LANDAU ASSOCIATES

FINAL
REMEDIAL INVESTIGATION WORK PLAN

Chelan PUD Worthen Substation Site
500 South Worthen Street
Wenatchee, Washington

February 3, 2025

Prepared for

Puget Sound Energy
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Bellevue, Washington

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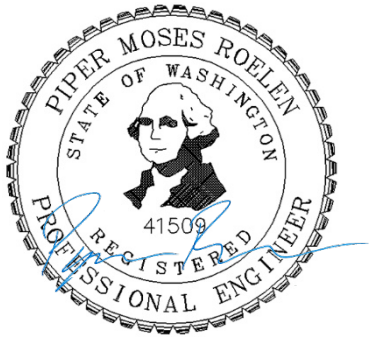
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LIST OF ABBREVIATIONS AND ACRONYMS

°C ..... degrees Celsius
°F ..... degrees Fahrenheit
AEC ..... Anderson Environmental Contracting, LLC
Apex ..... Apex Laboratories, LLC
ARAR ..... applicable or relevant and appropriate requirement
Aspect ..... Aspect Consulting
AST ..... aboveground storage tank
ASTM ..... ASTM International
bgs ..... below ground surface
BNSF ..... BNSF Railway Company
BTEX ..... benzene, toluene, ethylbenzene, xylenes
Cascade ..... Cascade Oil & Gas Company
CFR ..... Code of Federal Regulations
City ..... City of Wenatchee, Washington
COPC ..... contaminant of potential concern
cPAH ..... carcinogenic polycyclic aromatic hydrocarbon
CSM ..... conceptual Site model
CUL ..... cleanup level
CWG ..... carbureted water gas
DAHP ..... Washington State Department of Archaeology and Historic Preservation
DNAPL ..... dense non-aqueous phase liquid
DRO ..... diesel-range organics
Ecology ..... Washington State Department of Ecology
EIM ..... Environmental Information Management
EPA ..... US Environmental Protection Agency
Erlandsen ..... Erlandsen, Inc.
ESU ..... evolutionarily significant unit
ft ..... foot/feet
ft/day ..... feet per day
GC ..... gas chromatography
GeoEngineers ..... GeoEngineers, Inc.
GNR ..... Great Northern Railway
GPR ..... ground-penetrating radar
GRO ..... gasoline-range organics
HASP ..... health and safety plan
HCID ..... hydrocarbon identification
IDW ..... investigation-derived waste
IPaC ..... Information for Planning and Consultation

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

kV ..... kilovolt
Landau ..... Landau Associates, Inc.
LNAPL ..... light non-aqueous phase liquid
MGP ..... manufactured gas plant
mL/minute ..... milliliters per minute
mm ..... millimeters
MTCA ..... Model Toxics Control Act
NAPL ..... non-aqueous phase liquid
NAD83 ..... North American Datum of 1983
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
PCB ..... polychlorinated biphenyl
PCUL ..... preliminary cleanup level
PHS ..... Priority Habitats and Species
PQL ..... practical quantitation limit
PSE ..... Puget Sound Energy
PSP&L ..... Puget Sound Power & Light
PUD ..... Public Utility District No. 1 of Chelan County
QAPP ..... quality assurance project plan
RAIS ..... Risk Assessment Information System
RCRA ..... Resource Conservation and Recovery Act
RI ..... remedial investigation
ROW ..... right-of-way
RRO ..... residual-range organics
SAP ..... sampling and analysis plan
SCUM II ..... Sediment Cleanup User's Manual II
SIM ..... selected ion monitoring
Site ..... Chelan PUD Worthen substation site
SL ..... screening level
SMP ..... Shoreline Master Program
SMS ..... Sediment Management Standards
SPLP ..... synthetic precipitation leaching procedure
SVOC ..... semivolatile organic compound
TEQ ..... toxicity equivalence
TIC ..... tentatively identified compound

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

TPH ..... total petroleum hydrocarbons
TPH-D ..... diesel-range total petroleum hydrocarbons
TPH-G ..... gasoline-range total petroleum hydrocarbons
TPH-O ..... oil-range total petroleum hydrocarbons
UST ..... underground storage tank
VOC ..... volatile organic compound
WAC ..... Washington Administrative Code
WAD ..... weak acid dissociable
WDFW ..... Washington Department of Fish and Wildlife
WDOH ..... Washington State Department of Health
WISAARD ..... Washington Information System for Architectural and Archaeological Records Data
Worthen Street ..... South Worthen Street

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1.0 INTRODUCTION

This document was prepared on behalf of Puget Sound Energy (PSE) and Public Utility District No. 1 of Chelan County (PUD) by Landau Associates, Inc. (Landau) and presents a work plan for conducting a remedial investigation (RI) at the Chelan PUD Worthen Substation property located at 500 South Worthen Street (PUD Worthen Substation property) and adjacent land (Facility ID No. 44830; Cleanup Site ID No. 14795) in Wenatchee, Washington (collectively, the "Site"; Figure 1). This RI work plan was developed in accordance with Agreed Order No. DE 22971 between PSE, PUD, and Ecology (August 2, 2024 effective date) to meet the general requirements for an RI as defined by the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) cleanup regulation (Washington Administrative Code [WAC] 173-340-350). The RI will be conducted under Agreed Order No. DE 22971 in accordance with MTCA regulations.

1.1 Purpose

Environmental investigation has been ongoing at the Site since 2021 after a dense non-aqueous phase liquid (DNAPL) coal tar or coal tar-based material (determined to have originated from historical Site operations) was encountered in a subsurface boring proximate to the Site during an investigation related to the 2018 release of R99 biodiesel at the Coleman Oil Company property south of the Site (HydroCon 2018). Extensive investigation of soil and groundwater has taken place in the upland portion of the Site over the past 3 years to evaluate the nature and extent of historical releases from the Site.

The RI will further investigate the subsurface soil and groundwater in the upland portion of the Site, where data gaps have been identified and near the groundwater-surface water interface, for the purpose of further characterizing the concentrations, chemical nature, extent (horizontal and vertical), and the direction and rate of migration of hazardous substances released into the environment from historical manufactured gas plant (MGP) and steam plant operations at the Site. The data from the upland investigation will inform the design of a future investigation of sediment in the adjacent Columbia River. In addition, the RI will evaluate potential human and environmental receptors and potential pathways to each receptor from each medium and support recommendations for interim actions(s), if necessary. The intended result of completing the RI would be to provide sufficient information to facilitate the preparation of a feasibility study, in accordance with WAC 173-340-351, followed by the preparation of a cleanup action plan, in accordance with WAC 173-340-380.

1.2 General Site Information

The Site is located within the city limits of Wenatchee, on the west side of the Columbia River, and east of the BNSF Railway Company (BNSF) Wenatchee rail yard and tracks (Figure 1). The PUD Worthen Substation property is bounded by South Worthen Street (Worthen Street) to the east, the BNSF Wenatchee rail yard to the west, Chehalis Street and the Coleman Oil Company property (a petroleum bulk storage facility) to the south, and the SC Fresh property (a commercial business facility) to the north. Current data indicate that the Site, as defined in WAC 173-340-200, includes a portion of the PUD Worthen Substation property, the southeast corner of the SC Fresh property, and a portion of the

Worthen Street right-of-way (ROW). The final boundaries of the Site will be informed by data collected as part of the RI and described in the RI report. The PUD Worthen Substation property is zoned for industrial use by the City of Wenatchee and is surrounded by industrial properties to the north, west, and south of the Site. Worthen Street is oriented in a roughly north-northwest to south-southeast direction, parallel to the local orientation of the Columbia River. For ease of discussion in this document, directions in the vicinity of the Site are referred to as "Site directions" where it is assumed that the PUD substation property, Worthen Street, and the Columbia River are oriented north-south.

1.3 Current Site Use

The PUD Worthen Substation portion of the Site currently operates as an active electrical substation consisting of the following features shown on Figure 2A:

- A 115-kilovolt (kV) switchyard in the southern part of the PUD parcel (Chelan County Parcel No. 222010693001) where large, overhead transmission lines enter and voltage is reduced by transformers
- A 12.47-kV substation in the center of the parcel where voltage is further reduced by transformers to levels appropriate for commercial and residential use
- A storage yard area where vehicles and equipment are stored by the PUD.

There are also several buildings on the PUD substation/switchyard property used to store equipment and house facility infrastructure that are not continuously occupied. Other than buildings and concrete pads for electrical equipment, most of the property is gravel-surfaced. The northernmost portion of the PUD Worthen Substation property is leased to a commercial business (SC Fresh) and is occupied by two storage buildings surrounded by asphalt pavement.

No stormwater infrastructure (catch basins, drywells, swales) has been observed during Site investigations or is known to be present at the PUD Worthen Substation property based on review of historical facility plans. Stormwater at the Site generally infiltrates through the gravel surfacing. A stormwater line running east to west along Chehalis Street, with a manhole near the intersection with South Worthen Street and an outfall on the riverbank of the Columbia River, is present to the south of the Site; however, there are no known connections to this line from the PUD Worthen Substation property. There are no other known stormwater lines in Worthen Street near the Site.

The Site extends beyond the PUD Worthen Substation property onto the southeast corner of the SC Fresh property (Chelan County Parcel No. 222011692075), which is owned by Sage Hill Property, LLC. Two structures are present on the SC Fresh property, one storage building on the west side of the parcel, adjacent to the BNSF rail yard and the other on the north side, which includes the SC Fresh office space. The portion of the Site known to be located on the SC Fresh property consists of a paved asphalt driveway.

The Site also extends east into Worthen Street and the associated ROW, which consists of a paved, two-lane road running north-south in between the PUD parcel and the Columbia River to the east and a

pedestrian trail follows Worthen Street on the eastern side of the street. Worthen Street terminates at a dead end at Hale Park south of the Coleman Oil Company property.

2.0 SITE DESCRIPTION

Since the Site was discovered in 2018 following the discovery of coal tar in a monitoring well at an adjacent cleanup site, several phases of investigation have been completed by PSE and the PUD at the PUD Worthen Substation property and within the Worthen Street ROW to determine the nature, magnitude, and extent of contamination associated with historical Site operations.

The following subsections describe the Site's history, the topography/geology/hydrology/hydrogeology at and in the region around the Site, the results of previous Site investigations, adjacent properties including former and current operations and uses, documented releases of contamination, and discuss the preliminary conceptual Site model.

2.1 Site History

The following summarizes the history of ownership, operations, and infrastructure of the current PUD Worthen Substation property, which is the likely primary source of Site contamination. Historical features related to the former MGP, the former steam plant, and other proximate properties are shown on Figure 3.

- **1907:** The historical MGP/steam plant property was originally developed in 1907 by Entiat Electric & Power with a steam plant. Historical steam plant infrastructure included:
  - Steam plant building; the steam plant was powered by coal-fired boilers using water from the Columbia River
  - Three in-ground concrete and brick structures used to store coal brought in by the adjacent rail.
- **1910:** The steam plant was acquired by the Wenatchee Valley Gas & Electric Company.
- **1913:** An MGP facility using a carbureted water gas (CWG) system was constructed on the property north of the steam plant.[1] A 1913 contract for construction of the MGP plant included the following items to build and install although it should be noted that not all of these features, such as the purifier boxes, have been confirmed to be present by other historical records, such as Sanborn or other historical maps or documents:
  - One 50,000-cubic-foot gasholder
  - Two 8 x 8-foot (ft) purifier boxes
  - One 8 x 8-ft compression tank
  - One 15,000-gallon oil tank
  - One 8 x 10 x 8-ft compressor
  - One 50-horsepower boiler

[1] In the 1915, 1917, and 1918 editions of the Brown's Directory of American Gas Companies (Brown 1915, 1917, 1918, the "process manufacture" for the MGP facility was listed as "Lowe." The Lowe process for enriching the water gas was invented by Thaddeus S.C. Lowe in 1873 and was originally referred to as the "Lowe water gas" process. This process later became more widely known as the Carbureted Water Gas (CWG) process (Thomas 2010).

  - Yard piping to street mains
  - One 4-ft United Gas Improvement Company gas set
  - One 3 x 2 x 3-ft boiler feed pump
  - One 3.5 x 5 x 3.5-ft oil pump
  - One 4 x 6 x 4-ft circulating pump.
- **1924:** Puget Sound Power & Light (PSP&L), a predecessor company of PSE, assumed operations of the MGP plant.
- **1945:** PSP&L sold the gas plant to Wenatchee Gas.
- **By 1947:** MGP operations ceased and the gas plant infrastructure was converted to distribute propane gas. Based on available records, Wenatchee Gas distributed propane through the distribution pipelines associated with the gas plant until approximately 1956 when a new natural gas distribution system began operations.
- **Between 1948 and 1956:** The PUD acquired the steam plant property (consisting of three parcels).
- **Between 1949 and 1958:** The PUD subsequently converted the property to a substation.
- **1959:** The steam plant was removed.
- **Between 1958 and 1961:** The MGP was removed.
- **1968:** The PUD acquired the gas plant property.

The PUD has operated the property as a substation/switchyard since those operations began and prior MGP/steam plant infrastructure was removed, as indicated above. A potential expansion of existing substation infrastructure onto the north end of the PUD substation property was recently explored by the PUD, but has since been terminated.

2.2 Site Topography, Geology, Hydrology, and Hydrogeology

The following subsections describe the Site's known topography, geology, hydrologic, and hydrogeologic conditions.

2.2.1 Topographic and Geologic Conditions

Topography at the Site and Worthen Street is relatively flat, but the west bank of the Columbia River, immediately east of Worthen Street, drops steeply down to the river, which generally lies at an elevation about 13 to 25 ft below the Site, depending on the river stage (Figure 2B). The ground surface in the northern portion of the PUD substation property generally consists of gravel parking and storage areas and concrete pads beneath substation infrastructure. The 115-kV switchyard in the southern portion of the PUD substation property has two buildings that support substation operations as well as an approximately 90-ft by 30-ft concrete slab. The 12.47-kV substation portion of the PUD substation property has one building that supports substation operations. The 115-kV switchyard is approximately 5 ft higher in elevation than the 12.47-kV substation on the PUD parcel.

According to published geologic maps, surficial geology at the Site and the surrounding area is mapped as quaternary fluvial deposits (Gresens 1983). Based on a map provided in a 1978 Washington State Department of Natural Resources report on the Chumstick Formation (Gresens et al. 1978), the bedrock in downtown Wenatchee consists entirely of Chumstick Formation sandstones and conglomerates. The Chumstick Formation in the Wenatchee area and portions of the Wenatchee River valley is situated within a graben bounded by the Leavenworth and Entiat faults, to the west and east, respectively. During the period of expansion and faulting, the Chumstick Formation underwent significant folding and deformation, and the fold axes of two mapped synclines and one anticline extend in a general northwest-southeast direction through the Wenatchee area (Tabor et al. 1982).

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 generally consists of highly weathered sandstone and interbedded siltstone deposits with more competent siltstones and sandstones slightly deeper. Rare interbeds of fossilized organic matter (leaves, plant debris, peat) and low to medium-grade coal seams are found interbedded within the Chumstick Formation at the northern area of the Site and mudstone deposits are found at areas in the southern portion of the Site. A localized 3- to 4-ft-thick clay layer is present immediately above the Chumstick Formation, east of Worthen Street near the north end of the PUD property. Based on borings advanced into competent bedrock during Site investigations or during the geotechnical investigation (see Section 2.3.3.3), it appears that the competent bedrock at the Site is primarily unfractured. However, a discrete fractured layer was observed in competent siltstone (from 45 to 46 ft below ground surface [bgs]) in one Site investigation boring and in competent sandstone (from 32.2 to 32.5 ft bgs) in one geotechnical boring. The top of weathered bedrock generally slopes down toward the Columbia River.

Most of the PUD substation property (excluding the southernmost 40 to 50 ft), the southern portion of the SC Fresh property, and Worthen Street appears to be built on fill of varying thicknesses. Discrete shallow layers of slag, likely from historical MGP or steam plant operations, were observed in six borings completed in the northern portion of the Site during previous Site investigations and in one geotechnical boring. Chehalis Street and the Coleman Oil property to the south appear to be built mostly on native soil, but varying amounts of fill may also be present. Also, according to a 1937 Great Northern Railway (GNR) map (GNR 1937, Revised 1948), a former City of Wenatchee (City) dump site was present proximate to the northeastern portion of the current PUD substation property.

2.2.2 Hydrologic Conditions

The Columbia River flows generally to the south through Wenatchee. The local river elevation is influenced by water-level management at the Rocky Reach Dam (constructed 1956) and Rock Island Dam (constructed 1933), located approximately 7 miles upstream and 8-miles downstream of the Site, respectively, as well as by seasonal flows. Based on the 1989 40-year Federal Energy Regulatory Commission permit issued for the downstream Rock Island dam (FERC 1989), the dam is permitted to maintain its headwater between 609 and 613 ft National Geodetic Vertical Datum of 1929 (612.6 and 616.6 ft North American Vertical Datum of 1988 [NAVD88]; Snyder and Haynes 2010). [2] Based on the

[2] Elevations throughout this document are relative to NAVD88 unless otherwise indicated.

following datasets, river elevation changes near the Site appear to follow the same patterns as the Rocky Reach tailwater elevations:

- US Army Corps of Engineers river-stage data
- River-stage data from the Coleman Oil Company staff gauge
- PUD river-level pressure transducer data calculated using backwater curve modeling for river mile 466.8 located at Wenatchee Riverfront Park from January 1, 2018 to August 14, 2024.

These datasets also indicate that river levels vary seasonally. From January 1, 2018 to August 14, 2024, the minimum and maximum elevations recorded by the PUD were 614.73 and 627.49 ft, respectively; however, this magnitude of river variance has not been observed at the Site or recorded in river-level data calculated by the PUD during Landau's investigation activities described in this document. During the course of Landau's Site investigations (Section 2.3.3) and subsequent reporting, the river-level elevation has varied by approximately 3.7 ft, based on river-level data calculated by the PUD. Also, no significant increases or decreases in water levels have been measured during Landau's quarterly groundwater monitoring events.

The Wenatchee River is located approximately 2.5 miles north (upstream) of the Site and flows from the west out of the Cascade mountain range to the east to its confluence with the Columbia River.

The topography of the top of the riverbank of the Columbia River near the Site has changed over time due to shoreline filling, the construction of Worthen Street, and possibly in conjunction with dam construction. The high and low water marks of the Columbia River have also changed due to the construction of the upstream and downstream dams. Figure 3 shows the changes in the location of the top of the riverbank and the location of mapped edge-of-water of the Columbia River before and after construction of the upstream and downstream dams before, during, and after the period of the MGP operations. A brief timeline of the top of the riverbank and the edge of water with regard to development at the Site is provided below.

- **1901:** An "edge of water," taken on October 1, 1901, is shown on the 1937 GNR map (updated on June 7, 1948). The edge-of-water line is assumed to be indicative of a seasonal low water level given the time of year, and is significantly lower and farther east than the water level observed during the present day.
- **1907-1913:** The steam plant and MGP plant were constructed and began operations.
- **1912 to late 1930s**: City dump operations and filling occurred along the shoreline/riverbank.
- **1928/1929:** According to 1928 and 1929 topographic maps (Stone and Webster 1929, 1936), a mapped top of riverbank can be extrapolated to be west of the current top of bank. "First Class Shorelands" (shorelands area), or lines of ordinary low and high water levels, are also shown The shorelands area is shown to be gently sloping toward the river, and according to available maps, there was an approximately 150- to 250-ft horizontal separation distance between the low and high water lines of the Columbia River.
- **1933:** Construction of the downstream Rock Island Dam was completed.

- **1941:** A top of bank, dated September 16, 1941, is shown on the GNR map. The mapped top of bank mostly runs through the current alignment of Worthen Street proximate to the Site. A corresponding edge of water line for 1941 is not shown. South of the City dump, the 1941 top of bank is mapped west of (farther from the Columbia River than) the 1941 top of bank (Figure 3).
- **1947:** The MGP ceased operations.
- **1956:** The upstream Rocky Reach Dam was constructed. The construction of the upstream dam likely caused downstream water levels to drop slightly. Fill may have been added to the riverbank during this period of lower water tables resulting in the current position of the top of the bank.
- **1958-1961:** The MGP was removed sometime between 1958 and 1961 (Section 2.1).
- **1959:** The steam plant was removed (Section 2.1).
- **2019:** According to a 2019 light detection and ranging (LiDAR) bathymetric survey of the Columbia River, it appears that the historical shorelands areas have been filled or submerged beneath the river in the years following the construction of the upstream and downstream dams.

2.2.3 Hydrogeologic Conditions

Groundwater within the greater Wenatchee area is recharged by runoff from the adjacent mountain ranges in the area and flow directions are influenced by the Columbia and Wenatchee rivers. The City draws its groundwater supply from approximately 8 miles north of Wenatchee from the Eastbank aquifer, an unconsolidated aquifer recharged by the Columbia River (van Heeswijk et al. 2008).

Groundwater at the Site has been encountered in the unconsolidated alluvial deposits, dump material, and fill as well as discrete water-bearing intervals (ranging from less than 1 ft to 6 ft in thickness) within weathered sandstone and organic-rich siltstone deposits above competent bedrock within the Chumstick Formation. Water-bearing intervals in weathered bedrock have generally been encountered from 11 to 34 ft bgs. Based on the uniform nature of the groundwater potentiometric surface[3] measured in Site monitoring wells, the water-bearing intervals within the weathered bedrock appear to form a connected network and are also connected to the water-bearing interval in the unconsolidated materials, likely in the areas where saturated unconsolidated soils contact sloping bedrock. The depth to groundwater beneath the Site varies and the potentiometric surface has been measured at elevations ranging from approximately 615 to 619 ft in Site monitoring wells nearest to the river to approximately 647 ft in Site monitoring wells at the west side of the Site. Water-bearing intervals encountered in bedrock have not been observed to be located within continuous geologic deposits (e.g., water-bearing intervals are found in both sandstone and siltstone). Further, the groundwater encountered within Site monitoring wells recharges relatively slowly during sampling from standard, 2-inch monitoring wells. Discrete areas of perched water may also be present overlying competent or weathered bedrock.

The groundwater potentiometric surface and associated groundwater gradients at, and to the east of, the Site indicate that groundwater appears to flow generally to the east. There appears to be a

[3] The level to which groundwater will rise in a groundwater monitoring well.

"topographic" low in the bedrock northeast of the PUD property near the shoreline, where historical maps and the presence of anthropogenic materials observed in subsurface soil indicate the City dump was likely located (see Section 2.4.2). Based on borings completed along the shoreline, the elevation of top of bedrock east of Worthen Street from the approximate center of the 12.47-kV substation north to the SC Fresh property ranges from approximately 597 to 607 ft. The elevation of top of bedrock from south of the 12.47-kV substation to the southern boundary of the PUD property ranges from approximately 625 to 635 ft, which is generally higher than the level of the Columbia River (614.73 and 627.49 ft). Groundwater appears to discharge from the weathered bedrock intervals to the fill/alluvium/dump materials in the topographic low in the bedrock in the northeastern portion of the Site and into fill/alluvium in the eastern portion of the Site. The groundwater flow direction at the Site, based on groundwater potentiometric contours from prior Site investigations (Section 2.3), is interpreted to be generally to the east-northeast.

Based on recent river-level data supplied by the PUD, the river-level elevations have been approximately 0.02 ft to 1.06 ft higher than the corresponding groundwater elevations in shoreline monitoring wells screened in unconsolidated materials (WMW-1 through WMW-4 and WMW-11) with the exception of one groundwater elevation in WMW-4 (based on a water-level measurement taken on April 19, 2023), which was 0.44 ft higher than the river-level elevation. The river-level data supplied by the PUD is calculated using backwater curve modeling for river mile 466.8 located at Wenatchee Riverfront Park, which is located approximately 0.8 miles upstream of the Site. During Site reconnaissance visits completed by Landau during the approximate low and high river stage during February and May 2024, respectively, seeps have not been observed along the shoreline. The surface water of the Columbia River is expected to interact with groundwater in the unconsolidated deposits located along the shoreline at the Site.

Based on the results of a series of falling head and rising head slug tests conducted by GeoEngineers, Inc. (GeoEngineers) (2023a) at Site monitoring wells WMW-1 through WMW-4 in October 2022, hydraulic conductivity ranged from 0.002 to 0.003 ft per day (ft/day) in monitoring well WMW-1, which was screened primarily in unconsolidated alluvial deposits, to 0.017 to 0.199 ft/day in WMW-2 and WMW-4, which were screened primarily in fill (and City dump material in WMW-4) (GeoEngineers 2023a). Discrete water-bearing intervals are present within discontinuous beds of the Chumstick Formation at the Site and water-bearing intervals are typically composed of thin beds of different hydraulic conductivities (e.g., a single water-bearing zone can encompass both a siltstone and a sandstone bed). Given the heterogeneity of the encountered water-bearing intervals within the Chumstick Formation, the identified hydraulic conductivities for the water-bearing intervals within bedrock will likely not be representative of the hydraulic conductivities at the Site. No additional slug testing is anticipated to be completed for the RI.

2.3 Previous Environmental Investigations

During an investigation of an R99 biodiesel release at an adjacent cleanup site, free product coal tar was identified in a monitoring well (MW-22) advanced along the Worthen Street ROW, east of the PUD parcel (Figure 4). The discovery was reported in a 2018 Supplemental Remedial Investigation report

(HydroCon 2018), which was submitted to Ecology. Following the discovery of coal tar in MW-22, PSE and PUD completed the following Site investigation activities in the Worthen Street ROW in the vicinity and north of MW-22 and on the PUD property:

- Drilling and sampling 18 soil borings (WB-1 through WB-14 and AB-01, AB-02, AB-04, and AB05)
- Drilling, sampling, and constructing 18 monitoring wells (WMW-1 through WMW-18)
- Completing up to 8 consecutive quarters of groundwater monitoring and sampling of the monitoring wells.[4]

The following subsections describe the results of these investigation activities in chronological order. Site investigation locations are shown on Figure 5, and soil boring and monitoring well completion data and construction details are provided in Table 1. Figures showing soil analytical results, product identification, and locations of non-aqueous phase liquid (NAPL) are included as Figures 6A through 6C. Groundwater contours are shown on Figures 7A through 7C. Analytical data compared to preliminary screening levels (SLs) are shown on Figures 8A through 8C.[5] Contaminant concentration contours/ boundaries developed using preliminary cleanup levels (PCULs; see Section 3.0) are included as Figures 9A through 9D (isoconcentration contours shown on these figures are from the January 2024 groundwater monitoring event). Geologic cross-section locations are shown on Figure 10, and geologic cross sections are shown on Figures 11 through 14. Boring logs, soil borings, and well construction details are provided in Appendix A.

2.3.1 Site Discovery

In 2018, during an RI for an R99 biodiesel release on the Coleman Oil property adjacent to the south of the Site, completed by HydroCon, a NAPL, noted as black oil, was found on top of a clay layer within the soil boring for a downgradient monitoring well (MW-22) located north of the Coleman Oil site (HydroCon 2018), east of the PUD Worthen Substation property. The monitoring well was installed as part of an investigation to determine the northernmost extent of the R99 release. A sample of the NAPL was collected for fingerprinting by ASTM International (ASTM) Method D2887-14, and the product was identified as coal tar or a coal tar-based material and did not match the R99 standard used at the Coleman property during the investigation. Fingerprinting of NAPL from monitoring well MW-22 was also completed by GeoEngineers in 2022 and identified the product as a naphthalenes-dominant coal tar (Apex 2022).

2.3.2 Initial Investigation – GeoEngineers

On behalf of PSE, GeoEngineers conducted an initial investigation in October 2021 and April 2022 within the Worthen Street ROW (GeoEngineers 2022a). The investigation included the advancement of eight soil borings (WB-1 through WB-4 and WMW-1 through WMW-4; Figure 5) and installing and developing monitoring wells in four of the borings (WMW-1 through WMW-4) in accordance with the Sampling and Analysis Plans (SAPs; GeoEngineers 2021b, 2022b) and Quality Assurance Project Plan (QAPP;

[4] Newer wells were sampled over consecutive quarters after installation, but were sampled for less than 8 quarters.

[5] Preliminary SLs were originally developed by GeoEngineers (2022a) during initial investigation activities (see Section 2.3.2) and were adopted for the following phases of investigation.

GeoEngineers 2021a). The borings were completed using sonic drilling technology and were generally advanced to between 40 and 60 ft bgs. The borings generally encountered fill overlying alluvium overlying Chumstick Formation sandstones and siltstones (see Figures 11 and 12). During drilling, NAPL was observed by GeoEngineers in the soil boring location WB-2 and monitoring wells WMW-1 and WMW-4. Field observations documented on boring logs also indicated the presence of buried anthropogenic debris adjacent to the east-northeast of the PUD Worthen Substation property, which may be from historical dumping activities (i.e., the former City dump), but may have originated from general filling along the shoreline or demolition of the MGP facility or steam plant. Slag or "clinker-like material" was identified in shallow soils at boring WB-2.

Monitoring well WMW-1, located near the west side of Worthen Street, was constructed with a 10-ft screen interval across the continuous saturated zone found the unconsolidated shoreline alluvium. Nearshore monitoring wells WMW-2 through WMW-4 were constructed with 20-ft screen intervals across the continuous saturated zone found in the unconsolidated shoreline fill (from the former City dump and/or Worthen Street fill). None of the screened intervals for any of these wells crossed any sandstone, siltstone, or other lower material lenses (i.e., the screens did not create any conduits between discrete water-bearing zones). The monitoring wells were generally completed with a bottom-of-screen interval depth of between 35 and 37 ft bgs, immediately above shallow Chumstick Formation sandstone or siltstone bedrock or the localized clay layer. GeoEngineers' summary table for soil boring and well construction details are provided in Attachment 1 (Table 1).

GeoEngineers collected soil samples from the soil and well borings and submitted them to Analytical Resources, LLC of Tukwila, Washington for the following analyses:

- Total petroleum hydrocarbons (TPH) in the gasoline range (TPH-G) by the Northwest TPH extended-range gasoline analytical method (NWTPH-Gx)
- TPH in the diesel (TPH-D) and heavy oil ranges (TPH-O) by the Northwest TPH extended-range diesel analytical method (NWTPH-Dx)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by US Environmental Protection Agency (EPA) Method 8260
- Semivolatile organic compounds (SVOCs) by EPA Method 8270, including phenols and polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270 with selected ion monitoring (SIM).
- Total cyanide (by EPA Method SM 4500) and pH (by EPA Method 9045) in soil samples collected from borings where monitoring wells were installed (WMW-1 through WMW-4)
- Total metals (arsenic, barium, cadmium, chromium [unspeciated], copper, lead, mercury, nickel, selenium, silver, and zinc) by EPA Method 6020B/7471B in soil samples collected from boring locations where monitoring wells were not installed (WB-1 through WB-4)
- pH by EPA Method 9045D in soil samples collected in borings converted to monitoring wells (WMW-1 through WMW-4).

Soil analytical results were compared to preliminary SLs (Attachment 1, Table 4) developed by GeoEngineers (2022a) based on published MTCA Method A (unrestricted land use) and Method B soil cleanup levels, as applicable. Detections of TPH, BTEX, naphthalene, and carcinogenic PAH (cPAH)

toxicity equivalence (TEQ) were reported at concentrations above preliminary SLs in soil samples collected at various depths from all boring locations. Analytical result tables from GeoEngineers' initial investigation are provided in Attachment 1 (Tables 2 and 5). These results were previously provided to Ecology in Landau's January 2024 Interim Investigation Data Report (Landau 2024). Concentrations of 1-methylnaphthalene were detected in soil samples collected at various depths from all but two soil borings (WB-1 and WMW-3) at concentrations exceeding preliminary soil SLs.

Observed NAPL was noted in boring logs for soil boring location WB-2 and monitoring well locations WMW-1 and WMW-4. TPH was detected at concentrations greater than 10,000 milligrams per kilogram in the following soil samples indicating that NAPL may be present in or proximate to those locations (Feenstra et al. 1991):

- WB-2 (43 to 44 ft bgs)
- WB-3 (36 to 37 ft bgs)
- WB-4 (19 to 20 ft bgs)
- WMW-1 (46 to 47 ft bgs)
- WMW-2 (34 to 35 ft bgs)
- WMW-3 (23 to 24 ft bgs)
- WMW-4 (36 to 37 ft bgs).

