.1 U
Dimethyl Phthalate	NE	NE	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Di-N-Octyl Phthalate	NE	800,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Hexachlorobenzene	NE	630	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Hexachlorobutadiene	NE	13,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Hexachlorocyclopentadiene	NE	480,000	548 UJ	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 UJ	57.9 U	401 U	102 U	76.3 U
Hexachloroethane	NE	25,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Isophorone	NE	1,100,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
Nitrobenzene	NE	160,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
N-Nitrosodi-n-propylamine	NE	140	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	80.2 U	20.4 U	15.3 U
N-Nitrosodiphenylamine	NE	200,000	110 U	20.0 U	19.9 U	20.0 U	19.9 U	20.0 U	20.0 U	200 U	19.9 U	18.1 U	11.6 U	8020 U	20.4 U	15.3 U
Pentachlorophenol	NE	2,500	548 UJ	100 U	99.7 U	99.8 U	99.6 U	100 U	99.8 U	1000 U	99.6 U	90.7 U	57.9 U	401 U	102 U	76.3 U
Phenol	NE	24,000,000	110 U	**10.8 J**	**43.7**	**7.4 J**	19.9 U	**5.1 J**	**8.8 J**	**243**	**13.2 J**	**171**	**36.6**	**90**	**8.9 J**	15.3 U

Location ID			WB-1				WB-2					WB-3				
Sample ID			WB-1-5-6	WB-1-22-22.5	WB-1-26-27	WB-1-31.5-32	WB-2-6-7	WB-2-23-24	WB-2-35-36	WB-2-43-44	WB-2-51-52	WB-3-24.5-25	WB-3-33-34	WB-3-36-37	WB-3-42-42.5	WB-3-48-48.5
Sample Date			10/5/2021	10/5/2021	10/5/2021	10/5/2021	10/6/2021	10/6/2021	10/6/2021	10/7/2021	10/7/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021	10/4/2021
Start Depth (ft)			5	22	26	31.5	6	23	35	43	51	24.5	33	36	42	48
End Depth (ft)			6	22.5	27	32	7	24	36	44	52	25	34	37	42.5	48.5
Sheen			MS	SS	MS	MS	NS	MS	MS	NAPL	SS	NS	MS	HS	NS	SS
PID (ppm)			1.6	1.8	6.0	5.6	0.0	55.1	11.9	NR	1.4	0.5	1.1	34.7	21.1	1.2
HC Odor	MTCA A	MTCA B	Slight	Moderate	Moderate	None	None	None	Moderate	Strong	None	Slight	None	Moderate	None	None
Metals[7] (mg/kg)																
Arsenic	20	1	6.49 J	11.4	0.37	3.74	3.53	2.61	0.61	1.7	2.18	20.5	10.8	26.4	1.62	4.32
Barium	NE	16,000	331 J	1,330	164	130	101	217	138	135	165	707	694	285	605	717
Cadmium	2	80	0.75 J	2.31	0.08 J	0.53	0.13 J	0.13	0.04 J	0.07 J	0.12	0.66	0.93	1.50 J	0.13 J	0.2
Chromium	NE	NE	24.8 J	26.7	49.5	68.5	17.3	69.6	36.8	45.1	50.4	29.2	42.7	51.1	18.1	30.5
Copper	NE	3,200	148 J	233	22.0	66.7	15.3	39.4	13.1	20.4	27.7	622	94.0	116	19.3	26.1
Lead	250	NE	4,040 J	930	5.84	18.4	21.9 J	8.78	3.51	7.00	7.39	256	542	728	14.8	8.39
Mercury	2	NE	0.235 J	0.0302	0.0255 U	0.0429	0.0386	0.0164 J	0.0195 U	0.0145 J	0.0131 J	0.0839 J	0.0304 J	0.112	0.0312	0.0158 J
Nickel	NE	1,600	26.0	52.0	27.3	75.3	18.1 J	51.5	19.1	27.8	34.5	29.0	42.3	34.8	13.9	25.4
Selenium	NE	400	0.47 J	2.10	0.21 J	1.83	0.45 J	0.99	0.45 J	0.44 J	0.83	1.31	1.64	0.80	2.80	1.46
Silver	NE	400	0.40 J	1.05	0.02 J	0.20 J	0.06 J	0.12 J	0.21 U	0.06 J	0.06 J	0.68	1.14	0.55	0.17 J	0.15 J
Zinc	NE	24,000	411 J	699	75.8	106	62.8	96.3	48.4	55.6	74.5	303	432	557	104	89.5
Cyanide and pH																
Total Cyanide[8] (µg/g)	NE	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH[9] (pH Units)	NE	NE	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2

Phase 1 and Phase 2 Soil Analytical Data

Worthen Substation Site

Wenatchee, Washington

Location ID			WB-4				WMW-1					WMW-2					
Sample ID			WB-4-19-20	WB-54-19-20	WB-4-29-30	WB-4-39-40	WMW-1-27-28	WMW-1-33-34	WMW-1-36-37	WMW-1-46-47	WMW-1-53-54	WMW-2-19-20	WMW-52-19-20	WMW-2-22.5-23	WMW-2-31-32	WMW-2-34-35	WMW-2-39-40
Sample Date			10/6/2021	10/6/2021	10/6/2021	10/6/2021	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022
Start Depth (ft)			19	19	29	39	27	33	36	46	53	19	19	22.5	31	34	39
End Depth (ft)			20	20	30	40	28	34	37	47	54	20	20	23	32	35	40
Sheen			HS	HS	MS	SS	MS	NS	NS	HS	NS	NS	NS	NS	NA	MS	NA
PID (ppm)			340	340	140	2.1	0.4	2.1	1.2	44.6	3.6	0.2	0.2	0.4	NA	107.8	NA
HC Odor	MTCA A	MTCA B	Strong	Strong	None	None	None	None	None	Strong	None	None	None	None	NA	Strong	NA
Total Petroleum Hydrocarbons [1, 2] (mg/kg)																	
Gasoline-range hydrocarbons	30	NE	**9,740**	**7,130**	**420**	**65.5**	4.59 U	**7.57**	**6.5**	**10,000**	**39.1**	5.06 U	4.25 U	5.67 UJ	**627**	**7,470**	**131**
Diesel-range hydrocarbons	2,000	NE	**5,070**	**5,980**	**765**	**180**	53.0 U	60.2 U	53.1 U	**4,920**	52.5 U	**8.51**	**12.9**	**23.5**	**88.5**	**15,300**	**236**
Lube oil-range hydrocarbons	2,000	NE	**1,420**	**1,380**	**165**	**257**	106 U	120 U	106 U	**755**	105 U	**25.3**	**32**	**57.6**	**82.6**	**3,600**	**212**
Sum diesel+oil-range hydrocarbons	2,000	NE	**6,490**	**7,360**	**930**	**437**	106 U	120 U	106 U	**5,675**	105 U	**33.8**	**44.9**	**81.1**	**171**	**18,900**	**448**
BTEX [4] (ug/kg)																	
Benzene	30	18,000	5,650 U	6,040 U	**455**	**0.54 J**	**0.33 J**	**8.72**	**0.78 J**	**21,500**	**82.3**	**0.63 J**	**1.46 J**	0.81 U	**2,750**	**14,900**	**5.13**
Ethylbenzene	6,000	8,000,000	**159,000 J**	**95,000 J**	**2,240**	**0.79 J**	**1.29**	**3.70**	**2.30**	**71,000**	**246**	0.84 U	0.87 U	0.81 U	**4,580**	**73,300**	**6.08**
Toluene	7,000	6,400,000	**4,000 J**	**2,890 J**	**227**	1.11 UJ	**1.38**	**2.60**	**2.06**	**48,300**	**218**	0.84 U	0.87 U	0.81 U	**4,160**	**6,520**	**1.82**
Xylene, m-,p-	NE	NE	**126,000 J**	**71,200 J**	**2,030**	**1.08 J**	**1.03 J**	**2.87**	**1.86**	**139**	**4.76**	1.68 U	1.74 U	1.61 U	**92.4**	**39.0**	**4.16**
Xylene, o-	NE	NE	**65,100 J**	**37,700 J**	**1,360**	**0.48 J**	**0.42 J**	**1.48**	**0.61 J**	**62.2**	**2.06**	0.84 U	0.87 U	0.81 U	**45.4**	**34.2**	**2.78**
Total Xylenes	9,000	16,000,000	**191,000 J**	**109,000 J**	**3,390**	**1.57 J**	**1.45 J**	**4.36**	**2.47**	**100,000**	**341**	1.68 U	1.74 U	1.61 U	**6,890**	**73,200**	**6.94**
PAHs [5] (µg/Kg)																	
1-Methylnaphthalene	NE	34,000	**119,000**	**122,000**	**7,610 J**	**287**	5.00 U	**19.4**	5.00 U	**119,000**	**478**	**11.9**	**15.2**	**57.1**	**3,680**	**247,000**	**2,750**
2-Methylnaphthalene	NE	320,000	**113,000**	**119,000**	**5,070 J**	**251**	5.00 U	**6.42**	5.00 U	**172,000**	**733**	**15.0**	**18.4**	**80.3**	**5,220**	**294,000**	**3,290**
Acenaphthene	NE	4,800,000	**61,100**	**69,600**	**3,000 J**	**65.3**	**0.62 J**	**10.7**	**2.76 J**	**10,200**	**46.7**	**2.07 J**	**3.45 J**	**5.75**	**975**	**127,000**	**1,280**
Acenaphthylene	NE	NE	**29,900**	**33,600**	**1,480 J**	**12.5**	5.00 U	**4.7 J**	5.00 U	**80,700**	**133**	**2.65 J**	**1.44 J**	**22.7**	**199**	**40,600**	**203**
Anthracene	NE	24,000,000	**32,500**	**35,900**	**2,790**	**21.6**	5.00 U	**6.21**	**3.02 J**	**29,100**	**85.7**	**8.92**	**2.37 J**	**12.7**	**201**	**86,500**	**725**
Benzo(a)anthracene	NE	NE	**21,400**	**23,100**	**1,780 J**	**32.2**	**0.89 J**	**14.5**	**8.21**	**17,000**	**59.4**	**38.6 J**	**5.17 J**	**26.5**	**109**	**54,300**	**407**
Benzo(a)pyrene	100	190	**15,100**	**16,900**	**1,390 J**	**12.3 J**	**1.75 J**	**18.6**	**12.5**	**12,600**	**46.2**	**50.3 J**	**4.04 J**	**24.8**	**79.0**	**40,300**	**306**
Benzo(b)fluoranthene	NE	NE	--	--	**708 J**	**5.10 J**	**1.70 J**	**16.6**	**10.2**	--	**17.0**	**58.4 J**	**5.60 J**	**25.7**	**48.9**	--	**102**
Benzo(g,h,i)perylene	NE	NE	**3,370 J**	**3,190 J**	**485**	**16.9**	**2.31 J**	**11.8**	**11.9**	**4,820**	**36.0**	**36.4 J**	**7.16 J**	**76.6**	**56.8**	**9,850**	**126**
Benzo(j)fluoranthene	NE	NE	--	--	**379**	**3.97 J**	**0.80 J**	**5.76**	**3.95 J**	--	**14.6**	**29.9 J**	**2.82 J**	**11.6**	**37.7**	--	**97.3**
Benzo(k)fluoranthene	NE	NE	--	--	**396 J**	**7.13 J**	**0.78 J**	**3.17 J**	**2.77 J**	--	**10.4**	**30.6 J**	**2.34 J**	**11.6**	**31.6**	--	**75.2**
Benzofluoranthenes (Total)	NE	NE	**14,100**	**15,900**	**1,240 J**	**19.0 J**	**3.37 J**	**25.9**	**16.9**	**12,800**	**41.3**	**122 J**	**11.6 J**	**50.2**	**119**	**43,000**	**273**
Chrysene	NE	NE	**24,700**	**26,200**	**2,060 J**	**38.7**	**2.66 J**	**32.9**	**19.3**	**14,900**	**69.2**	**89.8 J**	**10.1 J**	**44.6**	**131**	**50,800**	**409**
Dibenzo(a,h)anthracene	NE	NE	**1,670**	**1,440**	**196 J**	**13.2 J**	5.00 U	**2.93 J**	**1.85 J**	**1,410**	**7.15**	**9.99**	**1.52 J**	**9.20**	**14.7**	**4,650**	**48.1**
Dibenzofuran	NE	80,000	**5,430**	**6,120**	**318**	**33.3**	5.00 U	**1.81 J**	5.00 U	--	**29.6**	**4.77 J**	**4.82 J**	**19.5**	**111**	--	**204**
Fluoranthene	NE	3,200,000	**40,900 J**	**42,400 J**	**3,180 J**	**100 J**	**3.10 J**	**47.5**	**26.1**	**32,700 J**	**133**	**25.7 J**	**10.8 J**	**47.1**	**261**	**113,000 J**	**784**
Fluorene	NE	3,200,000	**43,700 J**	**49,700 J**	**4,090 J**	**216 J**	**0.71 J**	**10.6**	**3.30 J**	**36,100 J**	**176**	**1.66 J**	**1.93 J**	**4.47 J**	**785**	**95,500 J**	**1,270**
Indeno(1,2,3-c,d)pyrene	NE	NE	**3,550**	**3,540**	**455 J**	**23.5 J**	5.00 U	**6.18**	**4.61 J**	**4,030**	**18.5**	**32.2 J**	**4.39 J**	**42.3**	**46.6**	**8,440**	**123**
Naphthalene	5,000	1,600,000	**213,000**	**222,000**	**6,950 J**	4.98 U	5.00 U	**119**	5.00 U	**240,000**	**1,150**	**12.9**	**14.0**	**46.6**	**9,590**	**456,000**	**3,720**
Phenanthrene	NE	NE	**203,000**	**208,000**	**12,300**	**840**	**2.20 J**	**54.1**	**9.25**	**117,000**	**487**	**26.3**	**23.3**	**76.6**	**1,180**	**342,000**	**3,290**
Pyrene	NE	2,400,000	**81,200**	**84,600**	**5,870 J**	**139**	**2.23 J**	**26.2**	**14.8**	**51,100 J**	**178**	**29.9 J**	**12.2 J**	**44.7**	**352**	**178,000 J**	**1,200**
cPAH TTEC (ND=0.5RL)	100	NE	**19,419**	**21,560**	**1,764 J**	**20.8 J**	**2.6 J**	**23.3 J**	**15.5 J**	**16,273**	**58.1**	**68.2 J**	**6.0 J**	**36.8**	**105**	**51,847**	**386**

Location ID			WB-4				WMW-1					WMW-2					
Sample ID			WB-4-19-20	WB-54-19-20	WB-4-29-30	WB-4-39-40	WMW-1-27-28	WMW-1-33-34	WMW-1-36-37	WMW-1-46-47	WMW-1-53-54	WMW-2-19-20	WMW-52-19-20	WMW-2-22.5-23	WMW-2-31-32	WMW-2-34-35	WMW-2-39-40
Sample Date			10/6/2021	10/6/2021	10/6/2021	10/6/2021	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022
Start Depth (ft)			19	19	29	39	27	33	36	46	53	19	19	22.5	31	34	39
End Depth (ft)			20	20	30	40	28	34	37	47	54	20	20	23	32	35	40
Sheen			HS	HS	MS	SS	MS	NS	NS	HS	NS	NS	NS	NS	NA	MS	NA
PID (ppm)			340	340	140	2.1	0.4	2.1	1.2	44.6	3.6	0.2	0.2	0.4	NA	107.8	NA
HC Odor	MTCA A	MTCA B	Strong	Strong	None	None	None	None	None	Strong	None	None	None	None	NA	Strong	NA
SVOCs[6] (µg/Kg)																	
1,2,4-Trichlorobenzene	NE	34,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	7,200,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	190,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
2,2'-Oxybis[1-chloropropane]	NE	14,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NE	8,000,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	NE	80,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	NE	240,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	NE	1,600,000	498 U	499 U	99.5 U	100 U	100 U	100 U	99.8 U	500 U	99.2 U	99.6 U	99.7 U	99.8 U	99.3 U	499 U	100 U
2,4-Dinitrophenol	NE	160,000	996 U	997 U	199 U	200 U	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	NE	3,200	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	NE	670	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	NE	6,400,000	99.6 UJ	**514 J**	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	NE	400,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
2-methylphenol	NE	4,000,000	99.6 U	99.7 U	19.9 U	20.0 U	20.00 U	20.00 U	20.00 U	**83.4 J**	19.8 U	19.9 U	19.9 U	20.0 U	**14.2 J**	**147 J**	20.0 U
2-Nitroaniline	NE	800,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	NE	NE	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	NE	2,200	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	NE	NE	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	NE	6,400	996 U	997 U	199 U	200 U	--	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ether	NE	NE	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-Methylphenol	NE	8,000,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	NE	5,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	NE	NE	249 U	249 U	49.8 U	50.0 U	--	--	--	--	--	--	--	--	--	--	--
4-methylphenol	NE	8,000,000	99.6 U	99.7 U	19.9 U	20.0 U	20.00 U	20.00 U	20.00 U	**114**	19.8 U	19.9 U	19.9 U	20.0 U	**28.6**	**540**	20.0 U
4-Nitroaniline	NE	50,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	NE	NE	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NE	320,000,000	996 U	997 U	**307**	200 U	--	--	--	--	--	--	--	--	--	--	--
Benzyl Alcohol	NE	8,000,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Chloroethoxy)Methane	NE	NE	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Chloroethyl)Ether	NE	910	249 U	249 U	49.8 U	50.0 U	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NE	71,000	**254**	**286**	**76.5**	50.0 U	--	--	--	--	--	--	--	--	--	--	--
Butyl benzyl Phthalate	NE	530,000	99.6 U	99.7 U	**19.2 J**	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Carbazole	NE	NE	**1,900**	**2,140**	**173**	20.0 U	20.0 U	**6.4 J**	20.0 U	**1,980**	**11.1 J**	**4.6 J**	19.9 U	**5.0 J**	**6.0 J**	**5,520**	**43.2**
Dibutyl Phthalate	NE	8,000,000	99.6 U	**161**	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	NE	64,000,000	249 U	249 U	49.8 U	50.0 U	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	NE	NE	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Di-N-Octyl Phthalate	NE	800,000	99.6 U	99.7 U	**20.1**	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	NE	630	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	13,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	NE	480,000	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	NE	25,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NE	1,100,000	99.6 U	**84.4 J**	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	NE	160,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	NE	140	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	NE	200,000	99.6 U	99.7 U	19.9 U	20.0 U	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	NE	2,500	498 U	499 U	99.5 U	100 U	--	--	--	--	--	--	--	--	--	--	--
Phenol	NE	24,000,000	99.6 U	99.7 U	**30.7**	**8.7 J**	**7.7 J**	**12.5 J**	**6.8 J**	**151**	**8.7 J**	19.9 U	19.9 U	20.0 U	**41.6**	**274**	20.0 U

Location ID			WB-4				WMW-1					WMW-2					
Sample ID			WB-4-19-20	WB-54-19-20	WB-4-29-30	WB-4-39-40	WMW-1-27-28	WMW-1-33-34	WMW-1-36-37	WMW-1-46-47	WMW-1-53-54	WMW-2-19-20	WMW-52-19-20	WMW-2-22.5-23	WMW-2-31-32	WMW-2-34-35	WMW-2-39-40
Sample Date			10/6/2021	10/6/2021	10/6/2021	10/6/2021	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/4/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022
Start Depth (ft)			19	19	29	39	27	33	36	46	53	19	19	22.5	31	34	39
End Depth (ft)			20	20	30	40	28	34	37	47	54	20	20	23	32	35	40
Sheen			HS	HS	MS	SS	MS	NS	NS	HS	NS	NS	NS	NS	NA	MS	NA
PID (ppm)			340	340	140	2.1	0.4	2.1	1.2	44.6	3.6	0.2	0.2	0.4	NA	107.8	NA
HC Odor	MTCA A	MTCA B	Strong	Strong	None	None	None	None	None	Strong	None	None	None	None	NA	Strong	NA
Metals[7] (mg/kg)																	
Arsenic	20	1	**2.61**	**3.07**	**0.70**	**2.77**	--	--	--	--	--	--	--	--	--	--	--
Barium	NE	16,000	**158**	**157**	**126**	**156**	--	--	--	--	--	--	--	--	--	--	--
Cadmium	2	80	**0.07 J**	**0.07 J**	0.10 U	**0.45**	--	--	--	--	--	--	--	--	--	--	--
Chromium	NE	NE	**52.3**	**47.9**	**38.0**	**68.3**	--	--	--	--	--	--	--	--	--	--	--
Copper	NE	3,200	**20.8**	**20.6**	**11.9**	**76.1**	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NE	**6.28**	**6.40**	**4.58**	**12.6**	--	--	--	--	--	--	--	--	--	--	--
Mercury	2	NE	**0.00950 J**	**0.0126 J**	0.0206 U	**0.0230 J**	--	--	--	--	--	--	--	--	--	--	--
Nickel	NE	1,600	**34.6**	**34.1**	**19.3**	**71.3**	--	--	--	--	--	--	--	--	--	--	--
Selenium	NE	400	**0.54**	**0.45 J**	**0.35 J**	**2.21**	--	--	--	--	--	--	--	--	--	--	--
Silver	NE	400	**0.04 J**	**0.04 J**	**0.04 J**	**0.27**	--	--	--	--	--	--	--	--	--	--	--
Zinc	NE	24,000	**67.6**	**65.5**	**44.7**	**94.2**	--	--	--	--	--	--	--	--	--	--	--
Cyanide and pH																	
Total Cyanide[8] (µg/g)	NE	50	--	--	--	--	0.05 U	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05 U	**0.15**	**0.26**	0.05 U	0.05 U
pH[9] (pH Units)	NE	NE	--	--	--	--	7.16	7.97	8.56	8.50	8.58	8.10	7.67	7.90	7.33	6.99	7.67

Table 2

Phase 1 and Phase 2 Soil Analytical Data

Worthen Substation Site
Wenatchee, Washington

Location ID			WMW-3					WMW-4				
Sample ID			WMW-3-6-7	WMW-3-17-18	WMW-3-23-24	WMW-3-35.5-36.5	WMW-3-39-40	WMW4-6-7	WMW4-17-18	WMW4-23-24	WMW4-36-37	WMW4-39-40
Sample Date			4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022
Start Depth (ft)			6	17	23	35.5	39	6	17	23	36	39
End Depth (ft)			7	18	24	36.5	40	7	18	24	37	40
Sheen			NS	NS	SS	HS	SS	NS	SS	MS	HS	NS
PID (ppm)			0.1	0.9	1.9	46.2	5.4	0.2	0.0	0.0	38.5	14.8
HC Odor	MTCA A	MTCA B	None	None	Slight	Moderate	Slight	None	None	Strong	Strong	Slight
Total Petroleum Hydrocarbons [1,2] (mg/kg)												
Gasoline-range hydrocarbons	30	NE	**29.9**	**15.4**	**125**	**47.6**	**457**	**27.6**	**18.2**	13.7 UJ	**4,280**	**87.5**
Diesel-range hydrocarbons	2,000	NE	**144**	**1,050**	**8,640**	**2,460**	**540**	**661**	**171**	**1,290**	**9,610**	**107**
Lube oil-range hydrocarbons	2,000	NE	**893**	**2,800**	**15,800**	**1,600**	**122**	**1,880**	**754**	**2,310**	**2,940**	138 U
Sum diesel+oil-range hydrocarbons	2,000	NE	**1,037**	**3,850**	**24,440**	**4,060**	**662**	**2,541**	**925**	**3,600**	**12,550**	**107**
BTEX [4] (ug/kg)												
Benzene	30	18,000	**27.2**	**2.97**	208 U	**5,260**	**557**	**15.7**	**21.6**	**7.65**	**15,000**	**2,380**
Ethylbenzene	6,000	8,000,000	**0.84 J**	0.96 U	**85.3 J**	**7,590**	**1,290**	**0.52 J**	**1.71**	**0.53 J**	**82,700**	**712**
Toluene	7,000	6,400,000	**5.28**	**1.41**	**93.2 J**	**244**	**85.8**	**2.89**	**2.74**	**1.69**	**1580**	**133**
Xylene, m-,p-	NE	NE	**0.68 J**	1.93 U	8.32 U	**60.7**	**23.3**	**0.68 J**	**2.15 J**	2.30 U	**35.0**	**13.6**
Xylene, o-	NE	NE	**0.26 J**	0.96 U	4.16 U	**22.8**	**13.9**	1.33 U	**0.62 J**	1.15 U	**19.8**	**7.47**
Total Xylenes	9,000	16,000,000	**0.94 J**	1.93 U	416 U	**4,170**	**1,860**	2.67 U	**2.76 J**	2.30 U	**54,800**	**1,050**
PAHs [5] (µg/Kg)												
1-Methylnaphthalene	NE	34,000	**44.3**	**63.2**	**111**	**28,500**	**4,060**	**293**	**438**	**40.5**	**91,300**	**835**
2-Methylnaphthalene	NE	320,000	**60.0**	**103**	**92.5**	**27,900**	**5,450**	**365**	**656**	**57.9**	**117,000**	**941**
Acenaphthene	NE	4,800,000	**5.10 J**	**9.53 J**	**280**	**14,600**	**2,160**	**390**	**30**	**12.1 J**	**75,600**	**271**
Acenaphthylene	NE	NE	14.9 U	**17.0 J**	75.0 U	**1,260**	**302**	**1,020**	**52**	**5.94 J**	**5,880**	**51.5**
Anthracene	NE	24,000,000	**7.03 J**	**33.4**	**99.5**	**9,280**	**1,370**	**2,780**	**85**	**17.0**	**36,800**	**328**
Benzo(a)anthracene	NE	NE	**30.6**	**87.3**	**548**	**5,980**	**1,020**	**12,300**	**333**	**32.5**	**19,000**	**135**
Benzo(a)pyrene	100	190	**38.1**	**83.8**	**258**	**3,690**	**751**	**15,800**	**369**	**25.2**	**15,800**	**93.3**
Benzo(b)fluoranthene	NE	NE	**42.7**	**146**	**234**	**1,370**	**349**	**9,440**	**268**	**28.0**	--	**36.9**
Benzo(g,h,i)perylene	NE	NE	**151**	**356**	**277**	**1,600**	**406**	**17,600**	**392**	**23.3**	**6,430 J**	**37.3**
Benzo(j)fluoranthene	NE	NE	**23.0**	**55.5**	**122**	**1,200**	**311**	**6,030**	**165**	**15.6**	--	**32.4**
Benzo(k)fluoranthene	NE	NE	**18.9**	**56.6**	**117**	**924**	**247**	**6,140**	**155**	**13.0 J**	--	**25.9**
Benzofluoranthenes (Total)	NE	NE	**86.7**	**256**	**514**	**3,530**	**899**	**21,500**	**594**	**58.2**	**15,600**	**96.2**
Chrysene	NE	NE	**47.2**	**277**	**871**	**5,970**	**1,090**	**14,500**	**481**	**76.4**	**21,600**	**150**
Dibenzo(a,h)anthracene	NE	NE	**16.7**	**42.7**	**78.5**	**502**	**120**	**491**	**79.5**	**10.6 J**	**2,140 J**	**12.6**
Dibenzofuran	NE	80,000	**14.0 J**	**38.1**	**43.2 J**	**1,010**	**243**	**309**	**77.1**	**16.7**	--	**49.7**
Fluoranthene	NE	3,200,000	**34.9**	**142**	**1460**	**10,700**	**2,000**	**21,700**	**603**	**108**	**44,700 J**	**268**
Fluorene	NE	3,200,000	**2.84 J**	**17.7 J**	**267**	**11,900**	**2,210**	**467**	**40.3**	**18.7**	**35,500**	**482**
Indeno(1,2,3-c,d)pyrene	NE	NE	**53.3**	**235**	**165**	**1,490**	**342**	**13,200**	**300**	**25.6**	**5,350 J**	**31.8**
Naphthalene	5,000	1,600,000	**44.5**	**83.1**	**157**	**26,900**	**6,610**	**374**	**395**	**34.2**	**161,000**	**990**
Phenanthrene	NE	NE	**55.9**	**291**	**498**	**34,000**	**5,420**	**10,400**	**574**	**61.9**	**108,000**	**1500**
Pyrene	NE	2,400,000	**43.7**	**146**	**1,530**	**16,600**	**2,580**	**29,800**	**863**	**138**	**70,600 J**	**395**
cPAH TTEC (ND=0.5RL)	100	NE	**54.8**	**143**	**381**	**4,776**	**970**	**20,102**	**487**	**36.9 J**	**20,225**	**119**

Location ID			WMW-3					WMW-4				
Sample ID			WMW-3-6-7	WMW-3-17-18	WMW-3-23-24	WMW-3-35.5-36.5	WMW-3-39-40	WMW4-6-7	WMW4-17-18	WMW4-23-24	WMW4-36-37	WMW4-39-40
Sample Date			4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022
Start Depth (ft)			6	17	23	35.5	39	6	17	23	36	39
End Depth (ft)			7	18	24	36.5	40	7	18	24	37	40
Sheen			NS	NS	SS	HS	SS	NS	SS	MS	HS	NS
PID (ppm)			0.1	0.9	1.9	46.2	5.4	0.2	0.0	0.0	38.5	14.8
HC Odor	MTCA A	MTCA B	None	None	Slight	Moderate	Slight	None	None	Strong	Strong	Slight
SVOCs[6] (µg/Kg)												
1,2,4-Trichlorobenzene	NE	34,000	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	7,200,000	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	190,000	--	--	--	--	--	--	--	--	--	--
2,2'-Oxybis[1-chloropropane]	NE	14,000	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NE	8,000,000	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	NE	80,000	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	NE	240,000	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	NE	1,600,000	500 U	299 U	300 UJ	998 U	99.9 UJ	499 U	299 U	**16.8 J**	4510 U	**15.1 J**
2,4-Dinitrophenol	NE	160,000	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	NE	3,200	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	NE	670	--	--	--	--	--	--	--	--	--	--
2-Chloronaphthalene	NE	6,400,000	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	NE	400,000	--	--	--	--	--	--	--	--	--	--
2-methylphenol	NE	4,000,000	100 U	59.8 U	**51.6 J**	200 U	20.0 UJ	99.7 U	59.7 U	20.0 U	902 U	20.0 U
2-Nitroaniline	NE	800,000	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	NE	NE	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	NE	2,200	--	--	--	--	--	--	--	--	--	--
3-Nitroaniline	NE	NE	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	NE	6,400	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ether	NE	NE	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-Methylphenol	NE	8,000,000	--	--	--	--	--	--	--	--	--	--
4-Chloroaniline	NE	5,000	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	NE	NE	--	--	--	--	--	--	--	--	--	--
4-methylphenol	NE	8,000,000	100 U	**39.7 J**	**271 J**	**558**	**14.9 J**	**60.2 J**	**97.3**	**117**	902 U	20.0 U
4-Nitroaniline	NE	50,000	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	NE	NE	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NE	320,000,000	--	--	--	--	--	--	--	--	--	--
Benzyl Alcohol	NE	8,000,000	--	--	--	--	--	--	--	--	--	--
Bis(2-Chloroethoxy)Methane	NE	NE	--	--	--	--	--	--	--	--	--	--
Bis(2-Chloroethyl)Ether	NE	910	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NE	71,000	--	--	--	--	--	--	--	--	--	--
Butyl benzyl Phthalate	NE	530,000	--	--	--	--	--	--	--	--	--	--
Carbazole	NE	NE	100 U	**19.4 J**	60.0 UJ	**509**	**102 J**	**785**	**40.8 J**	20.0 U	**2,060**	**34.2**
Dibutyl Phthalate	NE	8,000,000	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	NE	64,000,000	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	NE	NE	--	--	--	--	--	--	--	--	--	--
Di-N-Octyl Phthalate	NE	800,000	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	NE	630	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	NE	13,000	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	NE	480,000	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	NE	25,000	--	--	--	--	--	--	--	--	--	--
Isophorone	NE	1,100,000	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	NE	160,000	--	--	--	--	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	NE	140	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	NE	200,000	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	NE	2,500	--	--	--	--	--	--	--	--	--	--
Phenol	NE	24,000,000	100 U	**13.4 J**	**594 J**	200 U	**19.9 J**	99.7 U	**25.2 J**	**31.9**	902 U	**133**

Location ID			WMW-3					WMW-4				
Sample ID			WMW-3-6-7	WMW-3-17-18	WMW-3-23-24	WMW-3-35.5-36.5	WMW-3-39-40	WMW4-6-7	WMW4-17-18	WMW4-23-24	WMW4-36-37	WMW4-39-40
Sample Date			4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/6/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022	4/5/2022
Start Depth (ft)			6	17	23	35.5	39	6	17	23	36	39
End Depth (ft)			7	18	24	36.5	40	7	18	24	37	40
Sheen			NS	NS	SS	HS	SS	NS	SS	MS	HS	NS
PID (ppm)			0.1	0.9	1.9	46.2	5.4	0.2	0.0	0.0	38.5	14.8
HC Odor	MTCA A	MTCA B	None	None	Slight	Moderate	Slight	None	None	Strong	Strong	Slight
Metals[7] (mg/kg)												
Arsenic	20	1	--	--	--	--	--	--	--	--	--	--
Barium	NE	16,000	--	--	--	--	--	--	--	--	--	--
Cadmium	2	80	--	--	--	--	--	--	--	--	--	--
Chromium	NE	NE	--	--	--	--	--	--	--	--	--	--
Copper	NE	3,200	--	--	--	--	--	--	--	--	--	--
Lead	250	NE	--	--	--	--	--	--	--	--	--	--
Mercury	2	NE	--	--	--	--	--	--	--	--	--	--
Nickel	NE	1,600	--	--	--	--	--	--	--	--	--	--
Selenium	NE	400	--	--	--	--	--	--	--	--	--	--
Silver	NE	400	--	--	--	--	--	--	--	--	--	--
Zinc	NE	24,000	--	--	--	--	--	--	--	--	--	--
Cyanide and pH												
Total Cyanide[8] (µg/g)	NE	50	**0.18**	**0.14**	**0.36**	**0.12**	0.05 U	**110**	**0.42**	**0.44**	**0.47**	0.05 U
pH[9] (pH Units)	NE	NE	7.60	7.18	6.76	6.89	9.66	6.89	7.13	6.84	7.16	9.17

Notes:

[1] Gasoline-range petroleum hydrocarbons by Northwest Method NWTPH-Gx.

[2] Diesel and oil-range petroleum hydrocarbons by Northwest Method NWTPH-Dx.

[3] The sum of diesel and oil-range organics with non-detects treated as zero, unless both results are not detected, then the highest reporting limit value is reported.

[4] Benzene, toluene, ethylbenzene, xylenes (BTEX) by United States EPA Method 8060D.

[5] Polycyclic aromatic hydrocarbons (PAHs) analyzed by EPA Method 8270E or 8270E-SIM.

[6] Semi-volatile organic compounds (SVOCs) analyzed by United States EPA Method 8270E.

[7] Metals analyzed by United States EPA Method 7471B.

[8] Cyanide analyzed by EPA Method SM 4500-CN G.

[9] pH analyzed by EPA Method 9045D.

Analyses performed by Analytical Resources of Tukwila, Washington. Cyanide was subbed to AmTest of Kirkland, Washington.

Total cyanide and pH analysis performed by AmTest Laboratories of Kirkland, Washington.

Sample WB-54-19-20 is a field duplicate sample of WB-4-19-20. Sample WMW-52-19-20 is a field duplicate sample of WMW-2-19-20.

WMW = Worthen Monitoring Well

-- Analysis not performed

SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

NAPL = Non-aqueous phase liquid

PID = Photoionization detector calibrated to 100 ppm isobutylene

ppm = parts per million

MTCA A = Model Toxics Control Act Method A Cleanup Level used as a preliminary screening level

MTCA B = Model Toxics Control Act Method B Cleanup Level used as a preliminary screening level

NA = Not applicable

NE = Cleanup level not established

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

µg/g = micrograms per gram

BTEX = Benzene, toluene, ethylbenzene, xylenes

PAH = Polycyclic aromatic hydrocarbons

PAHs - SIM = Polycyclic aromatic hydrocarbons by EPA Method 8270 selected ion mode

cPAH TTEC (ND=0.5RL) = The carcinogenic PAH total toxic equivalent concentration of benzo(a)pyrene calculated per WAC 173-340-708(8)(e), with non-detected results calculated at one-half the reporting limit.

U = The analyte is not detected at the indicated reporting limit

J = Estimated value detected below the reporting limit.

Bold font indicates a detection

Gray shading indicates an exceedance of MTCA Method A or, if there is no MTCA Method A, an exceedance of the MTCA Method B.

Blue shading indicates a non-detected concentration that is elevated above the preliminary screening level.

Table 3

Water Level Summary

Worthen Substation Site

Wenatchee, Washington

Sample ID	Date	Time	Manual Water Level (feet below TOC)	Top of Casing Elevation (feet NAVD88)[1]	Water Level Elevation (feet NAVD88)
WMW-1	4/20/2022	11:40	25.83	642.59	616.76
	7/20/2022	10:55	23.53		619.06
	10/19/2022	9:25	26.11		616.48
	1/4/2023	7:45	26.29		616.30
WMW-2	4/20/2022	11:45	22.62	638.94	616.32
	7/20/2022	11:00	22.26		616.68
	10/19/2022	9:30	22.66		616.28
	1/4/2023	9:30	22.32		616.62
WMW-3	4/20/2022	11:55	22.25	638.64	616.39
	7/20/2022	11:10	19.93		618.71
	10/19/2022	13:50	22.76		615.88
	1/4/2023	11:05	21.91		616.73
WMW-4	4/20/2022	11:50	22.97	639.47	616.50
	7/20/2022	11:05	20.68		618.79
	10/19/2022	12:55	23.31		616.16
	1/4/2023	10:50	22.81		616.66

Notes:

[1] Top of casing elevation surveyed by Erlandsen April 2022.

TOC - top of casing

NAVD88 - North American Vertical Datum of 1988

Table 4

Preliminary Groundwater Screening Levels

Worthen Substation Site

Wenatchee, Washington

Analyte	CAS Number	Surface Water Criteria											Drinking Water Criteria							Protection of Sediment	Vapor Intrusion[10]		Preliminary Groundwater Screening Level (µg/L)	Modifying Factor	Lowest Groundwater Screening Level (After PQL Adjustment) (µg/L)
		Chapter 173-201A WAC[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			MTCA Method B Formula Value[4,9]							MTCA Method B Formula Value[8,9]									
		Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health																
		Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	SCO (µg/L)	Carc. (µg/L)	Non-Carc. (µg/L)		PQL[11] (µg/L)	
Petroleum Hydrocarbons																									
Gasoline-range hydrocarbons	NA	–	1.0E+03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.0E+02	8.0E+02	–	–	–	8.0E+02	1.0E+02	800
Diesel-range hydrocarbons	NA	–	3.0E+03	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.0E+02	5.0E+02	–	–	–	5.0E+02	1.0E+02	500
Lube oil-range hydrocarbons	NA	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.0E+02	5.0E+02	–	–	–	5.0E+02	2.0E+02	500
Volatile Organic Compounds (VOCs)																									
Benzene	71-43-2	–	1.0E+01	4.4E-01	–	–	–	5.8E-01	2.3E+01	–	2.0E+03	–	5.0E+00	5.0E+00	–	8.0E-01	–	3.2E+01	–	4.7E+04	2.4E+00	1.0E+02	4.4E-01	2.0E-01	0.44
Ethylbenzene	100-41-4	–	1.2E+01	2.0E+02	2.9E+01	–	–	6.8E+01	–	–	6.9E+03	–	7.0E+02	7.0E+02	–	–	–	8.0E+02	–	1.0E+08	–	2.8E+03	1.2E+01	2.0E-01	12
Toluene	108-88-3	–	5.3E+01	1.8E+02	7.2E+01	–	–	5.7E+01	–	–	1.9E+04	–	1.0E+03	1.0E+03	–	–	–	6.4E+02	6.4E+02	1.1E+08	–	1.5E+04	5.3E+01	2.0E-01	53
Total Xylenes	1330-20-7	–	5.7E+01	–	–	–	–	–	–	–	–	–	1.0E+04	1.0E+04	–	–	–	1.6E+03	1.6E+03	1.8E+08	–	3.2E+02	5.7E+01	6.0E-01	57
Semivolatile Organic Compounds (SVOCs)																									
2,4-Dimethylphenol	105-67-9	–	–	8.5E+01	–	–	–	1.0E+02	–	–	5.5E+02	–	–	–	–	–	–	3.2E+02	3.2E+02	2.9E+08	–	–	8.5E+01	3.0E+00	85
2-methylphenol	95-48-7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.0E+02	8.0E+02	1.2E+07	–	–	8.0E+02	1.0E+00	800
4-Methylphenol	106-44-5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.6E+03	1.6E+03	4.1E+01	–	–	4.1E+01	2.0E+00	41.3
Carbazole	86-74-8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.2E+00	–	–	5.2E+00	1.0E-01	5.2
Phenol	108-95-2	–	–	1.8E+04	9.0E+03	–	–	4.0E+03	–	–	5.6E+05	–	–	–	–	–	–	4.8E+03	4.8E+03	2.9E+01	–	–	2.9E+01	1.0E+00	29
Polycyclic Aromatic Hydrocarbons (PAHs)																									
1-Methylnaphthalene	90-12-0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.5E+00	1.5E+00	5.6E+02	5.6E+02	8.6E+01	–	–	1.5E+00	1.0E-01	1.5
2-Methylnaphthalene	91-57-6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.2E+01	3.2E+01	1.0E+05	–	–	3.2E+01	1.0E-01	32
Acenaphthene	83-32-9	–	–	1.1E+02	3.0E+01	–	–	7.0E+01	–	–	6.4E+02	–	–	–	–	–	–	4.8E+02	4.8E+02	7.8E+05	–	–	3.0E+01	1.0E-01	30
Acenaphthylene	208-96-8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	NE	1.0E-01	NE
Anthracene	120-12-7	–	–	3.1E+03	1.0E+02	–	–	3.0E+02	–	–	2.6E+04	–	–	–	–	–	–	2.4E+03	2.4E+03	8.3E+05	–	–	1.0E+02	1.0E-01	100
Benzo(a)anthracene	56-55-3	–	–	1.4E-02	1.6E-04	–	–	1.2E-03	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-04	1.0E-01	0.1
Benzo(a)pyrene	50-32-8	–	–	1.4E-03	1.6E-05	–	–	1.2E-04	3.5E-02	–	2.6E+01	–	2.0E-01	2.0E-01	–	2.3E-02	–	4.8E+00	–	cPAH TTEC	–	–	1.6E-05	1.0E-01	0.1
Benzo(b)fluoranthene	205-99-2	–	–	1.4E-02	1.6E-04	–	–	1.2E-03	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-04	1.0E-01	0.1
Benzo(g,h,i)perylene	191-24-2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	NE	1.0E-01	NE
Benzo(j,k)fluoranthene	207-08-9	–	–	1.4E-02	1.6E-03	–	–	1.2E-02	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-03	1.0E-01	0.1
Chrysene	218-01-9	–	–	1.4E+00	1.6E-02	–	–	1.2E-01	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-02	1.0E-01	0.1
Dibenzo(a,h)anthracene	53-70-3	–	–	1.4E-03	1.6E-05	–	–	1.2E-04	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-05	1.0E-01	0.1
Dibenzofuran	132-64-9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.0E+00	8.0E+00	1.2E+00	–	–	1.2E+00	1.0E-01	1.2
Fluoranthene	206-44-0	–	–	1.6E+01	6.0E+00	–	–	2.0E+01	–	–	9.0E+01	–	–	–	–	–	–	6.4E+02	6.4E+02	5.3E+04	–	–	6.0E+00	1.0E-01	6.0
Fluorene	86-73-7	–	–	4.2E+02	1.0E+01	–	–	5.0E+01	–	–	3.5E+03	–	–	–	–	–	–	3.2E+02	3.2E+02	3.3E+05	–	–	1.0E+01	1.0E-01	10
Indeno(1,2,3-c,d)pyrene	193-39-5	–	–	1.4E-02	1.6E-04	–	–	1.2E-03	–	–	–	–	–	–	–	–	–	–	–	cPAH TTEC	–	–	1.6E-04	1.0E-01	0.1
Naphthalene	91-20-3	–	–	–	–	–	–	–	–	–	4.9E+03	4.9E+03	–	–	–	–	–	1.6E+02	1.6E+02	1.0E+06	8.9E+00	1.7E+02	8.9E+00	1.0E-01	8.9
Phenanthrene	85-01-8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	NE	1.0E-01	NE
Pyrene	129-00-0	–	–	3.1E+02	8.0E+00	–	–	2.0E+01	–	–	2.6E+03	–	–	–	–	–	–	2.4E+02	2.4E+02	2.9E+04	–	–	8.0E+00	1.0E-01	8.0
cPAH TTEC (ND=0.5RL)	NA	–	–	–	–	–	–	–	3.5E-02	3.5E-02	–	–	–	–	–	2.3E-02	2.3E-02	–	–	1.1E-03	–	–	1.1E-03	2.0E-01	0.2
Cyanide																									
Total Cyanide	57-12-5	2.2E+01	5.2E+00	1.9E+01	9.0E+00	2.2E+01	5.2E+00	4.0E+00	–	–	1.6E+03	–	2.0E+02	2.0E+02	–	–	–	5.0E+00	5.0E+00	–	–	–	4.0E+00	5.0E+00	5

Notes:

[1] Ambient Water Quality Criteria (AWQC) for protection of aquatic life and human health from Chapter 173-201A WAC; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[2] United States Environmental Protection Agency (EPA) Federally Promulgated Human Health Criteria applicable to Washington; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[3] National Recommended Water Quality Criteria (https://www.epa.gov/wqc/national-recommended-water-quality-criteria); values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[4] Model Toxics Control Act (MTCA) Method B surface water screening levels calculated according to Washington Administrative Code (WAC) 173-340-730(3)(b)(iii)(a) (equation 730-1) and WAC 173-340-730(3)(b)(iii)(b) (equation 730-2); values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[5] National Primary Drinking Water Regulation; http://water.epa.gov/drink/contaminants.index.cfm; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[6] Primary maximum contaminant levels, WAC 246-290-310; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[7] Secondary maximum contaminant levels, WAC 246-290-310; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[8] MTCA Method B groundwater screening levels calculated according to WAC-173-340-720(3)(b)(iii)(A)(equation 720-1) and WAC-173-340-720(3)(b)(iii)(B)(equation 720-2); values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[9] "Carc. Adjusted" (i.e., carcinogenic adjusted) and "Non-Carc. Adjusted" (i.e., non-carcinogenic adjusted) columns are applicable when a state or federal surface water standard is available, but is not considered to be "sufficiently protective" under MTCA (that is, the standard is based on a hazard quotient greater than 1 or a cancer risk greater than 1 x 10^{-5}). In these cases WAC 173-340-720(7)(b) and -730(5)(b) allows the standard to be adjusted downward to a hazard quotient of 1 or a cancer risk of 1 x 10^{-5}. For this table, the "Carc. Adjusted" and "Non-Carc. Adjusted" column are also used in cases where no state or federal standards are available.

[10] MTCA Method B groundwater screening levels protective of indoor air; values obtained from CLARC Master Spreadsheet.xlsx dated July 2022.

[11] Practical quantitation limit (PQL) is the typical value from Analytical Resources, LLC of Tukwila, Washington.

SVOCs = Semivolatile Organic Compounds
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
VOCs = Volatile Organic Compounds
PAHs = Polycyclic aromatic hydrocarbons
Gray shading identifies the basis for the groundwater screening level.
Blue shading identifies the basis for the groundwater screening level (after PQL adjustment).
Green shading identifies the groundwater screening level after adjustment for the PQL.