Arsenic was detected at concentrations above preliminary SLs in soil samples collected from boring WB-3, cadmium was detected at concentrations above SLs at WB-1, and lead was detected at concentrations above SLs at WB-1 and WB-3. Total cyanide was detected at a concentration exceeding the preliminary SL in a shallow soil sample from WMW-4; total cyanide was not detected above the preliminary SL in soil samples from WMW-1, WMW-2, or WMW-3. No matrix interference or other analytical issues with the total cyanide analytical method were identified by GeoEngineers. Soil pH ranged between 6.76 and 9.66. No other analytes exceeded preliminary soil SLs. Phenols (SVOCs) were reported at concentrations significantly below the preliminary SL in soil samples collected from all borings. As discussed in Section 2.3.1, GeoEngineers also submitted a sample of NAPL from MW-22 for fingerprinting per ASTM Method D2887-14. GeoEngineers' soil analytical results table is provided in Attachment 1 (Table 2).

2.3.2.1 April 2022 through April 2023 Groundwater Monitoring Events

GeoEngineers collected groundwater samples from WMW-1 through WMW-4 (Figure 5) during quarterly monitoring events conducted in April, July, and October 2022 and January and April 2023. Preliminary groundwater SLs for the Site (Attachment 1, Table 4) were developed by GeoEngineers (2022a), which took into consideration published federal and state surface water and drinking water criteria, and were adjusted to account for laboratory practical quantitation limits (PQLs), but were not adjusted for natural background. The groundwater analytical program included the following analytes:

- TPH-G, -D, and -O by Methods NWTPH-Gx and NWTPH-Dx, respectively
- BTEX by EPA Method 8260
- PAHs by EPA Method 8270E/SIM
- SVOCs by EPA Method 8270E

- Free cyanide, weak acid dissociable (WAD) cyanide, and total cyanide were analyzed for during four of the five quarterly monitoring events[6] by Standard Methods for the Examination of Water and Wastewater SM 4500-CN.

TPH-G, TPH-D, benzene, ethylbenzene, PAHs, and total cyanide were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-3 and WMW-4 during each of the five monitoring events.[7] Note that GeoEngineers did not develop a preliminary SL for free cyanide or WAD cyanide; however, free cyanide was detected at concentrations exceeding the total cyanide SL in samples collected from WMW-3 and WMW-4 during the July 2022 and January 2023 monitoring events and WMW-1 and WMW-2 during the April 2023 monitoring event. WAD cyanide was detected above the laboratory reporting limit only in the April 2023 sample collected from WMW-3 and WMW-4. No matrix interference or other analytical issues with the cyanide analytical methods were identified by GeoEngineers. Total xylenes were detected at concentrations above preliminary SLs during one of the monitoring events at WMW-3 and two events at WMW-4. Benzene was detected at concentrations above preliminary SLs in all groundwater samples collected from WMW-1 and during three of the five monitoring events at WMW-2. Chrysene, a cPAH, was reported at a concentration above the preliminary SL in one groundwater sample collected from WMW-1. Ethylbenzene, 1-methylnaphthalene, and naphthalene were detected at concentrations above preliminary SLs in one sample collected from WMW-2 (GeoEngineers 2023b). The groundwater data table from GeoEngineers' initial investigation is provided in Attachment 1 (Table 5). Phenols (SVOCs) were detected in groundwater at concentrations significantly below preliminary SLs. No other analytes exceeded preliminary groundwater SLs. Analytical data from GeoEngineers' initial investigation and subsequent groundwater monitoring events were uploaded to Ecology's Environmental Information Management (EIM) database.

2.3.3 Site Investigation/Characterization – Landau Associates

Between June 2023 and January 2024, Landau conducted additional Site investigation and characterization activities at the PUD substation property and within the Worthen Street ROW. The investigations were completed in accordance with the work plan, SAP, and QAPP prepared for the Site investigation and subsequent quarterly groundwater monitoring events (Landau 2024). The June 2023 investigation targeted selected areas of the Site near or downgradient of the footprint of historical MGP and steam plant structures and equipment where releases may have occurred. In August 2023, a PUD-directed geotechnical investigation was conducted by Aspect Consulting (Aspect) within the PUD substation property in support of exploring potential expansion of the existing substation infrastructure. Landau observed the geotechnical investigation activities for environmental purposes and collected select soil samples for laboratory analysis.

The December 2023 investigation targeted areas within the PUD substation and switchyard properties where data gaps remained following previous investigations. Analytical and forensic results for soil samples collected during Landau's investigations compared to preliminary SLs are included in Tables 2, 3, and 4. Analytical and forensic results for groundwater samples collected during the investigations

[6] Cyanide was added to the groundwater monitoring program at the request of Ecology after the first event.

[7] Total cyanide was analyzed for during four of the five monitoring events.

compared to preliminary SLs are included in Tables 4 and 5, respectively. Samples of NAPL were collected during the December 2023 investigation and forensics and physical parameter results of free product NAPL samples collected are included in Tables 6 and 7, respectively.

Landau conducted three quarterly groundwater monitoring events in July and October 2023 and January 2024. For all groundwater monitoring events, groundwater sampling was conducted following collection of water levels and using low-flow sampling procedures. Groundwater samples were collected following stabilization of field parameters in accordance with the procedures outlined in the June 2023 Landau Investigation Work Plan SAP (Landau 2023). Groundwater field parameters for groundwater monitoring events are provided in Table 8, and water-level measurements collected during groundwater monitoring events and river stage data corresponding to the groundwater monitoring dates are provided in Table 9. Prior to each groundwater sampling event, the depth to groundwater in the Site monitoring wells was measured using an electronic oil/water interface probe. Groundwater analytical results were compared to GeoEngineers' preliminary groundwater SLs.

No matrix interference or other analytical issues were confirmed with the cyanide analytical methods used as part of Landau's investigations or groundwater monitoring events. Analytical data from the investigations and groundwater monitoring events were uploaded to Ecology's EIM database.

The following subsections provide additional details related to each of these investigations.

2.3.3.1 June 2023 Investigation

In June 2023, Landau conducted additional Site characterization activities at the PUD property and in the Worthen Street ROW, including drilling 13 soil borings (WB-5 through WB-10 and WMW-5 through WMW-11; Figure 5) and installing monitoring wells in seven of the borings. Soil samples were collected from discrete intervals within each boring and a grab sample of NAPL/groundwater was collected from an open borehole. Analytical results of soil/NAPL/groundwater samples collected during the June investigation as compared to preliminary SLs are provided in Tables 2 and 5 and are shown on Figures 6A and 8A. Forensic results are provided in Tables 3 and 4. Gas chromatography (GC) forensic fingerprinting and/or chromatogram results are shown on Figure 6B.

The soil borings were completed using sonic drilling technology and were advanced to, and a few feet into, competent bedrock (Chumstick Formation sandstone or siltstone), which generally appears to act as a barrier to vertical migration of DNAPL. Competent bedrock was generally encountered between 25 and 57.5 ft bgs and borings were generally terminated between 30 and 70 ft bgs. The borings encountered varying amounts of fill with thicknesses ranging from 5 to 15 ft, and alluvium (consisting of silt, sand, and/or gravel) was encountered below the fill in borings WB-5, WB-6, WB-8, WB-9, WB-10, and monitoring wells WMW-8, WMW-10, and WMW-11 at thicknesses ranging from 1 to 15.5 ft. Weathered bedrock, consisting of Chumstick Formation sandstones and siltstones that are thinly interbedded in some locations, was encountered in all borings below the fill or alluvium at depths ranging from 5.5 ft bgs (at WMW-5) to 31 ft bgs (at WMW-11) and generally became more competent with depth. Slag fragments mixed with sand and gravel were observed within shallow soils at borings WB-6 and WB-8.

At the time of drilling, water-bearing intervals were encountered from approximately 11 ft (at WB-9) to 35 ft (at WMW-9) bgs as evidenced by the presence of saturated conditions or the presence of water in the borehole indicated by an oil/water interface probe. Saturated soils were encountered in unconsolidated alluvium deposits in borings WB-5 and monitoring wells WMW-8 and WMW-11. Saturated conditions were encountered in apparent discrete groundwater-bearing intervals in sandstone, siltstone, or interbedded sandstone/siltstone below unconsolidated fill, alluvium, and shallow weathered bedrock in borings WB-6, WB-7, and WB-8 and in monitoring wells WMW-5, WMW-6, WMW-7, WMW-9, and WMW-10. Saturated conditions in boring WB-9 were encountered in the uppermost weathered bedrock layer (siltstone) and may represent a discrete interval of perched groundwater. Groundwater was not encountered in boring WB-10.

Monitoring wells, where constructed, were generally placed on top of competent bedrock or within the water-bearing interval observed during drilling, ranging from an approximate base depth of 23 to 37 ft bgs. With the exception of monitoring well WMW-6—which was constructed with a 15-ft screen interval to allow the bottom of the well to be placed on the top of the observed competent bedrock and the top of the screen to be below the water table observed during drilling—monitoring wells were constructed with 10-ft screen intervals.

During drilling, minor amounts of NAPL were observed in soil and/or weathered bedrock at soil borings WB-6 (from 4 to 5 ft bgs), WB-9 (from 14 to 15 ft bgs), and WB-10 (from 23 to 23.5 ft bgs) and in a discrete fractured interval of competent bedrock at monitoring well WMW-5 (from 45 to 46 ft bgs). NAPL was also observed in groundwater that entered the open boreholes at soil borings WB-8 and WB-9. A grab sample of NAPL/groundwater was collected from the open borehole at WB-8.

Soil samples were collected from discrete intervals within each boring and were submitted under standard chain-of-custody procedures to Apex Laboratories, LLC (Apex) in Tigard, Oregon, an Ecology-accredited laboratory. Soil samples were generally analyzed for the following analytical suite (referred to as the “standard soil analytical suite”):

- TPH-G by NWTPH-Gx
- TPH-D/TPH-O by NWTPH-Dx
- BTEX by EPA Method 8260D
- Resource Conservation and Recovery Act (RCRA) 8 metals (i.e., total arsenic, barium, cadmium, total chromium, lead, mercury, selenium, and silver) by EPA Method 6020B
- PAHs by EPA Method 8270E
- Total cyanide by ASTM Method D7511.

In addition to the above-noted analytes, the following analyses were completed on specific soil samples:

- To assess the mobility of organic constituents present in soil to understand the leaching characteristics for evaluation of potential future remedial actions, soil samples WB-6 (4-4.5), WB-6 (11-11.5), and WMW-6 (6.5-7) were analyzed by the synthetic precipitation leaching procedure (SPLP) for BTEX and naphthalene.

- A slag sample was collected from a layer of slag within boring WB-8 from 9 to 10 ft bgs. The sample was analyzed for RCRA 8 metals and PAHs.
- Selected soil samples (WB-5 [15-16], WB-6 [4-4.5], WB-6 [11-11.5], WB-7 [6-7], WB-8 [27-28], WB-10 [11.5-12], WMW-5 [45-46], WMW-6 [6.5-7], and WMW-8 [17.5-18]) were submitted for GC forensic fingerprinting by ASTM Method D2887 and/or chromatogram analysis following receipt of standard soil analytical suite results.
- One soil sample (WB-6 [4-4.5]) was analyzed for low-level PAHs and homologs by EPA Method 8270.
- The NAPL/groundwater sample collected from boring WB-8 was submitted for analysis for TPH-G by NWTPH-Gx, TPH-D/TPH-O by NWTPH-Dx, BTEX by EPA Method 8260D as well as GC forensic fingerprinting by ASTM Method D2887.

Soil analytical results were compared to GeoEngineers' preliminary soil SLs (GeoEngineers 2022a) based on published MTCA Method A (unrestricted land use) and Method B soil SLs, as applicable (Table 2). Detections of TPH-D, TPH-G, BTEX, naphthalenes (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene), and/or cPAH TEQ in soil were reported at concentrations above preliminary soil SLs at various depths in boring locations WB-5 through WB-10 and WMW-5 through WMW-8. No metals were reported at concentrations above preliminary SLs in soil samples. Detections of cyanide, TPH-D, benzene, and benzo(a)pyrene (a cPAH) were reported at concentrations exceeding preliminary SLs in the NAPL/soil sample collected from WB-6 from 4 to 4.5 ft bgs. Cyanide was not reported at a concentration above the preliminary SL in any other soil sample. Detections of TPH-G, benzene, benzo(a)pyrene, and naphthalene were reported at concentrations exceeding preliminary SLs in the NAPL/soil sample collected from WMW-5 from 45 to 46 ft bgs. Detections of TPH-D, TPH-G, benzene, ethylbenzene, and total xylenes were reported at concentrations exceeding preliminary SLs in the NAPL/groundwater sample collected from boring WB-8. TPH-O was reported as non-detect in the WB-8 NAPL sample, but the TPH-O detection limit was elevated above the preliminary SL. The cPAH TEQ concentration was reported above the SL in the slag sample collected from WB-8.

The GC forensic fingerprinting and/or chromatogram analyses identified GC patterns indicative of the following:

- Coal tar/MGP waste in borings WB-5 (15-16 ft bgs), WB-6 (4-4.5 and 11-11.5 ft bgs), WB-8 (27-28 ft bgs), WB-10 (11.5-12 ft bgs), WMW-5 (45-46 ft bgs), WMW-6 (6.5-7 ft bgs), and WMW-8 (17.5-18 ft bgs), as well as the NAPL/groundwater grab sample collected from WB-8
- Diesel #2, #4/fuel oil in a soil sample collected from boring WB-7 (6-7 ft bgs)
- A mixture of petroleum and non-petroleum material (i.e., petroleum hydrocarbons that have undergone significant biological degradation) in a soil sample collected from boring WB-6 (4-4.5 ft bgs). The forensic analysis that identifies the presence of these degradation products, along with an abundance of PAHs, indicates that the non-petroleum material in the sample is potentially coal tar or MGP waste.

2.3.3.2 July 2023 Groundwater Monitoring Event

The July 2023 event was the first quarterly groundwater monitoring event that included the monitoring wells installed during the June 2023 investigation (as well as the four monitoring wells previously installed by GeoEngineers). Groundwater samples were collected from monitoring wells WMW-1 through WMW-11 (Figure 5) and submitted for laboratory analysis for the following constituents (referred to as the "standard groundwater analytical suite"):

- TPH-G by NWTPH-Gx
- TPH-D/TPH-O by NWTPH-Dx
- BTEX by EPA Method 8260D
- RCRA 8 dissolved metals by EPA Method 6020B
- PAHs by EPA Method 8270E
- Free cyanide by ASTM Method D7237-15A.

Groundwater analytical results were compared to GeoEngineers' preliminary groundwater SLs and are provided in Tables 5 and 6, and detected exceedances of preliminary groundwater SLs and/or detection limits above preliminary SLs from the July 2023 groundwater monitoring event are shown on Figure 8A.

In addition to the standard groundwater analytical suite, one groundwater sample collected from WMW-1 was submitted for forensic volatile, gas-specific tentatively identified compounds (TICs), and oxygenates analysis by EPA Method 8260D to gather further information on dissolved constituents reported in the sample given the well's proximity to the former Cascade Oil & Gas Company (Cascade)/Continental Oil gasoline tanks and fuel pump (see Section 2.4.2.2). Groundwater was measured at Site monitoring wells between elevation 642.56 ft (6.80 ft bgs) at WMW-7 and 615.65 ft (23.82 ft bgs) at WMW-4. Groundwater potentiometric elevation surface contours for the July 2023 groundwater monitoring event are shown on Figure 7A, and cumulative groundwater elevations measured since April 2022 (including GeoEngineers' groundwater monitoring events) are provided in Table 10. The presence of NAPL was not observed in any of the wells during the groundwater monitoring event.

The following provides a summary of analytical results from the July 2023 monitoring event:

- Detections of TPH, naphthalenes, or cPAH TEQ were reported at concentrations above preliminary SLs, or the detection limit for these analytes was elevated above preliminary SLs, in groundwater samples collected from monitoring wells WMW-3, WMW-4, WMW-6, and WMW-8.
- Detections of BTEX were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-3, WMW-4, WMW-8, and WMW-9. No detections were reported at concentrations above preliminary SLs in the soil sample collected from WMW-9 and no impacts to soil were identified during drilling. WMW-9 is at the upgradient edge of the Site and is crossgradient of historical infrastructure (i.e., potential contaminant sources); therefore, the detection of benzene in the groundwater sample from WMW-9 does not appear to be associated with the Site. DNAPL at the Site appears to have migrated downward through

weathered bedrock in the vicinity of the MGP and followed the sloping interfaces of the underlying bedrock to the east (toward Coleman Oil monitoring well MW-22 and Site monitoring wells WMW-3 and WMW-4) and to the north (toward Site monitoring wells WMW-1 and WMW-2). Free product DNAPL was observed in soil at WMW-1 approximately 6 ft below the bottom of the screen interval (see cross section on Figure 14). Additionally, the proportions of PAH detections reported in groundwater samples collected from WMW-1 (below preliminary SLs) are consistent with the PAH detections in groundwater samples collected from monitoring wells where coal tar/MGP waste was identified by forensic analysis in soil samples collected within the screened interval. Because of these factors, the benzene detected in the groundwater sample from WMW-1 is considered to be associated with Site contamination.

- Detections of free cyanide were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-7, and WMW-9. However, total cyanide was not detected in soil samples collected from the borings for these three monitoring wells. Gas-phase cyanide was reportedly only significant in coal gas, and cyanide reaction products are present in significant quantities only at coal carbonization sites, but not at CWG sites (Hayes et al. 1996). Purifier wastes (e.g., wood chips, iron filings, sulfur oxides, Prussian blue, and spent oxide wastes), which often contain significant quantities of chemically complexed cyanide compounds, have not been identified at the Site. In addition, monitoring wells WMW-7 and WMW-9 are upgradient of the estimated extent of impacted soil associated with the Site. Free cyanide detected in groundwater samples from WMW-7 and WMW-9 do not appear to be related to contamination at the Site. Therefore, the estimated extent of impacted groundwater associated with the Site shown on Figure 8A does not encompass WMW-7 or WMW-9. While coal tar NAPL along with associated groundwater contamination has been identified at WMW-1, laboratory analysis has not identified cyanide in the coal tar (see Section 2.3.3.5). Along with the absence of cyanide in groundwater in any other monitoring wells within the Site boundaries, the absence of purifier and spent oxide wastes at the Site, and the location of WMW-1 in relation to groundwater gradients at the Site (i.e., generally west to east), the free cyanide detection at WMW-1 does not appear to be related to contamination at the Site.
- Detections of dissolved arsenic were reported at concentrations above preliminary groundwater SLs, or the arsenic detection limit was elevated above preliminary SLs, in all groundwater samples. Note that the preliminary groundwater SL for dissolved arsenic is based on the MTCA Method B cancer value and has not been adjusted to account for PQLs or state natural background concentrations (5 micrograms per liter). The detection of dissolved arsenic above the state natural background concentration in groundwater at monitoring well WMW-8 is likely indicative of mobilization of naturally occurring arsenic due to reducing (i.e., anaerobic)[8] groundwater conditions caused by the degradation of organic contamination from the MGP site, and not a release of arsenic at the Site (Table 5).
- A detection of 1,2,4-trimethylbenzene was reported below the preliminary SL by forensic volatile analysis (along with the detections of BTEX previously reported by Method 8260D) in the groundwater sample collected from WMW-1. Additionally, n-pentane (C5), isopentane, and n-butane were reported as TICs. No oxygenates were detected.

[8] Note that groundwater field parameters collected from monitoring wells (Table 9) located centrally within the Site boundaries, such as WMW-3, WMW-4, and WMW-8, generally exhibit reducing/anaerobic conditions (e.g., dissolved oxygen [DO] concentrations less than 1 milligram per liter and negative oxidation reduction potential [ORP]); whereas parameters for monitoring wells near or outside the Site boundaries, such as WMW-2, WMW-5, WMW-11, and WMW-14, generally exhibit oxidizing/ aerobic conditions (e.g., DO greater than 1 and positive ORP).

2.3.3.3 August 2023 Geotechnical/Environmental Investigation

In August 2023, a PUD-directed geotechnical investigation was conducted by Aspect within the PUD substation property in support of exploring potential expansion of the existing substation infrastructure. Landau observed the geotechnical investigation activities for environmental purposes and collected select soil samples for laboratory analysis. The geotechnical investigation included drilling five soil borings (AB-01 through AB-05; Figure 5). One boring (AB-03) was completed as a monitoring well (WMW-12). The borings were completed using hollow-stem auger and HQ3™ (rock coring) drilling methods, were advanced to depths ranging from 25 to 41 ft bgs, and were generally terminated at depths directed by Aspect, except for AB-03/WMW-12 where Landau requested additional drilling depth to construct the monitoring well. Monitoring well WMW-12 was completed to 23 ft bgs and was constructed with a 10-ft screen interval (Table 1).

Apparent fill was encountered in all geotechnical borings at thicknesses ranging from 4 to 12 ft. Alluvium was encountered below the fill in boring AB-01 and monitoring well AB-03/WMW-12 at thicknesses of 8.5 ft and 4 ft, respectively. Weathered Chumstick Formation bedrock (sandstone, siltstone, or interbedded sandstone/siltstone) was encountered below the fill or alluvium at depths ranging from 4 ft bgs (at AB-04) to 15.5 ft bgs (at AB-01) and generally became more competent with depth. Competent bedrock was determined by practical refusal with hollow-stem auger drilling methods and was encountered at borings AB-02 at 28.5 ft bgs and AB-05 at 26.5 ft bgs and was present to the maximum depth of the borings. Competent bedrock could not be confirmed in borings AB-01, AB-03/WMW 12, and AB-04. A discrete fractured interval in competent sandstone bedrock was observed in boring AB-05 from 32.2 to 32.5 ft bgs; groundwater was not encountered within the discrete fractured interval. No debris from historical dumping activities or filling along the shoreline was observed. A layer of slag was encountered in boring AB-02 from 7.7 to 8.7 ft bgs. Groundwater was encountered in soil in discrete groundwater-bearing zones in sandstone or interbedded sandstone/siltstone below unconsolidated fill, alluvium, and shallow weathered bedrock in borings AB-03/WMW-12 and AB-04 at 19 ft and 13.5 ft bgs, respectively. Groundwater was not encountered in borings AB-01, AB-02, and AB-05. For context, at the time of drilling during the June 2023 investigation, groundwater was encountered from 11 ft (at WB-9) to 35 ft (at WMW-9) bgs.

Soil samples collected from the geotechnical borings were analyzed for the standard soil analytical suite as well as for GC forensic fingerprinting by ASTM Method D2887. Analytical results were compared to GeoEngineers' preliminary soil SLs (GeoEngineers 2022a). Detections of TPH, BTEX, or cPAH TEQ in soil were reported at concentrations above preliminary SLs at various depths in samples collected from boring locations AB-01 through AB-04. Cyanide and RCRA 8 metals were not detected at concentrations above preliminary SLs in any of the soil samples collected during Aspect's investigation.

The GC forensic fingerprinting and/or chromatogram analyses identified GC patterns indicative of the following:

- Coal tar in AB-01 from 15 to 16 ft bgs and 25 to 25.5 ft bgs
- Bunker C/Diesel #6 in AB-04 from 7.5 to 7.9 ft bgs

- Diesel #2, #4/fuel oil in AB-03/WMW-12 from 7.5 to 9.0 ft bgs. In the soil sample collected from AB-2 from 12.5 to 13.7 ft bgs, diesel #2, #4/fuel oil was identified, but the presence or absence of isoprenoids in the sample could not be readily determined by the method and the characterization as diesel #2, #4/fuel oil could not be confirmed.

Analytical results for the August 2023 investigation compared to preliminary SLs are shown on Figure 6A and in Table 2. GC forensic fingerprinting and/or chromatogram results are shown on Figure 6B.

2.3.3.4 October 2023 Groundwater Monitoring Event

During the October 2023 groundwater monitoring event, groundwater samples were collected for laboratory analysis for the standard groundwater analytical suite from Site monitoring wells WMW-1 through WMW-12 (installed during the August 2023 geotechnical investigation). Groundwater was measured at Site monitoring wells between elevation 643.20 (6.16 ft bgs) at WMW-7 and 616.03 (22.61 ft bgs) at WMW-3. Groundwater potentiometric elevation surface contours for the October 2023 groundwater monitoring event are shown on Figure 7B, and cumulative groundwater elevations are provided in Table 10. NAPL was not observed in any of the wells during the groundwater monitoring event.

The following provides a brief summary of analytical results from the October 2023 monitoring event:

- Detections of TPH, naphthalenes, or cPAH TEQ were reported at concentrations above preliminary SLs in groundwater samples collected from monitoring wells WMW-3, WMW-4, WMW-6, WMW-8, and WMW-12.
- Detections of dissolved arsenic were reported at concentrations above preliminary groundwater SLs, or the detection limit was elevated above preliminary SLs, in all groundwater samples. As noted in Section 2.3.2.1, the preliminary groundwater SL for arsenic was not adjusted to account for PQLs or natural background concentrations. The detection of dissolved arsenic above the natural background concentration at monitoring well WMW-8 is likely the result of reducing groundwater conditions and not a release of arsenic at the Site.
- Detections of BTEX were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-3, WMW-4, WMW-8, and WMW-9.
- Detections of free cyanide were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-7, and WMW-9, similar to the July 2023 monitoring event.

For the same reasons discussed for the July 2023 groundwater sampling event (Section 2.3.3.2), free cyanide detected in groundwater from WMW-1, WMW-7, and WMW-9 and benzene detected in groundwater from WMW-9 do not appear to be related to Site contamination. Therefore, monitoring wells WMW-7 and WMW-9 are not included in the estimated extent of impacted groundwater associated with the Site shown on Figure 8B.

Groundwater analytical results are provided in Table 5, and detected exceedances of preliminary groundwater SLs and/or detection limits above preliminary SLs from the October 2023 groundwater monitoring event are shown on Figure 8B.

2.3.3.5 December 2023 Investigation

In December 2023, Landau conducted further investigation within the PUD property, including the Worthen Street substation and switchyard and within the Worthen Street ROW. The investigation included the advancement of 10 soil borings (WB-11 through WB-14 and WMW-13 through WMW-18; Figure 5) and the construction of groundwater monitoring wells in six of the borings (WB-11 through WB-14 and WMW-13 through WMW-18). The soil borings were advanced using sonic drilling technology and were advanced to, and slightly into, competent bedrock, which presented as Chumstick Formation siltstones and fine-grained sandstones. Competent bedrock was generally encountered from 24 to 38 ft bgs and borings were generally terminated between 35 and 45 ft bgs, except for boring WB-13 where competent bedrock was encountered at 64.5 ft bgs and the boring was terminated at 70 ft bgs. The borings encountered varying amounts of fill with thicknesses ranging from 1 to 15.5 ft, and alluvium was encountered below the fill in all locations with thicknesses ranging from 4 to 14 ft. The southern extents of the PUD property generally had less fill than the northern portions. Weathered bedrock, consisting of interbedded Chumstick Formation sandstones, siltstones, and mudstones, was encountered in all borings from 7 (WMW-15) to 25 ft bgs (WB-13) and bedrock generally became more competent with depth.

At the time of drilling, water-bearing intervals were encountered from approximately 10 to 33 ft bgs as determined by the presence of saturated conditions or the presence of water in the borehole indicated by an oil/water interface probe. Saturated conditions were not encountered in monitoring wells WMW-13, WMW-15, and WMW-18, and in soil boring WB-14. Water-bearing intervals within these soil borings were determined by assessing the depth at which water began entering into the borehole by retracting the casing at 5-ft intervals and monitoring for the presence of water using a water-level indicator. With the exception of monitoring well WMW-14, monitoring wells were generally constructed with 10-ft screen intervals constructed over the length of the identified water-bearing interval. Groundwater at WMW-14 was encountered in unconsolidated material (sand and silty sand) above dry weathered sandstone bedrock and the monitoring well was constructed with a 6.5-ft screen interval keyed approximately 2 ft into the weathered sandstone, which appeared to act as an aquitard to prevent vertical migration of contamination into any lower water-bearing intervals in weathered bedrock.

During drilling, more than 2 gallons of black, viscous NAPL was encountered within a decomposed siltstone at boring WB-13 from 35 to 36.5 ft bgs. A sample of free product NAPL was collected along with a sample of soil/NAPL below the free product interval. Following collection of NAPL and soil samples for chemical and physical parameter analysis, the boring was overdrilled from ground surface to 40 ft bgs with a larger-diameter (8-inch) casing and 10 ft of hydrated bentonite chips were added to create a seal to prevent the vertical migration of NAPL. The boring was then advanced through the seal with a smaller (6-inch) casing to competent bedrock.

NAPL was not observed in soil at any other borings advanced during the December 2023 investigation; however, NAPL was identified in groundwater encountered in boring WB-11. The NAPL was observed as 2 to 3-millimeter (mm) orange-brown globules/flecks, which were suspended within the water column.

Using a bailer, Landau collected a grab sample of groundwater from boring WB-11 to be analyzed for the standard groundwater analytical suite as well as GC forensic fingerprinting by ASTM Method D2887. The amount of product within the open boring was not measurable, and no measurable amounts of NAPL were observed in soil collected from the water-bearing interval.

Soil samples for laboratory analysis for the standard soil analytical suite were collected from discrete intervals within each boring. The soil and groundwater grab sample analytical results for the standard analytical suites are discussed below. Due to shipping carrier delays, soil samples collected from borings WB-11, WMW-17, and WMW-18 were delivered outside of the method-required hold time for cPAHs, TPH-D, TPH-O, and mercury. During validation of data for results analyzed outside of method-required hold times, non-detect results were rejected and detections were J- qualified (indicating that the result is an estimated quantity and the result may be biased low).

- Detections of TPH were reported at concentrations above preliminary SLs in soil samples collected from borings WB-11, WB-12, WB-13, WMW-14, WMW-15, WMW-17, and WMW-18.
- Detections of BTEX were reported at concentrations above preliminary SLs in soil samples collected from borings WB-11, WB-12, and WB-13.
- Detections of cPAHs and cPAH TEQ were reported at concentrations above preliminary SLs in borings WB-11, WB-12, WB-13, and WMW-18.
- Total cadmium and total lead were detected at concentrations above preliminary SLs in the shallow soil sample collected from boring WB-13 from 20.5 to 21.5 ft bgs, approximately 3.5 ft below apparent dump material. Because no detections of TPH, BTEX, naphthalenes, or PAHs were reported at concentrations above preliminary SLs and the sample was collected from below apparent dump material, metals detected in soil at WB-13 are not interpreted to be related to Site contamination.
- Total cyanide was not detected at concentrations above laboratory reporting limits in any soil samples collected during the December 2023 investigation, including the samples of NAPL and NAPL/soil collected from boring WB-13.
- Detections of TPH, BTEX, naphthalenes, and cPAHs were reported at concentrations above preliminary SLs in the groundwater grab sample collected from boring WB-11. Cyanide was not detected in the groundwater grab sample at a concentration exceeding the laboratory reporting limit.

In addition to the above-noted soil and groundwater samples analyzed for the standard soil/ groundwater analytical suites, the following analyses were completed on specific soil, groundwater, and NAPL samples:

- Soil samples WB-11 (8-9), WB-11 (26-26.5), WB-12 (22.5-23), WB-13 (25.5-26),), WMW-14 (15.5-16), WMW-15 (12-12.5), WMW-15 (16-16.5), WMW-17 (10-10.5), WMW-18 (14-14.5), the sample of free product NAPL from boring WB-13, and the groundwater sample from boring WB-11 were submitted for GC forensic fingerprinting by ASTM Method D2887 and/or chromatogram analysis.