NE = Not established
PQL = Practical quantitation limit
TEC = Toxic equivalent concentration
-- = No screening criteria available
MTCA = Washington State Model Toxics Control Act

Carc = carcinogenic
CUL = Cleanup Level
AWQC = Ambient Water Quality Criteria
WAC = Washington Administrative Code
NA = Not applicable

MCL = Maximum contaminant level
PQL = Practical quantitation limit
EPA = United States Environmental Protection Agency

Table 5

Groundwater Analytical Data

Worthen Substation Site

Wenatchee, Washington

Location ID	Preliminary Groundwater Screening Level (Table 4)	WMW-1				WMW-2				WMW-3				WMW-4			
Sample ID		WMW-1-W-20220420	WMW-1-W-20220720	WMW-1-W-20221019	WMW-1-W-20230104	WMW-2-W-20220420	WMW-2-W-20220720	WMW-2-W-20221019	WMW-2-W-20230104	WMW-3-W-20220421	WMW-3-W-20220720	WMW-3-W-20221019	WMW-3-W-20230104	WMW-4-W-20220421	WMW-4-W-20220720	WMW-4-W-20221019	WMW-4-W-20230104
Sample Date		4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/21/2022	7/20/2022	10/19/2022	1/4/2023	4/21/2022	7/20/2022	10/19/2022	1/4/2023
Total Petroleum Hydrocarbons[1,2] (mg/L)																	
Gasoline-range hydrocarbons	0.8	**0.199**	**0.101**	0.100 U	**0.117**	0.100 U	0.100 U	**0.486 J**	0.100 U	**8.22**	**1.22**	**1.180**	**1.480**	**7.35**	**2.78**	**3.660**	**4.760**
Diesel-range hydrocarbons	0.5	**0.237**	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	**1.61**	**0.685**	**0.544**	**0.545**	**1.45**	**1.00**	**1.16**	**1.05**
Lube oil-range hydrocarbons	0.5	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Sum diesel+oil-range hydrocarbons[3]	0.5	**0.237**	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	**1.61**	**0.685**	**0.544**	**0.545**	**1.45**	**1.00**	**1.16**	**1.05**
BTEX[4] (µg/L)																	
Benzene	0.44	**3.24**	**2.85**	**1.69**	**10.7**	**2.59**	**2.13**	**25.2 J**	**0.06 J**	**333**	**35.8**	**72.2**	**66.9**	**274**	**120**	**141**	**171**
Ethylbenzene	12	**3.87**	**1.09**	**1.03**	**1.90**	**1.01**	**2.16**	**17.7 J**	0.20 U	**157**	**19.6**	**17.0**	**14.8**	**124**	**57.3**	**50.4**	**57.5**
Toluene	53	**5.18**	**1.96**	**0.79**	**0.85**	**2.02**	**1.41**	**7.43 J**	0.20 U	**2.60**	**0.46**	**0.68**	**0.69**	**3.13**	**1.41**	**1.67**	**2.22**
Total Xylenes	57	**7.63**	**3.47**	**2.20**	**4.64**	**2.65**	**3.62**	**23.3 J**	0.60 U	**117**	**22.3**	**25.2**	**17.9**	**108**	**43.6**	**48.3**	**62.1**
SVOCs[5] (µg/L)																	
2,4-Dimethylphenol	85	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	9.0 U	9.0 U	3.0 U	3.0 U	9.0 U	9.0 U	3.0 U	3.0 U
2-methylphenol	800	1.0 U	**0.3 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.0 U	3.0 U	1.0 U	1.0 U	3.0 U	3.0 U	1.0 U	1.0 U
4-methylphenol	41.3	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	6.0 U	2.0 U	2.0 U	6.0 U	6.0 U	2.0 U	2.0 U
Carbazole	5.2	1.0 U	0.10 UJ	0.10 U	0.10 U	1.0 U	0.10 UJ	**0.07 J**	0.10 U	**5.0**	0.10 UJ	**0.39**	**0.43**	**5.1**	0.10 UJ	**1.73**	**1.88**
Phenol	28.9	1.0 U	**0.3 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**7.4**	**1.3 J**	**2.0**	**1.7**	**7.3**	**3.6**	**4.9**	**4.0**
PAHs[6] (µg/L)																	
1-Methylnaphthalene	1.5	**1.38**	0.10 U	**0.08 J**	0.10 U	0.10 U	0.10 U	**2.80**	0.10 U	**117**	**25.1**	**14.1**	**16.1**	**87.3**	**53.2**	**62.1**	**47.3**
2-Methylnaphthalene	32	**1.39**	0.10 U	**0.06 J**	0.10 U	0.10 U	0.10 U	**3.26**	0.10 U	**126**	**25.6**	**10.2**	**12.3**	**73.6**	**38.0**	**27.7**	**31.9**
Acenaphthene	30	**0.27**	0.10 U	**0.03 J**	**0.06 J**	0.10 U	0.10 U	**0.64**	0.10 U	**37.8**	**8.82**	**5.01**	**4.78**	**29.9**	**19.8**	**14.6**	**15.6**
Acenaphthylene	NE	**1.43**	**0.03 J**	**0.04 J**	**0.03 J**	**0.08 J**	**0.03 J**	**0.17 J**	0.10 U	**2.00 J**	**0.34**	**0.13 J**	**0.17**	**0.95 J**	**0.52**	**0.66 J**	**0.66**
Anthracene	100	**0.50**	0.10 U	**0.05 J**	0.10 U	**0.13**	0.10 U	**0.05 J**	0.10 U	**4.71**	**1.90**	**0.63**	**0.72**	**4.05**	**2.02**	**1.79**	**1.54**
Benzo(a)anthracene	0.1	**0.06 J**	0.10 U	**0.08 J**	**0.06 J**	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.44**	**0.06 J**	**0.09 J**	3.00 U	**0.17**	**0.69**	**0.27**
Benzo(a)pyrene	0.1	0.10 U	0.10 U	**0.07 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.29**	0.10 U	0.10 U	3.00 U	0.10 U	**0.49**	**0.17**
Benzo(b)fluoranthene	0.1	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.12**	0.10 U	0.10 U	3.00 U	0.10 U	0.30 U	0.10 U
Benzo(g,h,i)perylene	NE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.15**	0.10 U	0.10 U	3.00 U	0.10 U	**0.27 J**	**0.08 J**
Benzo(j)fluoranthene	0.1	0.10 U	0.10 U	**0.05 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.13**	0.10 U	0.10 U	3.00 U	0.10 U	**0.22 J**	**0.07 J**
Benzo(k)fluoranthene	0.1	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.09 J**	0.10 U	0.10 U	3.00 U	0.10 U	0.30 U	0.10 U
Benzofluoranthenes (Total)	NE	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	6.00 U	**0.36**	0.20 U	0.20 U	6.00 U	0.20 U	**0.62**	**0.20**
Chrysene	0.1	**0.07 J**	0.10 U	**0.12**	**0.07 J**	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.50**	**0.08 J**	**0.11**	3.00 U	**0.19**	**0.76**	**0.27**
Dibenzo(a,h)anthracene	0.1	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 U	3.00 U	0.10 U	0.10 UJ	0.10 U	3.00 U	0.1 U	0.30 UJ	0.10 U
Dibenzofuran	1.15	**0.25**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	**0.07 J**	0.10 U	**4.26**	**0.76**	**0.39**	**0.31 J**	**2.62 J**	**1.20**	**1.11**	**1.11**
Fluoranthene	6	**0.81**	**0.02 J**	**0.12**	**0.16**	0.10 U	0.10 U	**0.02 J**	0.10 U	**2.89 J**	**2.16**	**0.65**	**0.70**	**2.26 J**	**1.73**	**2.25**	**1.24**
Fluorene	10	**1.09**	0.10 U	**0.03 J**	**0.02 J**	0.10 U	0.10 U	**0.37**	0.10 U	**22.4**	**5.88**	**2.61**	**2.39**	**16.3**	**9.12**	**7.51**	**7.83**
Indeno(1,2,3-c,d)pyrene	0.1	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	3.00 U	**0.11**	0.10 U	0.10 U	3.00 U	0.10 U	0.30 U	0.10 U
Naphthalene	8.9	**1.25**	0.10 U	**0.18**	0.10 U	0.10 U	0.10 U	**17.8 J**	0.10 U	**319**	**52.1**	**24.8**	**30.0**	**210**	**114**	**141**	**102**
Phenanthrene	NE	**0.18**	0.10 U	**0.06 J**	0.10 U	0.10 U	0.10 U	**0.30**	0.10 UJ	**24.0**	**9.38**	**3.25**	**3.62**	**19.8**	**12.6**	**9.41**	**7.74**
Pyrene	8	**1.03**	**0.31**	**0.60**	**0.38**	0.10 U	0.10 U	**0.03 J**	0.10 UJ	**3.94**	**2.65**	**0.81**	**0.88**	**2.56 J**	**2.04**	**2.96**	**1.58**
cPAH TTEC (ND=0.5RL)	0.2	**0.12**	0.0855 U	**0.1092 J**	**0.0867 J**	**0.15**	0.0855 U	0.0855 U	0.0855 U	4.5 U	**0.412 J**	**0.0868 J**	**0.0901 J**	4.5 U	**0.3463 J**	**0.6886 J**	**0.2397**
Cyanide (µg/L)																	
Free Cyanide	5	--	5.0 U	5.0 U	5.0 U	--	5.0 U	5.0 U	5.0 U	--	**9.0**	5.0 U	**5.0**	--	**5.0**	5.0 U	**6.0**
Total Cyanide	5	--	5.0 U	5.0 U	5.0 U	--	5.0 U	5.0 U	5.0 U	--	**8.0**	**7.0**	**9.0**	--	**10.0**	**9.0**	**6.0**
Weak Acid Dissociable Cyanide	5	--	5.0 U	5.0 U	5.0 U	--	5.0 U	5.0 U	5.0 U	--	5.0 U	5.0 U	5.0 U	--	5.0 U	5.0 U	5.0 U

Location ID	Preliminary Groundwater Screening Level (Table 4)	WMW-1				WMW-2				WMW-3				WMW-4			
Sample ID		WMW-1-W-20220420	WMW-1-W-20220720	WMW-1-W-20221019	WMW-1-W-20230104	WMW-2-W-20220420	WMW-2-W-20220720	WMW-2-W-20221019	WMW-2-W-20230104	WMW-3-W-20220421	WMW-3-W-20220720	WMW-3-W-20221019	WMW-3-W-20230104	WMW-4-W-20220421	WMW-4-W-20220720	WMW-4-W-20221019	WMW-4-W-20230104
Sample Date		4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/21/2022	7/20/2022	10/19/2022	1/4/2023	4/21/2022	7/20/2022	10/19/2022	1/4/2023
Field Parameter																	
pH (S.U.)	NA	7.66	7.58	7.82	8.15	6.71	6.36	6.73	6.80	6.97	6.64	6.81	7.03	6.96	6.70	6.89	6.97
Specific Conductance (µs/cm)	NA	623	583	335.8	428.4	234.0	316.2	310.6	255.2	981	1181	831	919	1120	1159	860	994
Turbidity (NTU)	NA	1.53	4.78	12.36	17.46	8.61	3.02	8.76	2.86	4.91	2.88	9.76	4.54	1.42	0.02	8.54	14.81
Dissolved Oxygen (mg/L)	NA	0.21	0.1	0.11	0.32	3.76	0.88	1.36	4.36	0.15	0.00	0.02	0.19	0.14	0.01	0.08	0.14
Temperate (degrees Celsius)	NA	14.2	16.2	14.5	9.8	12.4	14	14.3	12.5	15.2	18.0	16.7	14.8	14.7	17.5	15.8	14.5
ORP (millivolts)	NA	-173.6	-119.8	-193.3	-152.3	134.4	121.1	9.1	82.2	-144.0	-124.7	-158.1	-164.6	-150.5	-135.7	-182.9	-176.6

Notes:

[1] Gasoline-range petroleum hydrocarbons by Northwest Method NWTPH-Gx.

[2] Diesel- and lube oil-range petroleum hydrocarbons by Northwest Method NWTPH-Dx.

[3] The sum of diesel and oil-range organics with non-detects treated as zero, unless both results are not detected, then the highest reporting limit value is reported.

[4] Benzene, toluene, ethylbenzene, xylenes (BTEX) by United States EPA Method 8060D.

[5] Semi-volatile organic compounds (SVOCs) analyzed by United States EPA Method 8270E.

[6] Polycyclic aromatic hydrocarbons (PAHs) analyzed by EPA Method 8270E or 8270E-SIM.

Analyses performed by Analytical Resources of Tukwila, Washington.

Sample WMW-53-W-20220421 is a field duplicate of WMW-3-W-20220421.

WMW = Worthen Monitoring Well

-- Analysis not performed

NA = Not applicable

NE = Not established

NTU = Nephelometric Turbidity unit

mg/L = milligrams per liter

µg/L = micrograms per liter

µs/cm = microsiemens per centimeter

BTEX = Benzene, toluene, ethylbenzene, xylenes

PAH = Polycyclic aromatic hydrocarbons

PAHs - SIM = Polycyclic aromatic hydrocarbons by EPA Method 8270 selected ion mode

cPAH TTEC (ND=0.5RL) = The carcinogenic PAH total toxic equivalent concentration of benzo(a)pyrene calculated per WAC 173-340-708, with non-detected results calculated at one-half the reporting limit.

PQL = Practical quantitation limit

S.U. = Standard units

OPR = Oxidation-reduction potential

U = The analyte is not detected at the indicated reporting limit

J = Estimated value detected below the reporting limit

Bold font indicates a detection.

Gray shading indicates an exceedance of the preliminary screening level.

Blue shading indicates a non-detected concentration that is elevated above the preliminary screening level.

APPENDIX A
Phase 1 and 2 Boring Logs

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SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel / Dames & Moore (D&M)

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point lead test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GeoEngineers

Figure A-1

Rev 01/2022

DRAFT

Drilled	Start 10/5/2021	End 10/5/2021	Total Depth (ft) 40	Logged By LAH / Checked By GRL	Driller Holt Services, Inc.	Drilling Method Sonic
Surface Elevation (ft) / Vertical Datum	642.87 NAVD88		Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Easting (X) / Northing (Y)	1771546.287 153552.2687		System Datum	WA State Plane North NAD83-1996	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							AC	Approximately 18 inches asphalt concrete pavement			Air knifed to 5 feet
640								SP/ML	Fine to medium sand and silt, anthropogenics (glass fragments)			
	5		60			WB-1-5-6		SP-SM	Brown sand with silt and gravel, trace anthropogenics debris (glass fragments) and trace organic matter (wood, twigs) (moist)	MS	1.6	Slight hydrocarbon-like odor
635										SS	0.3	
	10		50						Becomes light gray with cobbles up to 5 inches Increased cobble content, becomes dry to moist	MS	0.1	
									Becomes brown to dark gray	MS	2.8	
630									Becomes brown to dark brown	MS	2.5	
	15		48							MS	2.1	
625										SS	1.2	
	20		48					GM	Gray silty gravel with sand and cobbles up to 4 inches (dry to moist)	SS	1.0	No hydrocarbon-like odor
620						WB-1-22-22.5		SP-SM	Brownish red and black fine to medium sand with silt and gravel, cobbles up to 4 inches, substantial anthropogenic debris (coal-like fragments, glass fragments) (moist)	SS	1.8	Moderate hydrocarbon-like odor
								GM	Gray silty gravel with sand and cobbles (moist)	SS	0.3	Moderate to strong hydrocarbon-like odor
	25		60					SP-SM	Gray sand with silt and gravel (moist)	MS	6.0	Moderate to strong hydrocarbon-like odor
615						WB-1-26-27				SS	4.9	
	30							Sandstone	Light gray sandstone/sand			No hydrocarbon-like odor

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on GPS (Rec). Vertical approximated based on (undetermined).

Date:7/8/22 Path:P:\9\9186084\GINT\9186084401.GPJ DBLibrary:Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_STANDARD_NO_GW

Log of Boring WB-1

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-2
Sheet 1 of 2

DRAFT

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	30		36					/SP		NS	2.6	
						WB-1-31.5-32		Siltstone	Dark brown siltstone, friable, planar bedding (moist)	MS	5.6	No hydrocarbon-like odor
610			30					Sandstone	Sandstone/sand, thinly bedded to bedded (dry) to moist)			Large rock in shoe
										NS	5.2	
	35					WB-1-34.5-35						
			30							NS	2.6	
605								Siltstone	Dark brown siltstone (dry to moist)			
								NR	No recovery	NS	1.3	
	40											

Date:7/8/22 Path:P:\9\9186084\GINT\9186084O1.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_STANDARD_NO_GW

Log of Boring WB-1 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-2
Sheet 2 of 2

DRAFT

Drilled	Start 10/6/2021	End 10/7/2021	Total Depth (ft) 55	Logged By LAH / Checked By GRL	Driller Holt Services, Inc.	Drilling Method Sonic
Surface Elevation (ft) / Vertical Datum	647.1 NAVD88		Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Easting (X) / Northing (Y)	1771540.963 153451.8972		System Datum	WA State Plane North NAD83-1996	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0						AC	Approximately 2 inches asphalt concrete pavement			Air knifed to 5 feet
645							SP-SM	Sand with silt and anthropogenics debris (burnt debris)			
								Anthropogenic debris (clinker-like material)			
	5	42			WB-2-6-7		SP-SM	Brown fine to medium sand with silt and gravel, cobbles up to 4 inches, trace anthropogenic debris (brown-red brick fragments) (moist)	NS	0.0	
640									NS	0.1	
	10	56						With brown-red brick fragments	NS	0.0	
								Layer laden with brown-red brick fragments (up to 2x4 inches)	NS	0.0	
635								No anthropogenics			
									NS	0.0	
	15	57									
							ML	Brown sandy silt (moist)	NS	0.0	
630									SS	0.0	
							SP-SM	Brown fine to medium sand with silt and gravel, cobbles up to 4 inches			
	20	60					Siltstone/ ML	Brown-gray siltstone/silt, trace gravel and sand, friable (dry to moist)	NS	41.0	
625									SS	11.2	
					WB-2-23-24				MS	55.1	
	25	60									
							Sandstone	Light gray fine to medium sandstone, friable (dry to moist)	SS	0.8	
620							SP	Brown fine to medium sand (dry to moist)	NS	0.0	
	30						Siltstone/	Interbedded siltstone and sandstone (dry to moist)			Groundwater observed at approximately 29 feet during drilling

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on GPS (Rec). Vertical approximated based on (undetermined).

Log of Boring WB-2

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-3
Sheet 1 of 2

DRAFT

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	30		60					Sandstone	Gray siltstone, trace gravel and sand, pieces of friable siltstone (dry to moist)	NS	0.0	
615								Siltstone		NS	0.2	
										NS	2.5	
	35		60			WB-2-35-36		Sandstone	Light gray fine to medium sandstone, trace fines, friable (dry to moist)	MS	11.9	Moderate hydrocarbon-like odor
610								Siltstone	Light gray siltstone, trace fine sand, indurated (dry to moist)	NS	2.3	
	40		30					Sandstone /SP	Gray sandstone/fine to medium sand (dry to moist)	NS	0.0	
										NS	0.0	
605										NS	1.7	
						WB-2-43-44		NR	Transition zone; sandstone and siltstone, water bearing			Material logged from run clean out, unit description may not be representative; strong hydrocarbon-like odor; visible NAPL coating of sand
	45		48					Siltstone	Gray siltstone, trace fine sand, indurated (dry to moist)	SS	35	Slight hydrocarbon-like odor
600										NS	27.3	
	50		30									No hydrocarbon-like odor
						WB-2-51-52				SS	1.4	
595								NR	No recovery			
	55											

Log of Boring WB-2 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-3
Sheet 2 of 2

DRAFT

Drilled	Start 10/4/2021	End 10/4/2021	Total Depth (ft) 48.5	Logged By LAH / Checked By GRL	Driller Holt Services, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	639.67 NAVD88		Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Easting (X) Northing (Y)	1771627.141 153512.8549		System Datum	WA State Plane North NAD83-1996	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0						SP-SM	Fine sand with silt, occasional gravel and cobbles up to 6 inches			Air knifed to 6 feet
635	5	48					SP-SM	Brown sand with silt and gravel, occasional cobbles, substantial anthropogenic debris (glass and pottery fragments) (moist)	NS	0.2	
630	10	56							NS	0.1	
								Increased cobble content	NS	0.1	
625	15	60							NS	0.2	
									NS	0.1	
								Occasional anthropogenic debris (red-brown brick fragments)	NS	0.2	
620							SP-SM	Gray sand with silt (dry to moist)			
	20	54					SM	Dark brown silty sand with gravel, trace organic matter (wood fibers) (moist)	NS	0.2	
							SP-SM	Brown fine to medium sand with silt and gravel, occasional cobbles up to 3 inches (dry to moist)	NS	0.3	
615									NS	0.5	Slight hydrocarbon-like odor Groundwater observed at approximately 24½ feet during drilling
	25	0			WB-3-24.5-25		SM	Black silty sand with gravel, trace organic matter (fibers) (moist)			
610							NR	No recovery			
	30										

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on GPS (Rec). Vertical approximated based on (undetermined).

Date:7/8/22 Path:P:\9186084\GINT\9186084401.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_STANDARD_NO_GW

Log of Boring WB-3

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-4
Sheet 1 of 2

DRAFT

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	30		42					SM	Dark gray to black silty fine to medium sand, occasional organic matter (root fibers, wood fragments) and moderate anthropogenics debris (metal fragments, glass fragments) (wet)	SS	0.2	
						WB-3-33-34				MS	1.1	
605	35		60									
						WB-3-36-37			Substantial anthropogenics debris (wire fragments, glass)	HS	34.7	Moderate hydrocarbon-like odor
								CL	Gray lean clay, with red-brown and black mottling along fine sand seams, trace organic matter (roots fibers) (dry to moist)			
600									Trace anthropogenic debris (metal fragments up to 3x5 inches)	NS	2.5	Slight hydrocarbon-like odor
	40		42						Becomes black with gray			
						WB-3-42-42.5			Becomes gray	NS	21.1	
								Siltstone	Gray siltstone, indurated, planar fractures (dry to moist)			No hydrocarbon-like odor
595			60							NS	2.1	
	45								Becomes brown	NS	4.0	
						WB-3-48-48.5				NS	1.2	

Log of Boring WB-3 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

DRAFT

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
10/6/2021	10/6/2021	45	LAH / GRL	Holt Services, Inc.	Sonic

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
644.57 NAVD88	N/A	TerraSonicT1150 Crawler

Easting (X) / Northing (Y)	System Datum	
1771624.317 / 153352.7605	WA State Plane North NAD83-1996	Groundwater not observed at time of exploration

Notes: Field duplicate (WB-54-19-20) taken from sample WB-4-19-20

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0					AC	Approximately 20 inches asphalt concrete pavement			Air knifed to 5 feet
						SP/ML	Sand and silt with cobbles			
640	5	27				SP-SM	Brown sand with silt and gravel, cobbles up to 4 inches (moist)	SS	0.4	
								SS	0.2	
						NR	No recovery			
635	10	60				SP-SM	Brown sand with silt and gravel, trace anthropogenic debris (red-brick like fragments) (moist)	SS	0.0	
								SS	0.1	
								SS	10.4	
630	15	60				SM	Brown silty sand with gravel and cobbles up to 3 inches	SS	10.4	Moderate to strong hydrocarbon-like/solvent-like odor
							Becomes dark gray with trace organic matter (wood fragments, fibers) (moist to wet)	SS	24.6	
625	20	60		WB-4-19-20		SP-SM	Brown sand with silt (dry to moist)	HS	340	Moderate to strong hydrocarbon-like odor
							Becomes gray with gravel	MS	132	
620						SP	Gray sand with trace silt (dry to moist)	SS	5.8	
	25	60				SP-SM	Dark brown sand with silt (dry to moist)			Hard drilling at 25 feet Strong solvent-like odor
								SS	130	
615				WB-4-29-30		SP/ Sandstone	Gray sand and sandstone, friable (dry to moist)			Strong solvent-like odor
	30							MS	141	

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on GPS (Rec). Vertical approximated based on (undetermined).

Log of Boring WB-4

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-5
Sheet 1 of 2

DRAFT

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	30		60						<5% fines	MS	140	
								Siltstone	Dark brown siltstone/planar bedding (dry to moist)	MS	52	
610										MS	5.3	
	35		60					SP/ Sandstone	Gray sand and sandstone, friable (dry to moist)	SS	4.9	No odor
								Siltstone	Dark brown siltstone, friable, planar bedding (dry to moist)	SS	2.4	
										NS	2.1	
605						WB-4-39-40						
	40		60					Sandstone	Light gray sandstone with silt, indurated (dry to moist)			No odor
										NS	0.0	
600										NS	0.0	
	45											

Date:7/8/22 Path:P:\9\9186084\GINT\9186084401.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_STANDARD_NO_GW

Log of Boring WB-4 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-5
Sheet 2 of 2

DRAFT

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/4/2022	4/4/2022	60	LAH / GRL	Holt Services, Inc.	Sonic

Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Surface Elevation (ft) Vertical Datum	642.84 NAVD88	Top of Casing Elevation (ft)	642.59
Easting (X) Northing (Y)	1771500.448 153649.0635	Horizontal Datum	WA State Plane North NAD83-1996

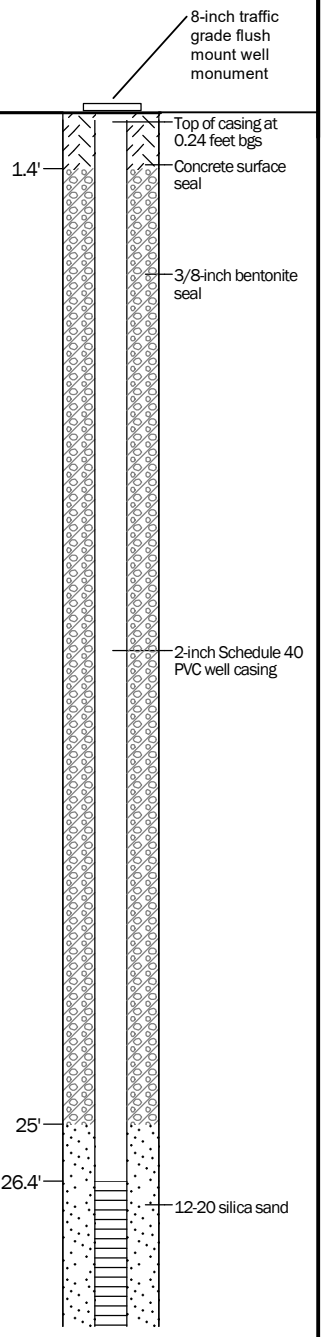
DOE Well I.D.: BNY 885
A 2-in well was installed on 4/4/2022 to a depth of 36.8 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
4/5/2022	26.53	616.31

Notes: Soft drilling 0 to 25 feet below ground surface (bgs), hard drilling 25 to 60 feet bgs

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	Approximately 5 inches asphalt concrete pavement		
									SM	Silty fine sand with gravel, angular (moist)		
									AC	Approximately 3 inches asphalt concrete pavement		
640			48						SP-SM	Brown sand with silt, fine to coarse gravel and occasional cobbles, angular and subrounded (dry to moist)	NS	0.3
											NS	0.2
	5		53							Becomes brown to gray		
											NS	3.2
635										Cobble up to 4 inches	SS	0.4
	10		60							Cobble up to 4 inches		
630											NS	0
									SP-SM	Dark gray to black sand with silt and fine gravel (burn-like debris, wood and brick debris, light weight) (dry to moist)	SS	0.2
	15		48							Becomes brown with occasional cobble, no burn-like debris	SS	0.2
625											NS	0.3
	20		60							Becomes light gray with pieces of friable sandstone	SS	0.4
620											NS	0.9
	25		58						SM	Dark gray silty fine to medium sand (moist)		
615						WMW-1-27-28			SP-SM	Gray fine to coarse sand with silt and pieces of friable sandstone (moist to wet)	MS	0.4
											SS	0.7
	30											

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on survey by Erlandsen, Inc. (4/29/2022). Vertical approximated based on survey by Erlandsen, Inc. (4/29/2022).

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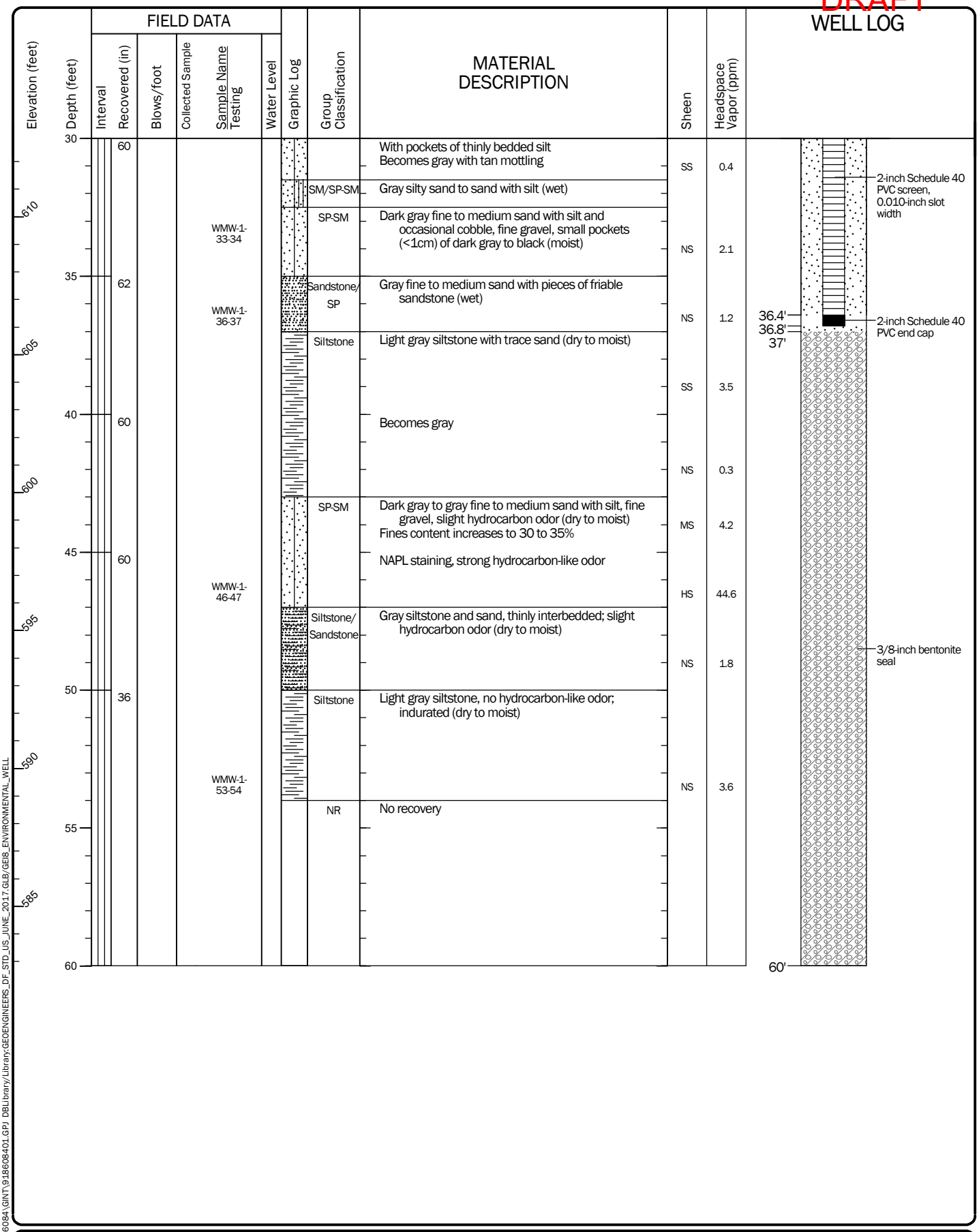
Log of Monitoring Well WMW-1

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-6
Sheet 1 of 2

DRAFT



Log of Monitoring Well WMW-1 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-6
Sheet 2 of 2

DRAFT

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/6/2022	4/6/2022	40	LAH / GRL	Holt Services, Inc.	Sonic

Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Surface Elevation (ft) Vertical Datum	639.64 NAVD88	Top of Casing Elevation (ft)	638.94
Easting (X) Northing (Y)	1771568.812 153630.1687	Horizontal Datum	WA State Plane North NAD83-1996

DOE Well I.D.: BNY 888
A 2-in well was installed on 4/6/2022 to a depth of 35.18 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
4/6/2022	21.20	618.44

Notes: Soft drilling 0 to 34 feet below ground surface (bgs), hard drilling 34 to 40 feet bgs; field duplicate (WB-52-19-20) taken from sample WB-2-19-20

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
635	0								GP	Brown fine to coarse gravel with sand (moist)		
		1	48						SP-SM	Brown fine to medium sand with silt, gravel, organics (root fibers), and trace anthropogenics (moist)	NS	0.3
	5									Grades to dry to moist		
		2	21								NS	0.4
										Cobble in core barrel		
630									NR	No recovery		
	10	3	62						SP-SM	Brown fine to medium sand with silt, gravel and anthropogenics (debris/metal fragments) (moist)	NS	0.1
									SP	Black and white burn-like debris, light weight, anthropogenic debris (glass and wood debris)		
625										Brown fine to medium sand with fine gravel, occasional cobbles up to 3 inches and anthropogenics debris (glass and wood debris) (moist)	NS	0.2
	15	4	60						SP-SM	Brown sand with fine to coarse gravel, occasional cobble and trace organics (root fibers) (moist)	NS	0.2
620						WMW-2-19-20					NS	0.2
	20	5	30									
						WMW-2-22.5-23			SM	Red-brown silty sand with occasional gravel (wet)	NS	0.4
615									SM	Dark gray silty fine to coarse sand with gravel and cobble (wet)		
	25	6	0						NR	No recovery		
610	30											

WELL LOG

- 8-inch traffic grade flush mount well monument
- Top of casing at 0.70 feet bgs
- 1.7' Concrete surface seal
- 3/8-inch bentonite seal
- 2-inch Schedule 40 PVC well casing
- 13' 12-20 silica sand
- 14.78' 2-inch Schedule 40 PVC screen, 0.010-inch slot width

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on survey by Erlandsen, Inc. (4/29/2022). Vertical approximated based on survey by Erlandsen, Inc. (4/29/2022).

Log of Monitoring Well WMW-2

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-7
Sheet 1 of 2

Date:7/8/22 Path:P:\9186084\GINT\9186084401.GPJ DBLibrary:Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_WELL

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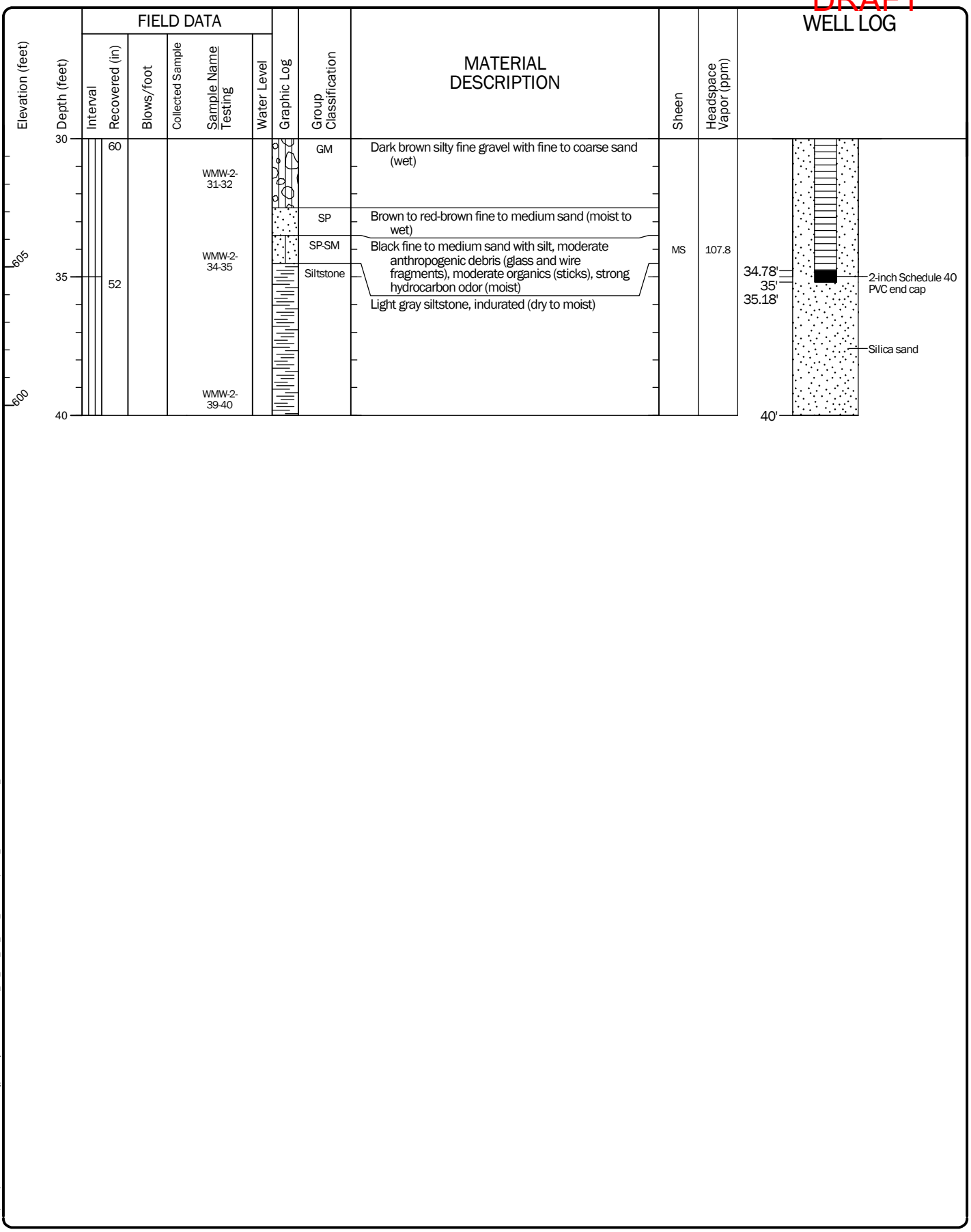


Log of Monitoring Well WMW-2 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-7
Sheet 2 of 2

DRAFT

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
4/6/2022	4/6/2022	40	LAH / GRL	Holt Services, Inc.	Sonic

Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Surface Elevation (ft) Vertical Datum	639.54 NAVD88	Top of Casing Elevation (ft)	638.64
Easting (X) Northing (Y)	1771610.173 153554.9907	Horizontal Datum	WA State Plane North NAD83-1996

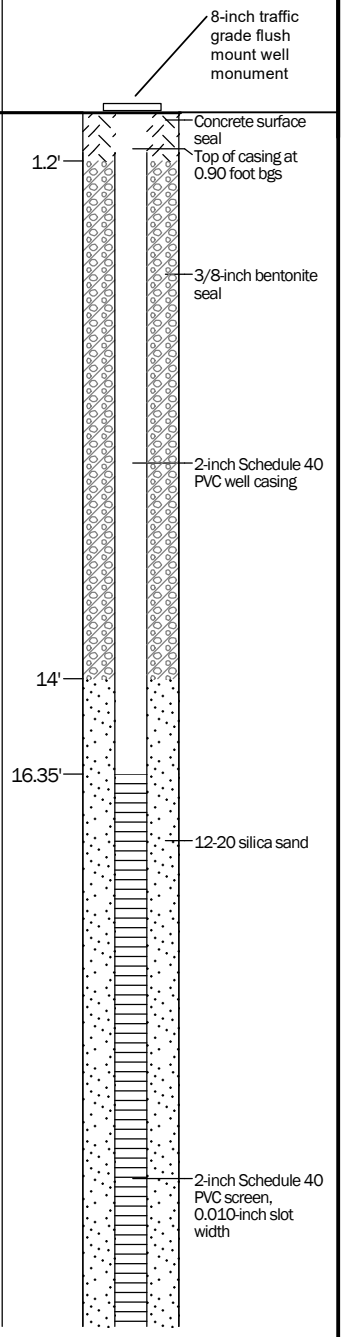
DOE Well I.D.: BNY 887
A 2-in well was installed on 4/6/2022 to a depth of 36.6 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
4/6/2022	20.92	618.62

Notes: Soft drilling 0 to 37 feet below ground surface (bgs), hard drilling 37 to 40 feet bgs

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0						GP	Brown fine gravel with sand		
		44					SP-SM	Brown fine to medium sand with silt, gravel, organics (root fibers) and trace anthropogenics (wire fragments) (dry to moist)	NS	0
635									NS	0.1
	5	24		WMW-3-6-7			OH	Brown sandy organic silt with fine gravel, occasional organics (root fibers) and trace anthropogenics (glass and wire fragments) (dry to moist)	NS	0.1
							NR	No recovery		
630	10	33					SP	Gray fine to coarse sand with fine to coarse gravel, trace silt and occasional cobble (moist)	NS	1.8
								Becomes brown		
625								With anthropogenics (brick fragments)		
	15	52								
				WMW-3-17-18			SP-SM	Brown fine to medium sand with silt, occasional fine gravel, cobbles, trace anthropogenics (glass and wire fragments) (dry to moist)	NS	0.9
620								Becomes dark brown to brown	NS	0.2
	20	50			▼			Becomes moist		
							SP	Brown fine to medium sand with silt, fine gravel, occasional cobbles, trace organics (wood and root fibers), and occasional anthropogenics (glass and wire fragments) (moist)	NS	0.3
				WMW-3-23-24			SP-SM	Dark brown to black fine sand with silt, fine gravel, and moderate anthropogenic debris (wire, glass and wood fragments), slight hydrocarbon-like odor (moist to wet)	SS	1.9
615	25	0					NR	7-inch-thick layer of antrhopogenic wood-like waste No recovery		
610	30							Flapper bit had 6 inches sand, slight silvery sheen	MS	0.4

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on survey by Erlandsen, Inc. (4/29/2022). Vertical approximated based on survey by Erlandsen, Inc. (4/29/2022).

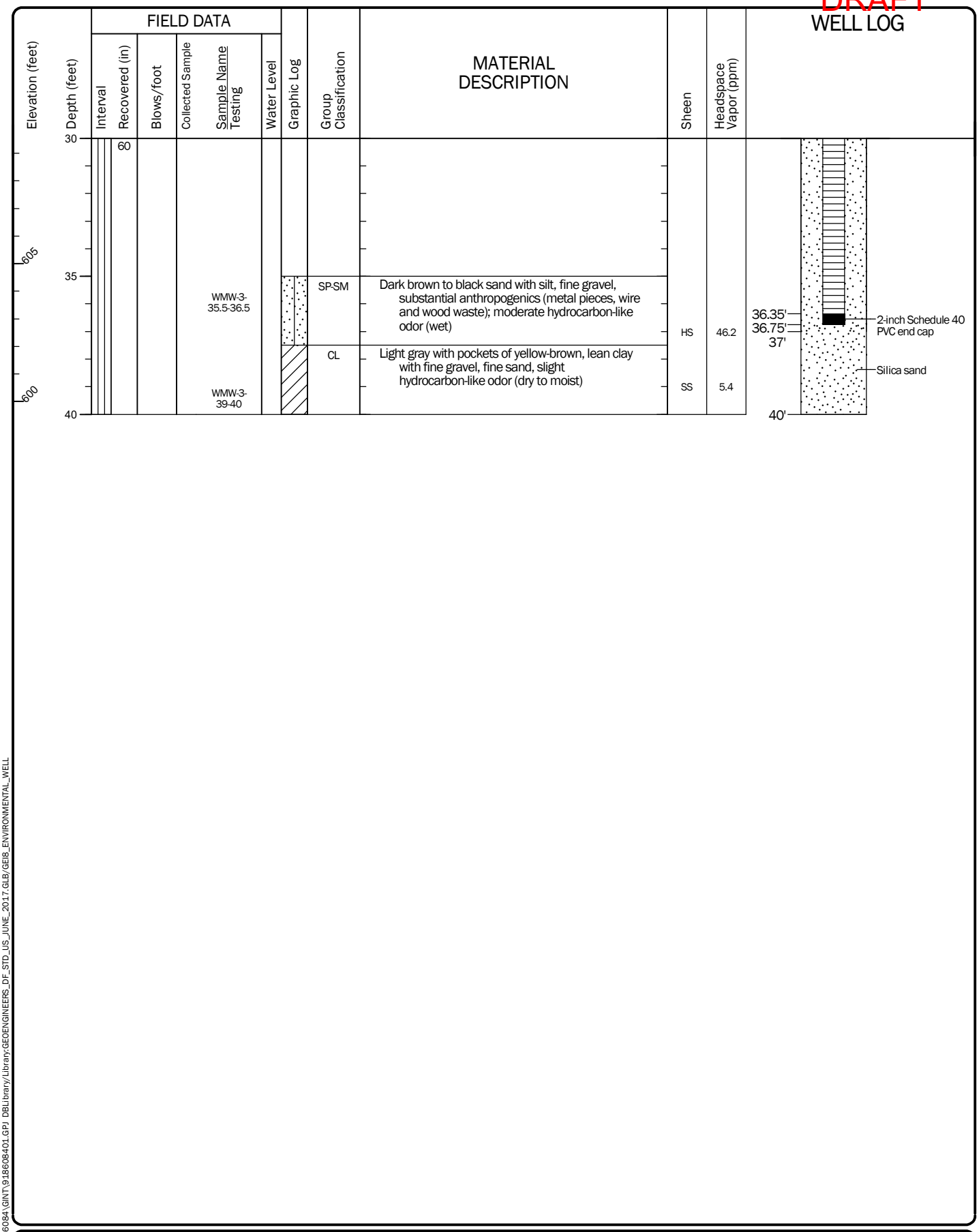
Log of Monitoring Well WMW-3

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-8
Sheet 1 of 2

DRAFT



Log of Monitoring Well WMW-3 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-8
Sheet 2 of 2

DRAFT

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/5/2022	4/5/2022	40	LAH	GRL	Holt Services, Inc.	Sonic

Hammer Data	N/A	Drilling Equipment	TerraSonicT1150 Crawler
Surface Elevation (ft) Vertical Datum	640.07 NAVD88	Top of Casing Elevation (ft)	639.47
Easting (X) Northing (Y)	1771625.294 153509.9315	Horizontal Datum	WA State Plane North NAD83-1996

DOE Well I.D.: BNY 886
A 2-in well was installed on 4/5/2022 to a depth of 36.6 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
4/6/2022	21.91	618.16

Notes: Soft drilling 0 to 37 feet below ground surface (bgs), hard drilling 37 to 40 feet bgs

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0						GP	Brown fine gravel with sand		
							SM	Dark brown silty fine to coarse sand with occasional fine to coarse gravel, organics (root fibers), and trace anthropogenics (tile and glass fragments) (dry to moist) Anthropogenics (black, burn-like debris, wood)		
							NR	No recovery	NS	0.1
635	5	30		WMW-4-6-7			SP-SM	Brown fine to medium sand with silt, fine to coarse gravel, occasional organics (root fibers and wood fragments), and trace anthropogenics (glass fragments) (dry to moist)	NS	0.2
							NR	No recovery		
630	10	33					SP-SM	Brown fine to medium sand with silt, fine to coarse gravel, and trace anthropogenics (glass fragments) (dry to moist)	NS	0.3
							SP-SM	Brown fine to medium sand with silt and gravel, trace anthropogenics (glass and wire fragments) (dry to moist)	NS	0.1
625	15	43		WMW-4-17-18				Dark brown occasional to moderate anthropogenics (brick and wire fragments) (dry to moist)	SS	0
									SS	0
620	20	60			▼				SS	0
				WMW-4-23-24			SP-SM	Heave sheen/NAPL, strong hydrocarbon-like odor at 23.4 feet	MS	0
615	25	30						Dark brown to black sand with silt, occasional fine gravel, moderate organics (root fibers and wood fragments), and occasional anthropogenics (wire fragments), slight organic-like odor (moist to wet) Substantial anthropogenics (wood fragments, waste debris, metal scraps and fragments) at 24 feet Becomes wet at 25 feet	NS	0
	30									

WELL LOG

- 8-inch traffic grade flush mount well monument
- Top of casing at 0.60 feet bgs
- 3' — Concrete surface seal
- 3/8-inch bentonite seal
- 2-inch Schedule 40 PVC well casing
- 15'
- 16.01' — 12-20 silica sand
- 2-inch Schedule 40 PVC screen, 0.010-inch slot width

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on survey by Erlandsen, Inc. (4/29/2022). Vertical approximated based on survey by Erlandsen, Inc. (4/29/2022).

Log of Monitoring Well WMW-4

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-9
Sheet 1 of 2

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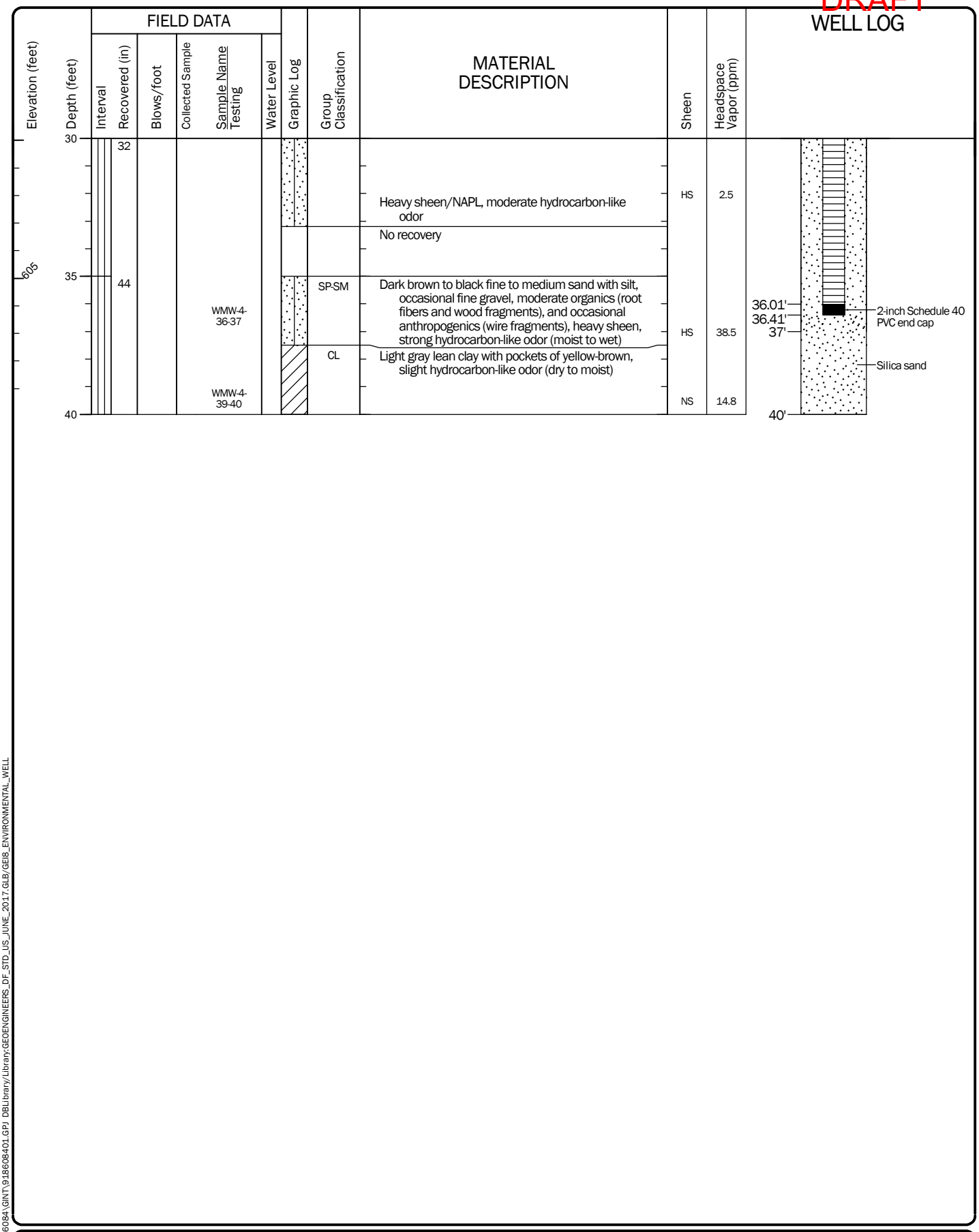

Log of Monitoring Well WMW-4 (continued)

GeoEngineers

Project: PSE Worthen Substation
Project Location: Wenatchee, Washington
Project Number: 9186-084-01

Figure A-9
Sheet 2 of 2

APPENDIX B

Sampling and Analysis Plan

Sampling and Analysis Plan
Chelan Public Utility District Substation Site
500 South Worthen Street
Wenatchee, Washington

June 13, 2023

Prepared for

Puget Sound Energy
Bellevue, Washington

LANDAU ASSOCIATES

155 NE 100th St, Ste 302
Seattle, WA 98125
206.631.8680

TABLE OF CONTENTS

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LIST OF ABBREVIATIONS AND ACRONYMS

ASTM	ASTM International
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTEXN	BTEX and naphthalene
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EIM	Ecology's Environmental Information Management system
EPA	US Environmental Protection Agency
ft	foot/feet
Landau	Landau Associates, Inc.
LNAPL	light non-aqueous phase liquid
mL	milliliter
NTU	nephelometric turbidity unit
NWTPH-Dx	Northwest TPH extended-range diesel analytical method
NWTPH-Gx	Northwest TPH extended-range gasoline analytical method
ORP	oxidation reduction potential
PAH	polycyclic aromatic hydrocarbon
PID	photoionization detector
ppm	parts per million
PSE	Puget Sound Energy
PUD	Chelan Public Utility District
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
Site	500 South Worthen Street in Wenatchee, Washington
SPLP	synthetic precipitation leaching procedure
TPH	total petroleum hydrocarbon
TPH-D	diesel-range total petroleum hydrocarbons
TPH-G	gasoline-range total petroleum hydrocarbons
TPH-O	heavy oil-range total petroleum hydrocarbons
VOA	volatile organic analyte
VOC	volatile organic compound
WAC	Washington Administrative Code

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1.0 INTRODUCTION

On behalf of Puget Sound Energy (PSE), Landau Associates, Inc. (Landau) prepared this sampling and analysis plan (SAP; Appendix B of the project work plan), which describes the procedures for conducting field activities during investigation and characterization activities at the Worthen Street Substation Site (Site). The Site is located at 500 South Worthen Street in Wenatchee, Washington (Figure 1 of the project work plan), and is currently owned by the Chelan Public Utility District (PUD). The primary objective of this SAP is to provide sampling and analysis procedures and methodologies consistent with accepted procedures such that the data collected will be adequate for use in characterizing environmental conditions at the Site. This document was prepared in accordance with the requirements of Washington Administrative Code (WAC) 173-340-820.