- The free product NAPL sample collected from boring WB-13 and soil samples collected from WB-11 (8-9), WB-12 (22.5-23), and WMW-18 (14-14.5) were analyzed for low-level PAHs and homologs by EPA Method 8270 to assist in characterizing the contamination.
- The sample of free product NAPL collected from boring WB-13 was analyzed for total cyanide, water-soluble petroleum hydrocarbons and volatiles, SPLP volatiles and semi-volatiles, water-soluble gas-specific TICs and oxygenates.
- The sample of free product NAPL collected from boring WB-13 was also analyzed for physical parameters density by ASTM Method D1475 at three temperatures (71 degrees Fahrenheit [°F], 200°F, and 400°F), kinematic viscosity by ASTM Method D445 at four temperatures (50°F, 100°F, 200°F, and 212°F) and interfacial tension by ASTM Method D971 modified.[9]

Total cyanide was not detected at a concentration above the preliminary SL in the free product NAPL sample. Water-soluble petroleum hydrocarbons and volatiles and SPLP volatiles and semi-volatiles were reported at concentrations above the detection limits. No water-soluble gas-specific TICs or oxygenates were reported at concentrations above the detection limits.

Kinematic viscosity of the free product NAPL ranged from 91.24 centistokes at 50°F to 2.94 centistokes at 212°F. Density ranged from 1.039 grams per milliliter (g/mL) at 71°F to 0.786 g/mL at 400°F. Interfacial tension was reported at 28.2 dynes/centimeter (dynes/cm). The results of the physical parameter testing are discussed further in Section 2.5.3.

The GC forensic fingerprinting and/or chromatogram analyses identified GC patterns indicative of the following:

- Coal tar/MGP waste in borings WB-11 (26-26.5 ft bgs), WB-12 (22.5-23 ft bgs), and WB-13 (25.5-26, 30.5-31, 37.5-38.5, and 40-41 ft bgs)
- Diesel #2, #4/fuel oil in WMW-18 (14-14.5 and 22-23 ft bgs)
- Kerosene/Jet-A fuel in WMW-15 (12-12.5 and 16-16.5 ft bgs)
- R99 biodiesel in WMW-14 (15.5-16 ft bgs)
- Bunker C/Diesel #6 in WB-11 (8-9 ft bgs) and WMW-17 (10-10.5 ft bgs).

Analytical results of soil samples collected during the December investigation compared to preliminary SLs are shown on Figure 6A and in Tables 2 and 5. GC forensic fingerprinting and/or chromatogram results are shown on Figure 6B. Forensic and physical parameter results are provided in Tables 4, 7, and 8.

2.3.3.6 January 2024 Groundwater Monitoring Event

During the January 2024 groundwater monitoring event, groundwater samples were collected for laboratory analysis for the standard groundwater analytical suite from Site monitoring wells WMW-1 through WMW-18. Groundwater was measured at Site monitoring wells between elevation 646.68 (7.41 ft bgs) at WMW-16 and 616.31 (26.28 ft bgs) at WMW-1. Groundwater potentiometric elevation surface contours for the January 2024 groundwater monitoring event are shown on Figure 7C, and

[9] Modification to the method was necessary due to the density and viscosity of the sample.

cumulative groundwater elevations are provided in Table 10. NAPL was observed as approximately 1 to 2-mm brown-orange globules at the bottom of the water column of monitoring well WMW-17 and as bright orange flecks at the bottom of the water column at monitoring well WMW-8. There was not enough volume of product observed to collect a representative sample, and product was not observed within these wells during prior sampling events and/or drilling.

The analytical results from the January 2024 monitoring event are summarized below. Due to inclement weather conditions resulting in shipping delays, samples for cPAH analysis from monitoring wells WMW-5, WMW-6, WMW-7, WMW-8 and the associated duplicate sample, and WMW-18 were analyzed out of hold time. Results for analyses completed out of hold time and reported below laboratory reporting limits were rejected, and analytical results with detected concentrations above reporting limits were "J-" qualified during Landau's internal data review.

- Detections of TPH, naphthalenes, and/or cPAH TEQ were reported at concentrations above preliminary SLs in groundwater samples collected from monitoring wells WMW-3, WMW-4, WMW-6, WMW-8, WMW-12, WMW-14, WMW-16, WMW-17, and WMW-18.
- Detections of dissolved arsenic were reported at concentrations above the preliminary groundwater SL, or the detection limit was elevated above the preliminary SL, in all groundwater samples. As noted above, the preliminary groundwater SL for arsenic has not been adjusted to account for PQLs or natural background concentrations and detections of arsenic are likely the result of reducing groundwater conditions and not a release of arsenic at the Site.
- Detections of BTEX were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-3, WMW-4, WMW-8, WMW-9, WMW-17, and WMW-18.
- Similar to the July and October 2023 groundwater monitoring events, detections of free cyanide were reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-7, and WMW-9. As noted above, cyanide reaction products are not known to be generated at CWG sites, and purifier and spent oxide wastes have not been identified or observed at the Site; therefore, cyanide does not appear to be related to Site contamination.

Groundwater analytical results are provided in Table 5, and exceedances of preliminary groundwater SLs and/or detection limits above preliminary SLs from the January 2024 groundwater monitoring event are shown on Figure 8C. Groundwater concentration contours compared to the PCULs outlined in Section 3.1 for benzene, TPH-D, TPH-G, and naphthalene are shown on Figures 9A through 9D, respectively. All data from previous investigations as well as data generated during the investigation outlined in this RIWP will be screened against the PCULs, which may be modified based on the findings from the RI and as approved by Ecology, in the RI report (Section 5.0). Following January 2024 groundwater monitoring, the analytical laboratory prepared a Site-specific grouping letter (Apex 2024) that further characterized and identified contaminant types that impacted groundwater samples and placed the samples in contaminant-specific groups. Details of the results of the grouping letter are provided below.

- Coal tar/MGP waste was identified in groundwater samples collected from monitoring wells WMW-3, WMW-4, WMW-6, WMW-8, and WMW-17.

- A polar/semi-polar unresolved complex mixture dominant dissolved-phase material was identified by the analytical laboratory in groundwater samples collected from monitoring wells WMW-5, WMW-6, WMW-10, WMW-12, WMW-15, WMW-16, and WMW-18.Note that while this mixture was identified in samples from monitoring wells WMW-5, WMW-10, WMW-15, and WMW-16, no detections of contaminants that are likely associated with the Site were reported at concentrations above preliminary SLs. Therefore, these monitoring locations are outside of the estimated extent of impacted groundwater associated with the Site.
- R99 biodiesel was identified in groundwater samples collected from monitoring well WMW-14.

Additionally, the following soil samples that were not previously analyzed for GC forensic fingerprinting by ASTM Method D2887 were characterized in the grouping letter:

- WB-13 (30.5-31), WB-13 (37.5-38), WB-13 (40-41), WMW-18 (22-23), and AB-01 (25-25.5). With the exception of the soil sample collected from WMW-18, all these listed samples were characterized as coal tar/MGP waste. The soil sample collected from WMW-18 (22-23) was characterized as diesel #2, #4/fuel oil.

A copy of the grouping letter is provided as Attachment 2.

2.4 Summary of Other Adjacent or Proximate Sites/Historical Facilities

As described in Section 1.2, the Site is bordered to the north, west, and south by industrial properties. According to available historical records, properties adjacent to the Site with documented releases and/or a description of previous or current ownership/operator histories are listed below. Historical features of adjacent properties are shown on Figure 3. Known investigation locations adjacent to the Site on other properties are shown on Figure 4.

2.4.1 Listed Sites/Facilities

The sites/facilities described below are located adjacent to the Site and have been listed as contamination cleanup sites by Ecology.

2.4.1.1 Coleman Oil

The current Coleman Oil property located to the south of the PUD property across Chehalis Street (former Standard Oil Company) has been in operation as a bulk fuel storage and distribution facility since 1921 (Facility ID No. 83844381). Based on historical Sanborn fire insurance maps, two vertical gasoline aboveground storage tanks (ASTs), four oil ASTs, one kerosene AST, and four structures were present on the property in the 1920s. The number and configuration of ASTs has changed over time, but the property appears to have typically contained petroleum ASTs with a combined volume exceeding 200,000 gallons. The Coleman Oil Company purchased the property in 2007. A number of petroleum releases have been documented at the Coleman Oil Company property.

Known releases from the Coleman Oil Company property include gasoline releases in 2010 and 2013 and a significant release of R99 biodiesel from underground piping in 2017. The gasoline releases in 2010 (Cleanup Site ID No. 11391) and 2013 (Cleanup Site ID No. 12442) received No Further Action

determinations from Ecology in March 2015 and August 2014, respectively. In September 2014, an environmental covenant consisting of a land-use restriction was placed on the portion of the property where impacted soil remained from the 2010 gasoline release. The 2017 R99 biodiesel release (Cleanup Site ID No. 13215) resulted in a light NAPL (LNAPL) plume that migrated north-northeast across Chehalis Street, under the southeastern portion of the PUD property, across Worthen Street, and ultimately discharged to the Columbia River.

Coleman Oil site data indicate that R99 and groundwater are generally found above bedrock (generally identified as mudstone in cross sections), and groundwater contour maps and the mapped R99 plume boundaries indicate that flow direction generally follows a localized bedrock "channel" that is oriented to the northeast from near the R99 biodiesel release location. The direction of LNAPL and groundwater flow match the groundwater gradients within the Coleman Oil site. As noted in Section 2.2.3, the elevation of bedrock along the Columbia River at the Coleman Oil site (east of the southern portion of the PUD property) is generally above the river stage.

Significant investigation and cleanup activities have been ongoing since 2017, which appear to have largely eliminated the presence of LNAPL in monitoring wells and mitigated discharges to the river (although occasional sheens are reportedly observed adjacent to known seep locations). Four seep locations (at approximate elevation 622 ft) were sampled in conjunction with the Coleman Oil site investigation activities. Dissolved-phase TPH in the form of gasoline- and diesel-range organics are still present in groundwater at concentrations above applicable cleanup levels (CULs) across the plume monitoring area (HydroCon 2022). Further remediation of the R99 biodiesel release is currently underway.

2.4.1.2 BNSF Wenatchee Rail Yard

Based on Sanborn maps and a historical 1937 GNR map, the rail yard and railroad tracks east of the current PUD property have been present since at least 1921 and were originally operated by GNR, which through a series of mergers later became BNSF. A 1921 Sanborn map shows a rail spur to the MGP/steam plant for transportation of coal and coke. BNSF currently owns and operates the rail yard west of the rail tracks. According to Ecology's underground storage tank (UST) database, a used oil/ waste oil UST, installed in 1975 and decommissioned by removal in 1996, was present at the BNSF rail yard (Ecology; accessed July 16, 2024). The former location of this UST is unknown. Based on Ecology files, documented diesel releases from two diesel USTs, located at the rail yard to the west of the Site, were identified during UST site assessment activities in 1991 (Facility ID No. 28673212; Cleanup Site ID No. 5820; SEACOR 1992).

Groundwater monitoring at the rail yard from 2009 through 2018 included analysis of groundwater samples for TPH-D and TPH-O by Method NWTPH-Dx with silica-gel cleanup in samples collected from eight monitoring wells (MW-1 through MW-8). The analytical results showed concentrations of TPH-D and TPH-O decreasing over time in all wells to the point of being below MTCA Method A CULs and in many cases not detected above the laboratory reporting limit in samples collected from all monitoring wells except for MW-3, which is located to the north of the USTs. Beginning in 2019, TPD-D and TPH-O were analyzed for by Method NWTPH-Dx with and without silica-gel cleanup at Ecology's request

(Ecology 2018), and the results of the analysis without silica-gel cleanup were above MTCA Method A CULs in all samples with the exception of MW-5, which is located to the south of the USTs. Groundwater monitoring at the rail yard continued through at least 2022 with TPH-D and TPH-O (analyzed by Method NWTPH-Dx without silica-gel cleanup) detected in groundwater at concentrations above applicable CULs within the plume (Kennedy/Jenks 2024). The former USTs are potentially upgradient of the Site, and the estimated extent of groundwater contamination with diesel-range organics (DRO) concentrations exceeding MTCA Method A CULs are shown on Figure 4.

2.4.2 Other Historical Facilities

The facilities described below were or are located adjacent or proximate to the Site. The information presented is based on available historical records.

2.4.2.1 City Dump

A former City dump is present near the northeastern portion of the current PUD substation property, beneath and east of the current alignment of Worthen Street. The nature and extent of the former dump are not clearly defined, and the dates and duration of dump operations not certain, but based on various historical maps, it appears the dump may have been in operation from around 1912 to the late 1930s. The approximate extent of the dump shown on Figure 3 is based on:

- Its location shown on a 1937 GNR map labeled as “City Dump”
- The location of the protruding shoreline on historical maps and aerial photographs that indicates filling farther eastward than the rest of the shoreline
- The alignment of the road (east of the PUD property) and the location of the “City Dump Foreman’s Shacks” (north of the PUD property) shown on the 1937 GNR map
- The end of the railroad spur to the north (indicating potentially the northern extent of the dump) shown on the 1937 GNR map
- Observations made during drilling borings and monitoring wells completed in the area where buried debris and anthropogenic materials were identified in subsurface soils.

2.4.2.2 Cascade/Continental Oil

Based on a 1921 Sanborn fire insurance map, a gasoline service station and oil storage facility operated by Cascade Oil & Gas Company was located on the adjacent property to the north of the PUD substation property (currently the SC Fresh property) in 1921. The 1921 Sanborn map showed two gasoline ASTs, oil pumps, and a building housing lubricating oils on this property. Sanborn maps from 1928 and 1947 indicate the facility was operated by Continental Oil and showed four steel oil ASTs, a pump (the use is not specified), and an oil storage building. The size of the gas and oil tanks and quantity of oil stored in the buildings are not known. The tanks are not shown on the 1949 Sanborn map, which suggests that Continental Oil discontinued operations and removed its facilities sometime between 1947 and 1949.

2.4.2.3 Rex Spray

The former Wenatchee Rex Spray factory, located north of the former Cascade/Continental Oil property, was constructed in 1908 and manufactured insecticides and lime-sulfur spray as a pesticide treatment for orchards. The 1921 Sanborn map shows a rail spur from the north that terminates near the southeast corner of the Rex Spray property. The 1949 Sanborn map identifies the site as California Spray Chemical Corporation, and indicates that the factory had three large, circular ASTs, presumably used for storing sprays produced at the factory. The size of the tanks is unknown. A 1955 Kroll Atlas identifies the property as Wenatchee Wenoka Growers Association, and shows the presence of the tanks. The factory was removed by 1959.

2.5 Preliminary Conceptual Site Model

Available soil and groundwater data indicate that hazardous substances used at the Site have been released to the environment, resulting in contamination of environmental media. The following preliminary conceptual Site model (CSM) describes the hazardous substances present at the Site and their likely sources, contaminants of potential concern (COPCs), contaminant migration pathways, and potential receptors. Development of a preliminary CSM early in the remedial investigation/feasibility study process will help identify data gaps and guide data collection at the Site to evaluate the presence of COPCs and better understand contaminant migration pathways and potential receptors at the Site. The preliminary CSM is presented in graphical form on Figure 15 and includes hazardous substances and their potential sources, COPCs, and contaminant migration pathways.

2.5.1 Hazardous Substances and Sources

A number of hazardous substances have been identified in soil and/or groundwater during Site investigations. These substances have been identified both by observations of NAPL during Site investigations and GC forensic fingerprinting of soil, groundwater, and free product NAPL samples by ASTM Method D2887. Note that gasoline-range organics (GRO) have been identified in soil and groundwater at the Site; however, forensic analyses have not clearly indicated the presence of automotive gasoline in any samples; therefore, GRO detections are most likely representative of lighter-end petroleum fractions of other petroleum hydrocarbon-based products.

2.5.1.1 Hazardous Substances Associated with Historical Site Operations

The hazardous substances described below identified during Site investigations are interpreted to be associated with releases from historical Site operations (Section 2.1).

Coal Tar/Manufactured Gas Plant Waste

As discussed in Section 2.1, an MGP plant operated at the Site from 1913 to 1947 that was known to use a carbureted water gas (CWG) system (Brown 1915, 1917, 1918). Coal tar is a common byproduct known to be generated at MGP plants that use a CWG system. Coal tar is generated by less volatile chemical compounds condensing as the manufactured gas cooled, forming a complex oily liquid mixture that could be separated from the gas during various stages of the production, storage, and distribution process. In some cases, coal tar could be burned as a fuel at MGP plants or sold for use as a product or in

production of other materials (e.g., creosote and other petroleum distillates). It should be noted that MGP plants that use a CWG system produce coal tar that is generally less viscous than coal tar produced by other types of MGP plant operations (e.g., coal carbonization and oil gas processes) and generally do not produce coke as a process residual. It should also be noted that references on MPG sites indicate that "gas-phase cyanide was significant only in coal gas and the cyanide reaction products are present in significant quantities only on coal carbonization sites," whereas gas-phase cyanide was insignificant at CWG sites (Hayes et al. 1996). Purifier waste is generated at MGP plants as sulfur compounds that are removed from the manufactured gas, after being cooled, by passing the gas through purifier beds made up of either lime or wood chips with iron filings. There is no information regarding the specific type of purification process(es) used during the MGP plant's operation, but the generation of cyanide wastes from the purifiers would be negligible due to lack of significant gas-phase cyanide in the CWG process. Furthermore, purifier wastes, such as wood chips, iron filings, sulfur oxides, or Prussian blue, have not been observed or identified at the Site.

Coal tar/MGP waste is the most widespread hazardous substance that has been encountered during investigation activities at the Site. Coal tar/MGP waste has been encountered as NAPL during drilling and sampling of the WMW-1, WMW-4, WMW-5, WB-2, WB-6, WB-8, WB-9, WB-10, WB-11, WB-13, and MW-22 borings, with a significant amount of NAPL observed at WB-13. Characterization by GC forensic fingerprinting has also identified the presence of coal tar/MGP waste in soil samples and/or in the dissolved phase in groundwater samples collected from WMW-2, WMW-3, WMW-6, WMW-8, WMW-17, WB-3, WB-4, WB-5, WB-12, and AB-01 borings. See Figures 6B and 6C for exploration locations where coal tar/MGP waste was encountered as NAPL and/or where soil samples were characterized to contain coal tar/MGP waste contamination. See Figures 8A through 8C for locations where coal tar/MGP waste contamination has been characterized to be present in the dissolved-phase groundwater samples collected from Site monitoring wells in July and October 2023 and January 2024 as well as groundwater grab samples collected from Site borings in June and December 2023.

Coal tar/MGP waste has been encountered in soil at depths ranging from 4 ft bgs (WB-6) to 54 ft bgs (WMW-1) at the Site in fill, alluvium, and bedrock (weathered to various degrees), with the depth to the coal tar/MGP waste generally increasing to the east, following the slope of bedrock, and to the northeast toward the former City dump where there appears to be a topographic low in bedrock.

Based on the location and proximity of investigation locations where coal tar/MGP waste was observed or identified to former MGP infrastructure, this contamination most likely originated from historical MGP operations at the Site. The MGP infrastructure was roughly located within the footprint of the current 12.47-kV substation and the storage yard to the north of the 12.47-kV substation, which are both part of the PUD Worthen substation portion of the Site. See Figures 6B and 8A through 8C for GC characterization results in soil and/or groundwater.

Bunker C/Diesel #6

As discussed in Section 2.1, a steam plant operated at the Site from approximately 1907 to 1959. There were known to be three in-ground structures used to store coal that was burned at the steam plant. Based on available historical records, there is no evidence that the steam plant burned anything other

than coal; however, Bunker C/Diesel #6 could have also been used for power generation at the steam plant. MGP plants are also known to have used Bunker C/Diesel #6 as a gasification agent in the process of producing manufactured gas (McCarthy 2013). No specific documentation has been found to confirm the use and/or storage specifically of Bunker C/Diesel #6 at the MGP plant or the steam plant, but features labeled "oil tank" are shown on historical maps of the MGP.

During Site investigations, Bunker C/Diesel #6 has been encountered in the west-central portion of the Site as NAPL in the AB-04 exploration and as characterized by GC forensic fingerprinting analysis of soil samples collected from borings AB-04, WB-11, and WMW-17. See Figures 6B and 6C for exploration locations where Bunker C/Diesel #6 was encountered as NAPL and/or locations for which soil samples were characterized to contain coal tar/MGP waste contamination.

Bunker C/Diesel #6 has been encountered at generally shallower depths ranging from 7.5 ft bgs (AB-04) to 10.5 ft bgs (WMW-17) at the Site in weathered bedrock. These locations and depths suggest a localized historical source for this contamination. However, the exact source of Bunker C/Diesel #6 contamination is unknown because these products could have been used at the steam plant to produce electricity or at the MGP plant as a gasification agent. Bunker C/Diesel #6 contamination has been encountered in the area of the former MGP near the former oil tank, compression tank, gas tank, and assumed location of the purifier tanks as shown on Figure 3. Figure 6C shows the observed or likely estimated extent of NAPL contamination at the Site, including the extent of Bunker C/TPH free product, along with locations of historical features.

Diesel #2, Diesel #4/Fuel Oil

Diesel is known to have been stored in ASTs as the Coleman Oil property to the south of the Site as well as in USTS at the BNSF rail yard to the west of the Site. As discussed in Section 2.4.1.2, a release of diesel from the USTs at the BNSF rail yard was discovered during UST decommissioning activities in 1991 and groundwater monitoring continued at least through 2022 with TPH contamination in the form of diesel- and heavy oil-range organics detected in groundwater at concentrations above applicable CULs (Kennedy/Jenks 2024). The former USTs are potentially upgradient of the Site and the estimated extent of groundwater contamination at the rail yard (Kennedy/Jenks 2024) based on groundwater analytical data through 2022 is shown on Figure 4. No releases of diesel fuel are known to have occurred at the Coleman Oil property.

Diesel #2 and Diesel #4/fuel oil contamination was characterized to be present by GC forensic fingerprinting analysis of soil samples collected from the AB-03/WMW-12, WB-7, and WMW-18 borings, which are located in the current substation and the storage yard to the north. Diesel #2 and Diesel #4/fuel oil may also be present in soil at boring AB-02 but could not be confirmed by the analytical laboratory because the presence or absence of isoprenoids in this sample could not be readily determined based on the results of the ASTM D2887 testing. See Figure 6B for GC characterization results in soil and/or groundwater.

Diesel #2 and Diesel #4/fuel oil contamination has been encountered at depths ranging from 6 ft bgs in unconsolidated fill (WB-7) to 23 ft bgs in weathered bedrock (WMW-18; note that elevated PID readings

and petroleum odor were observed during drilling in weathered bedrock from approximately 9 ft to 14.5 ft bgs and Diesel #2 and Diesel #4/fuel oil contamination were identified in a sample from 14 to 14.5 ft bgs at WMW-18) at the Site in fill, alluvium, and weathered bedrock. Shallow detections of these products are likely from localized (i.e., on-Site) sources, but deeper detections may be from on-Site or off-Site sources. The specific source(s) of Diesel #2 and Diesel #4/fuel oil contamination is unknown; however, PSP&L operating reports from the 1920s and early 1930s routinely list diesel fuel as the oil used for enriching the steam used in the CWG process and, as discussed above, diesel releases have been documented at the adjacent BNSF rail yard.

2.5.1.2 Hazardous Substances Associated with Offsite Sources

The hazardous substances described below have been encountered during Site investigations but are interpreted to not be associated with the Site.

R99 Biodiesel

As detailed in Section 2.4.1.1, a significant release of R99 biodiesel from underground piping occurred in 2017 at the Coleman Oil Company property south of the Site. This resulted in an LNAPL plume that migrated north-northeast across Chehalis Street, under the southeastern portion of the PUD Worthen Substation property, across Worthen Street, and ultimately discharged into the Columbia River. Dissolved-phase gasoline- and diesel-range organics are still present in groundwater at concentrations above applicable CULs across the plume monitoring area (HydroCon 2022). R99 biodiesel contamination was characterized to be present by GC forensic fingerprinting analysis in a soil sample collected from the WMW-14 boring as well as a groundwater sample collected from WMW-14. WMW-14 is located on the eastern side of the 115-kV switchyard in the southern portion of the PUD Worthen Substation property. Groundwater in WMW-14 was encountered in unconsolidated alluvium; no groundwater-bearing intervals were identified in weathered bedrock. WMW-14 is interpreted to be along the northern edge of the R99 biodiesel plume, which is not associated with the Site. See Figure 6B for GC characterization results in soil and/or groundwater and Figure 4 for investigation locations associated with adjacent sites, including the estimated extent of the R99 biodiesel plume.

Kerosene/Jet-A Fuel

Kerosene/Jet-A fuel contamination was characterized to be present by GC forensic fingerprinting analysis of soil samples collected from the WMW-15 boring at depths of 12 to 12.5 ft bgs and 16 to 16.5 ft bgs, which is located near the center of the 115-kV switchyard in the southern portion of the PUD Worthen Substation property. Kerosene was not identified by the analytical laboratory in the sample collected from WMW-15 from 14 to 14.5 ft bgs. This is the only location where kerosene/Jet-A fuel contamination has been encountered during Site investigations. See Figure 6B for GC characterization results in soil and/or groundwater.

The source of the kerosene/Jet-A fuel contamination at the WMW-15 location is unknown. Kerosene was first identified at WMW-15 in a weathered siltstone that may be seasonally water-bearing below (above the observed water-bearing interval identified during the December 2023 drilling and installation of WMW-15) an uncontaminated weathered sandstone. Kerosene has not been identified at any other

locations at the Site. Therefore, kerosene is interpreted to be not related to the Site. As noted in Section 2.4.1.1, kerosene was known to be stored in an AST at the Coleman Oil property to the south of the Site; however, there have not been any documented releases of kerosene at the property. See Figure 3 for the locations and types of historical Site features.

2.5.2 Contaminants of Potential Concern

Initial Site COPCs were identified by Ecology (2024) based on the available information provided to Ecology in Landau's Interim Investigation Data Report (Landau 2024) and by Landau. Initial Site COPCs are based on the contaminants associated with the hazardous substances identified in Section 2.5.1, which are interpreted to be associated with the Site based on the current information available and that have been detected during previous Site investigations. To determine the applicable Site COPCs, data from previous Site investigations were compared to the PCULs developed for this RI work plan (Section 3.0). COPCs consist of petroleum hydrocarbons, select volatile organic compounds (VOCs), PAHs, and metals as listed below. Note that Site COPCs are subject to change based on the findings of the RI. Cyanide was not identified as a Site COPC by Ecology (2024) or Landau.

- Petroleum hydrocarbons (gasoline-range organics [GRO], diesel-range organics [DRO], and oil-range organics [RRO])
- VOCs (benzene, ethylbenzene, toluene, and total xylenes)
- PAHs (acenaphthene, anthracene, benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, cPAH TEQ, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene)
- Metals (arsenic, barium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc).

2.5.3 Contaminant Migration Pathways and Media of Potential Concern

As described in Section 2.2.1, the Site geology consists of varying thicknesses of alluvial deposits and/or fill materials overlying the Chumstick Formation, which at the Site presents as interbedded sandstone and siltstone bedrock. The uppermost layers of the Chumstick Formation generally consist of highly weathered sandstone or siltstone with more competent siltstone slightly deeper. Based on previous Site investigations, the competent bedrock at the Site is primarily unfractured and bedrock generally slopes west to east toward the Columbia River. As described in Section 2.2.2, groundwater at the Site has been encountered in unconsolidated alluvial deposits and in discrete intervals within the underlying weathered bedrock. The potentiometric surface of groundwater at the Site generally slopes west to east, toward the Columbia River.

As discussed in Section 2.5.1.2, coal tar/MGP waste is the most widespread hazardous substance that has been encountered during investigation activities at the Site. During Site investigations, free product NAPL has been encountered as both DNAPL and LNAPL with measurable free product NAPL being observed in weathered bedrock in the WB-2, WB-13, and WB-8 borings and in unconsolidated material in the MW-22, WMW-1, and WMW-4 borings. Free product NAPL in soil and/or groundwater collected

from borings WB-8, WB-13, and MW-22 has been identified as coal tar/MGP waste by GC forensic fingerprinting analysis.

Free product NAPL coal tar recovered from the WB-13 boring was observed as both LNAPL and non-wetting DNAPL in a wettability test performed by Landau where free product NAPL was placed in water and observed. The wettability test was performed in accordance with generally accepted industry standards (EPRI 2008). This suggests that the coal tar NAPL at the Site may be composed of both lighter and heavier than water phase constituents. Free product NAPL recovered from the WB-13 boring was tested for physical parameters and found to be slightly more dense than water and have a much higher kinematic viscosity than water at temperatures below 100 degrees Celsius (°C) (Table 8). Interfacial tension was reported at 28.2 dynes/cm, slightly higher than the literature values for interfacial tension of coal tar of between 15 and 27 dynes/cm (ITRC; accessed August 12, 2024). The surface tension of the coal tar at 20°C (20 dynes/cm; NOAA 1999) is expected to be significantly lower than that of the surface tension of water at 20°C (72.5 dynes/cm; Gianino 2006). This suggests that coal tar at the Site may be able to pass through smaller pore spaces than water and may explain why coal tar has been found deeper in the subsurface bedrock than where water-bearing zones have been encountered.

Free product NAPL in the WB-8 boring was observed to be on top of the water column in the boring during drilling. As detailed in Section 2.3.1, free product NAPL in the MW-22 boring, which was identified as coal tar or a coal tar-based material and a naphthalene-dominant coal tar (HydroCon 2018) by GC forensic fingerprinting analysis when sampled in 2018 and 2022, respectively, was observed on top of a clay layer at the bottom of the water column in unconsolidated material (gravelly sand). As discussed in Section 2.3.3.6, NAPL has also been observed as globules suspended in groundwater present toward the bottom of the water column in monitoring wells WMW-8 and WMW-17.

The current understanding of contaminant migration at the Site, based on the results of previous Site investigations, is that contamination in the form of coal tar NAPL has migrated downward through unconsolidated material to weathered bedrock, at which point a portion of the NAPL travelled along the top of the weathered bedrock and another portion of the NAPL continued downward through the weathered bedrock. The portion of the NAPL that travelled along the top of weathered bedrock migrated generally to the east (while also continuing downward through weathered bedrock) with the slope of bedrock where the NAPL flowed into unconsolidated material overlying the top of bedrock. A portion of the NAPL appears to have migrated downward through weathered bedrock and followed the contours of the underlying competent bedrock to the east and north of the former MGP, creating isolated “pools” of NAPL in low spots within the weathered bedrock/on top of competent bedrock, as well as migrating into and/or through the discrete water-bearing intervals within weathered bedrock. Measurable free product NAPL has not been observed within a water-bearing zone in weathered bedrock during Site investigations but has been observed above and below water-bearing zones. NAPL was also observed in a discrete fractured interval of competent bedrock at monitoring well WMW-5; however, it appears that the competent bedrock at the Site is primarily unfractured and NAPL migration is primarily controlled by bedrock contours.

It is understood that soil at the Site has been impacted both directly by NAPL and by impacted groundwater that has migrated through it. Groundwater at the Site has been impacted both by the NAPL migrating downward into and/or through discrete water-bearing zones in weathered bedrock and by NAPL running along the top of bedrock into groundwater present in unconsolidated material overlying bedrock in the eastern portion of the Site. Groundwater that had been in contact with the NAPL has carried dissolved-phase contaminants to other areas of the Site.

Sediment and/or surface water adjacent to the Site has the potential to be impacted both by contaminated groundwater and/or by NAPL migrating in unconsolidated material and/or in weathered bedrock toward the river. Site investigation activities to date have not bounded the eastern extent of NAPL and dissolved-phase groundwater contamination and have not included sediment; therefore, the presence or absence of contamination in sediment and/or surface water is currently unknown. Sediment and/or surface water may have been impacted from historical releases unrelated to the presence of ongoing sources.

Stormwater infrastructure (e.g., catch basins, drywells, swales) has not been observed at the Site during prior investigation activities, has not been identified in facility or City records, and is not known to be present (or to have been historically present). As such, stormwater is not considered to be an exposure pathway or a mechanism by which contamination migrates (or has historically migrated) at the Site. The elevation of the depth to bedrock at the Site is lower than the river stage, and surface water of the Columbia River at the Site is expected to interact with groundwater in the unconsolidated deposits. No groundwater seeps have been observed at the Columbia River shoreline at the Site; therefore, seeps are not considered to be an exposure pathway or a mechanism by which contamination migrates at the Site.

Because no continuously occupied buildings are present at the Site, vapor intrusion is not considered to be an exposure pathway or a mechanism by which contamination migrates at the Site.[10]

Based on potential migration pathways, the Site media of potential concern consist of soil, groundwater, and possibly surface water and sediment.