This SAP addresses the fieldwork for the Site investigation and characterization. The specifics of sampling locations, depths, media, and analyses are detailed in the project work plan, of which this SAP is Appendix B. The types of work and procedures in this SAP are considered general and may be adapted, as necessary for the location and phase of work being performed. The media and methods covered in this SAP include the following:

- Soil
  - Exploration
  - Field screening
  - Sampling
- Groundwater
  - Well installation
  - Pump types
  - Sampling.

2.0 SUBSURFACE INVESTIGATION

All subsurface explorations involving drilling will be completed by a driller licensed in Washington State and will be monitored by an environmental professional. Other subsurface explorations (air knifing) will be completed by personnel trained in operating the required equipment. Prior to initiation of drilling or any other intrusive subsurface activity, any available utility maps provided by the PUD and/or PSE will be reviewed to identify utilities in the vicinity of the proposed exploration locations. A public (One-Call) utility locate will be conducted followed by contracting with a private utility-locating service to confirm the location and identity of other underground utilities in the vicinity of the proposed locations. Ground-penetrating radar will be used to attempt to locate any subsurface structures or other impediments in the proposed drilling areas. The final location for each boring will be selected based on the findings of the utility locating and map review. Before and between drilling of each boring and at the completion of the project, downhole drilling equipment will be cleaned, as described in Section 8.0.

2.1 Sonic Drilling

Sonic drilling methods will be used to drill the boreholes for borings and for installation of new monitoring wells at the Site. Due to the high density of underground utilities at the Site, an air knife/vactor truck will be used to clear each boring location to a depth of at least 5 feet (ft) below ground surface.

The general procedure for sonic drilling is as follows (GeoDrilling International; accessed May 30, 2023):

- The core barrel, used to collect the soil sample, is advanced using high-frequency, resonant energy generated in the sonic head. During drilling, the resonant energy is transferred down the drill string to the bit face at various sonic frequencies. Simultaneously rotating the drill string evenly distributes the energy and impact at the bit. This results in the maximum amount of energy delivered to the bit, reducing friction on the surrounding soil, and allowing for fast penetration rates.
- When the core barrel has been advanced to the planned depth, the outer casing is sonically advanced over the core barrel. This protects the borehole's integrity as the core barrel is retrieved and minimizes slough soils entering what would otherwise be an open borehole. Using this methodology, a nearly undisturbed sample with approximately 100 percent recovery can be retrieved from the core barrel.
- The soil core recovered in the core barrel is removed via vibration into tubular plastic bags in approximately 2-ft intervals. Soil samples for laboratory analysis can then be collected from these bagged cores per the methods described in Section 4.0.

If dense non-aqueous phase liquid (DNAPL) free product is encountered in the soils of a boring during sonic drilling, telescoped casing and well seal drilling techniques (i.e., step-down drilling) will be implemented to prevent vertical migration of DNAPL.

2.2 Hand Auger

Hand-auger drilling methods may be used to obtain a soil sample in areas where the air knife uncovered suspected shallow soil contamination. Hand-auger drilling can be used to advance 2- to 4-inch-diameter boreholes and collect disturbed soil samples. In some cases, undisturbed soil samples can be collected from hand-auger borings using a small-diameter core sampler. The typical hand auger consists of an auger bit designed for the predominant type of soils to be encountered (e.g., sand, clay, etc.). A T-handle connects to the top of a rod, and the rod attaches to the auger bit. The whole assembly is manually rotated to advance the borehole. The soil cuttings and/or samples are retrieved by manually removing the auger bit approximately every 6 inches. Rod extensions are added as the borehole is advanced. The total drilling depth is usually limited by the density of the soils, presence of gravel or larger-sized rocks, and/or strength of the person using the auger. Hand-augering to depths greater than 15 ft is uncommon.

2.3 Borehole/Monitoring Well Decommissioning

Following soil and/or groundwater sample collection, soil borings not completed as monitoring wells will be decommissioned according to Washington State *Minimum Standards for Construction and Maintenance of Wells* (WAC 173-160-460). Per the code, each soil boring will be decommissioned by sealing the boring from the bottom up to the ground surface using bentonite chips or pellets, bentonite slurry, neat cement grout, or neat cement. Grout and slurry used for sealing the boring below the water table will be placed from the bottom up using methods that avoid segregation or dilution of the sealing material. Application methods include dump bailers and a tremie tube. Above the water table, grout and slurry can be hand-poured into the boring. Bentonite chips or and pellets should be poured into the borehole very slowly and monitored by a weighted sounding tape to minimize bridging.

The ground surface will be returned to its original condition, or better, after decommissioning soil borings that were not completed as monitoring wells. Asphalt and cement will be patched to cover the bentonite (or other material) seal. Vegetation will be replanted, if necessary, and groundcover will be restored by raking or other physical means. If working in a landscaped area, efforts will be made to disrupt existing conditions as little as possible during drilling to minimize restoration work.

For borings completed as monitoring wells (see Section 3.0 for installation procedures), upon completion of the cleanup action, or as otherwise needed if monitoring wells will be removed, monitoring wells will also be decommissioned according to Washington State *Minimum Standards for Construction and Maintenance of Wells* (WAC 173-160-460). These monitoring wells shall be decommissioned by filling the casing from bottom to land surface with bentonite, bentonite slurry, neat cement grout, or neat cement. The ground surface will be returned to its original condition, or better, after decommissioning. For wells within the City right-of-way, surface restoration will include

placement of materials similar to the existing road profiled (e.g., with gravel and asphalt patch) or as otherwise required by the right-of-way permit.

3.0 MONITORING WELL INSTALLATION AND DEVELOPMENT

Boreholes completed as groundwater monitoring wells will be drilled using sonic drilling equipment (though not anticipated, direct-push and/or hollow-stem auger drilling equipment may also be used during the investigation). Drilling procedures are described in Section 2.0, and soil logging, field screening, and soil sampling procedures are described in Section 4.0. Monitoring wells will be constructed by a Washington-licensed drilling contractor, in accordance with Chapter 173-160 WAC. Oversight of drilling and well installation activities will be conducted by an environmental professional familiar with construction of resource protection wells. Soil boring information will be recorded on a Log of Exploration form during drilling. Monitoring well construction details will be recorded on an As-Built Well Completion form.

Monitoring wells will be constructed with 2-inch-diameter, flush-threaded, Schedule 40 polyvinyl chloride (PVC) pipe. Well screen lengths may vary depending on installation location conditions, but well screen material will be Schedule 40 PVC with 0.020-inch slots.

A filter pack material consisting of pre-washed, pre-sized number 10-20 silica sand (or equivalent) will be placed from the bottom of the well to a minimum of 2 ft above the top of the screen. Filter pack material will be placed slowly and carefully to avoid bridging of material. The well screen will be surged by hand while placing the sand pack to promote settlement of the sand.

A bentonite seal will be placed above the filter sand pack material to within approximately 1 ft of ground surface. The seal will consist of bentonite chips. Concrete will be used to backfill the boring above the bentonite chips for placement of the protective cover. The wells will be completed with flush-mounted protective casings.

Unique identification tags assigned by the Washington State Department of Ecology (Ecology) will be attached to each well casing (inside the well monument) following well installation. Ecology tag numbers must be recorded on the As-Built Well Completion form.

After at least 24 hours following installation, Landau or the drilling contractor will develop each of the newly installed wells. Development of new monitoring wells will be achieved by repeatedly surging the well with a surge block and purging the well at a high flow rate with a gasoline-powered centrifugal pump or a battery-operated submersible pump until the water runs clear or at least 10 well casing volumes have been removed, whichever comes first. During development, the purged groundwater will be monitored for turbidity. “Clear,” for the purposes of well development, means that the turbidity of the purge water is equal to or less than 5 nephelometric turbidity units (NTU). If the well dewaters (i.e., runs dry) during the initial surging and purging effort, one final well casing volume will be removed after the well has fully recharged, if practicable. Well development activities will be recorded on a Well Development form.

4.0 SOIL AND DENSE NON-AQUEOUS PHASE LIQUID SAMPLING

This section describes procedures for soil logging and field screening during subsurface exploration, methodology for collecting soil and DNAPL free product samples, and the associated laboratory analyses.

4.1 Soil Logging

Continuous soil samples will be collected during subsurface exploration to classify soil lithology in accordance with the Unified Soil Classification System. Soil sample collection methods will depend on the type of exploration (Section 2.0). Lithology will be recorded on a Log of Exploration form along with evidence of contamination based on field screening (Section 4.2) and other pertinent information.

4.2 Field Screening

Soil will be field-screened for evidence of chemical impacts. Field-screening techniques may include visually inspecting the soil for staining, sheen, discoloration, odor, and other evidence of impact; field meters/monitoring equipment and/or field test kits may be used to identify known or suspected contaminants. Field screening will be conducted at all exploration locations on soil and DNAPL. Soil monitoring for volatile organic compound (VOC) contamination will be conducted using headspace analysis and will be performed by first measuring VOC levels along the length of freshly exposed soil in recovered soil cores using a photoionization detector (PID). If VOC readings above background levels (i.e., PID readings taken from ambient air in the project area) are observed, a small amount of soil from that portion of the soil core yielding the VOCs will be placed in a Ziploc® bag. The bag will then be sealed, the contents broken up, and the bag allowed to equilibrate for 2 to 5 minutes. Tubing will be attached to the PID and inserted into the Ziploc bag. The bag will be resealed around the tube and the highest reading measured by the PID will be recorded and entered in the comments section of the soil boring logs. Additionally, any PID readings of more than 5 parts per million (ppm) will be noted on the chain-of-custody form to communicate the potential need for dilution to the laboratory; 5 ppm is the threshold as readings below 5 ppm are commonly caused by interference.

If contamination is not readily discernible by the field screening described above, soil samples will be collected at the interval directly above competent bedrock.

If field screening of a soil sample indicates the potential presence of contaminants of concern, one soil sample will be collected from that interval and from the interval below the identified contamination (if present) for analysis. A record of the depth(s) of the soil samples will be recorded.

If free product DNAPL is encountered, soil samples will be collected from above and below the DNAPL-impacted interval and additional soil and/or DNAPL samples will be collected from within the DNAPL-impacted interval for leachability and fingerprinting analysis.

4.3 Soil Sampling Method

Soil samples collected for analysis for volatile parameters (e.g., VOCs) will be collected in accordance with US Environmental Protection Agency (EPA) Method 5035A. The EPA 5035A soil sampling method is intended to reduce volatilization and biodegradation of samples. The EPA 5035A procedure for soil sample collection is as follows:

- Collect soil samples as soon as possible after the polyethylene sleeve is cut open. Collect the sample using a coring device (i.e., EnCore® sampler, EasyDraw Syringe®, or a Terra Core™ sampling device). Each sample will consist of three, approximately 5-gram, samples from each depth interval sampled.
- Remove excess soil from the coring device. If an EasyDraw Syringe or Terra Core sampling device is used for sample collection, then place the "cored" soil directly into pre-weighed (by the analytical laboratory), preserved 40-milliliter (mL) vials. Vials will be preserved as indicated in the project Quality Assurance Project Plan (QAPP; Appendix C of the project work plan). If the EnCore sampler is used, then close the sampler for transport to the laboratory.

Collect 2 ounces of soil and place in a laboratory-supplied jar for moisture content analysis and laboratory screening purposes. Fill the jar to minimize headspace.

Soil samples to be analyzed for non-volatile parameters (e.g., certain metals, inorganic constituents, semivolatile organic constituents) will be collected from the identified soil sampling intervals using the following methods:

- Lightly scrape the outside of the soil core to expose a fresh sampling surface using a clean, decontaminated stainless-steel spoon.
- Using a new, stainless-steel spoon, collect soil from the desired interval, taking care that the soil being collected did not contact the sides of the tooling/core container.
- Homogenize the soil from the given interval in a decontaminated stainless-steel bowl or plastic bag using the stainless-steel spoon used to collect the sample.
- Transfer the homogenized soil into the appropriate laboratory-supplied sample containers.
- Immediately place all sample containers in a pre-chilled cooler.

4.4 Soil Laboratory Analysis

The following nomenclature will be used to label and identify soil samples during the field activities: Worthen Boring (or Worthen Monitoring Well) #-(soil interval)-YYMMDD. For example, a soil sample collected from boring WB100 spanning a depth from 12 to 14 ft below the ground surface on May 15, 2023, would be: WB100-(12-14)-230515.

Soil samples collected for laboratory analysis will be submitted on ice and under standard chain-of-custody procedures to the laboratory to be analyzed for:

- Total petroleum hydrocarbons (TPH) in the gasoline range (TPH-G) by the Northwest TPH extended-range gasoline (NWTPH-Gx) analytical method, and diesel-range TPH (TPH-D) and

heavy oil range TPH (TPH-O) by the Northwest TPH extended-range diesel (NWTPH-Dx) analytical method

- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method SW-846 8260D
- Total metals – Resource Conservation and Recovery Act (RCRA) 8 (arsenic, barium, cadmium, total chromium, lead, selenium, silver, mercury) by EPA Method SW-846 6020B
- Polycyclic aromatic hydrocarbons (PAHs) by EPA Method SW-846 8270E (reporting limits for 8270 scan meet project screening levels; however, samples may be run with selected ion monitoring [SIM] if screening levels are not achieved)
- Total cyanide by ASTM International (ASTM) Method D7511-12.

If BTEX or naphthalene is detected in a submitted soil sample, that sample may be submitted for synthetic precipitation leaching procedure (SPLP) for BTEX and naphthalene (BTEXN) analysis.

4.5 DNAPL Sampling Method

Free product DNAPL samples will be collected at the first two locations that DNAPL is encountered and at other locations where the observed DNAPL characteristics differ from the previously collected samples. DNAPL samples will be obtained from the recovered soil core of the associated boring. DNAPL samples collected for laboratory analysis will be obtained using laboratory-supplied sampling kits using the following methodology:

- For each sample, fill one 4-mL glass vial to the shoulder of the vial, and one 40-mL glass volatile organic analyte (VOA) vial, leaving ½ inch of headspace, with DNAPL-containing soil.
- Label the vial and place the 4-mL vial into the laboratory-supplied small plastic centrifuge tube and the 40-mL VOA vial into the large plastic centrifuge tube.
- Immediately place samples into a prepared cooler with ice, including a temperature blank.

DNAPL samples should be shipped in separate coolers from other soil and groundwater samples to minimize the potential for cross contamination of those other samples. Total cyanide will be analyzed in soil samples to quantify the sum of all cyanide-containing compounds in the sample.

4.6 DNAPL Laboratory Analysis

The following nomenclature will be used to label and identify free product DNAPL samples during the field activities: Worthen Boring (or Worthen Monitoring Well) #-(FP)-YYMMDD. For example, a free product DNAPL sample collected from boring WB95 collected on May 23, 2023, would be: WB95-(FP)-230523.

DNAPL samples collected for laboratory analysis will be submitted on ice and under standard chain-of-custody procedures to the laboratory to be analyzed for:

- Water-soluble fraction for TPH-D by NWTPH-Dx, forensic VOCs by NWTPH-Gx/EPA Method 8260, and PAHs by EPA Method 8270 to determine the quantities and ratios of the water-soluble fractions of free product DNAPL

- DNAPL forensic fingerprinting with simulated distillation by ASTM Method D2887-14
- SPLP for BTEXN by EPA Methods 1312/8260.

Based on the results of the above-noted leachability and fingerprinting analyses, all or a subset of the DNAPL samples will be analyzed for specialty physical characteristics, as follows:

- Viscosity by ASTM Method D445. The viscosity of free product DNAPL will be determined at up to three elevated temperatures. Data from the viscosity analyses can then be plotted on a log, which may inform viscosity at additional temperatures.
- Density by ASTM Method D4052.
- Interfacial tension by ASTM Method D971.

5.0 GROUNDWATER SAMPLING

Groundwater sampling will be required for the field investigation at the Site following installation of the monitoring wells. The methodology for groundwater sampling is described in this section.

5.1 Low-Flow Sampling Technique

Groundwater samples will be collected from all newly installed monitoring wells at least 72 hours after well development and from four of the existing monitoring wells (WMW-1 through WMW-4). Water levels will be measured prior to sample collection. Groundwater samples will be collected at each monitoring well using low-flow sampling techniques as described below:

- Immediately following removal of each well monument cover, the well head will be observed for damage, leakage, and staining. Additionally, immediately following removal of the well head cap, any odors will be documented, and the condition of the well opening will be observed. Any damage, leakage, or staining to the well head or well opening that could impact groundwater quality, sampling results, or prevent sampling will be documented on the sample collection form and photographed for reporting to Ecology.
- Depth to groundwater will be measured using an electronic oil/water interface probe to assess the potential presence of light non-aqueous phase liquid (LNAPL) or DNAPL petroleum product in the well. By convention and for consistency, the depth to groundwater will be measured from the north side of the top of the casing prior to extraction of water from the well, unless otherwise noted on the well casing. The interface probe and tape will be decontaminated between each monitoring well per the procedures described in Section 8.1.
- Prior to sampling, each well will be purged using a battery-operated or compressed gas-powered pump (Section 5.2) that is attached to dedicated purge and sample collection tubing made of low-density polyethylene. The well will be purged at less than 0.25 liters per minute (L/min) and with drawdown of less than 4 inches (0.3 ft) during purging. Purging will continue until temperature, conductivity, pH, dissolved oxygen (DO), and oxidation reduction potential (ORP) have stabilized, as described below.
  - Field parameters, including pH, temperature, conductivity, DO, and ORP will be continuously monitored during purging using a flow cell. Purging of the well will be considered complete when all field parameters become stable for three successive readings. The three successive readings should be within +/– 3 percent for temperature, +/– 3 percent for conductivity, +/– 10 percent for DO, +/– 10 millivolts for ORP, and +/– 10 percent for turbidity (NTU) for values greater than 5 NTU (if three turbidity values are less than 5 NTU, these values will be considered as stabilized).
  - Purge data will be recorded on a sample collection form including purge volume; time of commencement and termination of purging; any observations regarding color, turbidity, or other factors that may have been important in evaluating sample quality; and field measurements of pH, conductivity, temperature, DO, and ORP.
- Following the stabilization of field parameters, the flow cell will be disconnected, and groundwater samples will be collected. Sample data will be recorded on a sample collection form, including sample number, time collected, the observed physical characteristics of the

sample (e.g., color, turbidity, odor, and sheen), and field parameters (pH, conductivity, temperature, DO, and ORP).

- Any problems or significant observations encountered while sampling will be noted in the "comments" section of the sample collection form.
- Groundwater samples will be collected directly into the appropriate lab-provided sample containers using the same pump used for purging. To prevent degassing during sampling for VOCs, a pumping rate will be maintained below 100 mL/min. The VOC containers will be filled completely so that no head space remains. Samples will be chilled to less than 6 degrees Celsius (°C) immediately after collection. New gloves will be worn when collecting each sample.
- Groundwater for dissolved metals analyses will be collected last and field-filtered through a 0.45-micron, in-line disposable filter. A note will be made on the sample label, sample collection form, and chain-of-custody form to indicate the sample has been field-filtered.
- Between filling sample containers for petroleum/VOC compounds and metals, the discharge tubing will be reconnected to the flow cell and, after a sufficient volume of water has been purged, replicate groundwater parameter measurements will be recorded on the sample collection form. The purpose of replicate parameter measurements during sample collection is to confirm that groundwater conditions did not significantly change during the act of sampling. If groundwater conditions did change during the filling of containers beyond the stability thresholds discussed above, inform the project manager, continue purging the well, and recollect the samples.

5.2 Pump Types

Battery-operated and compressed gas-powered groundwater pumps are used at the Site for sampling; the pump type is selected based on its pumping capacity, its ability to be decontaminated, and the hydrogeology of the formation in which the well was installed. This section describes the pump types used at the Site.

5.2.1 Peristaltic Pumps

Peristaltic pumps are positive displacement pumps that use rollers to compress a tube or hose as it rotates, which creates a vacuum to draw fluid through the tubing. Pump components do not come in contact with the fluid being sampled, which reduces the risk of cross-contamination. Because water withdrawal depends on the suction created by the pump, the depth of the water table below ground surface for collected groundwater samples with a peristaltic pump is limited to approximately 28 ft or less.

Peristaltic pumps will be used to sample wells where a depth to groundwater of 28 ft or less is recorded. New tubing will be used at each well.

5.2.2 Bladder Pumps

Bladder pumps are positive displacement pumps that use compressed gas to push water to the surface. First, water enters the central PTFE chamber (i.e., the bladder). Next, compressed gas is fed to the pump in the space around the bladder. Pressure builds and the water is pushed up into the tubing. A check valve prevents the water from flowing back into the well. Finally, the compressed gas line is depressurized, allowing water to fill the bladder again and the process repeats.

Non-dedicated bladder pumps will be required where obtaining a groundwater sample with a peristaltic pump is not achievable due to a depth to groundwater of greater than 28 ft. New bladders are used at each well, while the pump assembly is reused and decontaminated between locations, as described in Section 8.0. Non-dedicated bladder pump assemblies are identified with numbers and/or letters, which are noted on sample collection forms. New air and water tubing is used at each well to prevent cross-contamination.

5.3 Laboratory Analysis

The following nomenclature will be used to label and identify groundwater samples during the field investigation activities: Worthen Monitoring Well #-YYMMDD. For example, a groundwater sample collected from well WMW105 on May 5, 2023, would be: WMW105-230505.

Groundwater samples collected for laboratory analysis will be submitted on ice and under standard chain-of-custody procedures to the laboratory to be analyzed for:

- TPH-G by NWTPH-Gx; TPH-D and TPH-O by NWTPH-Dx
- BTEX by EPA Method SW-846 8260D
- Dissolved metals – RCRA 8 by EPA Method SW-846 6020B
- PAHs (will be analyzed for only in samples with low turbidity (<5 NTU) by EPA Method SW-846 8270E (reporting limits for 8270 scan meet project screening levels; however, samples may be run with SIM if screening levels are not achieved)
- Free cyanide by ASTM Method D7237-10.

In addition to the above-mentioned analytes, selected groundwater samples collected downgradient of or within areas of the Site known to contain DNAPL with detections of dissolved-phase constituents will be submitted for fingerprinting analysis. The analysis will include PAH homologs by EPA Method 8270m.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Analytical samples collected during the field investigation will follow quality assurance/quality control (QA/QC) procedures and standards outlined in the project QAPP (Appendix C of the project work plan). Field QA/QC includes the collection of QC samples consisting of blind field duplicate samples and trip blanks. All QC samples (excluding trip blanks) will be collected at a rate of one QC sample per sampling event. Duplicate sampling locations will be determined based on contaminant concentrations as well as horizontal and vertical distribution. The procedures for collection of the QC samples are provided in the QAPP. Sample containers, preservatives, and holding times for each chemical analysis are provided in Table 1 of the QAPP.

6.1 Field Quality Control Sample Nomenclature

- Field duplicates for groundwater samples: "WMWDUP(Duplicate #)-YYMMDD". For example, the first field duplicate sample collected on May 8, 2023, would be named WMWDUP1-230508.
- Trip blanks: Labeled by the laboratory that provided them.

6.2 Equipment Calibration

All field parameter meters will be calibrated on site daily before use. The results of the calibration will be recorded in a calibration log specific to the meter being used and stored with the meter at all times. Meters will be recalibrated if any anomalous readings are observed. If recalibration does not adequately resolve the anomalous readings, the meter will be replaced prior to collection of additional samples.

7.0 DATA AND RECORDS MANAGEMENT

All field documentation, including the various data collection forms discussed in this SAP, survey information, and field notes, will be reviewed for completeness and accuracy, scanned, and stored electronically on a backed-up server.

All laboratory analytical data generated under this SAP will be validated in accordance with the Guidance on Environmental Data Verification and Data Validation (EPA 2002) and Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (Ecology 2004). The procedures and level of data validation will be conducted as indicated in the project QAPP. Validated data will be submitted through Ecology's Environmental Information Management System (EIM) in accordance with WAC 173-340-840(5) and Ecology's Toxics Cleanup Program Policy 840: Data Submittal Requirements.

8.0 EQUIPMENT DECONTAMINATION

The decontamination procedures described below are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records. Decontamination fluids will be managed per the procedures described in Section 9.0.

8.1 Water Level Indicator/Oil-Water Interface Probe

The tape and probe head of the oil-water interface probe will be wiped with a clean paper towel wetted with Alconox® soap and tap water and rinsed with Alconox soap, tap water, and de-ionized water between each well measurement. If any evidence of LNAPL or DNAPL is detected during water-level measurements, the probe head and tape will be decontaminated per the procedures described in Section 8.2.

8.2 Sampling Equipment

All reusable sampling equipment (e.g., stainless-steel bowls, stainless-steel spoons, soil split-spoon samplers, etc.) will be cleaned using a four-step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox and water solution.
2. Rinse and scrub equipment with clean tap water.
3. Rinse equipment a final time with de-ionized water to remove tap water impurities.
4. Collect rinsate blank samples, as specified in the QAPP.

Decontamination of reusable sampling devices (i.e., stainless-steel drive-point screens, non-dedicated pump housings, etc.) will occur between each sample collection and will follow the above-noted steps. At least 5 gallons of each decontamination liquid will be pumped through any non-dedicated pump systems or sampling equipment that cannot be fully disassembled.

8.3 Heavy Equipment

Heavy equipment (i.e., drilling equipment that is used downhole, or that contacts material and equipment going downhole) will be cleaned by a hot water, high-pressure wash before each use and at completion of the project. Potable tap water will be used as the cleaning agent.

9.0 RESIDUAL WASTE MANAGEMENT

Investigation-derived waste (IDW) from the investigation (e.g., soil cuttings, purge water, decontamination water) will be stored in Washington State Department of Transportation-approved 55-gallon drums. Procedures for IDW storage are as follows:

- Segregate soils into separate drums based on field-screening results and/or boring locations so the source of materials in each drum can be easily identified.
- Leave about 3 to 4 inches of headspace in each drum.
- When full or when not in active use, confirm the lid and ring are securely closed and attached to each drum.
- Drums will be stored on a hard, flat surface, at a pre-approved temporary storage location at the Site. Soil drums can be stored directly on the ground. Drums containing liquids will be stored within a plastic temporary secondary containment area (berms can be created with sandbags, clean soil, lumber (e.g., 4x4 posts) with heavy plastic sheeting covering the storage area and berms and secured by wrapping the plastic around the berm material or otherwise securing the plastic in place.

Upon initial placement of IDW into a drum, each drum will be labeled with "Investigation-Derived Waste – Pending Analysis" and the following information:

- A description of the media (i.e., soil or water)
- Origin of the medium (i.e., boring or well number)
- Accumulation start date (i.e., date the medium was first placed in the drum)
- Site identification (i.e., 500 South Worthen Street)
- Generator name (i.e., Puget Sound Energy)
- Contact person (i.e., Suzanne Dolberg)
- Any other pertinent information).

Once characterization has been completed, drums will then be labeled with Hazardous/Dangerous Waste or Non-Hazardous/Non-Dangerous Waste labels, as appropriate. Placement of these labels will occur no later than 30 days after receipt of the final analytical results used for waste characterization and classification.

After analytical results are received, Landau will arrange for the appropriate offsite disposal of the drums and their contents at an appropriately licensed and permitted disposal facility.

10.0 REFERENCES

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APPENDIX C

Quality Assurance Project Plan

Quality Assurance Project Plan
Chelan Public Utility District Substation Site
500 South Worthen Street
Wenatchee, Washington

June 13, 2023

Prepared for

Puget Sound Energy
Bellevue, Washington

LANDAU ASSOCIATES

155 NE 100th St, Ste 302
Seattle, WA 98125
206.631.8680

TABLE OF CONTENTS

TABLES

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LIST OF ABBREVIATIONS AND ACRONYMS

Apex ..... Apex Laboratories
CLP ..... Contract Laboratory Program
COC ..... chain of custody
DQI ..... data quality indicator
DQO ..... data quality objective
Ecology ..... Washington State Department of Ecology
EDD ..... electronic data deliverable
EPA ..... US Environmental Protection Agency
HASP ..... health and safety plan
ICP ..... Inductively coupled plasma
LCS ..... laboratory control sample
Landau ..... Landau Associates, Inc.
MQO ..... Measurement Quality Objective
QA ..... Quality Assurance
QAPP ..... Quality Assurance Project Plan
RL ..... reporting limit
Site ..... Public Utility District Substation
SOP ..... standard operating procedure
SVOC ..... semivolatile organic compound
TPH-D ..... diesel- and oil-range total petroleum hydrocarbons
TPH-G ..... total petroleum hydrocarbons
PSE ..... Puget Sound Energy
PUD ..... Public Utility District
VOC ..... volatile organic compound

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1.0 INTRODUCTION

On behalf of Puget Sound Energy (PSE), Landau Associates, Inc. (Landau) prepared this quality assurance project plan (QAPP; Appendix C of the project work plan), which establishes the quality assurance (QA) objectives for soil and groundwater sampling in support of investigation and characterization activities at the Chelan Public Utility District (PUD) Substation site located at 500 South Worthen Street in Wenatchee, Washington (Site). This QAPP describes the data quality objectives, laboratory activities, and quality assurance procedures that will be implemented. Site background information is provided in the work plan. QAPP revisions will be addressed in an addendum.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The specific roles, activities, and responsibilities of project participants are described in this section. PSE has the primary responsibility for managing the work at the Site. Landau is the primary consultant and will be conducting the field investigation and data validation. The primary laboratory is Apex Laboratories (Apex). Laboratories performing work under this QAPP will maintain current accreditation through the Washington State Department of Ecology (Ecology) for applicable methods and analytes. Contact information for the primary consultant and laboratory is provided below.

Contact	Responsibility
Landau Associates, Inc. (Landau) 421 West Riverside Avenue, Suite 256 Spokane, WA 99201 Telephone: (509) 444-9428	Coordinate laboratory analyses Data validation Reporting
Apex Laboratories 6700 SW Sandburg Street Tigard, OR 97223 Telephone: (503) 459-6522	Prime laboratory for chemical analysis

Key personnel and their roles and responsibilities are identified below.

Title/Role	Name	Organization	Responsibilities
PSE Project Manager	Suzanne Dolberg	PSE	Manages the project for PSE
Consultant Project Manager(s)	Piper Roelen; Shane Kostka	Landau	Supervises and coordinates all work for the project. These responsibilities include project planning and execution, scheduling, staffing, data evaluation, report preparation, subcontracts, and managing deliverables.
Ecology PM	TBD	Ecology	Manages the project for Ecology.
Quality Assurance Officer (QA)	Danille Jorgensen	Landau	Oversees and directs quality assurance reviews for the project, including laboratory procedures and actions. Coordinates and reviews data validation. Has oversight responsibility for management and integrity of the data.
Data Validator	Kristi Schultz	Landau	Reviews laboratory analytical data and provides data validation.
Field Lead	Dan Gray	Landau	Leads and coordinates field activities, including documentation, sampling, and sample handling. Reports directly to the Landau project managers (PMs).
Health and Safety Manager	Chris Kimmel	Landau	Responsible for review and implementation of the project Health and Safety Plan (HASP).
Environmental Laboratory Project Manager(s)	Michelle Poquiz	Apex	Manages laboratory analysis and reporting, including supervising in-house chain of custody, scheduling sample analyses within required holding times; oversees data review and preparation of laboratory reports and electronic data deliverables (EDDs).

3.0 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) reflect the overall degree of data quality or uncertainty that the decision-maker is willing to accept during decision-making. DQOs are used to specify the quality of the data, usually in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity. DQOs apply to the entire measurement system (e.g., sampling locations, methods of collection and handling, field analysis, laboratory analysis) and are used to ensure that environmental data are scientifically valid, defensible, and of an appropriate level of quality given the intended use for the data (EPA 2000). Data collected under this QAPP will be used to better define the nature and extent of contamination that may be associated with the Site. The QA objectives for the project data include the qualitative guidelines listed in the work plan, as well as quantitative determinations of the data quality indicators (DQIs). DQIs and their associated Measurement Quality Objectives (MQOs) are described in the sections below and are presented in Table C-1 of this QAPP.

Precision of the data will be determined through evaluation of the relative percent difference between blind field duplicates, matrix spike and matrix spike duplicates, and/or laboratory duplicates. Control limits for the laboratory duplicates and the matrix spike duplicates will be compared to laboratory acceptance limits generated according to US Environmental Protection Agency (EPA) guidelines. Control limits for the field duplicates will be 20 percent for groundwater unless the duplicate sample values are within five times the quantitation limit, in which case the control limit interval will be plus or minus the quantitation limit for water.

Accuracy of the data will be determined through recovery of spiked surrogates, matrix spikes, and spiked laboratory control samples. Control limits for spike recovery will be laboratory acceptance limits generated according to EPA guidelines.

Representativeness of the data will be optimized through appropriate selection of sampling locations and methods. Analyses will be performed promptly, within established holding times identified in Table C-4.

Completeness for the project will be established as the proportion of data generated that is determined to be valid. The DQO for completeness is 90 percent. Data points are considered invalid if they are rejected during data validation; the data validation approach for this project is provided in Section 7.0.

Comparability is an expression of the confidence with which one data set can be compared to another. In this project, standard methods, promulgated by the EPA or Ecology where available, will be used. Data generated will be reported in units consistent with Ecology guidelines.

Sensitivity is the capability of a method or an instrument to discern the difference between very small amounts of a substance. For the purposes of this project, sensitivity is the lowest concentration that

can be accurately detected by the analytical method. Laboratory reporting limits (RLs) and project screening levels are presented in Tables C-2 and C-3 of this QAPP, respectively.

4.0 ANALYTICAL METHODS

Chemical analyses will include selected volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), semivolatile organic compounds (SVOCs), total and dissolved metals, and total and free cyanide as described in the project Sampling and Analysis Plan. Groundwater samples submitted for analysis for diesel- and oil-range TPH may undergo silica-gel cleanup to evaluate samples for the presence of polar metabolites. Soil samples analyzed for VOCs may be prepared by the synthetic precipitation leaching procedure (SPLP). As presented in Table C-2, additional forensic analysis may be performed by Apex on free product and selected groundwater samples. Samples will be analyzed by EPA protocols or other methods as appropriate. Laboratory methods and target RLs are provided in Table C-2 of this QAPP.

The contracted chemical laboratory will implement project-required standard operating procedures (SOPs) for sample preparation, cleanup, and analysis. These SOPs will be based on Method SW-846 (EPA; accessed May 31, 2023). Documentation of these SOPs will be kept on file at the contracted laboratory.

Documentation of appropriate method performance for the project target compounds will be available from the contracted laboratory and will include the criteria for acceptance, rejection, or qualification of data. The laboratory is also required to periodically update method performance data such as control limits and method detection limits.

5.0 QUALITY CONTROL

This section details the measurement checks required to meet the DQIs for this project.

5.1 Field Quality Control

The QC procedures for measuring field parameters such as pH, redox potential, conductance, dissolved oxygen, turbidity, and temperature in groundwater samples will include daily calibration of the instruments, measuring duplicate samples, and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard.

Field and analytical laboratory control samples will be used to evaluate data precision, accuracy, representativeness, comparability, completeness, bias, and sensitivity of the analytical results for this investigation. The field QC samples and the frequency of collection and/or analysis by matrix and analysis is summarized and specified in the work plan. The evaluation of these samples is discussed in Section 7.0 and provided in Table C-1 of this QAPP. Field QC samples that will be collected for this project are described below.

5.1.1 Field Duplicates

A field duplicate will be collected at a frequency of at least one per 20 groundwater samples per chemical, not including QC samples, but not less than one field duplicate per sampling event. The blind field duplicate will consist of a split sample collected at a single sampling location. Blind field duplicates will be collected by alternately filling sample containers for both the original and the corresponding duplicate sample at the same location to decrease variability between the duplicates. Blind field duplicate sample results will be used to evaluate data precision. Blind field duplicates will not be collected for soil samples.

5.1.2 Field and Trip Blanks

Trip blanks will consist of de-ionized water or Ottowa sand, as appropriate for media and method, sealed in a sample container by the analytical laboratory. The trip blank will accompany VOC and/or gasoline-range TPH (TPH-G) soil and groundwater sample containers during transportation to and from the field, and will be returned to the laboratory with each shipment of VOC and/or TPH-G samples. The trip blank will remain unopened until received by the laboratory for analysis for VOCs and/or TPH-G. One trip blank per cooler containing samples for VOC and/or TPH-G analysis will be evaluated to determine possible sample contamination during transport.

Field blanks will not be collected because samples will be collected using dedicated or disposable equipment.

5.2 Analytical Quality Control

An analytical batch is defined as 20 samples or fewer of the same type of matrix, prepared and analyzed as a group. The following analytical QC samples will be associated with each batch if the control procedure is applicable to the analysis.

5.2.1 Laboratory Matrix Spike

A minimum of one laboratory matrix spike per 20 samples, not including QC samples, or one matrix spike sample per batch of samples if fewer than 20 samples are obtained, will be analyzed for all organic constituents as per the analytical method. If specified, the matrix spikes will be analyzed on a project sample; project-specific matrix spikes are not required. These analyses will be performed to provide information on accuracy and to verify that extraction and concentration levels are acceptable. The laboratory spikes will follow EPA guidance for matrix and blank spikes.

5.2.2 Laboratory Matrix Spike Duplicate

A minimum of one laboratory matrix spike duplicate per 20 samples, not including QC samples, or one matrix spike duplicate sample per batch of samples if fewer than 20 samples are obtained, will be analyzed for all organic constituents. If specified, the matrix spike duplicates will be analyzed on a project sample; project-specific matrix spikes are not required. These analyses will be performed to provide information on the precision of chemical analyses. The laboratory spikes will follow EPA guidance for matrix and blank spike duplicates.

5.2.3 Laboratory Duplicates

A minimum of one laboratory duplicate per 20 samples, not including QC samples, or one laboratory duplicate sample per batch of samples if fewer than 20 samples are obtained, will be analyzed for metals. Laboratory duplicates will be analyzed using project samples. These analyses will be performed to provide information on the precision of chemical analyses. The laboratory duplicate will follow EPA guidance in the method.

5.2.4 Laboratory Method Blanks

A minimum of one laboratory method blank per 20 samples, one every 12 hours, or one per batch of samples analyzed (if fewer than 20 samples are analyzed) will be analyzed for all parameters to assess possible laboratory contamination. Dilution water will be used whenever possible. Method blanks will contain all reagents used for analysis. The generation and analysis of additional method, reagent, and glassware blanks may be necessary to verify that laboratory procedures do not contaminate samples.

5.2.5 Laboratory Control Sample

A minimum of one laboratory control sample per 20 samples, not including QC samples, or one laboratory control sample per sample batch if fewer than 20 samples are obtained, will be analyzed for all parameters.

5.2.6 Surrogate Spikes

All project samples analyzed for organic constituents will be spiked with appropriate surrogate compounds as defined by the analytical methods.

6.0 DATA MANAGEMENT

Field data (groundwater field parameter data and water levels measurements) will be entered into an Excel spreadsheet and verified to determine that the entered data are correct and without omissions and errors.

Laboratory analytical results, including QC data, will be submitted electronically. The electronic formats will include a PDF file of the laboratory report, and EDD files that will be uploaded by Landau to a project EQuIS database. Laboratories will provide EDDs in EQuIS format with Landau valid values and Level 2 reports, which will include the following elements:

- Case narrative, including adherence to prescribed protocols, non-conformity events, corrective measures, and/or data deficiencies (including initial and continuing instrument calibrations, and explanations for any missed target RLs)
- Chain of-custody (COC) documentation
- Sample receipt and condition documentation
- Sample summary or equivalent
- Method summary or equivalent
- Sample results (with date, units, and RLs)
- Laboratory data qualifier definitions
- EPA Contract Laboratory Program (CLP)-equivalent forms
- Method/laboratory blank results
- Sample surrogate results
- Field QC results
- Laboratory control sample results
- Matrix spike results
- Duplicate and/or matrix spike duplicate results
- Post-digestion spike sample results
- Inductively coupled plasma serial dilution results.

7.0 DATA VERIFICATION AND VALIDATION

Sample collection forms, field notes, and water level measurements will be reviewed by Landau and placed in the electronic project files. Field data (groundwater field parameter data and water level measurements) will be entered into an Excel spreadsheet and verified to determine that all the entered data are correct and without omissions and errors.

Soil and groundwater analytical data will undergo EPA Level 2A validation to determine that the results are acceptable and meet the quality objectives described in Section 3.0. Samples submitted for analysis by Tier 2 Forensic Suite will not be validated.

Validation of the data will be performed by a Landau data validator with guidance from applicable portions of the National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2020b) and the National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA 2020a), analytical methods, and Landau SOPs.

The EPA Level 2A-equivalent validation and verification will include the following:

- Verification that the laboratory data package contains all necessary documentation (including COC records; identification of samples received by the laboratory; date and time of receipt of the samples at the laboratory; sample conditions upon receipt at the laboratory; date and time of sample analysis; and, if applicable, date of extraction, definition of laboratory data qualifiers, all sample-related QC data, and QC acceptance criteria)
- Verification that all requested analyses, special cleanups, and special handling methods were conducted
- Verification that QC samples were analyzed as specified in the appropriate work plan
- Evaluation of sample holding times
- Evaluation of QC data compared to acceptance criteria, including method blanks, surrogate recoveries, laboratory duplicate and/or replicate results, and laboratory control sample results
- Evaluation of RLs compared to target RLs specified in this QAPP.

Analytical data may be qualified based on the data validation review. Qualifiers will be consistent with applicable EPA national functional guidelines and will be used to provide data users with an estimate of the level of uncertainty associated with the qualified result. Data validation results will be evaluated with respect to assigned qualifiers to determine any data usability issues.

The following qualifiers may be assigned during the data validation process:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

NJ The analyte has been "tentatively identified" or "presumptively identified" as present and the associated numerical value is the estimated concentration in the sample.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

U The analyte was analyzed for but was not detected above the reported sample quantitation limit.

UJ The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

The objectives, evaluations, and actions employed during the data validation process will be guided by EPA national functional guidelines. Laboratories will be permitted to provide CLP-like forms in lieu of true CLP forms. The data validation criteria will not strictly adhere to national functional guidelines, but will also take into consideration method criteria for preservation and holding times; laboratory-specified criteria for surrogate, laboratory control samples, laboratory duplicates, and matrix spikes; and the data validator's professional judgment.

Data qualification arising from data validation activities will be documented in validation worksheets and as qualifiers in the EQuIS database.

8.0 REFERENCES

EPA. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015). SW-846. US Environmental Protection Agency. https://www.epa.gov/hw-sw846.

EPA. 2000. Final: Data Quality Objectives Process for Hazardous Waste Site Investigations. EPA QA/G-4 HW. EPA/600/R-00/007. US Environmental Protection Agency. January. https://www.epa.gov/sites/production/files/2015-07/documents/g4hw-final.pdf.

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EPA. 2020b. National Functional Guidelines for Organic Superfund Methods Data Review. OLEM 9240.0-51; EPA-540-R-20-005. US Environmental Protection Agency. November. https://www.epa.gov/sites/default/files/2021-03/documents/nfg_for_organic_superfund_methods_data_review_november_2020.pdf.

Table C-1
Measurement Quality Objectives
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Soil Samples Analyzed for Volatile Organic Compounds by SW-846 8260D (with 5035A)			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank, Trip Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Soil Samples Analyzed for SPLP Volatile Organic Compounds by SW-846 8260D			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Soil Samples Analyzed for Petroleum Hydrocarbons by NWTPH-Gx (with 5035A)			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank, Trip Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S

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DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Soil Samples Analyzed for Petroleum Hydrocarbons by NWTPH-Dx (with or without SGC)			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Soil Samples Analyzed for Semivolatile Organic Compounds by SW-846 8270E			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Soil Samples Analyzed for Total Metals by SW-846 6020B			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
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DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Soil Samples Analyzed for Total Cyanide by ASTM D7511-12			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
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DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Groundwater Samples Analyzed for Volatile Organic Compounds by SW-846 8260D			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <20%	S&A
Bias/Contamination	Method Blank, Trip Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Groundwater Samples Analyzed for SPLP Volatile Organic Compounds by SW-846 8260D			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Groundwater Samples Analyzed for Petroleum Hydrocarbons by NWTPH-Gx			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <20%	S&A
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Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
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Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Groundwater Samples Analyzed for Semivolatile Organic Compounds by SW-846 8270E			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <20%	S&A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S

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Measurement Quality Objectives
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Wenatchee, Washington

DQI	QC Sample or Activity Used to Assess MQO	MQO	Sampling or Analytical DQI
Groundwater Samples Analyzed for Dissolved Metals by SW-846 6020B			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <20%	S&A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S
Groundwater Samples Analyzed for Free Cyanide by ASTM D7237-10			
Representativeness	Cooler Temperature	<6°C	S
Accuracy	LCS/LCSD	Recoveries within laboratory-specified control limits	A
Method performance for matrix, bias	LCS and MS/MSD	Recoveries within laboratory-specified control limits	S&A
Precision	LCS/LCSD and MS/MSD	RPDs within laboratory-specified control limits	A
Precision	Field Duplicates	RPD <20%	S&A
Bias/Contamination	Method Blank	Target analytes not detected at concentrations > 1/2 the RL	S&A
Analytical Completeness	Number of usable (not rejected) results out of total number of results	90%	S&A
Field Completeness	Number of samples collected out of planned samples	90%	S

Acronyms/Abbreviations:

°C = degrees Celsius
A = analytical
ASTM = ASTM International
DQI = data quality indicator
EPA = US Environmental Protection Agency
LCS = laboratory control spike
LCSD = laboratory control spike duplicate
MQO = measurement quality objective
MS = matrix spike
MSD = matrix spike duplicate
QC = quality control
RL = reporting limit
RPD = relative percent difference

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
STANDARD SUITE (TIER 1)				
Volatile Organic Compounds by SW-846 8260D				
Prep Method:	*EPA 5035A*		*Method*	
Benzene	0.01	mg/kg	0.200	µg/L
Ethylbenzene	0.05	mg/kg	1.00	µg/L
Toluene	0.025	mg/kg	0.500	µg/L
Total Xylenes	0.075	mg/kg	1.50	µg/L
SPLP Volatile Organic Compounds by SW-846 8260D				
Prep Method:	*EPA 1312*		*EPA 1312*	
Benzene	12.5	µg/L	0.250	µg/L
Ethylbenzene	25.0	µg/L	0.500	µg/L
Naphthalene	100	µg/L	2.00	µg/L
Toluene	50.0	µg/L	1.00	µg/L
m,p-Xylene	50.0	µg/L	1.00	µg/L
o-Xylene	25.0	µg/L	0.500	µg/L
Petroluem Hydrocarbons by NWTPH-Gx, NWTPH-Dx				
Prep Method:	*5035A*		*Method*	
Gasoline Range Organics	5.00	mg/kg	100	µg/L
Prep Method:	*with or without SGC*		*with or without SGC*	
Diesel Range Organics	20.0	mg/kg	80	µg/L
Oil Range Organics	40.0	mg/kg	160	µg/L
Semivolatile Organic Compounds by SW-846 8270E (a)				
Prep Method:	*Method*		*Method*	
1,2,4-Trichlorobenzene	0.00667	mg/kg	--	µg/L
1,2-Dichlorobenzene	0.00667	mg/kg	--	µg/L
1,3-Dichlorobenzene	0.00667	mg/kg	--	µg/L
1,4-Dichlorobenzene	0.00667	mg/kg	--	µg/L
1-Methylnaphthalene	0.00533	mg/kg	0.0400	µg/L
2,2'-Oxybis(1-Chloropropane)	0.00667	mg/kg	--	µg/L
2,4,5-Trichlorophenol	0.0133	mg/kg	--	µg/L
2,4,6-Trichlorophenol	0.0133	mg/kg	--	µg/L
2,4-Dichlorophenol	0.0133	mg/kg	--	µg/L
2,4-Dimethylphenol	0.0133	mg/kg	--	µg/L
2,4-Dinitrophenol	0.0667	mg/kg	--	µg/L
2,4-Dinitrotoluene	0.0267	mg/kg	--	µg/L
2,6-Dinitrotoluene	0.0267	mg/kg	--	µg/L
2-Chloronaphthalene	0.00267	mg/kg	--	µg/L
2-Chlorophenol	0.0133	mg/kg	--	µg/L
2-Methylnaphthalene	0.00533	mg/kg	0.0400	µg/L
2-Methylphenol	0.00667	mg/kg	--	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
Semivolatile Organic Compounds by SW-846 8270E (a)				
Prep Method:	*Method*		*Method*	
2-Nitroaniline	0.0533	mg/kg	--	µg/L
2-Nitrophenol	0.0267	mg/kg	--	µg/L
3,3'-Dichlorobenzidine	0.0533	mg/kg	--	µg/L
3+4-Methylphenol(s)	0.00667	mg/kg	--	µg/L
3-Nitroaniline	0.0533	mg/kg	--	µg/L
4,6-Dinitro-2-methylphenol	0.0667	mg/kg	--	µg/L
4-Bromophenyl phenyl ether	0.00667	mg/kg	--	µg/L
4-Chloro-3-methylphenol	0.0267	mg/kg	--	µg/L
4-Chloroaniline	0.00667	mg/kg	--	µg/L
4-Chlorophenyl phenyl ether	0.00667	mg/kg	--	µg/L
4-Nitroaniline	0.0533	mg/kg	--	µg/L
4-Nitrophenol	0.0267	mg/kg	--	µg/L
Acenaphthene	0.00267	mg/kg	0.0200	µg/L
Acenaphthylene	0.00267	mg/kg	0.0200	µg/L
Anthracene	0.00267	mg/kg	0.0200	µg/L
Benz(a)anthracene	0.00267	mg/kg	0.0200	µg/L
Benzo(a)pyrene	0.004	mg/kg	0.0300	µg/L
Benzo(b)fluoranthene	0.004	mg/kg	0.0300	µg/L
Benzo(g,h,i)perylene	0.00267	mg/kg	0.0200	µg/L
Benzo(k)fluoranthene	0.004	mg/kg	0.0300	µg/L
Benzoic acid	0.333	mg/kg	--	µg/L
Benzyl alcohol	0.0133	mg/kg	--	µg/L
Bis(2-Chloroethoxy) methane	0.00667	mg/kg	--	µg/L
Bis(2-Chloroethyl) ether	0.00667	mg/kg	--	µg/L
Bis(2-ethylhexyl)phthalate	0.04	mg/kg	--	µg/L
Butyl benzyl phthalate	0.0267	mg/kg	--	µg/L
Carbazole	0.004	mg/kg	--	µg/L
Chrysene	0.00267	mg/kg	0.0200	µg/L
Dibenz(a,h)anthracene	0.00267	mg/kg	0.0200	µg/L
Dibenzofuran	0.00267	mg/kg	0.0200	µg/L
Diethylphthalate	0.0267	mg/kg	--	µg/L
Dimethylphthalate	0.0267	mg/kg	--	µg/L
Di-n-butylphthalate	0.0267	mg/kg	--	µg/L
Di-n-octyl phthalate	0.0267	mg/kg	--	µg/L
Fluoranthene	0.00267	mg/kg	0.0200	µg/L
Fluorene	0.00267	mg/kg	0.0200	µg/L
Hexachlorobenzene	0.00267	mg/kg	--	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
Semivolatile Organic Compounds by SW-846 8270E (a)				
Prep Method:	*Method*		*Method*	
Hexachlorobutadiene	0.00667	mg/kg	--	µg/L
Hexachlorocyclopentadiene	0.0133	mg/kg	--	µg/L
Hexachloroethane	0.00667	mg/kg	--	µg/L
Indeno(1,2,3-cd)pyrene	0.00267	mg/kg	0.0200	µg/L
Isophorone	0.00667	mg/kg	--	µg/L
Naphthalene	0.00533	mg/kg	0.0400	µg/L
Nitrobenzene	0.0267	mg/kg	--	µg/L
N-Nitroso-di-n-propylamine	0.00667	mg/kg	--	µg/L
N-Nitrosodiphenylamine	0.00667	mg/kg	--	µg/L
Pentachlorophenol (PCP)	0.0267	mg/kg	--	µg/L
Phenanthrene	0.00267	mg/kg	0.0200	µg/L
Phenol	0.00533	mg/kg	--	µg/L
Pyrene	0.00267	mg/kg	0.0200	µg/L
Total/Dissolved Metals by SW-846 6020B				
	Total Metals		Dissolved Metals	
Prep Method:	*Method*		*Method*	
Arsenic	1.00	mg/kg	1.00	µg/L
Barium	1.00	mg/kg	1.00	µg/L
Cadmium	0.200	mg/kg	0.200	µg/L
Chromium	1.00	mg/kg	2.00	µg/L
Lead	0.200	mg/kg	0.200	µg/L
Mercury	0.0800	mg/kg	0.0800	µg/L
Selenium	1.00	mg/kg	1.00	µg/L
Silver	0.200	mg/kg	0.200	µg/L

Notes:

Target reporting limits provided by Apex Laboratories, Tigard, Oregon.