2.5.4 Potential Receptors

The following subsections discuss potential human and ecological and receptors and their exposure pathways in the upland and aquatic environments at the Site.

2.5.4.1 Human Receptors and Exposure Pathways – Upland Environment

Human health risks related to known contamination at the Site are related to contaminated soil and groundwater (e.g., direct contact for workers engaged in construction and utility-related activities or consumption of groundwater as drinking water). No contamination has been identified in surface soils at the Site; therefore, there is no known risk to the general public. In summary, the primary exposure pathways for human receptors are:

[10] The vapor intrusion pathway may be reassessed after completion of upland Site characterization during the RI.

1. Consumption of groundwater as drinking water; note that no groundwater wells for drinking water consumption or irrigation are known to be present at or near the Site.
2. Incidental ingestion of contaminated soil and groundwater for workers engaged in subsurface construction or utility maintenance activities.
3. Direct contact with contaminated soil and groundwater for workers engaged in subsurface construction or utility maintenance activities.

2.5.4.2 Possible Human Receptors and Exposure Pathways – Aquatic

Possible human health risks associated with the river may include direct contact with, or incidental ingestion of, contaminated sediment exposed during low water periods and ingestion of fish that have been exposed to contamination in the river.

Washington has designated uses for protection in fresh surface waters of the state as identified in WAC 173-201A-600 and 173-201A-602. In this stretch of river, the designated surface water uses that pertain to possible human receptors include:

1. Recreational Uses: Primary contact
2. Water Supply Uses: Domestic water, industrial water, agricultural water, and stock water
3. Miscellaneous Uses: Harvesting, commerce/navigation, boating, and aesthetics.

Possible human health risks associated with the river will be discussed further in the supplemental work plan discussed in Section 4.6.

2.5.4.3 Ecological Receptors and Exposure Pathways – Uplands

A variety of ecological receptors exist within the project area. The uplands and riparian areas adjacent to the Columbia River provide habitat for mammals, birds, reptiles, and amphibians. The distribution of these species within the project area is influenced by food supply, availability of foraging and sheltering habitat, riparian habitat, water depth and quality, and river currents, among other features.

The primary exposure pathways for upland receptors are:

1. Ingestion of contaminated subsurface soil, and potentially contaminated surface water, sediments, and food items
2. Direct contact with subsurface soil, and potentially contaminated surface water or sediments.

Higher trophic-level receptors such as omnivorous and carnivorous birds and mammals are exposed principally through ingestion of contaminated food items, followed by water, soil, and sediment. Some contaminants may bioaccumulate in higher trophic-level animals that consume prey that have ingested contaminants.

Mammals known to forage in the uplands or near the river include river otter, yellow-bellied marmot, and raccoon. There have also been sightings of numerous herbivores including eastern gray squirrel, mule deer, and mountain cottontail. Birds that forage on or near the river and adjacent uplands include

killdeer, California quail, red-tail hawk, great blue heron, belted kingfisher, osprey, bald eagle, golden eagle, and a variety of gulls, ducks, and geese.

2.5.4.4 Possible Ecological Receptors and Exposure Pathways – Aquatic Environment

A variety of ecological receptors exist within the aquatic area in the vicinity of the upland site. The Columbia River provides habitat for benthic and epibenthic invertebrates as well as pelagic and benthic fish. Epibenthic invertebrates could contribute to transport of any contaminants in sediment to vertebrate predators. Fish in the Columbia River include salmonids, bull trout, and non-native brook trout. Various additional fish species have also been observed.

Washington has designated uses for protection in fresh surface waters of the state as identified in WAC 173-201A-600 and 173-201A-602. In this stretch of river, the designated surface water uses that pertain to possible ecological receptors include:

1. Aquatic Life Uses: Spawning/rearing
2. Miscellaneous Uses: Wildlife habitat.

Aquatic ecological receptors and pathways will be discussed and evaluated in greater detail in the supplemental work plan discussed in Section 4.6.

2.5.5 Natural and Cultural Resources

Preliminary data were gathered to identify wetlands, waterways, wildlife habitats, cultural resources, and probable associated permitting requirements for Site cleanup. The study area extends 200 ft from the Site per Wenatchee City Code 12.08.060.

Public documents reviewed include aerial photographs, the US Fish and Wildlife Services' Information for Planning and Consultation (IPaC) tool, National Wetlands Inventory mapping, Federal Emergency Management Agency floodplain data, Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) data, the City's critical areas map, Washington Natural Heritage Program Geographic Information System data set, and the Washington State Department of Archaeology and Historic Preservation's (DAHP's) Washington Information System for Architectural and Archaeological Records Data (WISAARD) tool regarding habitats, plants, and cultural resources.

The results of a literature search of readily available documentation and maps indicate the following resources in the study area that may be considered as part of project permitting:

- Columbia River, which is a:
  - Navigable water of the US with any work affecting navigation and/or work below mean high-water line in tidal waters subject to Section 10 of the Rivers and Harbors Act.
  - Water of the US with any dredge/fill activity below the high tide line subject to Section 404 and Section 401 of the Clean Water Act.
  - Water of the state subject to regulation under the Washington State Hydraulic Code (Chapter 220-660 WAC) for performance of work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state.

  - Shoreline of statewide significance subject to the City's Shoreline Master Program (SMP). The SMP jurisdiction includes the Columbia River and area 200 ft landward of the ordinary high-water line.

- The SMP indicates that the Site has a High Intensity shoreline environmental designation up to South Worthen Street and is immediately adjacent to a Waterfront Park designation (to the east) along the Apple Capital Recreation Loop Trail. Shoreline buffers are 60 ft in width per Table 5 of the City's SMP.
- The IPaC tool indicates potential occurrences of gray wolf, North American wolverine, yellow-billed cuckoo (species considered extirpated from Washington), and bull trout in the project area. Additional Endangered Species Act-listed species may also include monarch butterfly (candidate species), Upper Columbia River spring-run evolutionarily significant unit (ESU) Chinook salmon, Upper Columbia River distinct population segment steelhead trout, and Columbia River ESU chum salmon.
- The PHS data indicate occurrence of mule deer concentrations and golden eagles within the Township of the Site.
- The Washington Natural Heritage Program indicates records of rare plants in the study area including the Scouler's catchfly (*ssp. scouleri*) and coyote tobacco. Both species are considered "possibly extirpated" from their historical ranges.
- The DAHP WISAARD database identifies one Historic Property: Great Northern Railroad Wenatchee-Oroville Branch (Property ID: 733270) in the project area, immediately to the west of the Site.

Tribal considerations regarding fishery recovery and management will be included in the development of the RI. An Inadvertent Discovery Plan (of archaeological resources) including tribal and Ecology contacts is provided as Appendix E of this work plan. Additionally, the ground-disturbing activities described in this document will be monitored by a professional archaeologist who has completed 40 hours of training for Hazardous Materials Emergency Response and personal protection site work in accordance with US Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(e)(3) and who is current with their 8-hour refresher training in accordance with OSHA 29 CFR 1910.120(e)(8). The professional archaeologist will follow procedures and communication protocols outlined in the Inadvertent Discovery Plan should any archaeological materials be encountered during ground-disturbing activities.

3.0 PRELIMINARY CLEANUP LEVELS

Preliminary cleanup levels (PCULs) were developed for the preliminary Site COPCs in media of potential concern (soil and groundwater) to evaluate RI data and identify final Site COPCs. Ecology provided an initial determination of COPCs and PCULs (Ecology 2024), which was used as the initial basis for PCUL development. Ecology's determination was reviewed, evaluated, and supplemented as applicable based on additional data not previously provided to Ecology (i.e., December 2023 and January 2024 investigation data), discussions with Ecology, and further evaluation of contaminant sources, potential pathways, and potential receptors.

Soil and groundwater PCULs that are adequately protective of human health and the environment were developed in accordance with MTCA requirements. MTCA provides three approaches for establishing CULs: Method A, Method B, and Method C. The Method A approach is appropriate for sites that have few hazardous constituents or for contaminants for which toxicity information is not available to calculate Method B or Method C CULs. The Method B approach is applicable to all sites. The Method C approach is applicable for specific site uses and conditions (generally current and future industrial uses). The Method B and Method C approaches use applicable state and federal laws and risk equations to establish CULs. However, the Method B approach establishes CULs using exposure assumptions and risk levels for unrestricted land uses, whereas the Method C approach uses exposure assumptions and risk levels for restricted (e.g., industrial only) land uses. When using the MTCA Method B and Method C approaches, MTCA provides allowances that CULs are not set below chemical-specific practical quantitation limits (PQLs) or natural background levels.

Groundwater and soil PCULs for the Site were developed using MTCA Method B criteria. Appropriate receptors and exposure pathways and possible applicable or relevant and appropriate requirements (ARARs) were used to develop PCULs. PCULs developed for this work plan for all constituents detected in soil and groundwater were based on conservative values protective of human health and the environment.

Groundwater PCULs were developed considering protection of drinking water, protection of fresh surface water beneficial uses, environmental effects, and protection of sediment criteria. Groundwater PCULs were adjusted as allowed under MTCA [WAC 173-340-720(7)(c)] to be no less than the PQLs and natural background levels.

Soil PCULs were developed considering unrestricted land use, carcinogenic and non-carcinogenic direct human contact, protection of leaching to drinking water and surface water (for vadose and saturated soils), and protection of terrestrial ecological receptors. Soil PCULs were adjusted as allowed under MTCA [WAC 173-340-740(5)(c)] to be no less than the PQLs and natural background levels. Additional adjustments based on potential receptors, migration pathways, or exposure pathways may be made following the RI.

Tables 11 (groundwater) and 12 (soil) identify pathways, ARARs, and modifying factors (e.g., PQLs and/or natural background levels) used for development of PCULs for the Site.

3.1 Preliminary Groundwater Cleanup Levels

Groundwater PCULs protective of human health and the environment were developed for Site COPCs detected in groundwater (TPH, VOCs, PAHs, free cyanide, and metals), and are provided in Table 11.

Under MTCA (WAC 173-340-720), groundwater CULs are based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future Site use conditions. Ecology has determined that, at most sites, use of groundwater as a source of drinking water is the beneficial use requiring the highest quality of groundwater and that exposure to hazardous substances through ingestion of drinking water and other domestic uses represents the reasonable maximum exposure. However, groundwater at the Site discharges into surface waters of the Columbia River. Therefore, when developing groundwater PCULs, the most restrictive criterion for the highest beneficial use of groundwater was considered (i.e., protection of drinking water and protection of surface water quality in the Columbia River).

Groundwater PCULs were developed to be protective of drinking water, aquatic organisms, and human ingestion of aquatic organisms in fresh surface water, adjusted for PQL and natural background. To develop a single groundwater PCUL for each constituent, the lowest value protective criterion for identified pathways was selected, as shown in Table 11. Groundwater PCULs were developed considering:

- Protection of drinking water (incorporating Title 40 of the Code of Federal Regulations [CFR] 141.23 and Washington State primary and secondary maximum contaminant levels [WAC 246-290-310], MTCA Method A, and MTCA Method B carcinogenic and non-carcinogenic CULs)
- Protection of fresh surface water beneficial uses including aquatic species based on standards in Chapter 173-201A WAC, the EPA's federally promulgated human health criteria applicable to Washington in 40 CFR 131.45, criteria under Section 304(a) of the Clean Water Act, and MTCA Method B surface water values from Ecology's July 2024 cleanup level and risk calculation tables (Ecology; accessed August 2024)
- Protection of human health based on consumption of fish and shellfish harvested from the Columbia River
- The Risk Assessment Information System (RAIS) ecological benchmarks [for groundwater PCULs for hazardous substances for which environmental effects-based concentrations have not been established under applicable state or federal laws per WAC 173-340-730(3)(b)(C)(ii)].

Groundwater preliminary PCULs for Site COPCs are shown in Table 11. The following bullets summarize the basis for each groundwater PCUL for the Site:

- The PCULs for petroleum hydrocarbons (GRO and DRO plus RRO) and total chromium (based on chromium III) are based on MTCA Method A criteria.[11]
- The PCUL for benzene is based on Chapter 173-201A WAC protection of human health based on consumption of aquatic organisms.

[11] MTCA Method A values used for PCULs in the RI work plan in the absence of any MTCA Method B values. Final CULs may be based on Ecology Implementation Memorandum No. 23 (Ecology 2021a).

- PCULs for ethylbenzene, total xylenes, copper, lead, mercury, selenium, and zinc are based on Chapter 173-201A WAC protection of human health based on protection of aquatic life (chronic).
- PCULs for 1-methylnaphthalene and cPAH TEQ [calculated in accordance with the TEQ methodology in WAC 173-340-708(8) and Ecology Implementation Memorandum No. 11 (Ecology 2015)] are based on MTCA Method B carcinogenic criteria.
- The PCULs for 2-methylnaphthalene and dibenzofuran are based on MTCA Method B non-carcinogenic criteria.
- The PCUL for fluoranthene is based on 40 CFR 131.45 protection of human health criteria for consumption of aquatic organisms.
- The PCULs for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(j,k)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, and free and WAD cyanide were adjusted up to the PQL. PQL values for groundwater were based on reporting limits provided by Apex Laboratories, LLC (Apex) for this Site.
- The PCULs for anthracene, acenaphthene, acenaphthylene, naphthalene (based on total value of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene), fluorene, phenanthrene, pyrene, and barium are based on RAIS ecological benchmarks provided by Ecology (2024).
- The PCUL for arsenic was adjusted up to the natural background based on Natural Background Groundwater Arsenic Concentrations in Washington State (San Juan 2022).
- PCULs for cadmium, lead, and nickel are based on Section 304 of the Clean Water Act protection of human health based on protection of aquatic life (chronic).
- The PCUL for silver is based on Section 304 of the Clean Water Act protection of human health based on protection of aquatic life (acute).

As previously discussed, cyanide reaction products are not known to be present in significant quantities at CWG sites (Hayes et al. 1996) and purifier wastes have not been identified at the Site. Therefore, detections of free cyanide reported at concentrations above preliminary SLs in groundwater samples collected from WMW-1, WMW-7, and WMW-9 do not appear to be associated with the Site and cyanide is likely not a COPC in Site groundwater. However, analysis for free cyanide in groundwater will be included in the RI to further determine if cyanide impacts to groundwater are present or related to former operations at the Site. In addition, to assess potential impacts of cyanide on surface water quality at the Site, analysis for WAD cyanide will be included in groundwater samples collected from the nearshore vertical and angled monitoring wells (Section 4.0) during the RI.

Also, as previously discussed, the detection of dissolved arsenic above the Washington state natural background concentration in groundwater at monitoring well WMW-8 is likely indicative of mobilization of naturally occurring arsenic due to reducing groundwater conditions caused by the degradation of organic contamination from the MGP site, and not a release of arsenic at the Site. No other dissolved metals have been detected in groundwater at the Site at concentrations above preliminary SLs. Therefore, arsenic and other metals are not likely not COPCs in Site groundwater. However, analysis for dissolved metals will also be included in the RI to further evaluate if metals impacting groundwater are present or related to former operations at the Site.

3.2 Preliminary Soil Cleanup Levels

Soil PCULs protective of human health and the environment were developed for Site COPCs detected in soil (TPH, VOCs, PAHs, free cyanide, and metals), and are provided in Table 12. Note that analysis for total cyanide was conducted during previous Site investigation activities; however, the cleanup levels calculated with the MTCA equations are based on free cyanide. Therefore, free cyanide will be analyzed for in soil samples collected during the RI. Soil PCULs protective of human health were developed using applicable human health risk assessment procedures specified in WAC 173-340-708 and WAC 173-340-740 and are based on the reasonable maximum exposure expected to occur at the Site. WAC 173-340-740(5)(c) provides for adjustments to CULs, as needed, so that CULs are not less than the PQL and are not less than natural background levels. Under WAC 173-340-740, MTCA Method B soil CULs must be as stringent as:

- Concentrations established under applicable state and federal laws
- Concentrations protective of direct human contact with soil
- Concentrations protective of terrestrial ecological receptors
- Concentrations protective of groundwater.

These criteria were considered during development of the soil PCULs.

The only ARAR for soil is the Toxic Substances Control Act; there are no other soil concentrations established under applicable federal laws, and because toxics are not identified COPCs for the Site, ARARs were not incorporated into the development of Site soil PCULs. Soil PCULs were developed considering MTCA Method A soil CULs for unrestricted land uses, MTCA Method B CULs protective of direct human contact determined in accordance with WAC 173-340-740(3), soil protective of groundwater (drinking water and surface water) using the fixed parameter three-phase partitioning model in accordance with WAC 173-340-747(4), and terrestrial ecological receptors, adjusted for PQLs and natural background. The three-phase partitioning model provides a conservative estimate of the concentration of a contaminant in soil that is protective of groundwater.

To develop a single soil PCUL for each constituent, the lowest protective criterion was selected. For those constituents where the lowest value criterion is protection of groundwater, the criterion may not be applicable if it can be demonstrated empirically using the procedures specified in WAC 173-340-747 that soil concentrations do not cause an exceedance of the applicable groundwater PCULs. An empirical demonstration may be made based on the results of the RI. The following bullets summarize the basis for each soil PCUL for the Site:

- The PCULs for GRO and RRO are based on MTCA Method A criteria.
- The PCUL for cPAH TEQ is based on MTCA Method A criteria [benzo(a)pyrene equivalents based on the TEQ methodology in WAC 173-340-708(8)].
- The PCULs for benzene, ethylbenzene, toluene, total xylenes, 1-methylnaphthalene, benzo(a)pyrene, free cyanide, mercury, selenium, and silver were adjusted up to the PQL. PQL values for soil were based on reporting limits provided by Apex for this Site. The PCUL for free

cyanide was adjusted up to the PQL, which is based on the reporting limit provided by SVL Analytical, Inc. for the Site.

- The PCULs for 2-methylnaphthalene, fluoranthene, and naphthalene are based on soil in the saturated zone protective of drinking water.
- The PCUL for dibenzofuran is based on vadose zone soil protective of drinking water.
- The PCULs for acenaphthene, anthracene, fluorene, pyrene, barium, and lead are based on soil in the saturated zone protective of surface water.
- The PCULs for DRO and total chromium are based on protection of terrestrial ecological receptors.
- The PCULs for arsenic, cadmium, copper, nickel, and zinc were adjusted up to the natural background level (Ecology 1994).

3.3 Sediment (and Groundwater Protective of Sediment) Screening Levels

Based on evaluation of the groundwater sampling results from the angled shoreline wells, observations made in the field during the time of drilling the angled wells, and consultation with Ecology, appropriate screening levels for sediment (and groundwater protective of sediment) will be established and the planned scope and strategy for a future sediment investigation will be determined and detailed in a future supplemental RI work plan (discussed further in Section 4.6).

4.0 REMEDIAL INVESTIGATION SCOPE OF WORK – PHASED INVESTIGATION ACTIVITIES

The previous investigations conducted at the Site (Section 2.3) yielded a significant amount of data and information about the likely sources, nature, and extent of contamination in soil and groundwater at the Site and allowed development of a well-rounded preliminary CSM for the Site (Section 2.5). However, remaining data gaps have been identified, including:

- The most southerly/southwesterly extent of DNAPL at the Site was identified at the boring for monitoring well WMW-5, at a depth of 45 to 46 ft bgs. While DNAPL was not encountered in neighboring Coleman Oil borings/monitoring wells to the east and southeast of WMW-5, those borings were drilled only to depths of approximately 30 to 40 ft bgs. Therefore, it is unclear if the extent of DNAPL in the area east and southeast of WMW-5 is bounded.
- During drilling of the boring for monitoring well WMW-8, no DNAPL was encountered. This indicated that the extent of DNAPL did not extend east of this boring location. However, laboratory analyses of soil samples from WMW-8 identified TPH concentrations above the PCULs, and the observation of small globules of NAPL in the groundwater column in the well during a later monitoring event suggests that there may be DNAPL proximate to WMW-8; therefore, DNAPL may not be bounded by this location.
- The absence of DNAPL in the soil borings for locations WB-1, WB-14, WMW-10, and WMW-11 provide for a reasonable estimation of the northern extent of contamination at the Site. However, the presence of DNAPL in the borings for WB-13 and WMW-1 in this same area indicate that the DNAPL has not necessarily been adequately bounded to the west in this northern area. Additionally, the presence of groundwater contamination in water samples from monitoring well WMW-1 indicates that the upgradient extent of groundwater contamination in this area is also unknown.
- The presence or likely presence (based on TPH concentrations) of DNAPL, soil, and groundwater contamination in the easternmost borings or monitoring wells at the Site (i.e., WB-3, WMW-2, WMW-3, WMW-4) and Coleman Oil boring/monitoring well MW-22 indicates that the easterly extent of Site contamination has not been bounded. Therefore, it is also unclear whether surface water or sediment in the Columbia River east of the Site has been impacted.

Further investigation of contamination at the Site is warranted and will be conducted through the RI to evaluate the extent of contamination in the upland portion of the Site and determine whether the surface water or sediments of the Columbia River are being or have been impacted by contamination at the Site. The RI is divided into three focused investigation areas: the upland data gaps investigation, the shoreline/groundwater-surface water pathway investigation, and the sediment investigation. The sediment investigation is not included in this work plan, because data from the shoreline/groundwater-surface water pathway investigation may inform its design, which will be included in a future supplemental RI work plan. Locations of the proposed upland investigations are shown on Figure 16, and a brief description of each focused investigation area is provided below. At least 7 days' notice will be given to Ecology prior to beginning sampling.

- **Upland Data Gaps Investigation**: This portion of the RI will involve drilling up to five soil borings to a maximum depth of approximately 40 to 70 ft bgs using sonic drilling and sampling

techniques and the installation of monitoring wells in up to three of the soil borings. The Site soil borings and monitoring wells will generally be completed where additional data gaps remain following previous Site investigations completed by Landau and GeoEngineers (Section 2.3), generally along the Worthen Street ROW and at the former Cascade/Continental Oil facility. Borings that are not converted to monitoring wells will be designated sequentially starting from WB-15. Borings that will be converted to monitoring wells will be designated sequentially starting from WMW-19. Landau's rationale for the proposed boring locations is provided below.

  - Borings WB-15 and WB-16 are intended to determine the southeastern extents of contamination associated with the Site and the depth to competent bedrock in Worthen Street southeast of existing Site exploration locations. The borings are also intended to assess the presence of contamination at depths deeper than the nearby borings and monitoring wells installed for the Coleman Oil site investigation.
  - Monitoring wells WMW-20 and WMW-21 are intended to further define the eastern extents of contamination and the extents of NAPL in the area. The monitoring wells will also provide groundwater data from downgradient of the former MGP and near the shoreline. The current known extent of NAPL is shown on Figure 6C.
  - Monitoring well WMW-24 (located on the SC Fresh property) is intended to determine the western extent of the groundwater plume and soil contamination attributed to the Site. Drilling and installation of monitoring well WMW-24 is subject to the landowner's approval for entry and work on the SC Fresh property and obtaining an access agreement acceptable to PSE, PUD, and SC Fresh.

- **Shoreline/Groundwater-Surface Water Pathway Investigation**: This portion of the RI will include advancing and constructing up to three angled monitoring wells (WMW-19, WMW-22, and WMW-23) east of the Worthen Street ROW along the upper bank of the Columbia River that will be drilled/installed at an angle from ground surface down toward the Columbia River. The angled monitoring wells will be placed in areas at the top of the bank where overhead or subsurface utilities will accommodate drilling and construction of the wells and will be generally located east of the location of historical MGP infrastructure or proximate to the east of previous investigation locations where free product MGP waste/coal tar was identified. The monitoring wells will be angled approximately 45 degrees from vertical and will be oriented so that the screened interval will be as close to the groundwater-surface water interface as possible to determine potential impacts to soil and the groundwater-surface water pathway near the shoreline of the river. These wells will be completed at the interface of the alluvium/fill along the shoreline and the underlying competent siltstone bedrock (or shallower drilling refusal). Monitoring wells WMW-22 and WMW-23 may be screened within fill/dump material based on soil boring logs of surrounding investigation locations. Angled monitoring wells may also be used as future conditional point of compliance monitoring wells. Pressure transducers and dataloggers will be installed in the three angled monitoring wells and three nearby new and existing vertical monitoring wells (i.e., WMW-2, WMW-3, and WMW-20) to monitor groundwater levels on a continuous basis and evaluate groundwater/surface water interactions and dynamics at the Site. PUD river-level pressure transducer data for river mile 466.8 located at Wenatchee Riverfront Park will be used to monitor the river stage. The monitoring transducers/dataloggers will be maintained in these locations until completion of the fourth quarterly groundwater monitoring event (Section 4.5).

The following sections describe the RI 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), a Quality Assurance Project Plan (QAPP), a Site-specific Health and Safety Plan (HASP) including contingency planning for a hazardous waste spill, and an Inadvertent Discovery Plan (of archaeological resources) are included with this work plan as Appendices B, C, D, and 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. Soil and groundwater samples will be collected only for constituents identified as COPCs, except for the groundwater samples collected from angled shoreline wells (and potentially other nearshore vertical wells) that will be analyzed for Sediment Management Standards (SMS) criteria. Laboratory analytical services will be provided by Apex Laboratories, LLC (Apex) in Tigard, Oregon; SVL Analytical, Inc. in Kellogg, Idaho; Analytical Resources, LLC in Tukwila, Washington; and ALS Environmental in Kelso, Washington, all of which are Ecology-accredited laboratories. Laboratory physical parameter testing services will be provided by SPL in Arlington, Texas and Texas OilTech Laboratories, LP in Houston, Texas. Proposed boring and monitoring well locations are shown on Figure 16. All data will be screened against the PCULs identified in in Section 3.0.

4.1 Planning, Preparation, and Permitting

The following subsections address permitting and utility locating requirements prior to beginning the investigations. Note that under MTCA (Chapter 70A.305.090 Revised Code of Washington), a remedial action conducted under an agreed order is exempt from the procedural requirements of any laws requiring or authorizing local government permits or approvals for the remedial action. However, the remedial action must still comply with the substantive requirements of those local laws. Therefore, the substantive requirements of the local laws normally requiring a permit are described below.

4.1.1 Notices and Substantive Requirements Coordination

Notices/documentation for the processes described below will be submitted/documented prior to beginning field investigations.

4.1.1.1 Drilling Notice

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 WAC 173-160-151.

4.1.1.2 City of Wenatchee Right-of-Way Coordination

Up to seven soil borings/monitoring wells will be completed in or adjacent to the Worthen Street ROW. Landau will work with the City to determine the substantive requirements of permits that would typically be necessary for this work, will submit traffic control plans as needed for work in the City ROW, and will arrange for traffic control for partial road closures, as necessary. TBMM LLC of Wenatchee, Washington will provide traffic control services and the traffic control plan.

4.1.1.3 In-Water Work Permitting

No in-water work is planned for this phase of the RI discussed herein. As indicated in Sections 3.3 and 4.6, a subsequent sediment investigation will be conducted that will require in-water work. The permitting requirements for such will be included in a future supplemental RI work plan that will be prepared prior to that work.

4.1.2 Utility Locating and Utility Clearance

Prior to commencing drilling activities, available utility maps provided by the 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 at least 2 business days in advance of commencing drilling activities to mark public utilities in the vicinity of the proposed drilling locations. Landau will visit the Site with Geophysical Survey, a private utility locator and ground-penetrating radar (GPR) surveyor, to mark the proposed boring/monitoring well locations and private conductible utilities at the Site using electromagnetic and radio frequency transmission locating equipment. A GPR survey will also be completed to attempt to locate subsurface structures or other impediments (e.g., former building locations, unknown USTs, non-conductive utilities, large boulders, and other impediments to drilling) in the proposed drilling areas and to map the presence of underground structures located outside of the drilling areas to inform the evaluation of cleanup alternatives as well as the locations of any future borings within the GPR-mapped area.

Due to the known high density of underground utilities in the ROW, an air knife/vactor truck, operated by Anderson Environmental Contracting, LLC (AEC) or a subcontractor to AEC, will be used to clear each soil boring location to a depth of at least 5 ft bgs to confirm the absence of shallow utilities or other obstructions at each drilling location. Soils on the edges of each air-knife hole will be observed for evidence of NAPL or other obvious contamination. Soil samples will be collected by hand or hand-auger from the sidewalls of the air-knifed hole for field screening and/or laboratory analysis if NAPL 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. Per WAC 296-24-960(3)(a)(ii), a minimum of 10 ft clearance will be maintained between overhead lines and any part of the drilling equipment plus 0.4 inches for each 1 kilovolt (kV) over 50 kV. If air knifing provides visual indications of utilities at the boring location, the boring will be backfilled with clean fill or 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. Alternate boring locations will also be cleared with the air knife.

4.2 Advancement of Soil Borings and Soil Screening

Following utility clearance at each soil boring location, up to eight soil borings will be advanced to an expected maximum depth of 70 ft bgs (or competent bedrock) at the Site using sonic drilling techniques

at the general locations described above and shown on Figure 16. The depth of the soil borings will be below the previously identified depth of groundwater and below the typical static water level of the Columbia River. The final depth will also be below the maximum depth where DNAPL has been encountered in previous Site investigations. The borings are anticipated to penetrate into the competent bedrock of the Chumstick Formation, as determined by a Landau geologist, to determine if fractures in shallow competent bedrock are present and to evaluate the presence of NAPL overlying competent bedrock. All drilling activities will be conducted by AEC (a Washington State-licensed drilling contractor) and observed by Landau field personnel. At each location, a continuous soil core will be collected and soil samples for laboratory analysis will be collected from each boring location. If NAPL 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 NAPL. Seven borings (five converted to monitoring wells) are anticipated to be completed in the Worthen Street ROW; one boring will be completed on the SC Fresh property to the north of the PUD substation property.

At the soil borings located along the Columbia River, associated with the shoreline/groundwater-surface water pathway investigation, the soil borings will be angled approximately 45 degrees from vertical and oriented perpendicular to and toward the Columbia River. The remaining soil borings will be vertically oriented.

Soils will be logged in the field in accordance with the Unified Soil Classification System. Soils will be field-screened for the presence of VOCs and DNAPL. Field-screening techniques will include observing the soil for staining, sheen, discoloration, odor, and other evidence of impacts; using a photoionization detector to evaluate whether VOCs are present in soil; and conducting sheen testing to evaluate the potential presence of petroleum hydrocarbons.

Erlandsen, Inc. (Erlandsen), a licensed land surveyor, will survey the ground surface elevation of borings not converted to wells relative to the NAVD88 and the horizontal location relative to the North American Datum of 1983 (NAD83). All vertical and horizontal survey data will have a minimum resolution of 1/100 of 1 ft.

4.3 Soil and Free Product Sample Collection

Based on the field-screening results, at least one soil sample from each boring will be selected for laboratory analysis. The total number of samples at a given boring will be determined based on field observations. Soil samples will be collected from the interval(s) where screening identifies the greatest likelihood of contamination as well as from below the contaminated interval(s) (or competent bedrock if contamination extends through the length of the boring), or from the interval immediately above competent bedrock if no indications of contamination are observed through field screening. If free product NAPL is encountered, soil samples will be collected from above and below the NAPL-impacted interval and soil and/or NAPL samples will be collected from within the NAPL-impacted interval for leachability and fingerprinting/forensics analysis. One additional soil sample will be collected within the groundwater-bearing interval at each boring location. All samples will be submitted to Apex for analysis. A trip blank will accompany containers with soil samples for VOC and/or gasoline-range TPH (TPH-G)

analysis during transport to and from the field and will be returned to the laboratory with each shipment of VOC and/or TPH-G samples.

Soil samples selected for analysis will be submitted to a laboratory and analyzed for the following constituents in accordance with Table 1 of the SAP:

- TPH-G by the Northwest TPH extended-range gasoline analytical method (NWTPH-Gx)
- Diesel- and heavy oil-range TPH (TPH-D and TPH-O, respectively) by the Northwest TPH extended-range diesel analytical method (NWTPH-Dx) using silica-gel cleanup
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260D
- Total metals – arsenic, barium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc by EPA Method 6020B
- PAHs identified in SAP Table B-1 by EPA Method 8270E (reporting limits for Method 8270E scan meet project SLs; however, samples may be run with selected ion monitoring [SIM] if SLs are not achieved).
- Free cyanide by Method SOP SVL 4131.[12]

The following additional forensic analyses may also be included for selected soil samples:

- Forensic fingerprinting with or without simulated distillation by ASTM Method D2887-14.
- To determine the mobility of organic constituents present in soil, soil samples may be selected for synthetic precipitation leaching procedure (SPLP) analysis for BTEX and naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene from sampling locations with detections of one or more of these analytes by EPA Methods 1312/8270E.
- Low-level PAHs and homologs by EPA Method 8270M.