(a) TEQs for cPAHs will be calculated in accordance with CLARC's guidance "Using Toxicity Equivalency Factors 2007."

Acronyms/Abbreviations:

cPAH = carcinogenic polycyclic aromatic hydrocarbon
EPA = US Environmental Protection Agency
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
-- = not applicable
RL = reporting limit
SCG = silica gel cleanup
SIM = select ion monitoring
SPLP = Synthetic Precipitation Leaching Procedure
TEQ = toxicity equivalence

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
General Chemistry				
Prep Method:	*Method*		*Method*	
Free Cyanide (ASTM D7237-10)	--	--	5.0	µg/L
Total Cyanide (ASTM D7511-12)	0.100	mg/kg	--	--
FORENSICS SUITE (TIER 2)				
Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx				
Prep Method:	*Method*		*Method*	
Gasoline Range Organics	5.00	mg/kg	0.100	mg/L
Acetone	1000	µg/kg	20.0	µg/L
Acrylonitrile	100.0	µg/kg	2.00	µg/L
Benzene	10.00	µg/kg	0.200	µg/L
Bromobenzene	25.0	µg/kg	0.500	µg/L
Bromochloromethane	50.0	µg/kg	1.00	µg/L
Bromodichloromethane	50.0	µg/kg	1.00	µg/L
Bromoform	100.0	µg/kg	1.00	µg/L
Bromomethane	500.0	µg/kg	5.00	µg/L
2-Butanone (MEK)	500	µg/kg	10.0	µg/L
n-Butylbenzene	50.0	µg/kg	1.00	µg/L
sec-Butylbenzene	50.0	µg/kg	1.00	µg/L
tert-Butylbenzene	50.0	µg/kg	1.00	µg/L
Carbon disulfide	500	µg/kg	10.0	µg/L
Carbon tetrachloride	50.0	µg/kg	1.00	µg/L
Chlorobenzene	25.0	µg/kg	0.500	µg/L
Chloroethane	500	µg/kg	5.00	µg/L
Chloroform	50.0	µg/kg	1.00	µg/L
Chloromethane	250	µg/kg	5.00	µg/L
2-Chlorotoluene	50.0	µg/kg	1.00	µg/L
4-Chlorotoluene	50.0	µg/kg	1.00	µg/L
Dibromochloromethane	100.0	µg/kg	1.00	µg/L
1,2-Dibromo-3-chloropropane	250	µg/kg	5.00	µg/L
1,2-Dibromoethane (EDB)	50.0	µg/kg	0.500	µg/L
Dibromomethane	50.0	µg/kg	1.00	µg/L
1,2-Dichlorobenzene	25.0	µg/kg	0.500	µg/L
1,3-Dichlorobenzene	25.0	µg/kg	0.500	µg/L
1,4-Dichlorobenzene	25.0	µg/kg	0.500	µg/L
Dichlorodifluoromethane	100.0	µg/kg	1.00	µg/L
1,1-Dichloroethane	25.0	µg/kg	0.400	µg/L
1,2-Dichloroethane (EDC)	25.0	µg/kg	0.400	µg/L
1,1-Dichloroethene	25.0	µg/kg	0.400	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
cis-1,2-Dichloroethene	25.0	µg/kg	0.400	µg/L
trans-1,2-Dichloroethene	25.0	µg/kg	0.400	µg/L
1,2-Dichloropropane	25.0	µg/kg	0.500	µg/L
1,3-Dichloropropane	50.0	µg/kg	1.00	µg/L
2,2-Dichloropropane	50.0	µg/kg	1.00	µg/L
1,1-Dichloropropene	50.0	µg/kg	1.00	µg/L
cis-1,3-Dichloropropene	50.0	µg/kg	1.00	µg/L
trans-1,3-Dichloropropene	50.0	µg/kg	1.00	µg/L
Ethylbenzene	25.0	µg/kg	0.500	µg/L
Hexachlorobutadiene	100.0	µg/kg	5.00	µg/L
2-Hexanone	500	µg/kg	10.0	µg/L
Isopropylbenzene	50	µg/kg	1.00	µg/L
4-Isopropyltoluene	50	µg/kg	1.00	µg/L
Methylene chloride	500	µg/kg	10.0	µg/L
4-Methyl-2-pentanone (MiBK)	500	µg/kg	10.0	µg/L
Methyl tert-butyl ether (MTBE)	50	µg/kg	1.00	µg/L
Naphthalene	100	µg/kg	2.00	µg/L
n-Propylbenzene	25	µg/kg	0.500	µg/L
Styrene	50	µg/kg	1.00	µg/L
1,1,1,2-Tetrachloroethane	25	µg/kg	0.400	µg/L
1,1,2,2-Tetrachloroethane	50	µg/kg	0.500	µg/L
Tetrachloroethene (PCE)	25	µg/kg	0.400	µg/L
Toluene	50	µg/kg	1.00	µg/L
1,2,3-Trichlorobenzene	250	µg/kg	2.00	µg/L
1,2,4-Trichlorobenzene	250	µg/kg	2.00	µg/L
1,1,1-Trichloroethane	25	µg/kg	0.400	µg/L
1,1,2-Trichloroethane	25	µg/kg	0.500	µg/L
Trichloroethene (TCE)	25	µg/kg	0.400	µg/L
Trichlorofluoromethane	100	µg/kg	2.00	µg/L
1,2,3-Trichloropropane	50	µg/kg	1.00	µg/L
1,2,4-Trimethylbenzene	50	µg/kg	1.00	µg/L
1,3,5-Trimethylbenzene	50	µg/kg	1.00	µg/L
Vinyl chloride	25	µg/kg	0.400	µg/L
m,p-Xylene	50	µg/kg	1.00	µg/L
o-Xylene	25	µg/kg	0.500	µg/L
Xylenes, total	75	µg/kg	1.50	µg/L
trans-1,4-Dichloro-2-butene	500	µg/kg	10.0	µg/L
n-Hexane	500	µg/kg	10.0	µg/L
1,1,2-Trichloro-1,2,2-trifluoroethane	100	µg/kg	2.00	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
Acrolein	--	--	10.0	µg/L
2-Chloroethyl vinyl ether	--	--	10.0	µg/L
Iodomethane	--	--	10.0	µg/L
Tetrahydrofuran	--	--	10.0	µg/L
Isobutyl alcohol	--	--	250	µg/L
Vinyl acetate	--	--	10.0	µg/L
Volatiles by Purge and Trap and GC/MS				
n-Butane	50.0	µg/kg	1.00 µg/L	µg/L
Isopentane	50.0	µg/kg	1.00 µg/L	µg/L
n-Pentane	250	µg/kg	1.00 µg/L	µg/L
n-Heptane	50.0	µg/kg	1.00 µg/L	µg/L
3-Methylhexane	50.0	µg/kg	1.00 µg/L	µg/L
Isooctane	50.0	µg/kg	1.00 µg/L	µg/L
Methylcyclohexane	50.0	µg/kg	1.00 µg/L	µg/L
2,3,3-Trimethylpentane	50.0	µg/kg	1.00 µg/L	µg/L
n-Octane	250	µg/kg	5.00 µg/L	µg/L
n-Dodecane	250	µg/kg	5.00 µg/L	µg/L
Oxygenates by Purge and Trap and GC/MS				
Ethanol	6250	µg/kg	125	µg/L
tert-Butanol (TBA)	5000	µg/kg	100	µg/L
tert-Amyl ethyl ether (TAEE)	25.0	µg/kg	0.500	µg/L
Diisopropyl ether (DIPE)	25.0	µg/kg	0.500	µg/L
Ethyl-tert-butyl ether (ETBE)	25.0	µg/kg	0.500	µg/L
tert-Amyl methyl ether (TAME)	25.0	µg/kg	0.500	µg/L
Methyl tert-butyl ether (MTBE)	50.0	µg/kg	1.00	µg/L
1,2-Dibromoethane (EDB)	50.0	µg/kg	0.500	µg/L
1,2-Dichloroethane (EDC)	25.0	µg/kg	0.400	µg/L
Polyaromatic Hydrocarbons (PAHs) and PAH Homologs by EPA 8270E Modified				
cis-Decalin	4.00	µg/kg	0.0400	µg/L
C1-Decalin	20.0	µg/kg	0.100	µg/L
C2-Decalin	20.0	µg/kg	0.100	µg/L
C3-Decalin	40.0	µg/kg	0.200	µg/L
C4-Decalin	40.0	µg/kg	0.200	µg/L
Naphthalene	8.00	µg/kg	0.0400	µg/L
1-Methylnaphthalene	8.00	µg/kg	0.0400	µg/L
2-Methylnaphthalene	8.00	µg/kg	0.0400	µg/L
C1-Naphthalenes	20.0	µg/kg	0.100	µg/L
C2-Naphthalenes	20.0	µg/kg	0.100	µg/L
C3-Naphthalenes	20.0	µg/kg	0.100	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
C4-Naphthalenes	20.0	µg/kg	0.100	µg/L
Acenaphthene	4.00	µg/kg	0.0200	µg/L
Acenaphthylene	4.00	µg/kg	0.0200	µg/L
Dibenzofuran	4.00	µg/kg	0.0200	µg/L
Fluorene	4.00	µg/kg	0.0200	µg/L
C1-Fluorenes	20.0	µg/kg	0.100	µg/L
C2-Fluorenes	20.0	µg/kg	0.100	µg/L
C3-Fluorenes	20.0	µg/kg	0.100	µg/L
Dibenzothiophene	4.00	µg/kg	0.0200	µg/L
C1-Dibenzothiophene	20.0	µg/kg	0.100	µg/L
C2-Dibenzothiophene	20.0	µg/kg	0.100	µg/L
C3-Dibenzothiophene	20.0	µg/kg	0.100	µg/L
C4-Dibenzothiophene	40.0	µg/kg	0.200	µg/L
Phenanthrene	4.00	µg/kg	0.0200	µg/L
Anthracene	4.00	µg/kg	0.0200	µg/L
1-Methylphenanthrene	4.00	µg/kg	0.0200	µg/L
C1-Phenanthrenes/Anthracenes	20.0	µg/kg	0.100	µg/L
C2-Phenanthrenes/Anthracenes	20.0	µg/kg	0.100	µg/L
C3-Phenanthrenes/Anthracenes	20.0	µg/kg	0.100	µg/L
C4-Phenanthrenes/Anthracenes	40.0	µg/kg	0.200	µg/L
Fluoranthene	4.00	µg/kg	0.0200	µg/L
Pyrene	4.00	µg/kg	0.0200	µg/L
C1-Fluoranthenes/Pyrenes	20.0	µg/kg	0.100	µg/L
C2-Fluoranthenes/Pyrenes	20.0	µg/kg	0.100	µg/L
C3-Fluoranthenes/Pyrenes	20.0	µg/kg	0.100	µg/L
C4-Fluoranthenes/Pyrenes	40.0	µg/kg	0.200	µg/L
Chrysene	4.00	µg/kg	0.0200	µg/L
Benz(a)anthracene	4.00	µg/kg	0.0200	µg/L
C1-Chrysenes/Benz(a)anthracenes	20.0	µg/kg	0.100	µg/L
C2-Chrysenes/Benz(a)anthracenes	20.0	µg/kg	0.100	µg/L
C3-Chrysenes/Benz(a)anthracenes	20.0	µg/kg	0.100	µg/L
C4-Chrysenes/Benz(a)anthracenes	40.0	µg/kg	0.200	µg/L
Benzo(b)fluoranthene	6.00	µg/kg	0.0300	µg/L
Benzo(k)fluoranthene	6.00	µg/kg	0.0300	µg/L
Benzo(a)pyrene	6.00	µg/kg	0.0300	µg/L
Benzo(e)pyrene	4.00	µg/kg	0.0200	µg/L
Perylene	4.00	µg/kg	0.0200	µg/L
Indeno(1,2,3-cd)pyrene	4.00	µg/kg	0.0200	µg/L
Dibenz(a,h)anthracene	4.00	µg/kg	0.0200	µg/L

Table C-2
Reporting Limit Goals
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Analyte	Soil/Product		Groundwater	
	RL	Units	RL	Units
Benzo(g,h,i)perylene	4.00	µg/kg	0.0200	µg/L
1,1'-Biphenyl	4.00	µg/kg	0.0400	µg/L
2,6-Dimethylnaphthalene	4.00	µg/kg	0.100	µg/L
1,6,7-Trimethylnaphthalene	4.00	µg/kg	0.0400	µg/L
Benzo(b+k)fluoranthene(s)	12.0	µg/kg	0.0600	µg/L
Forensics by ASTM D-2887-14				
Boiling Range Distribution of Petroleum Fractions	--	%m/m	--	--

Table C-3
Project Screening Levels
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Chemical Data Group	Chemical Name	CAS No.	Soil Project Screening Level (a) (mg/kg)	Groundwater Project Screening Level (b) (µg/L)
Petroleum	Gasoline Range Organics	N/A	30	800
Petroleum	Diesel Range Organics	N/A	2,000	500
Petroleum	Oil Range Organics	N/A	2,000	500
VOCs	Benzene	71-43-2	0.03	0.44
VOCs	Ethylbenzene	100-41-4	6.00	12
VOCs	Toluene	108-88-3	7.00	53
VOCs	m,p-Xylenes	179601-23-1	N/A	N/A
VOCs	o-Xylenes	95-47-6	N/A	N/A
VOCs	Total Xylenes	1330-20-7	9.00	57
PAHs	1-Methylnaphthalene	90-12-0	34	1.5
PAHs	2-Methylnaphthalene	91-57-6	320	32
PAHs	Acenaphthene	83-32-9	4,800	30
PAHs	Acenaphthylene	208-96-8	N/A	N/A
PAHs	Anthracene	120-12-7	24,000	100
PAHs	Benzo(a)anthracene	56-55-3	N/A	0.1
PAHs	Benzo(a)pyrene	50-32-8	0.10	0.1
PAHs	Benzo(b)fluoranthene	205-99-2	N/A	0.1
PAHs	Benzo(g,h,i)perylene	191-24-2	N/A	N/A
PAHs	Benzo(k)fluoranthene	207-08-9	N/A	0.1
PAHs	Chrysene	218-01-9	N/A	0.1
PAHs	Dibenzo(a,h)anthracene	53-70-3	N/A	0.1
PAHs	Dibenzofuran	132-64-9	80	1.20
PAHs	Fluoranthene	206-44-0	3,200	6.0
PAHs	Fluorene	86-73-7	3,200	10
PAHs	Indeno(1,2,3-cd)pyrene	193-39-5	N/A	0.1
PAHs	Naphthalene	91-20-3	5.00	8.9
PAHs	Phenanthrene	85-01-8	N/A	N/A
PAHs	Pyrene	129-00-0	2,400	8.0
PAHs	cPAH TEQ (ND = 0.5 RL)	N/A	0.1	0.2
SVOCs	1,2,4-Trichlorobenzene	120-82-1	34	N/A
SVOCs	1,2-Dichlorobenzene	95-50-1	7,200	N/A
SVOCs	1,3-Dichlorobenzene	541-73-1	N/A	N/A
SVOCs	1,4-Dichlorobenzene	106-46-7	190	N/A
SVOCs	2,2'-Oxybis(1-chloropropane)	108-60-1	14	N/A
SVOCs	2,4,5-Trichlorophenol	95-95-4	8,000	N/A
SVOCs	2,4,6-Trichlorophenol	88-06-2	80	N/A
SVOCs	2,4-Dichlorophenol	120-83-2	240	N/A
SVOCs	2,4-Dimethylphenol	105-67-9	1,600	85
SVOCs	2,4-Dinitrophenol	51-28-5	160	N/A
SVOCs	2,4-Dinitrotoluene	121-14-2	3.2	N/A
SVOCs	2,6-Dinitrotoluene	606-20-2	0.67	N/A
SVOCs	2-Chloronaphthalene	91-58-7	6,400	N/A
SVOCs	2-Chlorophenol	95-57-8	400	N/A
SVOCs	2-Methylphenol	95-48-7	4,000	800
SVOCs	2-Nitroaniline	88-74-4	800	N/A

Table C-3
Project Screening Levels
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Chemical Data Group	Chemical Name	CAS No.	Soil Project Screening Level (a) (mg/kg)	Groundwater Project Screening Level (b) (µg/L)
SVOCs	2-Nitrophenol	88-75-5	N/A	N/A
SVOCs	3,3'-Dichlorobenzidine	91-94-1	2.2	N/A
SVOCs	3-Nitroaniline	99-09-2	N/A	N/A
SVOCs	4,6-Dinitro-2-methylphenol	534-52-1	6.4	N/A
SVOCs	4-Bromophenyl phenyl ether	101-55-3	N/A	N/A
SVOCs	4-Chloro-3-methylphenol	59-50-7	8,000	N/A
SVOCs	4-Chloroaniline	106-47-8	5.0	N/A
SVOCs	4-Chlorophenyl phenyl ether	7005-72-3	N/A	N/A
SVOCs	4-Methylphenol	106-44-5	8,000	41.3
SVOCs	4-Nitroaniline	100-01-6	50	N/A
SVOCs	4-Nitrophenol	100-02-7	N/A	N/A
SVOCs	Benzoic Acid	65-85-0	320,000	N/A
SVOCs	Benzyl Alcohol	100-51-6	8,000	N/A
SVOCs	Bis(2-chloroethoxy)methane	111-91-1	N/A	N/A
SVOCs	Bis(2-chloroethyl)ether	111-44-4	0.91	N/A
SVOCs	Bis(2-ethylhexyl)phthalate	117-81-7	71	N/A
SVOCs	Butylbenzylphthalate	85-68-7	530	N/A
SVOCs	Carbazole	86-74-8	N/A	5.2
SVOCs	Dibutylphthalate	84-74-2	8,000	N/A
SVOCs	Diethylphthalate	84-66-2	64,000	N/A
SVOCs	Dimethylphthalate	131-11-3	N/A	N/A
SVOCs	Di-n-octylphthalate	117-84-0	800	N/A
SVOCs	Hexachlorobenzene	118-74-1	0.63	N/A
SVOCs	Hexachlorobutadiene	87-68-3	13	N/A
SVOCs	Hexachlorocyclopentadiene	77-47-4	480	N/A
SVOCs	Hexachloroethane	67-72-1	25	N/A
SVOCs	Isophorone	78-59-1	1,100	N/A
SVOCs	Nitrobenzene	98-95-3	160	N/A
SVOCs	n-Nitroso-di-n-propylamine	621-64-7	0.14	N/A
SVOCs	n-Nitrosodiphenylamine	86-30-6	200	N/A
SVOCs	Pentachlorophenol	87-86-5	2.5	N/A
SVOCs	Phenol	108-95-2	24,000	29
Metals	Arsenic	7440-38-2	20	0.058 (c)
Metals	Barium	7440-39-3	16,000	3,200 (c)
Metals	Cadmium	7440-43-9	2.0	N/A
Metals	Total Chromium	7440-47-3	N/A	50 (c)
Metals	Lead	7439-92-1	250	15 (c)
Metals	Mercury	7439-97-6	2.0	2.0 (c)
Metals	Selenium	7782-49-2	400	80 (c)
Metals	Silver	7440-22-4	400	80 (c)
General Chemistry	Total Cyanide	57-12-5	50	5.0

Table C-3
Project Screening Levels
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Notes:

(a) Method A where applicable, if no Method A then minimum of Method B. Screening levels provided by GeoEngineers (April 2023)

(b) Groundwater screening levels take into consideration surface water criteria and drinking water criteria, and adjusted to account for practical quantitation limits (PQLs) provided by Analytical Resources, LLC of Tukwila, Washington. Screening levels provided by GeoEngineers (April 2023).

(c) Preliminary screening levels. Method A where applicable, if no Method A then minimum of Method B. Screening levels for dissolved metals were not provided by GeoEngineers as they did not analyze water samples for metals.

Acronyms/Abbreviations:

µg/L = micrograms per liter

mg/kg = milligrams per kilogram

Table C-4
Sample Containers, Preservatives, and Holding Times
PSE Worthen Street Substation Investigation Quality Assurance Project Plan
Wenatchee, Washington

Matrix	Analytical Method	Prep Method	Container	Preservative	Holding Time (a)	Laboratory
Soil	NWTPH-Dx	with or without SGC	8 oz. glass jar	Cool to <6°C	14 days to extract; 40 days to analyze	Apex
	NWTPH-Gx	5035A	40 mL VOA - 5035 (MeOH)	MeOH, Cool to <6°C	14 days	Apex
	SW-846 8260D	5035A	40 mL VOA - 5035 (MeOH)	MeOH, Cool to <6°C	14 days	Apex
		1312 (SPLP)	8 oz. glass jar	Cool to <6°C	14 days	Apex
	SW-846 8270E	Method	8 oz. glass jar	Cool to <6°C	14 days to extract; 40 days to analyze	Apex
	SW-846 6020B	Method	8 oz. glass jar	Cool to <6°C	180 days (28 days Hg)	Apex
	ASTM D7511-12	Method	8 oz. glass jar	Cool to <6°C	14 days	Apex
	SW-846 8270M	Method	8 oz. glass jar	Cool to <6°C	14 days	Apex
	ASTM D2877-14	Method	2 oz. glass jar	None	180	Apex
Water	NWTPH-Dx	with or without SGC	1 L Amber glass - HCL	HCl to pH <2, Cool to <6°C	14 days to extract; 40 days to analyze	Apex
	NWTPH-Gx	Method	40 mL VOA - HCL	HCl to pH <2, Cool to <6°C	14 days	Apex
	SW-846 8260D	Method	40 mL VOA - HCL	HCl to pH <2, Cool to <6°C	14 days	Apex
		1312 (SPLP)	40 mL VOA - Nonpreserved	Cool to <6°C	14 days	Apex
	SW-846 8270E	Method	1 L Amber glass - Nonpreserved	Cool to <6°C	7 days to extract; 40 days to analyze	Apex
	SW-846 6020B	Method	250 mL Poly - Nitric (HNO3)	HNO3 tp pH <2 (Hg also cool to	180 days (28 days Hg)	Apex
	ASTM D7237-10	Method	125 mL Brown Poly - NaOH	NaOH to pH >10, Cool to <6°C	14 days	Apex
	SW-846 8270M	Method	1L Amber Glass	Cool to <6°C	7 days to extract; 40 days to analyze	Apex

Note:

(a) Time from sample collection to extraction/Time from sample extraction to analysis.

Acronyms/Abbreviations:

°C = degrees Celsius
ASTM = ASTM International
EPA = US Environmental Protection Agency
HCL = hydrochloric acid
Hg = mercury
HNO3 = nitric acid
L = liter
MeOH = methanol
mL = milliliter
NaOH = sodium hydroxide
oz = ounces
SGC = silica-gel cleanup
SPLP = Synthetic Precipitation Leaching Procedure
VOA = volatile organic analysis

APPENDIX D

Site-Specific Health and Safety Plan

Work Location Personnel Protection and Safety Evaluation Form

Attach Pertinent Documents/Data
Fill in Blanks As Appropriate

Project Number:	130037.010	Reviewed by:	Christine Kimmel
Prepared by:	Weston Boardman	Date:	May 31, 2023
Date:	May 9, 2023		

A. Work Location Description

1.	**Project Name:**	Puget Sound Energy Worthen Substation Site
2.	**Location:**	500 South Worthen Street, Wenatchee WA 98801
3.	**Anticipated Activities**	Drilling oversight, well installation and development, soil sampling, free product dense non-aqueous phase liquid sampling, and groundwater sampling.
4.	**Size:**	2 Acres
5.	**Surrounding Population:**	Site is surrounded by commercial properties, roadway, and railway and is located within the city limits of Wenatchee; population of approximately 35,405 (2021)
6.	**Buildings/Homes/Industry:**	Site is an active substation.
7.	**Topography:**	Site is generally level with steep 25-30 foot slope down to Columbia River to the east.
8.	**Anticipated Weather:**	12 to 25 degrees C, sunny
9.	**Unusual Features:**	Site is an active Chelan County PUD substation, BNSF railroad tracks to the west, and Columbia River to the east.
10.	**Site History:**	1920 – Wenatchee Valley Gas & Electric Company steam plant and manufactured gas plant (MGP). 1921 to 1928 – Puget Sound Power & Light assumed operations. 1959 – Steam plant and MGP removed and converted to substation operated by Chelan County PUD. 1991 – Diesel release(s) documented on adjacent BNSF property to the west during UST closure activities. 2017 – Significant R11 biodiesel release from underground piping on adjacent property to the south operated by Coleman Oil Company, which resulted in a light non-aqueous phase liquid (LNAPL) plume that apparently migrated under the southeastern portion of the Site and to the Columbia River.

April 2018 – Apparent coal tar encountered in boring MW22 in Worthen Street right of way (ROW) east of property.

2022 – Additional locations with subsurface coal tar contamination and dissolved-phase petroleum contamination discovered in soil borings and monitoring wells

B. Hazard Description

1. Background Review: ☒ Complete ☐ Partial
If partial, why? Click here to enter text.

2. Hazardous Level: ☐ B ☐ C ☒ D ☐ Unknown
Justification: Sampling is for the potential presence of gasoline-, diesel-, and heavy oil-range total petroleum hydrocarbons (TPH); volatile organic compounds (VOCs), which include benzene, toluene, ethylbenzene, and xylenes (BTEX); metals, which include arsenic, barium, cadmium, total chromium, lead, selenium, silver, and mercury; polycyclic aromatic hydrocarbons (PAHs); and free cyanide in soil and groundwater. Coal tar or coal tar-like material dense non-aqueous phase liquid (DNAPL) will be sampled if present.

3. Types of Hazards: (Attach additional sheets as necessary)

A. ☒ Chemical ☒ Inhalation ☒ Explosive
☐ Biological ☒ Ingestion ☐ O_2 Def. ☒ Skin Contact

Describe: Potential contaminants may pose a risk to human health through inhalation, ingestion, and/or skin contact. Subsurface vapor may accumulate causing a potential explosive condition.

B. ☒ Physical ☐ Cold Stress ☒ Noise ☐ Heat Stress ☒ Other
Describe: Heavy equipment (drilling rig) will be used at the site to advance borings and install monitoring wells which presents a physical and noise hazard. Several borings will be advanced in the Worthen Street ROW with traffic control, which presents a physical hazard.

C. ☐ Radiation
Describe: Click here to enter text.

4. Nature of Hazards:

☒ Air Describe: Vapor from subsurface sources of VOCs and particulate matter with environmental impacts

☒ Soil Describe: Contaminants may be present in the soil of the property which may pose a risk to human health through inhalation, ingestion, and/or skin contact.

☐ Surface Water Describe: Click here to enter text.

☒ Groundwater Describe: Contaminants may be present in the groundwater of the property which may pose a risk to human health through inhalation, ingestion, and/or skin contact.

☒ Other Describe: Free product DNAPL may be present in borings at the property which may pose a risk to human health through inhalation, ingestion, and/or skin contact.

5. Chemical Contaminants of Concern ☐ N/A

Contaminant	PEL (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
BTEX (protective to benzene)	0.1 ppm	500 ppm	Unknown levels in soil and groundwater	Dermal contact, ingestion, inhalation	Irritated eyes, skin, nose, and respiratory system; giddiness; headache; nausea; staggered gait; dermatitis; fatigue; anorexia; lassitude; bone marrow depressant (benzene is a known carcinogen)	PID meter
Cyanide (HCN)	5 mg/m^3	50 mg/m^3	Unknown levels in soil and groundwater	Inhalation, dermal contact, ingestion, eye contact	Asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased rate and depth of respiration or respiration slow and gasping; thyroid, blood changes	Dust control

RCRA Metals (protective to arsenic)	0.002 mg/m^3	5 mg/m^3	Unknown levels in soil and groundwater	Inhalation, skin absorption, dermal contact, ingestion.	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Dust Control
Total petroleum hydrocarbons	100 ppm	400 ppm	Unknown levels in soil and groundwater.	Dermal contact, ingestion, inhalation	Irritation of eyes, nose, and throat; nausea; dizziness; headache; dry, cracked skin	PID meter

Notes: Click here to enter text.

6. Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Heavy Machinery	Drilling Equipment	Project location	Maintain safe distance from drilling equipment, maintain communications with drill operator, and follow drilling subcontractors' safety procedures around drilling equipment. Make eye contact with operator prior to advancing near equipment.
Traffic	Drilling in ROW with traffic control in place	Worthen St ROW	Stay alert, remain in area protected by traffic control, watch for vehicles around work area, place work vehicle between oncoming vehicles and work area (inside the traffic control area).
Travel to the site	Operating motor vehicle in traffic on highways and rural roads	Route to and from site from Landau Associates office	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection, all vehicles to be maintained and in good working order. Obey all traffic laws including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time for travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish a planned route prior to departure. Be observant of unsafe road conditions and erratic/dangerous drivers.
Underground and Above Ground Utilities	Damage to utilities through advancement of borings	Project location	Public and private utility locating services will be performed prior to drilling and all boring locations will be air-knifed to a depth of at least 5 ft bgs. Drilling locations will adhere to minimum clearance distances from overhead transmission lines in accordance with WAC 296-24-960 and WAC 296-155-428. A minimum 10-ft separation will be maintained from overhead power lines less than 50 kilovolts (kV). There are 115-kV lines present at the site. A minimum separation of 12.5 ft will be maintained from the 115-kV lines.

Explosion	Spark from non-grounded equipment conducting work in the subsurface	Excavation area	If vapors accumulate in subsurface, the potential exists for a spark from non-grounded equipment to cause an explosion. Properly ground excavation equipment. Use intrinsically safe equipment when working in areas of free product (no cell phones).

7. Work Location Instrument Readings ☒ N/A

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

Location:	Click here to enter text.		
Percent O_2:	Click here to enter text.	Percent LEL:	Click here to enter text.
Radioactivity:	Click here to enter text.	PID:	Click here to enter text.
FID:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.
Other:	Click here to enter text.	Other:	Click here to enter text.

8. Hazards Expected in Preparation for Work Assignment ☒ N/A

Describe: Click here to enter text.

C. Personal Protective Equipment

1. Level of Protection

☐ A ☐ B ☐ C ☒ D

Location/Activity: Safety vest, hard hat (when working near heavy equipment), steel-toed work boots, nitrile gloves, safety glasses.

☐ A ☐ B ☒ C ☐ D

Location/Activity: Upgrade to Level C based on air monitoring program (see Attachment A)

2. Protective Equipment (specify probable quantity required)

Respirator ☐ N/A

- ☐ SCBA, Airline
- ☐ Full-Face Respirator
- ☒ Half-Face Respirator (Cart. organic vapor) (Only if upgrade to Level C)
- ☐ Escape mask
- ☐ None
- ☐ Other:
- ☐ Other:

Clothing ☐ N/A

- ☐ Fully Encapsulating Suit
- ☐ Chemically Resistant Splash Suit
- ☐ Apron, Specify:
- ☒ Tyvek Coverall (only if upgrade to Level C)
- ☐ Saranex Coverall
- ☐ Coverall, Specify
- ☒ Other: high visible safety vest

Head & Eye ☐ N/A

- ☒ Hard Hat
- ☐ Goggles
- ☐ Face Shield
- ☒ Safety Eyeglasses
- ☒ Other: hearing protection

Hand Protection ☐ N/A

- ☐ Undergloves; Type:
- ☒ Gloves; Type: nitrile
- ☐ Overgloves; Type:
- ☐ None
- ☐ Other:

Foot Protection ☐ N/A

- ☐ Neoprene Safety Boots with Steel Toe/Shank
- ☐ Disposable Overboots
- ☒ Other: steel-toed boots

3. Monitoring Equipment ☐ N/A

- ☒ CGI
- ☐ O2 Meter
- ☐ Rad Survey
- ☐ Detector Tubes (optional)

Type:

- ☒ PID
- ☐ FID
- ☐ Other

D. Decontamination

Personal Decontamination ☒ Required ☐ Not Required

If required, describe: Personal decontamination will be facilitated by using sample-dedicated PPE, to be changed between locations. Avoid hand to mouth activities. Removed PPE to be treated as investigative-derived waste.

Equipment Decontamination ☒ Required ☐ Not Required

If required, describe: All non-disposable sampling equipment will be decontaminated using wet decontamination procedures:

- Wash and scrub equipment with Alconox/tap water solution
- Rinse with tap water
- Rinse with distilled water
- Repeat entire procedure or any parts of the procedure as necessary.

E. Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
013	Utility locates including GPR	Early to mid-June 2023
013	Air knifing, drilling, well installation	June 14 to June 30, 2023
013	Well Development	Early July 2023
013	Quarterly Groundwater Monitoring	July and October 2023; January and April 2024
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F. Subcontractor's Health and Safety Program Evaluation ☐ N/A

Name and Address of Subcontractor: Anderson Drilling, 705 Colorado Street, Kelso, WA 98626

	Evaluation Criteria		
Item	Adequate	Inadequate	Comments
Medical Surveillance Program	☒	☐	Click here to enter text.
Personal Protective Equipment Availability	☒	☐	Click here to enter text.
Onsite Monitoring Equipment Availability	☒	☐	Click here to enter text.
Safe Working Procedures Specification	☒	☐	Click here to enter text.
Training Protocols	☒	☐	Click here to enter text.
Ancillary Support Procedures (if any)	☒	☐	Click here to enter text.
Emergency Procedures	☒	☐	Click here to enter text.
Evacuation Procedures Contingency Plan	☒	☐	Click here to enter text.
Decontamination Procedures Equipment	☒	☐	Click here to enter text.
Decontamination Procedures Personnel	☒	☐	Click here to enter text.

General Health and Safety Program Evaluation: ☒ Adequate ☐ Inadequate

Additional Comments: Click here to enter text.

Evaluation Conducted by: Weston Boardman Date: 05/09/2023

Emergency Facilities and Numbers

Hospital: Central Washington Hospital & Clinics: Emergency Room; 1201 South Miller Street, Wenatchee, WA 98801
Directions: Travel north on South Worthen Street, 0.5 miles; turn left onto Orondo Street, 0.2 miles; continue straight onto Orondo Avenue, 0.7 miles; turn left onto Fuller Street, 0.6 miles, turn right onto Red Apple Road, 0.1 miles, turn left onto Rosewood Avenue, 223 feet; continue straight, 39 feet; turn left (destination on right, 56 feet.

Telephone: (509) 662-1511
Emergency Transportation Systems (Fire, Police, Ambulance) -- 911

Emergency Routes – Map (Attachment __)

Emergency Contacts:

Name	Offsite	Onsite
Chris Kimmel	(425) 329-0254	(206) 786-3801
Shane Kostka	(509) 444-9428	(208) 819-1965
Piper Roelen	(425) 329-0319	(425) 503-6784

In the event of an emergency, do the following:

1. Call for help as soon as possible. Call 911. Give the following information:
    - WHERE the emergency is – use cross streets or landmarks
    - PHONE NUMBER you are calling from
    - WHAT HAPPENED – type of injury
    - WHAT is being done for the victim(s)
    - YOU HANG UP LAST – let the person you called hang up first.
2. If the victim can be moved, paramedics will transport to the hospital. If the injury or exposure is not life-threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.

Health and Safety Plan
Approval/Sign Off Form

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Weston Boardman		05/09/2023
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Shane Kostka Site Safety Coordinator		5/31/2023
Christine Kimmel LAI Health and Safety Manager		5/31/2023
Piper Roelen Project Manager		6/8/2023

Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date
		Click here to enter text.

Attachment A
Action Levels for Respiratory Protection

Monitoring Parameter	Reading	Level of Protection
VOCs	PID reading >1 ppm in breathing zone for more than 15 minutes or >25 ppm for momentary peak	Evacuate the area or upgrade to Level C – half-face respirator with organic vapor/HEPA cartridge
VOCs	>1 ppm and <25 ppm	Upgrade to Level C and temporarily stop work until ambient concentrations reduce to background
VOCs	>25 ppm	Stop work, contact H&S Manager
Explosivity	LEL >10% Or <19.5% Oxygen>23%	Stop Work, verify proper grounding of equipment prior to contacting Health & Safety Manager.
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Click here to enter text.	Click here to enter text.	Click here to enter text.
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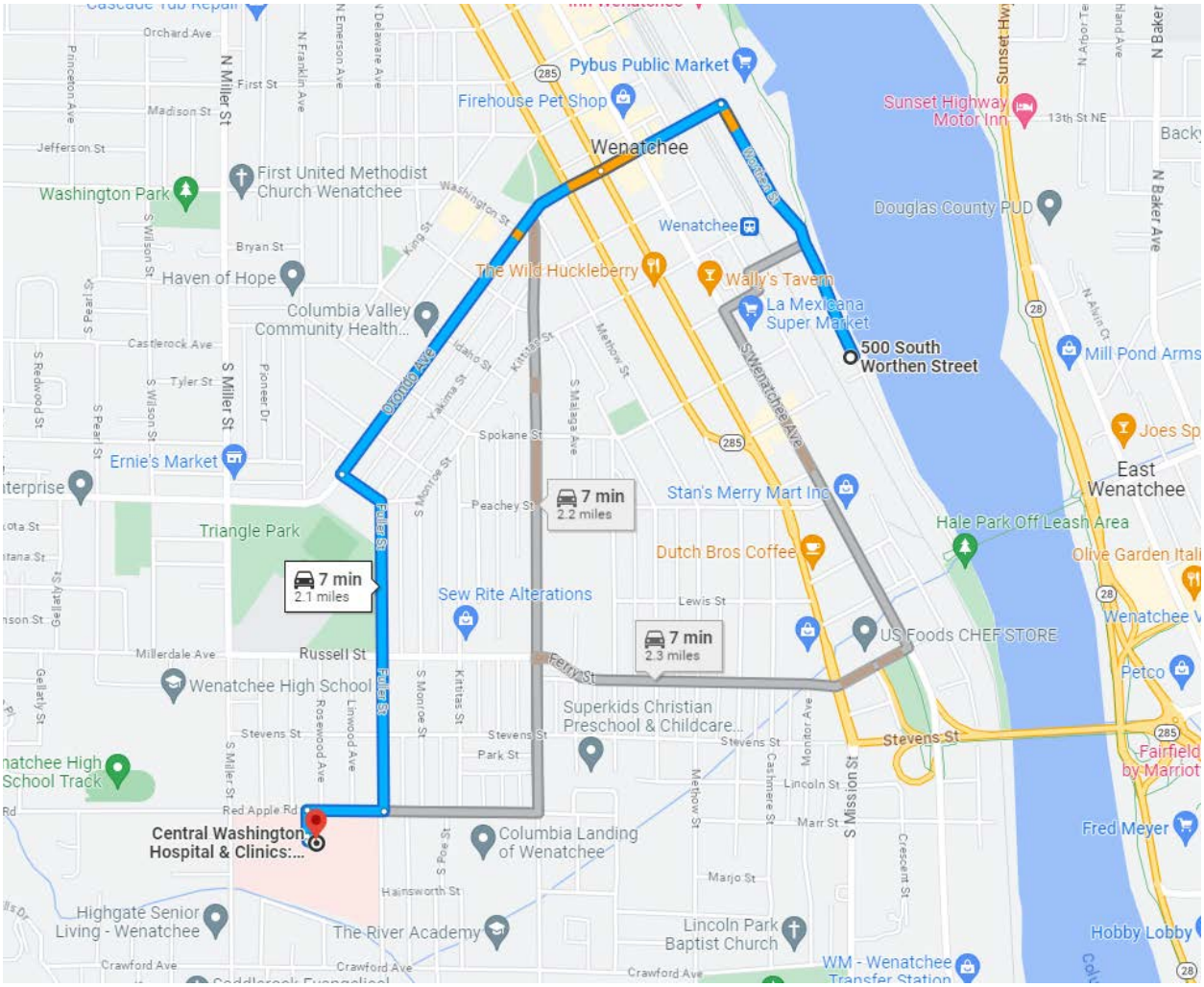
Attachment B

Mapped Route to Hospital



APPENDIX E

Inadvertent Discovery Plan

INADVERTENT DISCOVERY PLAN (IDP)

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

Project Number:	Applicant:
Project Name: Worthen Substation Site	Project Location: Wenatchee, Washington

As the project proponent, I have read this document in full and understand that:

1. I will follow the actions in the IDP in the event that site crew uncover any archaeological object or other cultural resource as a result of project actions, including but not limited to ground-disturbing activities such as excavation, boring, and concrete removal. _____ Initials

2. It is my responsibility to ensure that all site crew on all phases of project excavation and construction understand the requirements of this IDP. _____ Initials

3. A complete copy of this signed document will be maintained on site at all times for the duration of the project for site crew training. _____ Initials

4. The PSE Cultural Resources Program strongly encourages that all personnel on my crew watch the Washington Department of Ecology's (2019) Short Version Inadvertent Discovery video. _____ Initials

_____ _____ _____

Signature Name (Printed) Date

1. Introduction

The following IDP outlines the procedures to be implemented in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required for any project that creates disturbance above or below ground surface. An IDP is not a substitute for a formal cultural resource review. 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.

In the event that archaeological deposits are inadvertently discovered during project activities in any portion of the project area, ground-disturbing activities should be halted immediately, and the PSE site representative and PSE archaeologist should be notified. PSE will then contact the Department of Archaeology and Historic Preservation (DAHP) and the affected Tribes, as appropriate.

A separate protocol for discovery of human skeletal remains is described below in *Section 4. Protocol for Discovery of Human Skeletal Remains*.

2. Recognizing Cultural Resources

A cultural resource is an item of historical, traditional, or cultural importance. The item could be precontact or historic. Examples include:

a) Buried layers of black soil with a multi-species accumulation of shell (shell-midden) and associated charcoal, mammal bone, antler, or burned rocks;
b) An area of charcoal or very dark stained soil with associated artifacts;
c) Non-natural sediment or stone deposits that may be related to activity areas of people;
d) Stone, bone, shell, horn, or antler tools that may include projectile points (arrowheads), scrapers, cutting tools, wood working wedges or axes, and grinding stones;
e) Artifacts made of chipped or ground stone (i.e. an arrowhead, adze or maul) or an accumulation (more than one) of cryptocrystalline stone flakes (lithic debitage);
f) Basketry, cedar garments, fish weir stakes or items made of botanical materials;
g) Buried cobbles that may indicate a hearth feature;
h) Old ceramic pieces, metal pieces, tools and bottles;
i) Clusters of tin cans or bottles, logging or agricultural equipment that appear to be older than 50 years;
j) Old munitions casings (<u>always assume these are live and never touch or move</u>);
k) Buried railroad tracks, decking, or other industrial materials; or
l) Old building materials and foundations.

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

3. On-Site Responsibilities

a) **Stop Work**

If any contractor or subcontractor believes that he or she has uncovered any cultural resource during construction of the project, all work adjacent to the discovery must stop. No vehicles, equipment, and unauthorized personnel will be permitted to traverse the discovery. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/ cultural materials as set forth in this document.

b) **Protect the Discovery**

The discovery location should not be left unsecured at any time. Protect and ensure integrity of the discovery until cleared by DAHP or a licensed, professional archaeologist. The project manager is responsible to taking appropriate steps to protect the discovery. The project manager may direct work away from the cultural resources prior to contacting the PSE archaeologists.

c) **Notify PSE archaeologist and project lead**

PSE Archaeologists:

Elizabeth Dubreuil
Desk: 360.766.5609
Mobile: 425.691.7095
Email: Elizabeth.Dubreuil@pse.com

Jessica Morris
Mobile: 530.307.1332
Email: Jessica.Morris@pse.com

PSE Project Lead:

Primary Contact:	Alternate Contact:
Name: Suzanne Dolberg	Name: Piper Roelen, P.E.
Title: Project Manager, PSE	Title: Principal, Landau Associates, Inc.
Phone: 425-229-0172	Phone: 425-503-6784
Email: Suzanne.Dolberg@pse.com	Email: proelen@landauinc.com

On-Site Contractor:

Primary Contact:	Alternate Contact:
Name: Weston Boardman, Senior Staff GIT	Name: Dan Gray, L.G., Senior Staff, Staff Geolc
Phone: 303-815-9967	Phone: 206-513-1285
Email: wboardman@landauinc.com	Email: dgray@landauinc.com

d) **PSE will notify DAHP**

Once notified, the PSE archaeologist will contact DAHP to report the discovery. To avoid delay, the project manager may contact DAHP if they are not able to reach a PSE archaeologist.

Rob Whitlam, Ph.D.
State Archaeologist
Email: Rob.Whitlam@dahp.wa.gov
Desk: 360.586.3080
Mobile: 360.890.2615

Lance Wollwage, Ph.D.
State Archaeologist
Email: Lance.Wollwage@dahp.wa.gov
Phone: 360.890.2616

James Macrae
Assistant State Archaeologist
Email: James.Macrae@dahp.wa.gov
Phone: 564.669.0899

The DAHP will review the information about the discovery and assist with identification. DAHP may also inform the project proponent and PSE of additional steps to further protect the discovery.

4. Protocol for Discovery of Human Skeletal Remains

Any human skeletal remains discovered during project-related ground disturbance, construction, maintenance, or operation activities will be treated with dignity and respect.

In the event that human remains are discovered during ground disturbance, construction, maintenance, or operation of the project, follow steps 3.a through 3.c above as well as the steps described below to ensure compliance with RCW 27.44: Indian Graves and Records, RCW 68.60: Abandoned and Historic Cemeteries and Historic Graves, and RCW 68.50.645: Skeletal Human Remains – Duty to Notify.

Washington State law requires immediate notification of known or suspected human remains whenever they are uncovered by investigation or construction activities to county and/or municipal law enforcement agencies, county medical examiner or coroner's offices, DAHP, and federal and local agencies involved directly with the project or having jurisdiction over the subject properties.

If human remains are discovered or exposed in backhoe trench spoils or sidewalls, and/or any other excavations performed during the excavation of the project **all excavation will cease** and the site will be secured. The remains will be covered with a tarp or other materials (not soil or rocks) temporarily. The finding of human skeletal remains **will be reported to the County Coroner / Medical Examiner and local law enforcement** in the most expeditious manner possible.
The remains will not be touched, moved, photographed, or further disturbed.

The Coroner/ Medical Examiner will assume jurisdiction over the remains and determine if the remains are human and whether those remains are non-forensic. The Coroner/ Medical Examiner will report their findings to DAHP. The DAHP will be responsible for informing the affiliated tribes regarding the discovery. The State Physical Anthropologist will make a determination of whether the remains are Native American or non-Native American and report that finding to any appropriate cemeteries and the affected Tribes.

Construction may continue at the discovery location only **after the DAHP determines the boundaries** of the discovery location and compliance with state and federal law requirements are complete.

5. Discovery Protocol Contact Information

Coroner/ Medical Examiner:	**Local Sherriff's Office:**
Name: Wayne Harris	Name: Mike Mason
Title: Chelan County Coroner	Title: Chelan County Sherriff
Address: 415 Washington St. Suite 205	Address: 401 Washington St.
Wenatchee, WA 98801	Wenatchee, WA 98801
Phone: 509-667-6625	Phone: 509-667-6851

State Physical Anthropologist:
Guy Tasa, Ph.D.
Email: Guy.Tasa@dahp.wa.gov
Phone: 360.790.1633
PO Box 48343
Olympia, WA 98504-8343

Assistant State Physical Anthropologist:
Alex Garcia-Putnam, Ph.D.
Email: Alex.Garcia-Putnam@dahp.wa.gov
Phone: 360.890.2633
PO Box 48343
Olympia, WA 98504-8343

Examples of Archaeological Artifacts Addressed in this IDP

Chipped Stone Artifacts

- Glass-like material
- Angular
- Unusual material for area
- Unusual shape
- Regularity of flaking
- Variability of size

Ground Stone Artifacts

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

Bone or Shell Artifacts

- Often smooth
- Unusual shape
- Carved or pointed as if used as a tool
- Often wedge shape like a “shoe horn”

- Carved, tubular, or bead-like shapes

Shell Midden

- Heavy concentration of shell or shell hash (crushed and compacted shell fragments)
- Often associated with black or greasy soil
- Often in a layered appearance

Historic foundations or remnants of structures

- Concentrations of brick
- Railroad and trolley tracks
- Structural features
- Wood or iron pipes
- Layers of brick or wood

Historic-Period Artifacts

- Concentrations of buried ceramics, metal, or glass
- Rusted or crumbling metal
- Purple or “milky” white glass
- Unusually-shaped glass bottles
- Bottles or ceramics with markings on bottom