In addition to the aforementioned analytes, soil samples collected at the screened interval of the angled soil borings related to the shoreline/groundwater-surface water pathway investigation will be submitted for the following analyses:

- Total organic carbon by EPA Method 9060Amod
- Grain-size analysis by ASTM Method D6913
- Total solids by EPA Method SM 2540G.

Additional soil samples may be submitted to the laboratory for archival purposes in case future analyses are needed. NAPL samples may also be analyzed for some or all of these chemical and forensic parameters.

[12] Because the MTCA CULs listed in Ecology's Cleanup Levels and Risk Calculations (CLARC) database for cyanide in soil and groundwater are based on free cyanide, soil and groundwater will be analyzed for free cyanide during investigations completed during the RI, to facilitate comparison of cyanide results to MTCA CULs.

4.3.1 Non-Aqueous Phase Liquid Analysis and Forensics

Significant free product DNAPL coal tar was encountered during Landau's December 2023 investigation in a soil boring located within the Worthen Street ROW (WB-13). In addition, fuel oil, kerosene, R99 biodiesel, and Bunker C contamination in soil at the Site has been identified.

Samples of free product NAPL may be collected if the observed characteristics of encountered NAPL differ from previous samples collected, as described in the SAP (Appendix B). If NAPL that differs from previously identified NAPL is identified (e.g., significantly different color, viscosity, density), or if measurable free product is present in monitoring well MW-22, NAPL samples may be collected and submitted for specialty physical characteristic and fingerprinting analyses. These analyses may inform cleanup alternatives, increase understanding of leaching and mobility of free product NAPL, and help create an analytical standard to quantify dissolved constituents in Site groundwater samples, including:

- SPLP analysis for BTEX and naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by EPA Methods 1312/8270E
- Forensics PAHs and homologs by EPA Method 8270M
- Water-soluble fraction for TPH-D/TPH-O and TPH-G by NWTPH-Dx/NWTPH-Gx, water-soluble VOCs, gas-specific tentatively identified compounds (TICs), and oxygenates by EPA Method 8260 to determine the quantities and ratios of the water-soluble fractions of free product DNAPL
- Forensic fingerprinting with or without simulated distillation by ASTM Method D2887-14.

Apex will provide a narrative describing the results of the leachability and forensic analyses that will be included in the RI report.

Based on the results of the above-noted leachability and fingerprinting analyses for NAPL samples and if field observations indicate that the NAPL encountered differs from a the previously collected samples, selected NAPL samples may be analyzed for the following physical parameters by SPL, LLC in Arlington, Texas or Texas OilTech Laboratories, LP in Houston, Texas.

- Kinematic viscosity by ASTM Method D445
- Density by ASTM Method D1475
- Interfacial tension by ASTM Method D971(m)
- Surface tension by ASTM Method D971(b).

The density and viscosity of free product NAPL will be determined at up to three elevated temperatures. Data from the density and viscosity analyses can then be plotted on a log, which may inform density and viscosity at additional temperatures.

If LNAPL is encountered in soil in any of the borings (including monitoring well WMW-24 completed in the apparent downgradient direction of the former Cascade/Continental Oil gasoline tanks and fuel pumps), soil samples will be collected and analyzed using the hydrocarbon identification (HCID) method. Up to two samples will be analyzed for HCID. Based on the HCID results, additional quantitative (e.g., for TPH-D, TPH-G, and/or TPH-O) and/or fingerprinting analyses may be conducted.

4.4 Monitoring Well Installation and Development

Up to six monitoring wells will be installed at selected boring locations (Figure 16). 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 avoid creating vertical conduits for DNAPL migration, and avoid biased high dissolved-phase contaminants in samples where DNAPL is in contact with water in the annular space of the well.[13]

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 across the identified groundwater-bearing interval in weathered bedrock (anticipated to be encountered at approximately 11 to 40 ft bgs based on existing monitoring wells at the Site) or below the identified groundwater table in unconsolidated material, generally with 10 ft of 0.020-inch slot-size screen. Well screens will not be installed in competent bedrock unless required to adequately span a water-bearing interval. Based on the depth to the groundwater-bearing interval in weathered bedrock and the measured potentiometric surface during previous investigations and the proposed monitoring well construction, the groundwater level is anticipated to be generally above the top of the screen elevation for wells screened in weathered bedrock. Unless LNAPL is observed, wells screened in unconsolidated materials (anticipated to be along the shoreline), the bottom depth of the monitoring wells will be placed on top of competent bedrock or keyed into weathered bedrock if no deeper water-bearing intervals are identified in the soil boring. 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.

Consistent with existing Site wells, a filter pack (12/20 sand or equivalent) will extend from the base of the boring to a minimum of 2 ft above the screen. Based on turbidity measured during previous groundwater monitoring events, a 12/20 sand is an appropriate filter pack for wells screened in the Chumstick and unconsolidated formations at the Site. 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 the Worthen Street ROW will be completed with high-density runway-rated monuments set in concrete. Angled wells will be completed within traffic-rated vaults set in concrete.

For monitoring wells associated with the shoreline/groundwater-surface water pathway investigation, the monitoring wells will be angled approximately 45 degrees from vertical and oriented perpendicular to and toward the Columbia River. The bottom depth of the angled monitoring wells will be placed on

[13] Installation of monitoring wells may still be elected 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 or a grout slurry mixture.

top of, and slightly into, competent bedrock anticipated to be encountered beneath the alluvium/fill near the shoreline.

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. Erlandsen will survey the ground surface and top-of-casing elevations of the wells relative to NAVD88 and horizontal location relative to NAD83. In addition, Erlandsen will survey the elevation of the Chelan PUD-owned transducer present at the Wenatchee Riverfront Park Boat Launch relative to NAVD88. All vertical and horizontal survey data will have a minimum resolution of 1/100 of 1 ft.

Monitoring well maintenance, including visual monitoring of aboveground features, monitoring turbidity in groundwater samples, and confirming that the total depth of the wells is maintained will be conducted during each sampling event. If Landau believes the wells have been damaged or otherwise compromised, maintenance of the well(s) (e.g., redeveloping, removing accumulated sediment, cleaning the well screen) will be arranged. Any downhole maintenance will be conducted prior to purging and sampling the wells.

All new and existing monitoring wells will be decommissioned in coordination with Ecology in accordance with WAC 173-160-460 if determined to be unnecessary for monitoring groundwater at the Site.

4.5 Groundwater Sampling and Analysis

Groundwater samples will be collected and submitted for laboratory analysis from the new monitoring wells after at least 72 hours following well development to allow for post-development equilibrium conditions to establish. Groundwater monitoring of the newly installed monitoring wells will be conducted in conjunction with quarterly groundwater monitoring events of existing Site monitoring wells. Future quarterly groundwater monitoring events may also include the Coleman Oil site monitoring well MW-22. However, because this well appears to have been screened across the soil interval where NAPL coal tar was observed during drilling, MW-22 may not be sampled if NAPL is identified in the well during monitoring.

Prior to each groundwater sampling event, Landau personnel will measure the depth to groundwater in the 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[14] with new tubing to purge and sample Site wells (WMW-1 through WMW-24; Figure 16) and potentially Coleman Oil monitoring well MW-22 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. During the purging of each well, the pH, conductivity, temperature, oxidation-reduction potential, dissolved oxygen, and turbidity of the extracted water will be measured

[14] Bladder pumps will be used if the static water level is deeper than 28 ft bgs.

and well drawdown will be monitored and documented. After stabilization of the field parameter measurements, one groundwater sample will be collected from each well. Samples for quality assurance and quality control will be collected in accordance with the Site-specific QAPP, provided in Appendix C.

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

- TPH-G by NWTPH-Gx
- TPH-D and TPH-O by NWTPH-Dx[15]
- VOCs (benzene, ethylbenzene, and xylenes) by EPA Method 8260D
- PAHs identified in SAP Table B-1 will be analyzed for only in samples with low turbidity (i.e., 5 nephelometric turbidity units or less) by EPA Method 8270E (reporting limits for Method 8270 scan meet project SLs; however, samples may be run with SIM if SLs are not achieved).

The following constituents will be analyzed for during high- and low-groundwater quarterly groundwater monitoring events (expected to be performed in spring and summer 2025). Analysis for these constituents during additional groundwater monitoring events will be determined based on analytical results from the first monitoring event and in consultation with Ecology.

- Dissolved metals (arsenic, barium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc) by EPA Method 6020B
- Free cyanide by ASTM Method D7237-15A. [16]
- WAD cyanide by SM 4500-CN.[17]

The following additional forensic analyses may also be included for selected groundwater samples if doing so would help fill a data gap or provide beneficial information for the CSM or feasibility study:

- Forensic fingerprinting by NWTPH-Dx gas chromatography/flame ionization detection (GC/FID) characterization
- Low-level PAHs and homologs by EPA Method 8270M
- Forensic volatiles, gas-specific TICs, and oxygenates by EPA Method 8260D.

[15] Selected groundwater samples may be analyzed with and without silica-gel cleanup. Analysis with silica-gel cleanup will be performed if it is suspected or demonstrated that there are high levels of naturally occurring organics in groundwater (e.g., groundwater is found in or near a peat layer or other organic material such as anthropogenic waste in the City dump area) or it is deemed important to understand if there are polar metabolite breakdown products in the groundwater. Collection of data pertaining to silica-gel cleanup will be consistent with Ecology's Guidance for Silica Gel Cleanup in Washington State (Ecology 2023) and Guidance for the WDOE NWTPH-Dx Method for Testing Groundwater (Hobbs et al. 2024).

[16] Because the MTCA CULs listed in the CLARC database for cyanide in soil and groundwater are based on free cyanide, soil and groundwater will be analyzed for free cyanide during investigations completed during the RI, to facilitate comparison of cyanide results to MTCA CULs.

[17] WAD cyanide analysis is to be performed to provide a direct comparison to the WAC 173-201A-240 (Table 240) that indicates that the water quality standards for freshwater aquatic life (acute and chronic) are based on WAD analytical method 4500-CN. Based on these criteria, WAD cyanide samples will be collected only from those wells near the groundwater/surface water interface. Specifically, WAD cyanide samples will therefore be collected from three angled wells (WMW-19, WMW-22, and WMW-23) and up to three corresponding nearshore vertical wells (WMW-2, WMW-4, and WMW-20 or Coleman Oil monitoring well MW-22 [depending on conditions observed in the field]).

In addition to the above-noted analytes, groundwater samples from the angled monitoring wells will also be collected for analysis for the following constituents (based on the Chapter 173-204 WAC SMS and the procedures outlined in the Sediment Cleanup User's Manual II (SCUM II; Ecology 2021b) list for protection of freshwater sediment): [18]

- Semivolatile organic compounds (SVOCs) 4-methylphenol, benzoic acid, bis(2-ethylhexyl)phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, pentachlorophenol, phenol, and total PAHs,[19] by EPA Method 8270E
- SVOCs dibutyltin, monobutyltin, tetrabutyltin, and tributyltin by EPA Method 8270 E SIM
- Pesticides beta-hexachlorocyclohexane, dieldrin, endrin ketone, total DDDs, total DDEs, and total DDTs by EPA Method 8081B
- Polychlorinated biphenyls (PCBs) by EPA Method 8082A
- Ammonia (as N) by ASTM 4500-NH_3 G
- Total sulfides by EPA Method SM 4500-S2-D.

A total of four quarters of groundwater monitoring will be conducted as part of this RI. Groundwater monitoring events will include monitoring wells WMW-1 through WMW-24 and may include Coleman Oil site monitoring well MW-22.

Seeps have not been observed during visual assessments of the Columbia River shoreline/riverbank in the vicinity of the Site; however, seeps have been present at the Coleman Oil site where groundwater generally flows on top of bedrock (Section 2.4.1.1) and the elevation of bedrock (and measured groundwater elevations) along the shoreline is generally higher than the river stage. The elevation of the depth to bedrock at the Site is lower than the river stage and surface water of the Columbia River at the Site is expected to interact with groundwater in the unconsolidated deposits. Seeps have not been observed at the Site and are not considered to be an exposure pathway or a mechanism by which contamination migrates at the Site; however, if seeps are observed or expected based on assessments of groundwater elevation and river-level elevation data, up to four seep locations will be sampled quarterly for the same analyte list as the groundwater samples collected at the angled monitoring wells.

4.6 Sediment Investigation

Following completion of the angled wells, a sediment investigation will be designed in consultation with Ecology. Following such consultation with Ecology, a supplemental RI work plan for the sediment investigation will be prepared and submitted to the agency for review and approval. The supplemental RI work plan will include in-water work permitting requirements and the approach and methodology for collection of surface and subsurface sediment samples for chemical analysis, consistent with SMS/SCUM

[18] Because corresponding groundwater and surface water elevations at the Site indicate that the Columbia River may be a losing stream at certain periods at the Site, samples from nearshore vertical wells may also be analyzed for SMS/SCUM list constituents.

[19] Total PAHs are the sum of 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes (b+j+k), benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

II. The project SAP, QAPP, and HASP will be modified as necessary; however, the QAPP and HASP included with this work plan (Appendices C and D, respectively) include elements related to sediment sampling and analysis in anticipation of future sediment sampling activities.

4.7 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.

Dedicated equipment, including monitoring well screens, will be periodically assessed for any biofouling that may occur due to microbial activity in the presence of organic compounds. Measures will be taken to assess and address biofouling to ensure the collection of representative data from the equipment.

4.8 Investigation-Derived Waste Management

Investigation-derived waste (IDW) from the investigations (e.g., soil cuttings, purge water, decontamination water) will be stored in Washington State Department of Transportation-approved 55-gallon drums. IDW will be managed in accordance with the SAP. A Contingency and Emergencies Plan for management of material generated during investigation activities is included as Attachment C to the HASP. Procedures for IDW storage are 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 or on pallets. 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). All drums will be covered in plastic sheeting.

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.

Landau will arrange for the appropriate offsite disposal of the drums and their contents at an appropriately licensed and permitted disposal facility after analytical results are received, but generally no later than 90 days after IDW accumulation begins. Able Clean-up Technologies, Inc. of Spokane, Washington will transport the waste drums to the appropriate disposal facility. Non-dangerous and non-hazardous waste will be disposed of at a regional Subtitle D landfill once a waste profile and waste manifest are generated. Hazardous waste (if encountered) will be disposed of at a regional Subtitle C landfill. Documentation pertaining to proper disposal will be submitted to Ecology by including this information in an appendix to the RI report.

4.9 Other Remedial Investigation Requirements

As identified in WAC 174-340-350, the following information will be collected to include in the RI report and/or inform the CSM or feasibility study, as applicable:

- Climate-related information [WAC 174-340-350(6)(f)]: i.e., “Sufficient information, based on best available science, must be collected on current and projected local and regional climatological characteristics to determine which could affect the migration of hazardous substances or the resilience of cleanup action alternatives. Relevant characteristics can include temperature extremes, sea level, seasonal patterns of rainfall, the magnitude and frequency of extreme storm events (such as flooding), the potential for landslides, prevailing wind direction and velocity, variations in barometric pressure, and the potential for wildfires.” Relevant climatological information collected during the RI may include an analysis of potential changes in precipitation, extreme storm events, and river levels and the associated potential for shoreline/riverbed erosion.
- Information on potential receptors from vulnerable populations or overburdened communities:
  - Land and resource use information [WAC 174-340-350(6)(g)]: i.e., “To determine the exposure or potential exposure of human and ecological receptors, including likely vulnerable populations and overburdened communities, to hazardous substances at the site, sufficient information must be collected….”

- Human receptor information [WAC 174-340-350(6)(h)(iii)]: i.e., “Sufficient information must be collected on human receptors to determine … whether the receptors include likely vulnerable populations or overburdened communities.”

5.0 REPORTING

Following the completion of the RI field investigation outlined in this work plan (and future supplemental RI work plans), an RI report will be prepared in accordance with WAC 173-340-350 to document the nature and extent of contamination at the Site to inform and support the preparation of a feasibility study (and potentially an interim action work plan) for potential cleanup actions at the Site. The RI report will document the findings of the investigative activities outlined in this work plan and the data collected using text, tables, figures, geologic/hydrogeologic cross sections, and groundwater contour maps, as appropriate. The report will include an assessment of the quality of the analytical data as outlined in the QAPP (Appendix C), and present and discuss the data relative to the PCULs outlined in Section 3.0. All data from previous investigations will also be screened against the PCULs generated in this report. Proposed cleanup standards for media applicable to the Site will also be included, which include proposed points of compliance (potentially including conditional points of compliance) for impacted Site media. Note that PCULs and COPCs may be modified based on the findings from the RI and as approved by Ecology. The RI report will incorporate the findings of previous Site investigations and the data collected, as appropriate.

Based on the findings of the RI field investigation and collection of other required information (Section 4.9), the preliminary CSM outlined in this work plan will be evaluated and updated as necessary using any new information on Site geology and hydrogeology, hazardous substances present at the Site and their sources, COPCs, contaminant migration pathways, and/or human and ecological receptors. A supplemental RI work plan for the sediment investigation will be prepared and submitted to Ecology for review and approval. In preparation for the supplemental work plan, an interim data submittal will be prepared for review and discussion with Ecology. The supplemental RI work plan will include in-water work permitting requirements and the approach and methodology for collection of surface and subsurface sediment samples for chemical analysis.

The RI report will first be prepared according to the schedule outlined in Section 6.0 and monthly progress reports will be submitted to Ecology during the course of the RI field investigation, which will include new Site data and information as they become available as well as laboratory analytical data that have been validated. All environmental sampling data will be submitted to Ecology's EIM database at the time of draft RI report submittal.

6.0 SCHEDULE FOR IMPLEMENTATION

This schedule for implementation of the RI will be in compliance with the schedule included in the Exhibit B of the Agreed Order (i.e., field work will be completed within 12 months following Ecology approval of the final RI work plan, SAP, QAPP, and HASP; and a draft RI report will be submitted within 60 days of receipt and validation of all laboratory data). If additional time is needed to complete these activities due to unforeseen conditions or circumstances, an identified need for collection of additional field data, or as otherwise agreed upon between Ecology and the PUD/PSE, a request for extension will be submitted to Ecology with an explanation. Ecology will base its decision on whether to grant an extension based on the adherence to the terms and conditions described in Section 8.10 of the Agreed Order.

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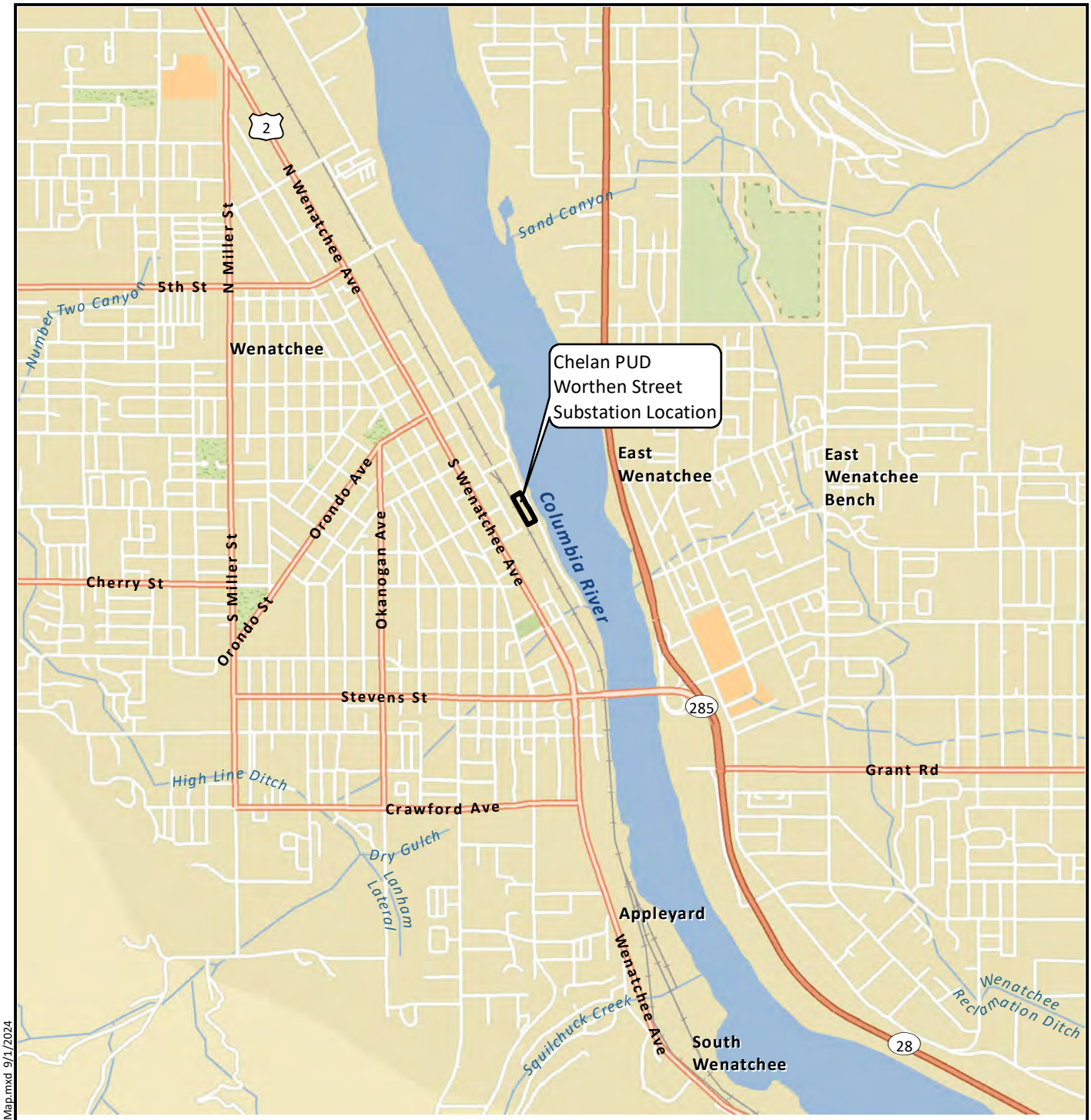
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LANDAU ASSOCIATES

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

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222011692035
FAUBION
FAMILY LLC

SC Fresh

222011692075
SAGE HILLS
PROPERTY LLC

222010815275
BNSF RAILWAY
COMPANY

222010140201
HAMILTON WILLIAM
D & DIANNE L

222010140210
BNSF RAILWAY
COMPANY

BNSF
Wenatchee
Railyard

222010140151
HAMILTON WILLIAM
D & DIANNE L

222010140201
HAMILTON WILLIAM
D & DIANNE L

222010693001
CHELAN
COUNTY PUD

South Worthen Street

Chehalis Street

222011693105
CHELAN
COUNTY PUD

Columbia River

222010140300
PIEPEL PREMIUM
FRUIT STORAGE LLC

222010140200
PIEPEL PREMIUM
FRUIT STORAGE LLC

222010815425
PIEPEL PREMIUM
FRUIT STORAGE LLC

222011693005
COLEMAN
SERVICES V LLC

222011693100
CHELAN
COUNTY PUD

Legend

- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- 12.47-kV Substation
- 115-kV Switchyard

Notes

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

Acronyms

BNSF = BNSF Railway Company
kV = kilovolt
PUD = Public Utility District

222011693100 (Parcel ID)
CHELAN COUNTY PUD (Owner Name)

0 80 160
Scale in Feet

Sources: City of Wenatchee GIS.

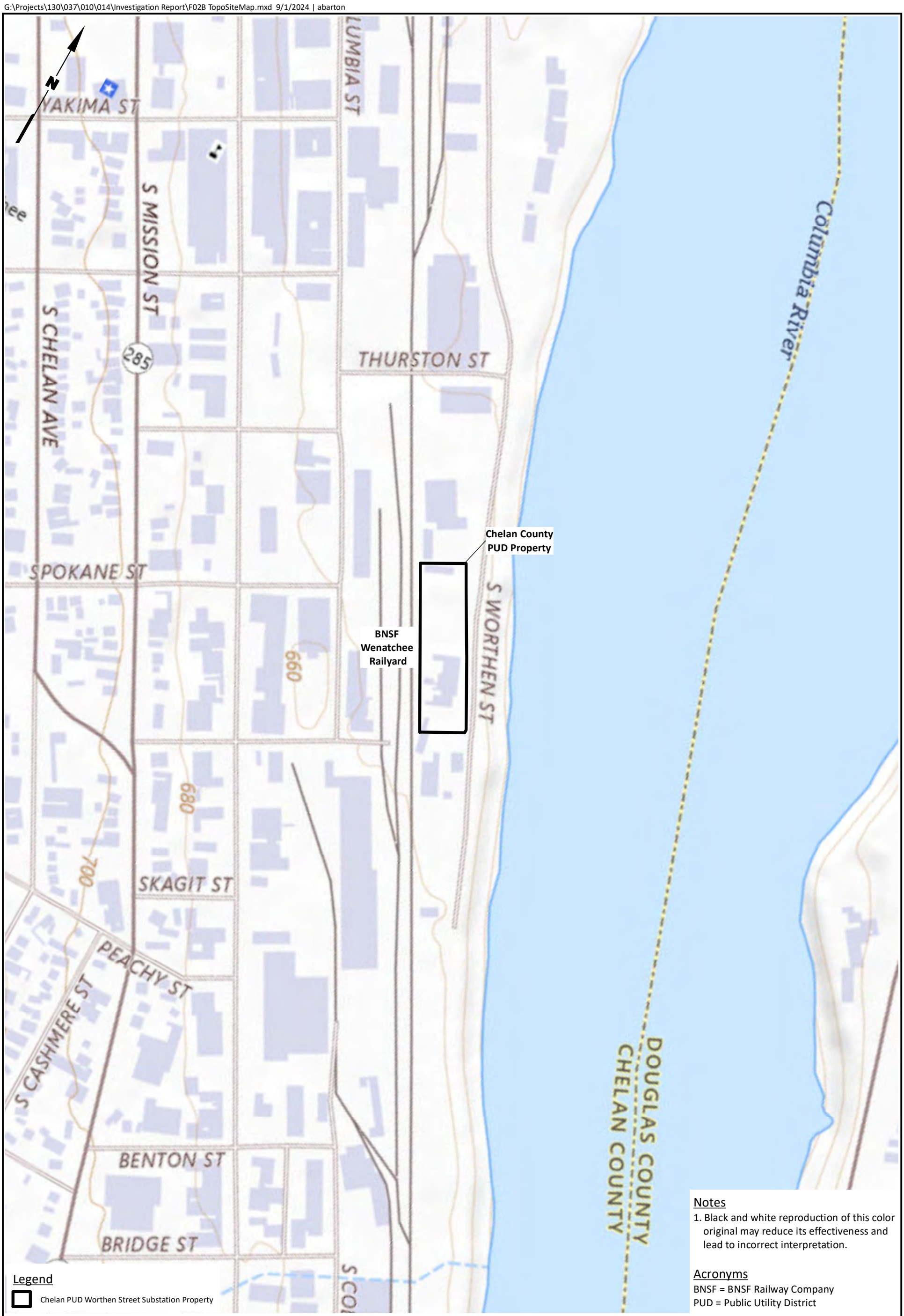
LANDAU ASSOCIATES

Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Property Map

Figure
2A

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Notes

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

Acronyms

BNSF = BNSF Railway Company
PUD = Public Utility District

Sources: City of Wenatchee GIS.

0 310 620

Scale in Feet

LANDAU ASSOCIATES

Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Topographic Site Map

Figure
2B

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222010815275

222010815290

222010596001

222010140201

222010140210

222010140201

222010815394

222010140151

222011692035

Rex Spray Storage Tank

SC Fresh

Fuel Pumps

Gasoline Tanks

222011692075

Former Cascade/ Continental Oil

City Dump

Foreman's Shacks

Gas Works

Coal Storage

Compression Tank

Steel Oil Tank

Oil Tank

Gas Tank

Purifier Tanks?

Gas Holder

Diesel UST

BNSF Wenatchee Railyard

Diesel UST

Steam Electric Generation Plant

222010693001

Transformer Oil Tank

Electric Substation

City of Wenatchee Dumping Ground 8/10/1933

Columbia River

South Worthen Street

222011693105

First Class Shorelands 1928

Top of Bank 1941

Chehalis Street

2017 Remedial Excavation

Shoreline 1901

Top of Bank 1929

Coleman Oil (Former Standard Oil)

222011693100

2019 Remedial Excavation

222011693005

2018 Drum Spill Excavation

2013 Remedial Excavation

Legend

- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure
- Coleman/Standard Oil Historical Infrastructure
- Coleman Oil Remedial Excavations
- Estimated Extent of City Dump
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- 1st Class Shore Lands Extent 1928
- Top of Bank 1929
- Top of Bank 1941
- Shoreline 1901
- Current Shoreline (Based on LiDAR)

Notes

1. Historical Infrastructure (BNSF, MGP/Steam Plant, City Dump, Contintental/Cascade Oil, and Coleman Oil - from Sanborn and Great Northern Railway Maps).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Acronyms

BNSF = BNSF Railway Company
MGP = manufactured gas plant
UST = underground storage tank

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon.

0 80 160

Scale in Feet

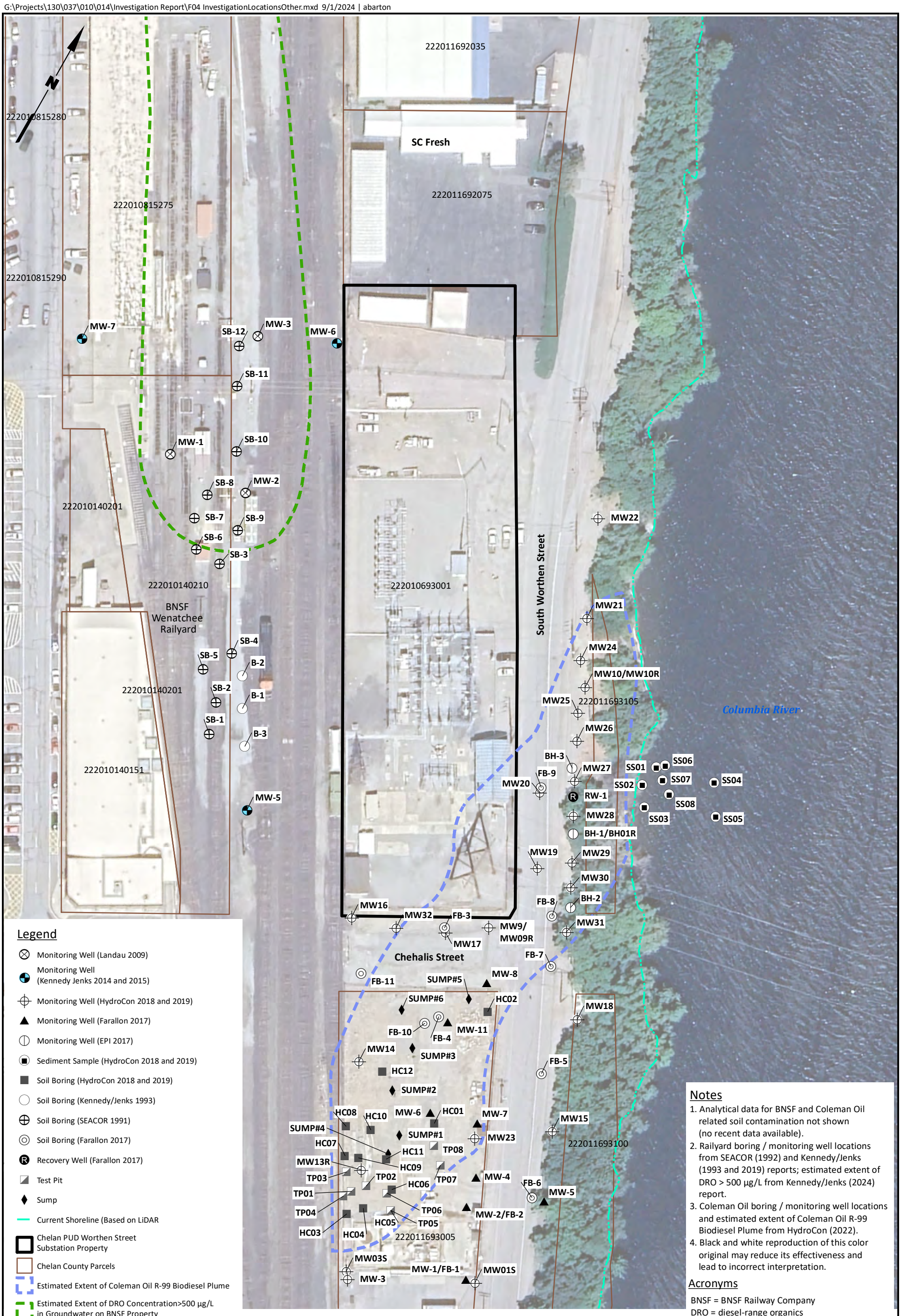
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Historical Site Features

Figure 3

G:\Projects\130\037\010\014\Investigation Report\F04 InvestigationLocationsOther.mxd 9/1/2024 | abarton



Legend

- Monitoring Well (Landau 2009)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (Farallon 2017)
- Monitoring Well (EPI 2017)
- Sediment Sample (HydroCon 2018 and 2019)
- Soil Boring (HydroCon 2018 and 2019)
- Soil Boring (Kennedy/Jenks 1993)
- Soil Boring (SEACOR 1991)
- Soil Boring (Farallon 2017)
- Recovery Well (Farallon 2017)
- Test Pit
- Sump
- Current Shoreline (Based on LiDAR
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of DRO Concentration>500 µg/L in Groundwater on BNSF Property

Notes

1. Analytical data for BNSF and Coleman Oil related soil contamination not shown (no recent data available).
2. Railyard boring / monitoring well locations from SEACOR (1992) and Kennedy/Jenks (1993 and 2019) reports; estimated extent of DRO > 500 µg/L from Kennedy/Jenks (2024) report.
3. Coleman Oil boring / monitoring well locations and estimated extent of Coleman Oil R-99 Biodiesel Plume from HydroCon (2022).
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Acronyms

BNSF = BNSF Railway Company
DRO = diesel-range organics
µg/L = micrograms per liter
PUD = Public Utility District

0 80 160

Scale in Feet

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy Jenks, Secor.

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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Investigation Locations on Adjacent Properties

Figure 4

G:\Projects\130\037\010\014\Investigation Report\F05 InvestigationLocationWorthen.mxd 9/1/2024 | abarton



Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Aspect 2023)
- Monitoring Well (HydroCon 2018)
- Soil Boring (Aspect 2023)
- Monitoring Well (GeoEngineers 2022)
- Soil Boring (GeoEngineers 2022)
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Current Shoreline (Based on LiDAR)

Note

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

Acronyms

BNSF = BNSF Railway Company
PUD = Public Utility District

0 70 140
Scale in Feet

Sources: City of Wenatchee GIS, GeoEngineers.

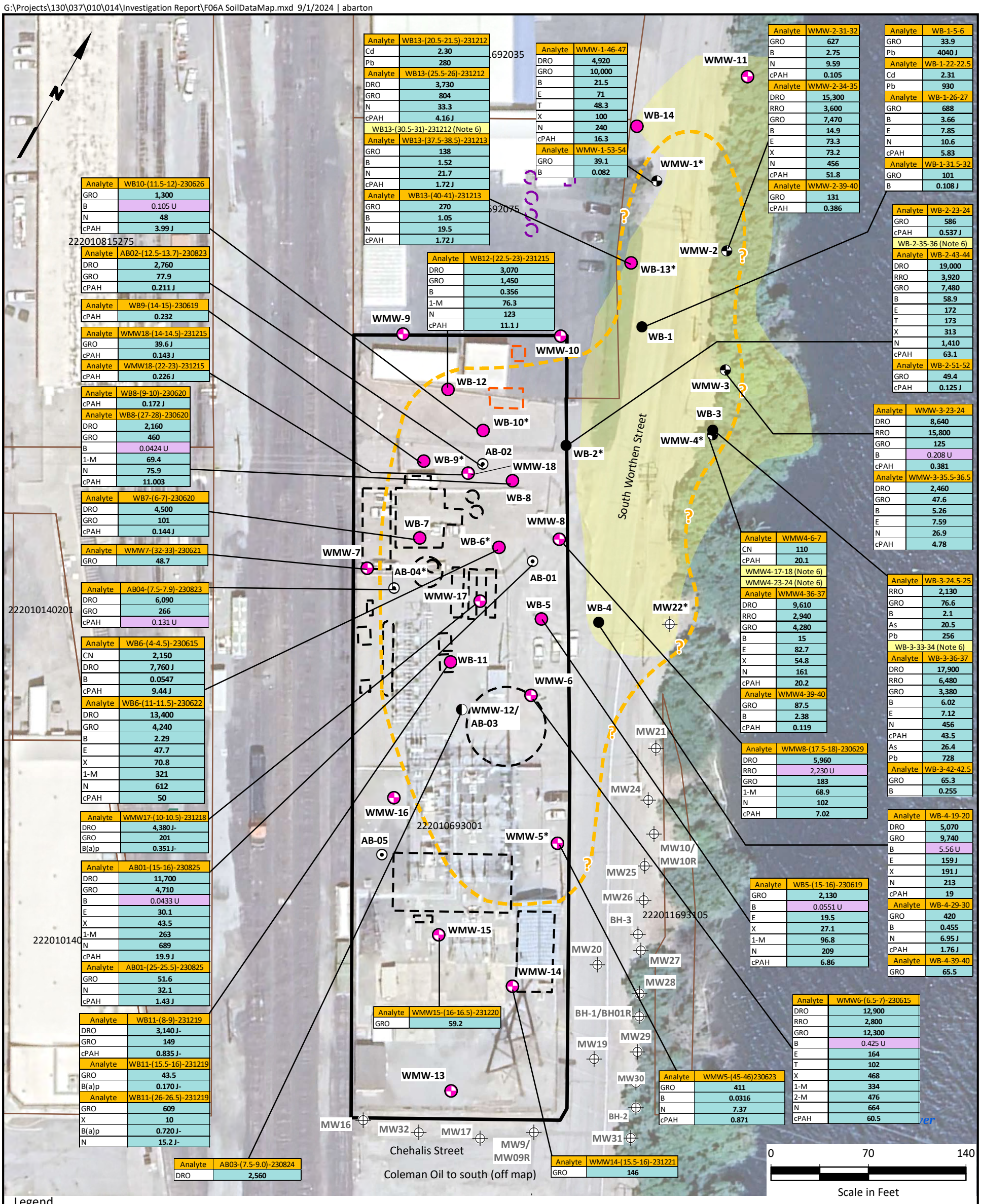
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Site Investigation Locations

Figure 5

G:\Projects\130\037\010\014\Investigation Report\F06A SoilDataMap.mxd 9/1/2024 | abarton



Analyte	WB13-(20.5-21.5)-231212
Cd	2.30
Pb	280
Analyte	WB13-(25.5-26)-231212
DRO	3,730
GRO	804
N	33.3
cPAH	4.16 J
WB13-(30.5-31)-231212 (Note 6)	
Analyte	WB13-(37.5-38.5)-231213
GRO	138
B	1.52
N	21.7
cPAH	1.72 J
Analyte	WB13-(40-41)-231213
GRO	270
B	1.05
N	19.5
cPAH	1.72 J

Analyte	WMW-1-46-47
DRO	4,920
GRO	10,000
B	21.5
E	71
T	48.3
X	100
N	240
cPAH	16.3
Analyte	WMW-1-53-54
GRO	39.1
B	0.082

Analyte	WMW-2-31-32
GRO	627
B	2.75
N	9.59
cPAH	0.105
Analyte	WMW-2-34-35
DRO	15,300
RRO	3,600
GRO	7,470
B	14.9
E	73.3
X	73.2
N	456
cPAH	51.8
Analyte	WMW-2-39-40
GRO	131
cPAH	0.386

Analyte	WB-1-5-6
GRO	33.9
Pb	4040 J
Analyte	WB-1-22-22.5
Cd	2.31
Pb	930
Analyte	WB-1-26-27
GRO	688
B	3.66
E	7.85
N	10.6
cPAH	5.83
Analyte	WB-1-31.5-32
GRO	101
B	0.108 J

Analyte	WB10-(11.5-12)-230626
GRO	1,300
B	0.105 U
N	48
cPAH	3.99 J

Analyte	AB02-(12.5-13.7)-230823
DRO	2,760
GRO	77.9
cPAH	0.211 J

Analyte	WB9-(14-15)-230619
cPAH	0.232

Analyte	WMW18-(14-14.5)-231215
GRO	39.6 J
cPAH	0.143 J
Analyte	WMW18-(22-23)-231215
cPAH	0.226 J

Analyte	WB12-(22.5-23)-231215
DRO	3,070
GRO	1,450
B	0.356
1-M	76.3
N	123
cPAH	11.1 J

Analyte	WB-2-23-24
GRO	586
cPAH	0.537 J
WB-2-35-36 (Note 6)	
Analyte	WB-2-43-44
DRO	19,000
RRO	3,920
GRO	7,480
B	58.9
E	172
T	173
X	313
N	1,410
cPAH	63.1
Analyte	WB-2-51-52
GRO	49.4
cPAH	0.125 J

Analyte	WB8-(9-10)-230620
cPAH	0.172 J
Analyte	WB8-(27-28)-230620
DRO	2,160
GRO	460
B	0.0424 U
1-M	69.4
N	75.9
cPAH	11.003

Analyte	WMW-3-23-24
DRO	8,640
RRO	15,800
GRO	125
B	0.208 U
cPAH	0.381
Analyte	WMW-3-35.5-36.5
DRO	2,460
GRO	47.6
B	5.26
E	7.59
N	26.9
cPAH	4.78

Analyte	WB7-(6-7)-230620
DRO	4,500
GRO	101
cPAH	0.144 J

Analyte	WMW7-(32-33)-230621
GRO	48.7

Analyte	WMW4-6-7
CN	110
cPAH	20.1
WMW4-17-18 (Note 6)	
WMW4-23-24 (Note 6)	
Analyte	WMW4-36-37
DRO	9,610
RRO	2,940
GRO	4,280
B	15
E	82.7
X	54.8
N	161
cPAH	20.2
Analyte	WMW4-39-40
GRO	87.5
B	2.38
cPAH	0.119

Analyte	WB-3-24.5-25
RRO	2,130
GRO	76.6
B	2.1
As	20.5
Pb	256
WB-3-33-34 (Note 6)	
Analyte	WB-3-36-37
DRO	17,900
RRO	6,480
GRO	3,380
B	6.02
E	7.12
N	456
cPAH	43.5
As	26.4
Pb	728
Analyte	WB-3-42-42.5
GRO	65.3
B	0.255

Analyte	WB6-(4-4.5)-230615
CN	2,150
DRO	7,760 J
B	0.0547
cPAH	9.44 J
Analyte	WB6-(11-11.5)-230622
DRO	13,400
GRO	4,240
B	2.29
E	47.7
X	70.8
1-M	321
N	612
cPAH	50

Analyte	WMW8-(17.5-18)-230629
DRO	5,960
RRO	2,230 U
GRO	183
1-M	68.9
N	102
cPAH	7.02

Analyte	WB-4-19-20
DRO	5,070
GRO	9,740
B	5.56 U
E	159 J
X	191 J
N	213
cPAH	19
Analyte	WB-4-29-30
GRO	420
B	0.455
N	6.95 J
cPAH	1.76 J
Analyte	WB-4-39-40
GRO	65.5

Analyte	WMW17-(10-10.5)-231218
DRO	4,380 J-
GRO	201
B(a)p	0.351 J-

Analyte	AB01-(15-16)-230825
DRO	11,700
GRO	4,710
B	0.0433 U
E	30.1
X	43.5
1-M	263
N	689
cPAH	19.9 J
Analyte	AB01-(25-25.5)-230825
GRO	51.6
N	32.1
cPAH	1.43 J

Analyte	WB5-(15-16)-230619
GRO	2,130
B	0.0551 U
E	19.5
X	27.1
1-M	96.8
N	209
cPAH	6.86

Analyte	WMW15-(16-16.5)-231220
GRO	59.2

Analyte	WMW6-(6.5-7)-230615
DRO	12,900
RRO	2,800
GRO	12,300
B	0.425 U
E	164
T	102
X	468
1-M	334
2-M	476
N	664
cPAH	60.5

Analyte	WB11-(8-9)-231219
DRO	3,140 J-
GRO	149
cPAH	0.835 J-
Analyte	WB11-(15.5-16)-231219
GRO	43.5
B(a)p	0.170 J-
Analyte	WB11-(26-26.5)-231219
GRO	609
X	10
B(a)p	0.720 J-
N	15.2 J-

Analyte	WMW5-(45-46)230623
GRO	411
B	0.0316
N	7.37
cPAH	0.871

Analyte	AB03-(7.5-9.0)-230824
DRO	2,560

Analyte	WMW14-(15.5-16)-231221
GRO	146

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Aspect 2023)
- Soil Boring (Aspect 2023)
- Monitoring Well (GeoEngineers 2022)
- Soil Boring (GeoEngineers 2022)
- Monitoring Well (Hydrocon 2018 and 2019)
- * NAPL observed in soil during drilling
- Estimated Extent of Impacted Soil Associated with Site
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure
- Estimated Extent of City Dump

Notes

1. All analytical results are in mg/kg. Non-detect exceedance = constituent analyzed for but not detected; reporting limit elevated above cleanup level.
2. Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).
3. cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.
4. GeoEngineers soil data qualifiers for borings WMW-1 through WMW-4 and WB-1 through WB-4 were applied by GeoEngineers.
5. cPAH TEQs were not calculated for samples where one or more cPAH analyte was rejected during the data validation process. For these samples, cPAHs reported above the associated screening levels are shown.
6. Soil samples representing the highest concentration(s) of analytes exceeding screening levels and/or the shallowest and deepest soil samples with exceedances of screening levels are shown for a given location. See Soil Analytical tables for full analytical results.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Screening Level Table

Analyte	Abbreviation	Soil Screening Level (mg/kg)
Total Cyanide	CN	50
Diesel-Range Organics	DRO	2,000
Residual-Range Organics	RRO	2,000
Gasoline-Range Organics	GRO	30
Benzene	B	0.03
Ethylbenzene	E	6.00
Toluene	T	7.00
Total Xylenes	X	9.00
1-Methylnaphthalene	1-M	34
2-Methylnaphthalene	2-M	320
Benzo(a)pyrene	B(a)p	0.10
Naphthalene	N	5.00
cPAH TEQ	cPAH	0.10
Arsenic	As	20
Lead	Pb	250
Cadmium	Cd	2.0

Analytical Notes

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = Result is an estimated quantity and the result may be biased low

Acronyms

BNSF = BNSF Railway Company
cPAH = carcinogenic polycyclic aromatic hydrocarbon
MGP = manufactured gas plant
mg/kg = milligrams per kilogram
NAPL = non-aqueous phase liquid
PUD = Public Utility District
TEQ = toxicity equivalence

Blue shading = detected exceedance
Purple shading = nondetect exceedance

Sources: City of Wenatchee GIS, GeoEngineers.

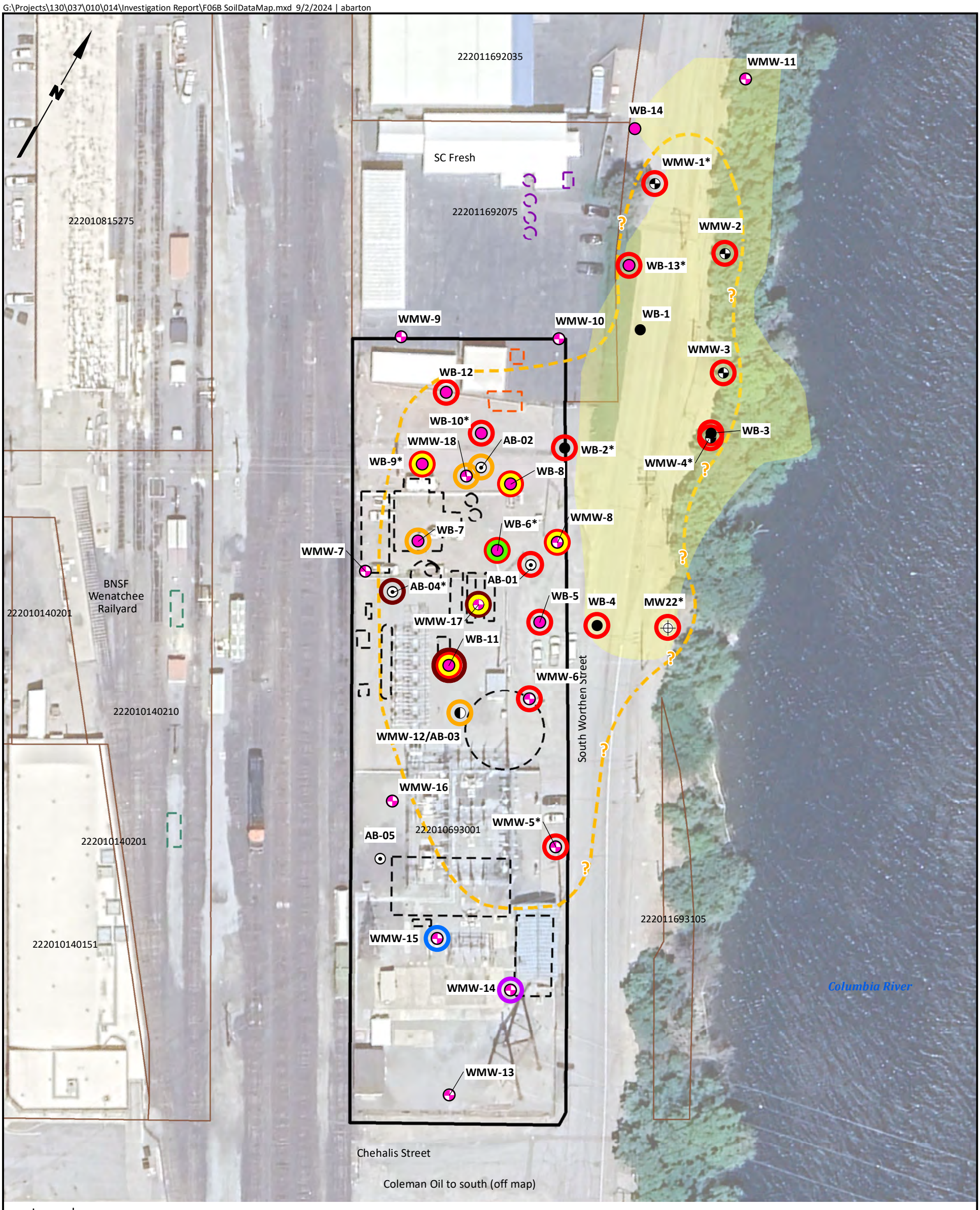
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Soil Data Map – Analytical Results Exceedances of Screening Levels

Figure 6A

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Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Aspect 2023)
- Soil Boring (Aspect 2023)
- Monitoring Well (GeoEngineers 2022)
- Soil Boring (GeoEngineers 2022)
- Monitoring Well (HydroCon 2018)
- * NAPL observed in soil during drilling

- Estimated Extent of Impacted Soil Associated with Site
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Estimated Extent of City Dump

- Chromatograms indicate presence of Diesel #2, #4/fuel oil in soil
- DNAPL coal tar observed, TPH > 10,000 mg/kg, or Chromatograms indicate presence of coal tar / MGP waste in soil
- Chromatograms indicate presence of coal tar / MGP waste in groundwater, or DNAPL observed in monitoring well during groundwater sampling or drilling
- Chromatograms indicate presence of Bunker-C / Diesel #6 in soil
- Chromatograms indicate presence of a mixture of petroleum and non-petroleum material in soil
- Chromatograms indicate presence of kerosene/Jet A in soil
- Chromatograms indicate presence of R-99 Biodiesel in soil

Note

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

Acronyms

BNSF = BNSF Railway Company
DNAPL = dense non-aqueous phase liquid
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
PUD = Public Utility District
TPH = total petroleum hydrocarbons

Sources: City of Wenatchee GIS.

0 70 140
Scale in Feet

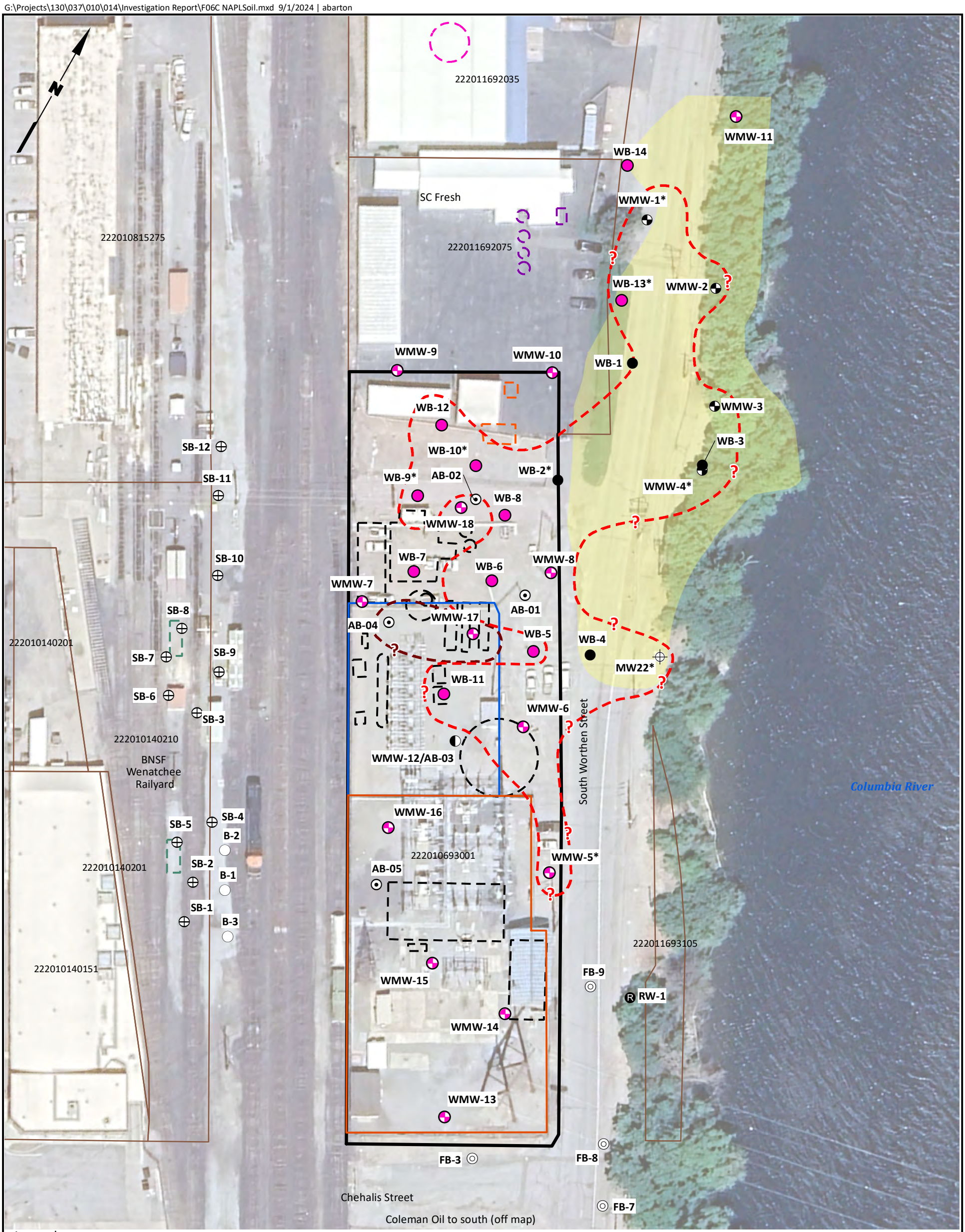
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Data Map - GC Characterization or Chromatogram Results

Figure
6B

G:\Projects\130\037\010\014\Investigation Report\F06C NAPLSoil.mxd 9/1/2024 | abarton



Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (Aspect 2023)
- Soil Boring (Aspect 2023)
- Soil Boring (GeoEngineers 2022)
- Soil Boring (Kennedy/Jenks 1993)
- Soil Boring (SEACOR 1991)
- Soil Boring (Farallon 2017)
- Recovery Well (Farallon 2017)
- * NAPL observed in soil during drilling

- Free Product Bunker C Oil Observed in Soil or Groundwater orTPH-D+O+G Greater than 10,000 mg/kg in Soil
- Free Product Coal Tar/MGP Waste Observed in Soil or Groundwater or TPH-D+O+G Greater than 10,000 mg/kg in Soil
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

- Chelan PUD Worthen Street Substation Property
- Estimated Extent of City Dump
- Chelan County Parcels
- 12.47-kV Substation
- 115-kV Switchyard

0 70 140

Scale in Feet

Acronyms

BNSF = BNSF Railway Company
PUD = Public Utility District
kV = kilovolt
mg/kg = milligram per kilogram
NAPL = non-aqueous phase liquid
TPH = total petroleum hydrocarbons
TPH-D = diesel-range TPH
TPH-G = gasoline-range TPH
TPH-O = oil-range TPH

Note

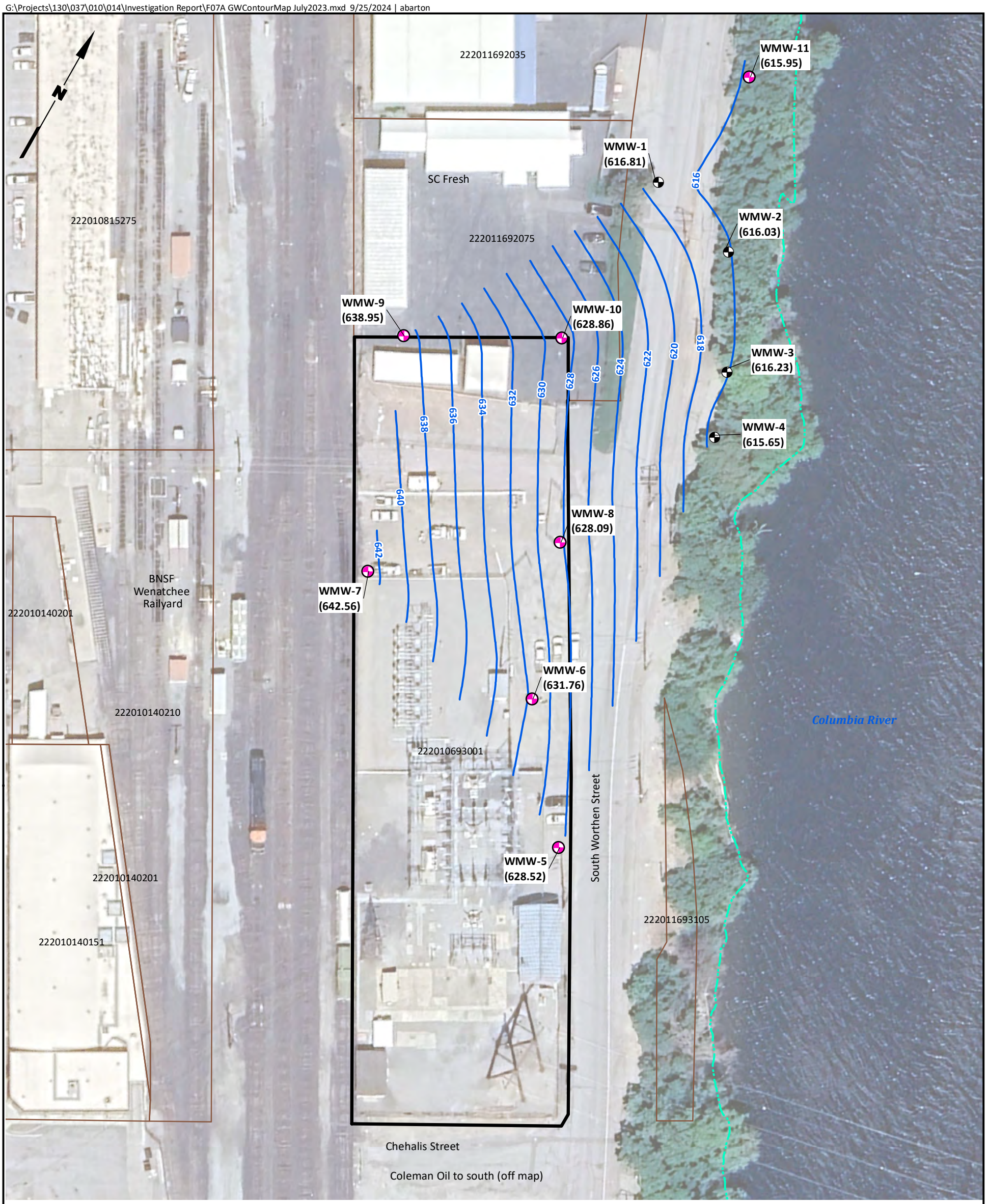
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy/Jenks, SEACOR.

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Chelan PUD Worthen Substation Site Wenatchee, Washington	**Known or Likely Extent of NAPL in Soil**	Figure 6C

G:\Projects\130\037\010\014\Investigation Report\F07A GWContourMap July2023.mxd 9/25/2024 | abarton



Legend

- Monitoring Well (Landau 2023)
- Monitoring Well (GeoEngineers 2022)
- **(631.52)** = Groundwater Elevation
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Groundwater Contour
- Current Shoreline (Based on LiDAR)

Note

1. Elevations in feet, NAVD88.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Acronyms

BNSF = BNSF Railway Company
NAVD88 = North American Vertical Datum of 1988
PUD = Public Utility District

0 70 140
Scale in Feet

Sources: City of Wenatchee GIS.

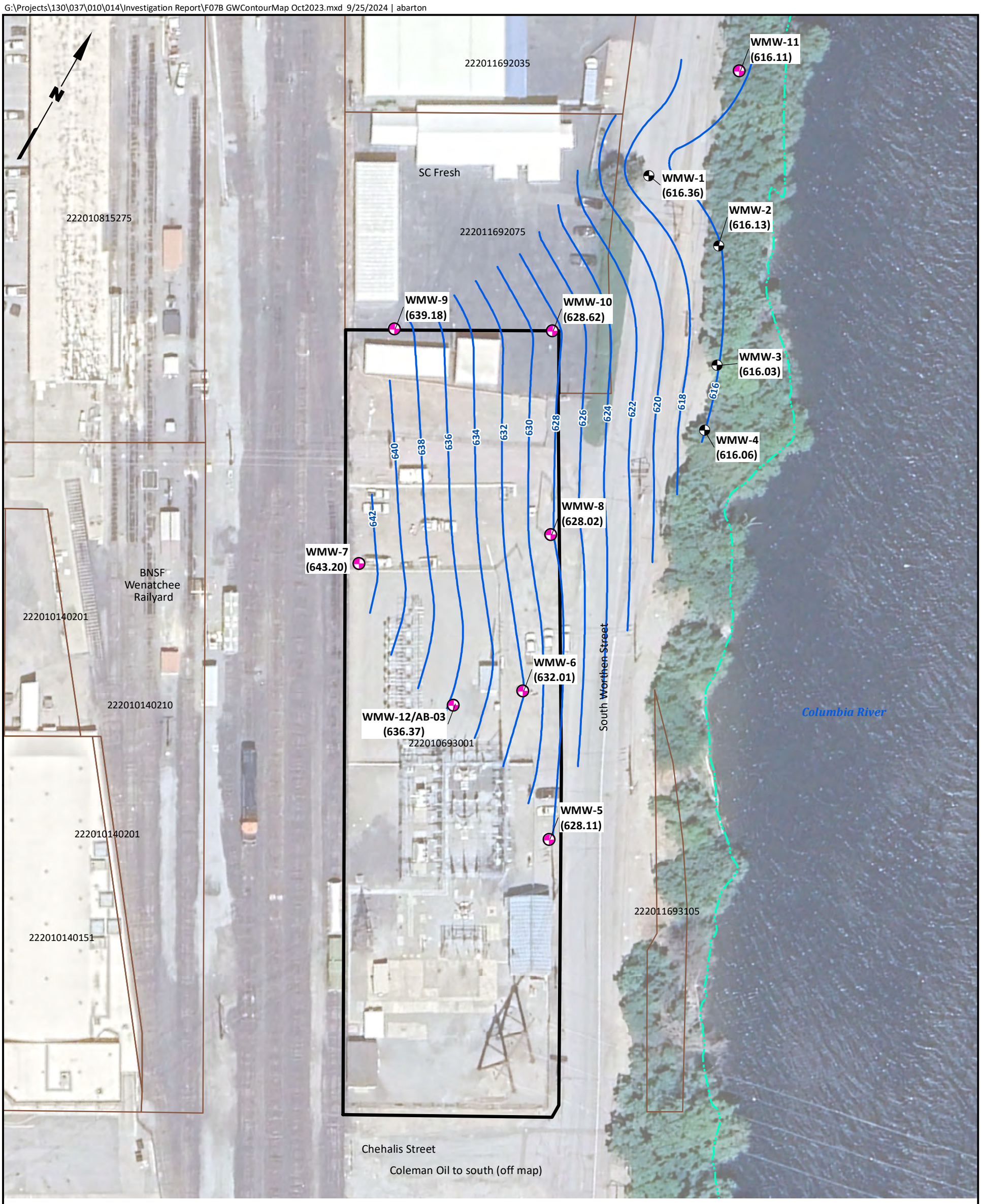
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Potentiometric Elevation Surface Contour Map (July 2023)

Figure
7A

G:\Projects\130\037\010\014\Investigation Report\F07B GWContourMap Oct2023.mxd 9/25/2024 | abarton



Legend

- Monitoring Well (Landau 2023)
- Monitoring Well (GeoEngineers 2022)
- **(631.52)** = Groundwater Elevation
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Groundwater Contour
- Current Shoreline (Based on LiDAR)

Notes

1. Elevations in feet, NAVD88.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Acronyms

BNSF - BNSF Railway Company
NAVD88 = North American Vertical Datum of 1988
PUD = Public Utility District

0 70 140

Scale in Feet

Sources: City of Wenatchee GIS.

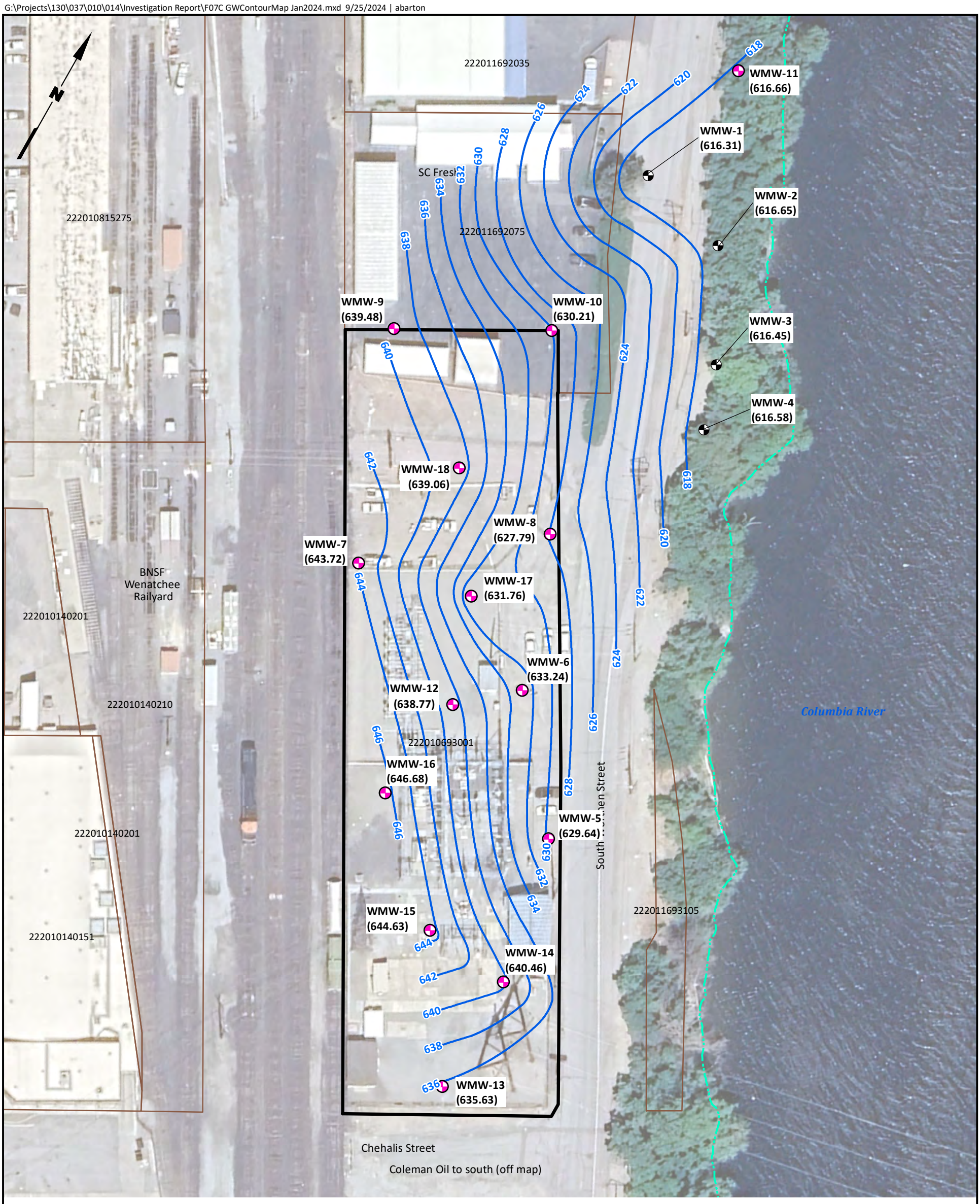
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Potentiometric Elevation Surface Contour Map (October 2023)

Figure
7B

G:\Projects\130\037\010\014\Investigation Report\F07C GWContourMap Jan2024.mxd 9/25/2024 | abarton



Legend

- Monitoring Well (Landau 2023)
- Monitoring Well (GeoEngineers 2022)
- **(631.52)** = Groundwater Elevation
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Groundwater Contour
- Current Shoreline (Based on LiDAR)

Notes

1. Elevations in feet, NAVD88.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Acronyms

BNSF - BNSF Railway Company
NAVD88 = North American Vertical Datum of 1988
PUD = Public Utility District

0 70 140
Scale in Feet

Sources: City of Wenatchee GIS.

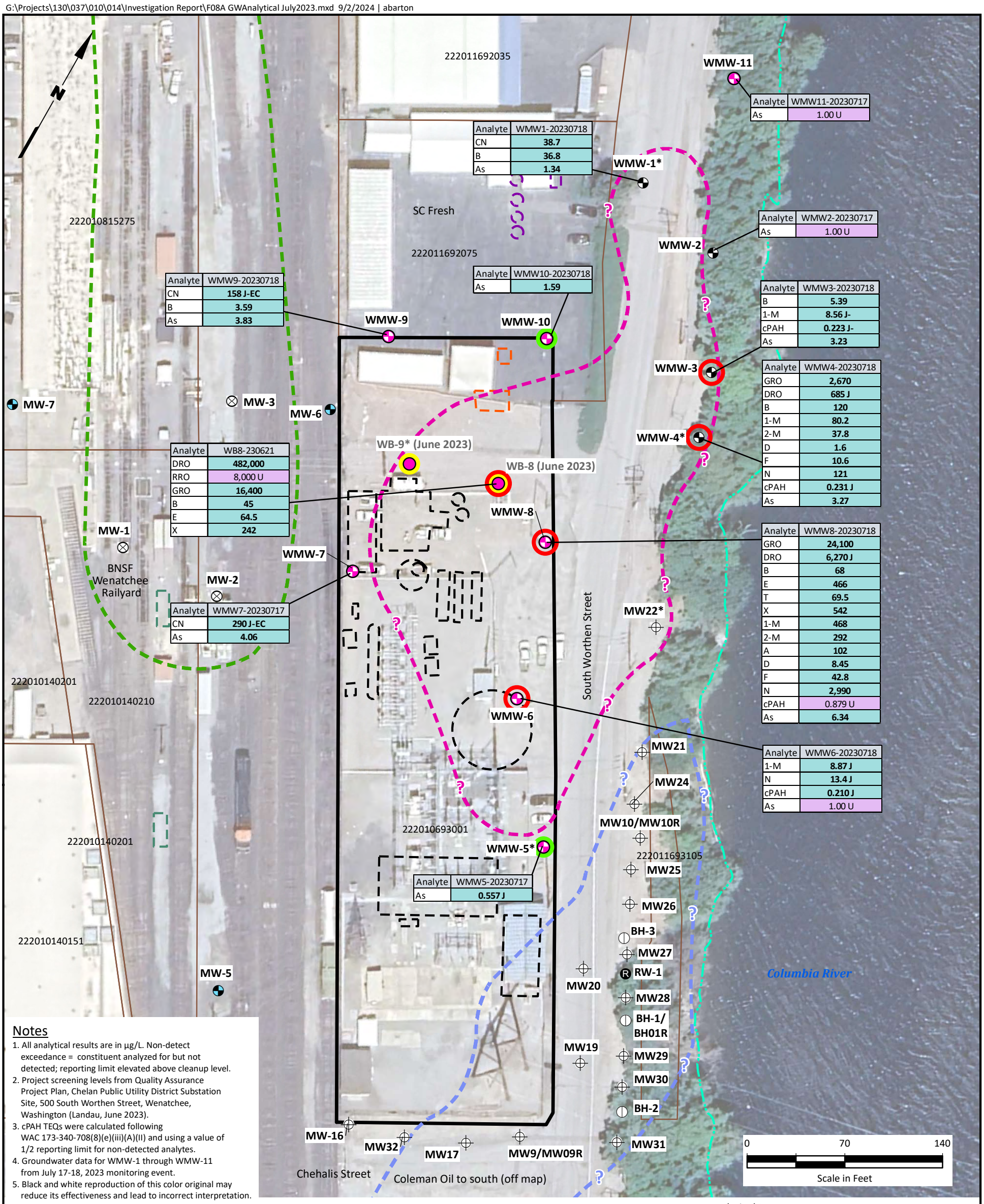
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Potentiometric Elevation Surface Contour Map (January 2024)

Figure 7C

G:\Projects\130\037\010\014\Investigation Report\F08A GWAnalytical July2023.mxd 9/2/2024 | abarton



Notes

1. All analytical results are in µg/L. Non-detect exceedance = constituent analyzed for but not detected; reporting limit elevated above cleanup level.
2. Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).
3. cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.
4. Groundwater data for WMW-1 through WMW-11 from July 17-18, 2023 monitoring event.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- Current Shoreline (Based on LiDAR)
- Chelan County Parcels
- Chelan PUD Worthen Street Substation Property
- * NAPL observed in soil during drilling
- Chromatograms indicate presence of coal tar / MGP waste in groundwater, or DNAPL observed in monitoring well during groundwater sampling or drilling
- Chromatograms indicate presence of a coal tar/MGP waste in groundwater
- Chromatograms indicate presence of a polar/semi-polar UCM in groundwater
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of Impacted Groundwater Associated with Site
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

Screening Level Table

Analyte	Abbreviation	Groundwater Screening Level (µg/L)
Free Cyanide	CN	5
Diesel-Range Organics	DRO	500
Residual-Range Organics	RRO	500
Gasoline-Range Organics	GRO	800
Benzene	B	0.44
Ethylbenzene	E	12
Toluene	T	53
Total Xylenes	X	57
1-Methylnaphthalene	1-M	1.5
2-Methylnaphthalene	2-M	32
Acenaphthene	A	30
Dibenzofuran	D	1.2
Fluorene	F	10
Naphthalene	N	8.9
cPAH TEQ	cPAH	0.2
Arsenic	As	0.058

Analytical Notes

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = The result is an estimated quantity and the result may be biased low.
J-EC = The result is an estimated quantity. The concentration detected in the sample exceeded the calibration range of the laboratory instrument.

Acronyms

BNSF = BNSF Railway Company
cPAH = carcinogenic polycyclic aromatic hydrocarbon
MGP = manufactured gas plant
NAPL = non-aqueous phase liquid
µg/L = micrograms per liter
PUD = Public Utility District
TEQ = toxicity equivalence
UCM = unresolved complex mixture

Blue shading = detected exceedance
Purple shading = nondetect exceedance

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon Kennedy Jenks.

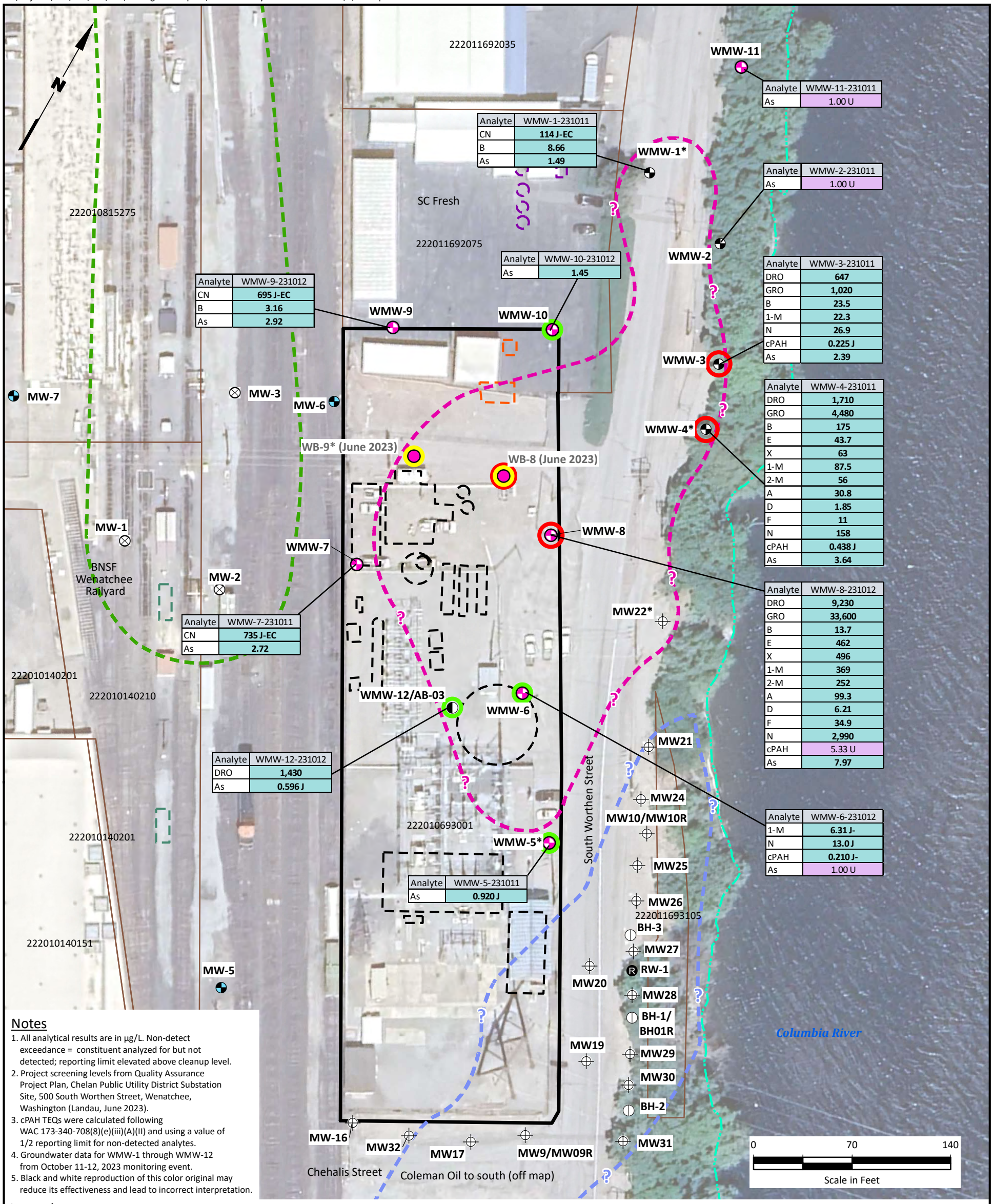
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Data Map - Analytical Results (July 2023) Exceedances of Screening Levels

Figure 8A

G:\Projects\130\037\010\014\Investigation Report\F08B GWAnalytical Oct2023.mxd 9/2/2024 | abarton



Notes

1. All analytical results are in µg/L. Non-detect exceedance = constituent analyzed for but not detected; reporting limit elevated above cleanup level.
2. Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).
3. cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.
4. Groundwater data for WMW-1 through WMW-12 from October 11-12, 2023 monitoring event.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- Current Shoreline (Based on LiDAR)
- Chelan County Parcels
- Chelan PUD Worthen Street Substation Property
- * NAPL observed in soil during drilling

- Chromatograms indicate presence of coal tar / MGP waste in groundwater, or DNAPL observed in monitoring well during groundwater sampling or drilling
- Chromatograms indicate presence of a coal tar/MGP waste in groundwater
- Chromatograms indicate presence of a polar/semi-polar UCM in groundwater
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of Impacted Groundwater Associated with Site
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

Screening Level Table

Analyte	Abbreviation	Groundwater Screening Level (µg/L)
Free Cyanide	CN	5
Diesel-Range Organics	DRO	500
Residual-Range Organics	RRO	500
Gasoline-Range Organics	GRO	800
Benzene	B	0.44
Ethylbenzene	E	12
Toluene	T	53
Total Xylenes	X	57
1-Methylnaphthalene	1-M	1.5
2-Methylnaphthalene	2-M	32
Acenaphthene	A	30
Dibenzofuran	D	1.2
Fluorene	F	10
Naphthalene	N	8.9
cPAH TEQ	cPAH	0.2
Arsenic	As	0.058

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon Kennedy Jenks.

Analytical Notes

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = The result is an estimated quantity and the result may be biased low.
J-EC = The result is an estimated quantity. The concentration detected in the sample exceeded the calibration range of the laboratory instrument.

Acronyms

BNSF = BNSF Railway Company
cPAH = carcinogenic polycyclic aromatic hydrocarbon
MGP = manufactured gas plant
NAPL = non-aqueous phase liquid
µg/L = micrograms per liter
PUD = Public Utility District
TEQ = toxicity equivalence
UCM = unresolved complex mixture

Blue shading = detected exceedance
Purple shading = nondetect exceedance

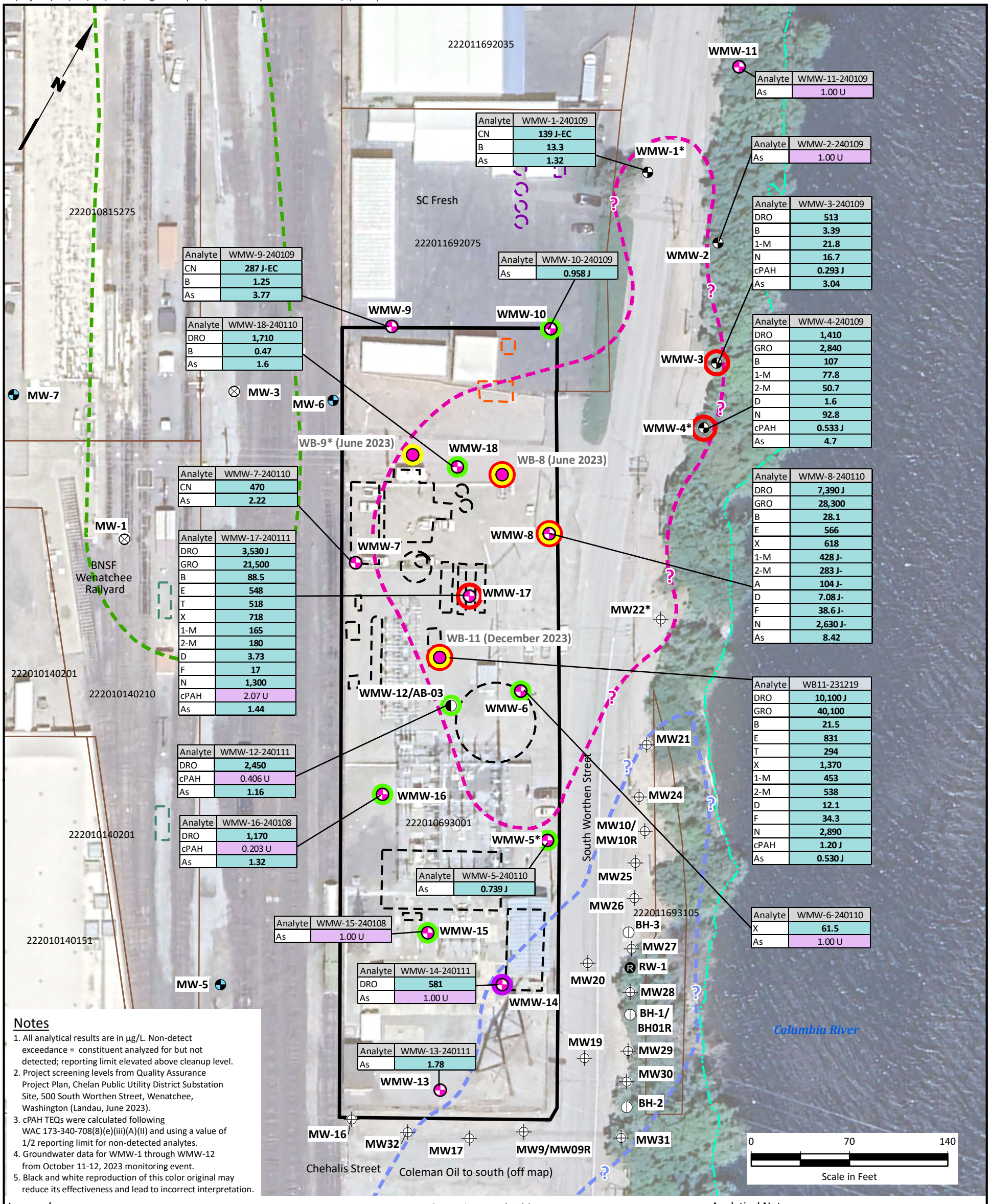
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Data Map - Analytical Results (October 2023) Exceedances of Screening Levels

Figure 8B

G:\Projects\130\037\010\014\Investigation Report\F08C GWAnalytical Jan2024.mxd 9/2/2024 | abarton



Analyte	WMW-1-240109
CN	139 J-EC
B	13.3
As	1.32

Analyte	WMW-11-240109
As	1.00 U

Analyte	WMW-2-240109
As	1.00 U

Analyte	WMW-3-240109
DRO	513
B	3.39
1-M	21.8
N	16.7
cPAH	0.293 J
As	3.04

Analyte	WMW-4-240109
DRO	1,410
GRO	2,840
B	107
1-M	77.8
2-M	50.7
D	1.6
N	92.8
cPAH	0.533 J
As	4.7

Analyte	WMW-8-240110
DRO	7,390 J
GRO	28,300
B	28.1
E	566
X	618
1-M	428 J-
2-M	283 J-
A	104 J-
D	7.08 J-
F	38.6 J-
N	2,630 J-
As	8.42

Analyte	WB11-231219
DRO	10,100 J
GRO	40,100
B	21.5
E	831
T	294
X	1,370
1-M	453
2-M	538
D	12.1
F	34.3
N	2,890
cPAH	1.20 J
As	0.530 J

Analyte	WMW-6-240110
X	61.5
As	1.00 U

Analyte	WMW-9-240109
CN	287 J-EC
B	1.25
As	3.77

Analyte	WMW-10-240109
As	0.958 J

Analyte	WMW-18-240110
DRO	1,710
B	0.47
As	1.6

Analyte	WMW-7-240110
CN	470
As	2.22

Analyte	WMW-17-240111
DRO	3,530 J
GRO	21,500
B	88.5
E	548
T	518
X	718
1-M	165
2-M	180
D	3.73
F	17
N	1,300
cPAH	2.07 U
As	1.44

Analyte	WMW-12-240111
DRO	2,450
cPAH	0.406 U
As	1.16

Analyte	WMW-16-240108
DRO	1,170
cPAH	0.203 U
As	1.32

Analyte	WMW-5-240110
As	0.739 J

Analyte	WMW-15-240108
As	1.00 U

Analyte	WMW-14-240111
DRO	581
As	1.00 U

Analyte	WMW-13-240111
As	1.78

Notes

1. All analytical results are in µg/L. Non-detect exceedance = constituent analyzed for but not detected; reporting limit elevated above cleanup level.
2. Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).
3. cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.
4. Groundwater data for WMW-1 through WMW-12 from October 11-12, 2023 monitoring event.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- Current Shoreline (Based on LiDAR)
- Chelan County Parcels
- Chelan PUD Worthen Street Substation Property
- * NAPL observed in soil during drilling

- Chromatograms indicate presence of coal tar / MGP waste in groundwater, or DNAPL observed in monitoring well during groundwater sampling or drilling
- Chromatograms indicate presence of a coal tar/MGP waste in groundwater
- Chromatograms indicate presence of a polar/semi-polar UCM in groundwater
- Chromatograms indicate presence of R99 Biodiesel in groundater
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of Impacted Groundwater Associated with Site
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- MGP/Steam Plant Historical Infrastructure
- BNSF Railyard Historical Infrastructure
- City Dump Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

Screening Level Table

Analyte	Abbreviation	Groundwater Screening Level (µg/L)
Free Cyanide	CN	5
Diesel-Range Organics	DRO	500
Residual-Range Organics	RRO	500
Gasoline-Range Organics	GRO	800
Benzene	B	0.44
Ethylbenzene	E	12
Toluene	T	53
Total Xylenes	X	57
1-Methylnaphthalene	1-M	1.5
2-Methylnaphthalene	2-M	32
Acenaphthene	A	30
Dibenzofuran	D	1.2
Fluorene	F	10
Naphthalene	N	8.9
cPAH TEQ	cPAH	0.2
Arsenic	As	0.058

Analytical Notes

U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = The result is an estimated quantity and the result may be biased low.
J-EC = The result is an estimated quantity. The concentration detected in the sample exceeded the calibration range of the laboratory instrument.

Acronyms

BNSF = BNSF Railway Company
cPAH = carcinogenic polycyclic aromatic hydrocarbon
MGP = manufactured gas plant
NAPL = non-aqueous phase liquid
µg/L = micrograms per liter
PUD = Public Utility District
TEQ = toxicity equivalence
UCM = unresolved complex mixture

Blue shading = detected exceedance
Purple shading = nondetect exceedance

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon Kennedy Jenks.

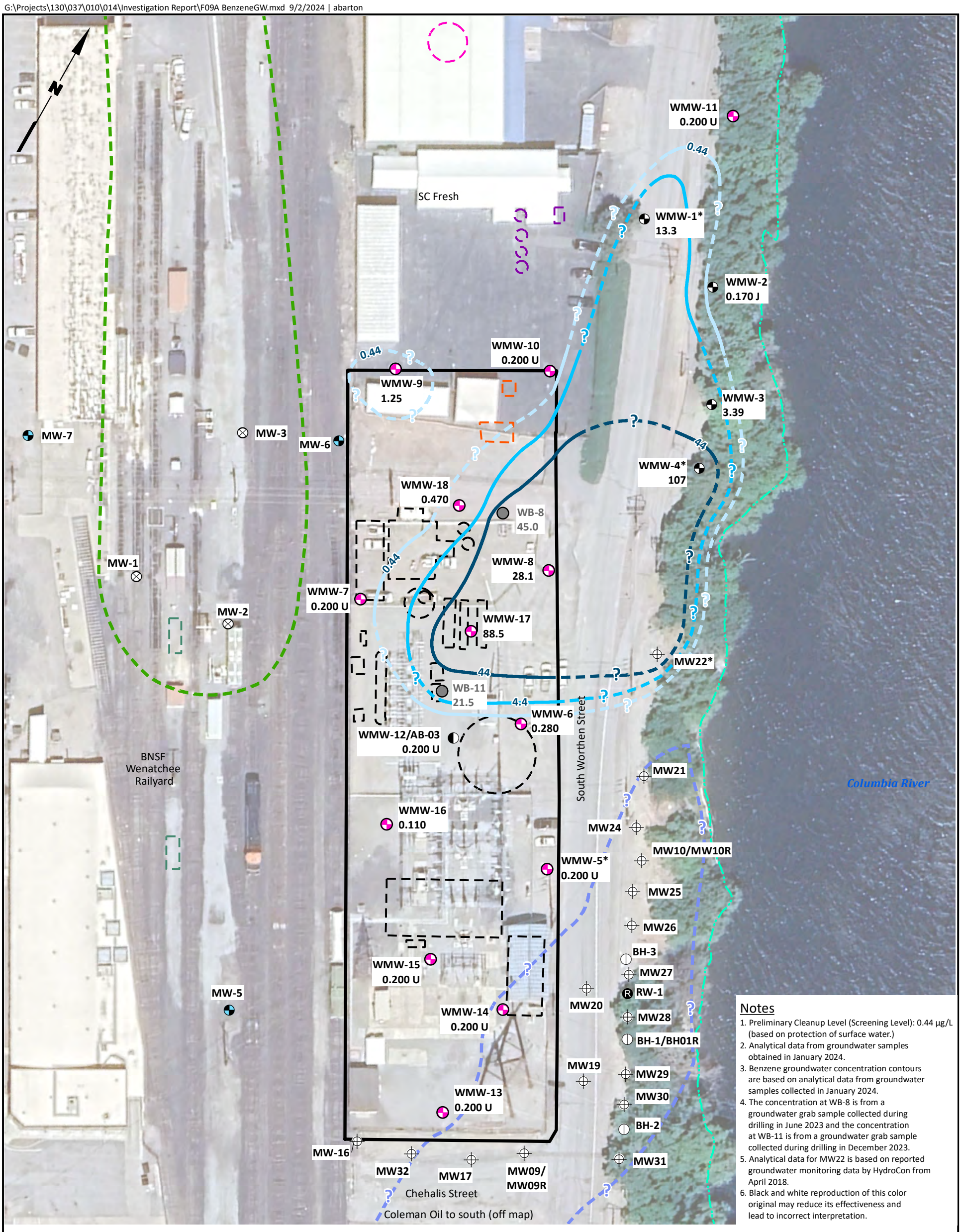
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Groundwater Data Map - Analytical Results (January 2024) Exceedances of Screening Levels

Figure 8C

G:\Projects\130\037\010\014\Investigation Report\F09A BenzeneGW.mxd 9/2/2024 | abarton



Notes

1. Preliminary Cleanup Level (Screening Level): 0.44 µg/L (based on protection of surface water.)
2. Analytical data from groundwater samples obtained in January 2024.
3. Benzene groundwater concentration contours are based on analytical data from groundwater samples collected in January 2024.
4. The concentration at WB-8 is from a groundwater grab sample collected during drilling in June 2023 and the concentration at WB-11 is from a groundwater grab sample collected during drilling in December 2023.
5. Analytical data for MW22 is based on reported groundwater monitoring data by HydroCon from April 2018.
6. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- * NAPL observed in soil during drilling

- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

- Chelan PUD Worthen Street Substation Property
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- Current Shoreline (Based on LiDAR)

Benzene Groundwater Concentration Contours

- 0.44 µg/L (Screening Level)
- 4.4 µg/L
- 44 µg/L
- Inferred Benzene Groundwater Concentration Contour

Analytical Notes

WMW-1 Sample ID
13.3 Benzene groundwater analytical result (January 2024) in µg/L
J = The result is an estimated/approximate quantity
U = The analyte was analyzed for, but was not detected above method detection limits

0 70 140
Scale in Feet

Acronyms

BNSF = BNSF Railway Company
MGP = manufactured gas plant
µg/L= micrograms per liter
NAPL = non-aqueous phase liquid
PUD = Public Utility District

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy Jenks.

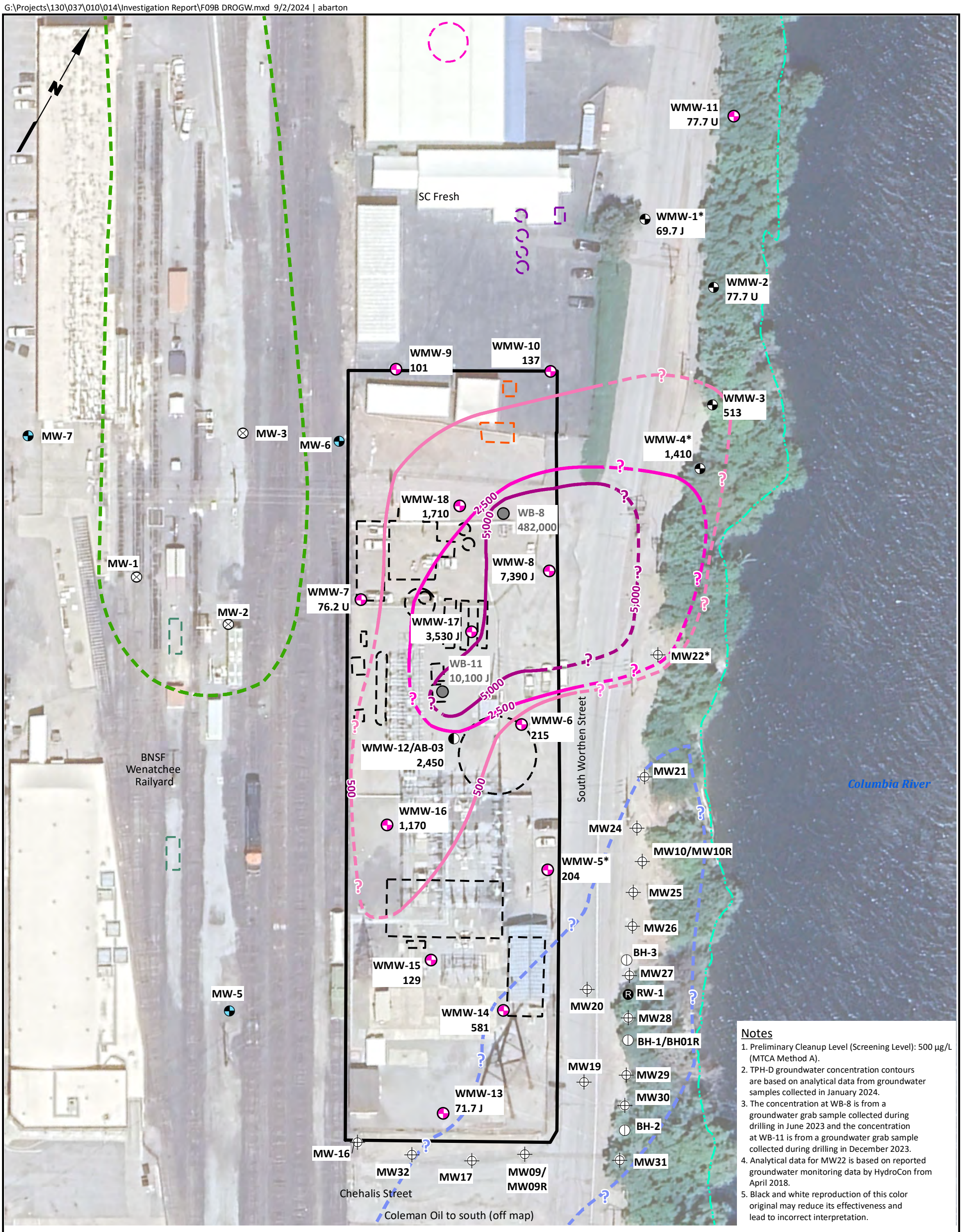
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Benzene Groundwater Concentration Contours

Figure
9A

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Notes

1. Preliminary Cleanup Level (Screening Level): 500 µg/L (MTCA Method A).
2. TPH-D groundwater concentration contours are based on analytical data from groundwater samples collected in January 2024.
3. The concentration at WB-8 is from a groundwater grab sample collected during drilling in June 2023 and the concentration at WB-11 is from a groundwater grab sample collected during drilling in December 2023.
4. Analytical data for MW22 is based on reported groundwater monitoring data by HydroCon from April 2018.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- * NAPL observed in soil during drilling

- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

- Chelan PUD Worthen Street Substation Property
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- Current Shoreline (Based on LiDAR)

TPH-D Groundwater Concentration Contours

- 500 µg/L (Screening Level)
- 2,500 µg/L
- 5,000 µg/L
- Inferred TPH-D Groundwater Concentration Contour

Analytical Notes

WMW-3 Sample ID
513 TPH-D groundwater analytical result (January 2024) in µg/L
J = The result is an estimated/approximate quantity
U = The analyte was analyzed for, but was not detected above method detection limits

Acronyms

BNSF = BNSF Railway Company
MGP = manufactured gas plant
µg/L= micrograms per liter
NAPL = non-aqueous phase liquid
PUD = Public Utility District
TPH-D= diesel-range total petroleum hydrocarbons

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy Jenks, Seacor.

0 70 140
Scale in Feet

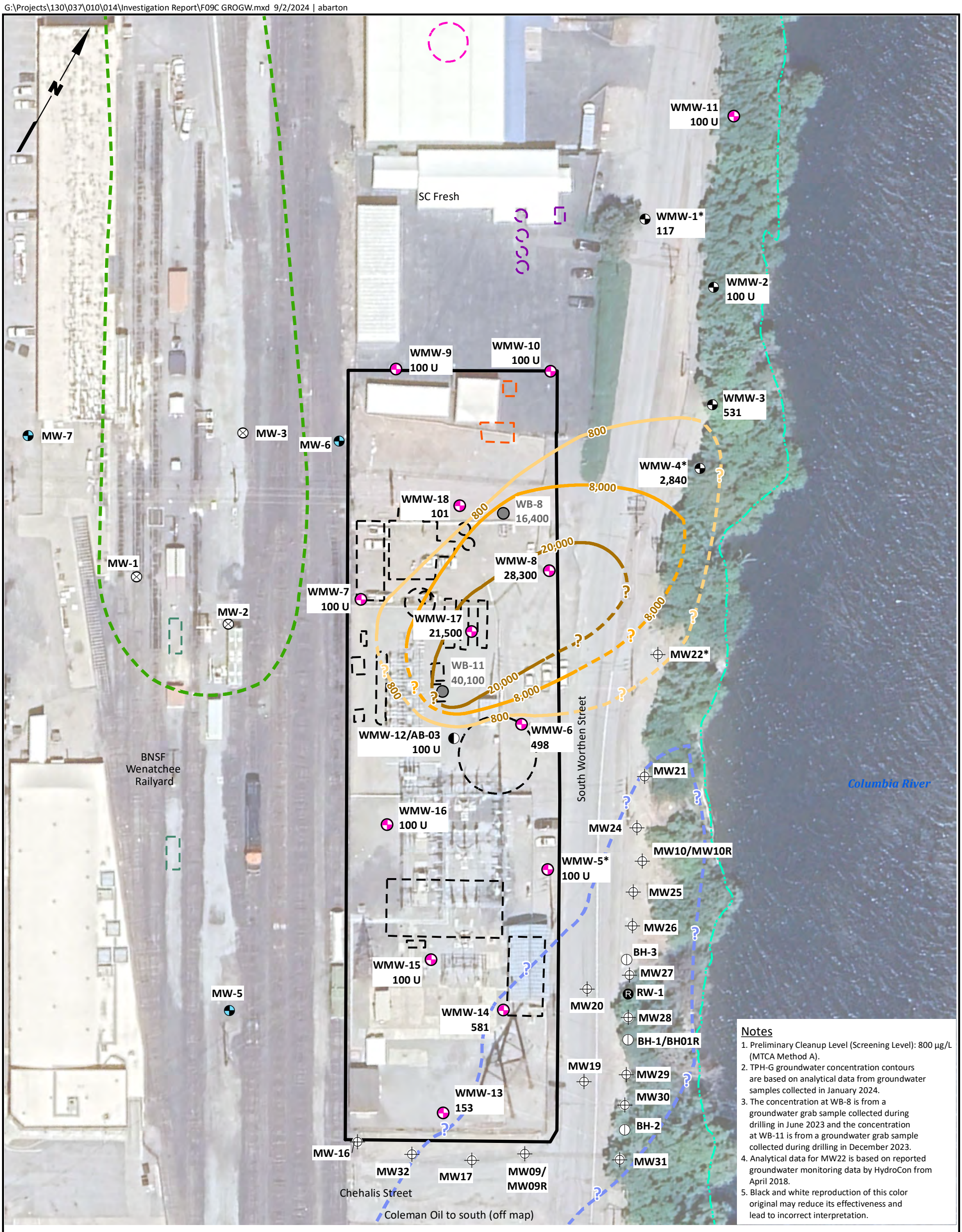
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Worthen Substation Site
Wenatchee, Washington

Diesel-Range Total Petroleum Hydrocarbons Groundwater Concentration Contours

Figure
9B

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Notes

1. Preliminary Cleanup Level (Screening Level): 800 µg/L (MTCA Method A).
2. TPH-G groundwater concentration contours are based on analytical data from groundwater samples collected in January 2024.
3. The concentration at WB-8 is from a groundwater grab sample collected during drilling in June 2023 and the concentration at WB-11 is from a groundwater grab sample collected during drilling in December 2023.
4. Analytical data for MW22 is based on reported groundwater monitoring data by HydroCon from April 2018.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- * NAPL observed in soil during drilling

- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

- Chelan PUD Worthen Street Substation Property
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- Current Shoreline (Based on LiDAR)

TPH-G Groundwater Concentration Contours

- 800 µg/L (Screening Level)
- 8,000 µg/L
- 20,000 µg/L
- Inferred TPH-G Groundwater Concentration Contour

Analytical Notes

WMW-6 Sample ID
498 TPH-G groundwater analytical result (January 2024) in µg/L
U = The analyte was analyzed for, but was not detected above method detection limits

Acronyms

BNSF = BNSF Railway Company
MGP = manufactured gas plant
µg/L = micrograms per liter
NAPL = non-aqueous phase liquid
PUD = Public Utility District
TPH-G = gasoline-range total petroleum hydrocarbons

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy Jenks, Seacor.

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Scale in Feet

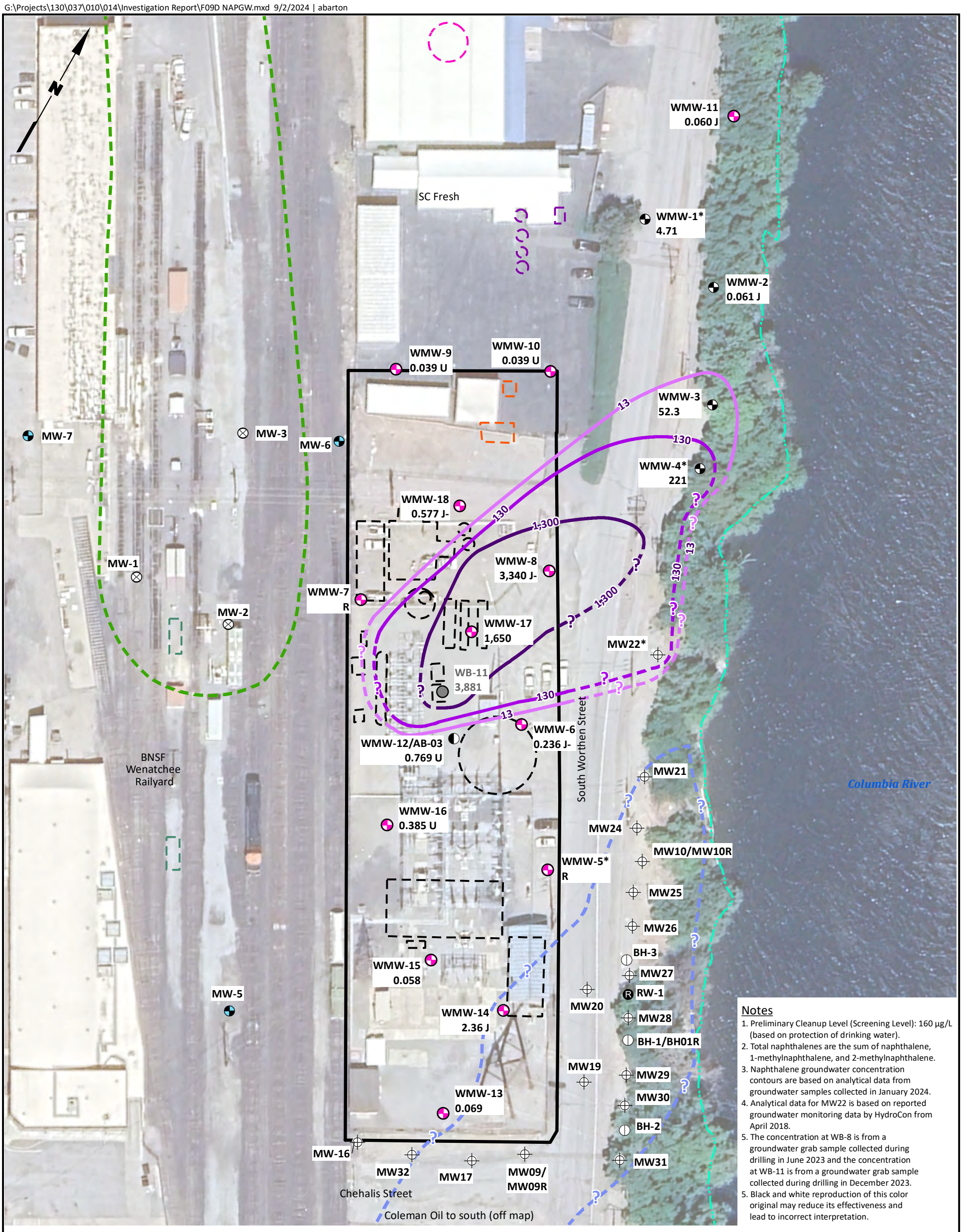
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Gasoline-Range Total Petroleum Hydrocarbons Groundwater Concentration Contours

Figure
9C

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Notes

1. Preliminary Cleanup Level (Screening Level): 160 µg/L (based on protection of drinking water).
2. Total naphthalenes are the sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.
3. Naphthalene groundwater concentration contours are based on analytical data from groundwater samples collected in January 2024.
4. Analytical data for MW22 is based on reported groundwater monitoring data by HydroCon from April 2018.
5. The concentration at WB-8 is from a groundwater grab sample collected during drilling in June 2023 and the concentration at WB-11 is from a groundwater grab sample collected during drilling in December 2023.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Recovery Well (Farallon 2017)
- * NAPL observed in soil during drilling

- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure

- Chelan PUD Worthen Street Substation Property
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume
- Estimated Extent of DRO Concentration > 500 µg/L in Groundwater on BNSF Property
- Current Shoreline (Based on LiDAR

Total Naphthalenes Groundwater Concentration Contours

- 13 µg/L (Preliminary Screening Level)
- 130 µg/L
- 1,300 µg/L
- Inferred Total Naphthalenes Groundwater Concentration Contour

Analytical Notes

WMW-1 Sample ID
3.43 Total Naphthalenes groundwater analytical result (January 2024) in µg/L
J = The result is an estimated quantity
J- = The result is an estimated quantity and the result may be biased low
U = The analyte was analyzed for, but was not detected above method detection limits
R = Data is unusable due to quality control criteria

Acronyms

BNSF = BNSF Railway Company
MGP = manufactured gas plant
µg/L= micrograms per liter
NAPL = non-aqueous phase liquid
PUD = Public Utility District

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon, Kennedy Jenks, Seacor.

0 70 140
Scale in Feet

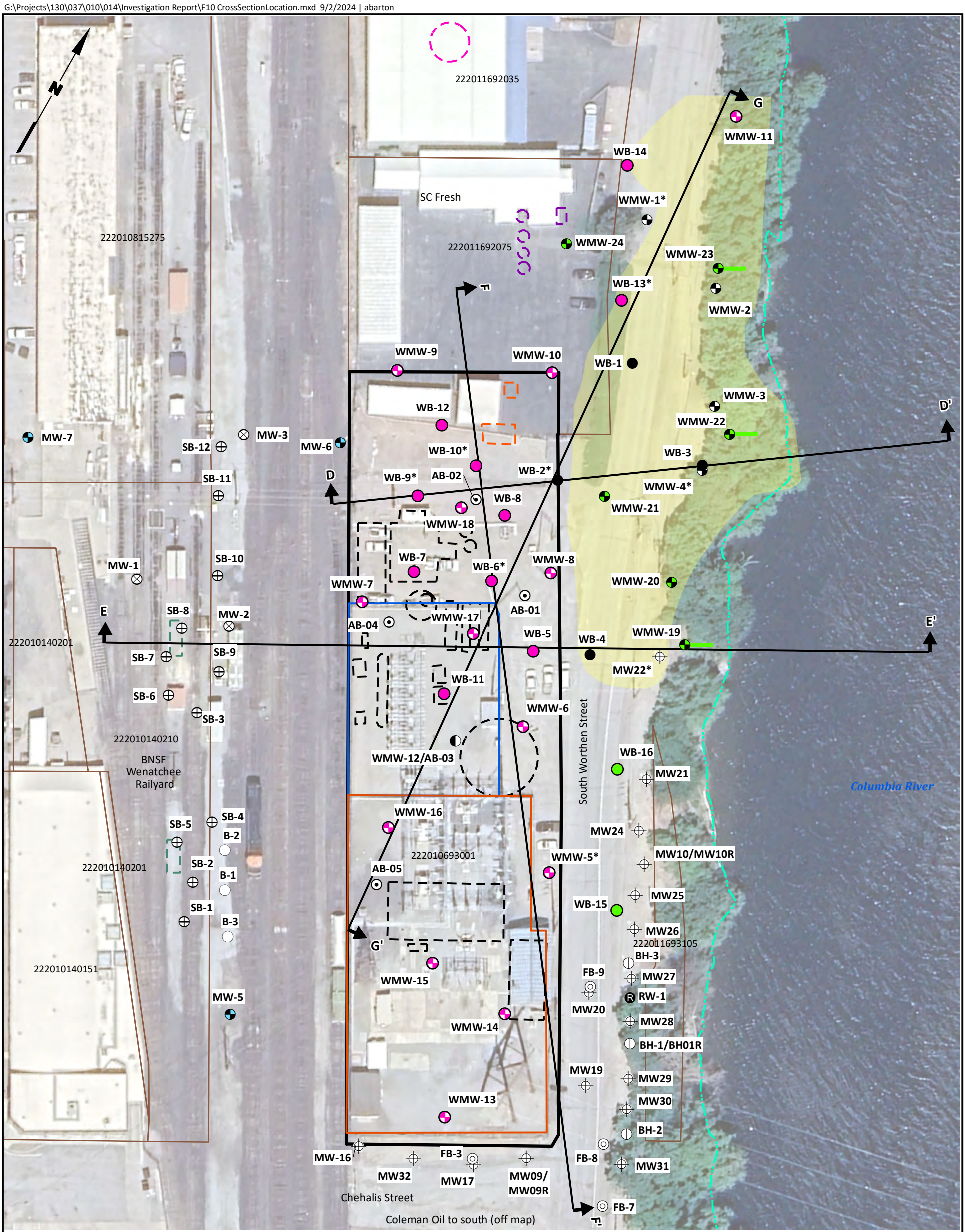
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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Total Naphthalenes (Naphthalene + 1-methylnaphthalene + 2-methylnaphthalene) Groundwater Concentration Contours

Figure
9D

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Legend

- Proposed Monitoring Well Location (Angled)
- Proposed Monitoring Well Location
- Proposed Soil Boring Location
- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Landau 2009)
- Monitoring Well (GeoEngineers 2022)
- Monitoring Well (Kennedy Jenks 2014 and 2015)
- Monitoring Well (HydroCon 2018 and 2019)
- * NAPL observed in soil during drilling
- Monitoring Well (EPI 2017)
- Monitoring Well (Aspect 2023)
- Soil Boring (Aspect 2023)
- Soil Boring (GeoEngineers 2022)
- Soil Boring (Kennedy/Jenks 1993)
- Soil Boring (SEACOR 1991)
- Soil Boring (Farallon 2017)
- Recovery Well (Farallon 2017)
- Current Shoreline (Based on LiDAR)
- Chelan PUD Worthen Street Substation Property
- Chelan County Parcels
- Estimated Extent of City Dump
- BNSF Railyard Historical Infrastructure
- MGP/Steam Plant Historical Infrastructure
- City Dump Historical Infrastructure
- Rex Spray Historical Infrastructure
- Continental/Cascade Oil Historical Infrastructure
- D D' Cross Section Location
- 12.47-kV Substation
- 115-kV Switchyard

Acronyms

BNSF = BNSF Railway Company
kV = kilovolt
MGP = manufactured gas plant
NAPL = non-aqueous phase liquid
PUD = Public Utility District

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, Kennedy Jenks, Seacor.

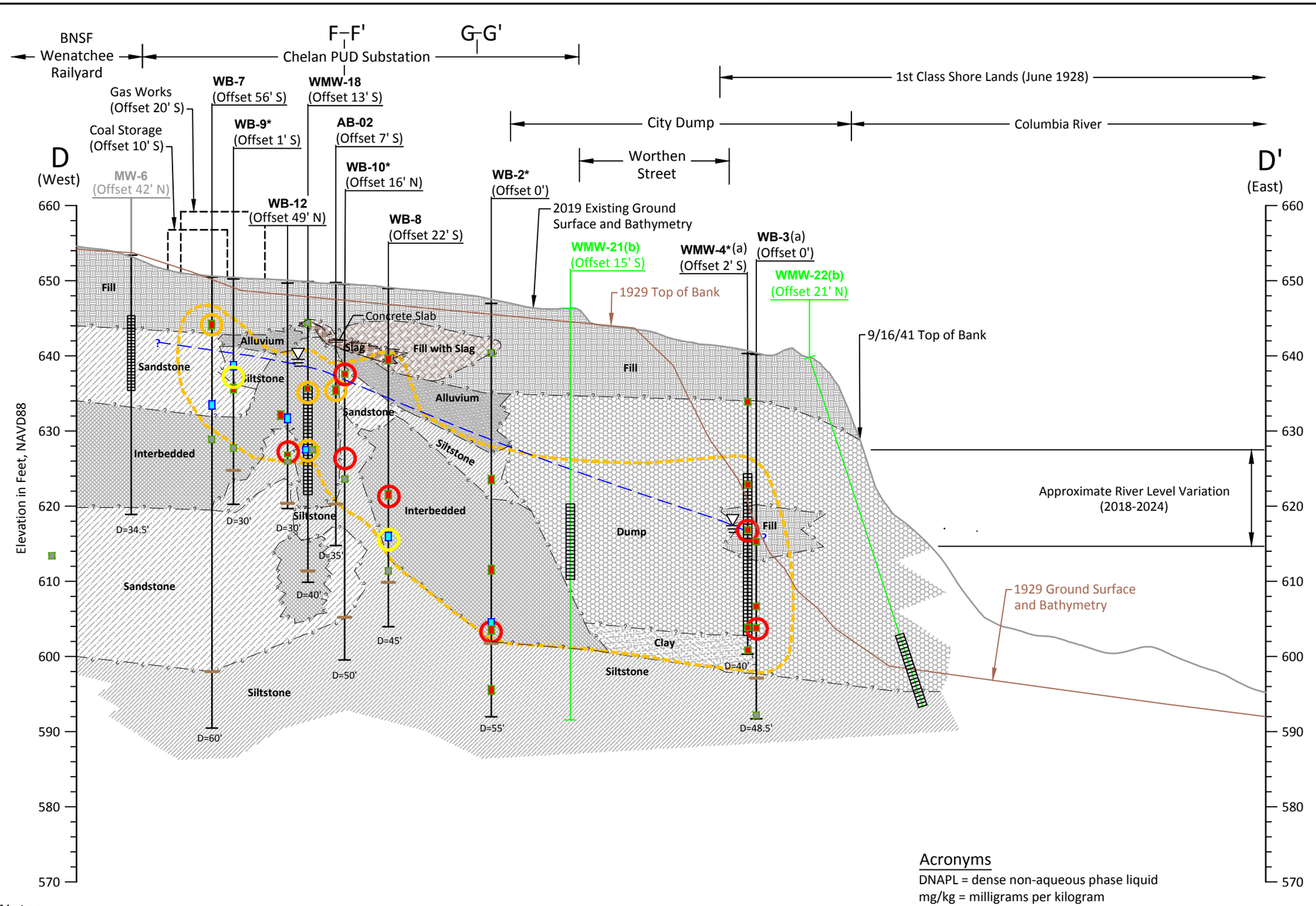
0 70 140
Scale in Feet

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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Cross Section Location Map

Figure
10



Legend

- * — NAPL Observed in Soil During Drilling
- SB7 — Adjacent Property Exploration Designation
- WB5 — Proposed Exploration Designation
- WB5 (Offset 7' S) — Exploration Designation; Offset Distance in Feet and Direction
- Top of Exploration
- Groundwater Level Measured During January 2024 Monitoring Event
- Groundwater Bearing Interval in Weathered Bedrock
- Well Screen Interval
- Soil Sample Interval < Screening Level
- Soil Sample Interval > Screening Level
- Inferred Groundwater Potentiometric Elevation Surface (January 2024)
- Inferred Geologic Contact
- 1929 Ground Surface and Bathymetry
- Competent Bedrock
- D=35 — Depth of Exploration (feet)
- Historical MGP / Steam Plant Infrastructure (Sanborn and Great Northern Railway Maps)
- Estimated Extent of Impacted Soil Associated with Site
- Chromatograms Indicate Presence of Diesel #2, #4 / fuel oil in Soil
- DNAPL Coal Tar Observed, TPH > 10,000 mg/kg, or Chromatograms Indicate Presence of Coal Tar / MGP Waste in Soil
- Chromatograms Indicate Presence of Coal Tar / MGP Waste in Groundwater, or DNAPL Observed in Monitoring Well during Groundwater Sampling or Drilling
- Chromatograms Indicate Presence of Petroleum and Non-Petroleum Mixture in Soil

- Sandstone
- Siltstone
- Interbedded Sandstone/Siltstone
- Clay
- Alluvium
- Fill
- Dump
- Slag
- Fill with Slag

Acronyms

DNAPL = dense non-aqueous phase liquid
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
NAVD88 = North American Vertical Datum of 1988
TPH = total petroleum hydrocarbons
NAPL = non-aqueous phase liquid
BNSF = BNSF Railway Company
PUD= Public Utility District

Notes

1. Analytical data for BNSF-related soil contamination not shown (no recent data available).
2. Bedrock units with thicknesses of 4 ft or greater called out individually. Consecutive bedrock units less than 4 ft in thickness called out as interbedded.
3. (a) Water-bearing interval in unconsolidated material.
4. (B) Proposed investigation location.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Geologic Profile D-D'

Horizontal Scale in Feet: 1"=45'
Vertical Scale in Feet: 1"=15'

0 — 45 — 90

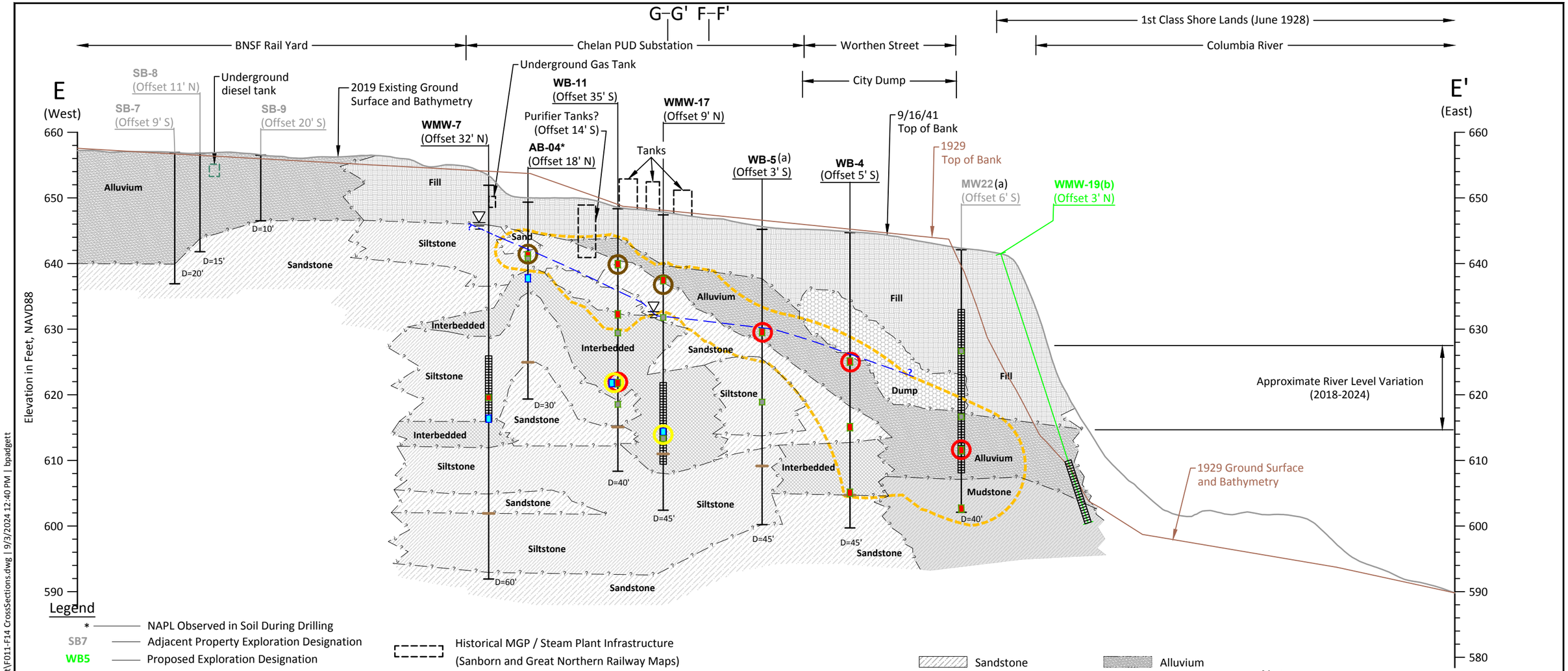
Scale in Feet
3x Vertical Exaggeration

Sources: Navionics Bathymetry; GeoEngineers, SEACOR; Chelan County PUD.

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Chelan PUD Worthen Substation Site Wenatchee, Washington	**Geologic Cross-Section D-D'**	Figure 11

Landau Associates | G:\Projects\130\037\010\014\Investigation Report\F011-F14 CrossSections.dwg | 9/3/2024 12:40 PM | bpadgett



Legend

- * — NAPL Observed in Soil During Drilling
- SB7 — Adjacent Property Exploration Designation
- WB5 — Proposed Exploration Designation
- **WB5** — Exploration Designation
- (Offset 7' S) — Offset Distance in Feet and Direction
- Top of Exploration
- Groundwater Level Measured During January 2024 Monitoring Event
- Groundwater Bearing Interval in Weathered Bedrock
- Well Screen Interval
- Soil Sample Interval < Screening Level
- Soil Sample Interval > Screening Level
- Inferred Groundwater Potentiometric Elevation Surface (January 2024)
- Inferred Geologic Contact
- 1929 Ground Surface and Bathymetry
- Competent Bedrock
- D=35 — Depth of Exploration (feet)

- Historical MGP / Steam Plant Infrastructure (Sanborn and Great Northern Railway Maps)
- BNSF Railyard Historical Infrastructure
- Estimated Extent of Impacted Soil Associated with Site
- DNAPL Coal Tar Observed, TPH > 10,000 mg/kg, or Chromatograms Indicate Presence of Coal Tar / MGP Waste in Soil
- Chromatograms Indicate Presence of Coal Tar / MGP Waste in Groundwater, or DNAPL Observed in Monitoring Well during Groundwater Sampling or Drilling
- Chromatograms Indicate Presence of Bunker-C / Diesel #6 in Soil

- Sandstone
- Siltstone
- Interbedded
- Clay
- Alluvium
- Fill
- Dump
- Mudstone

Geologic Profile E-E'

Horizontal Scale in Feet: 1"=45'
Vertical Scale in Feet: 1"=15'

0 — 45 — 90
Scale in Feet
3x Vertical Exaggeration

Acronyms

DNAPL = dense non-aqueous phase liquid
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
NAVD88 = North American Vertical Datum of 1988
TPH = total petroleum hydrocarbons
NAPL = non-aqueous phase liquid
BNSF = BNSF Railway Company
PUD= Public Utility District

Notes

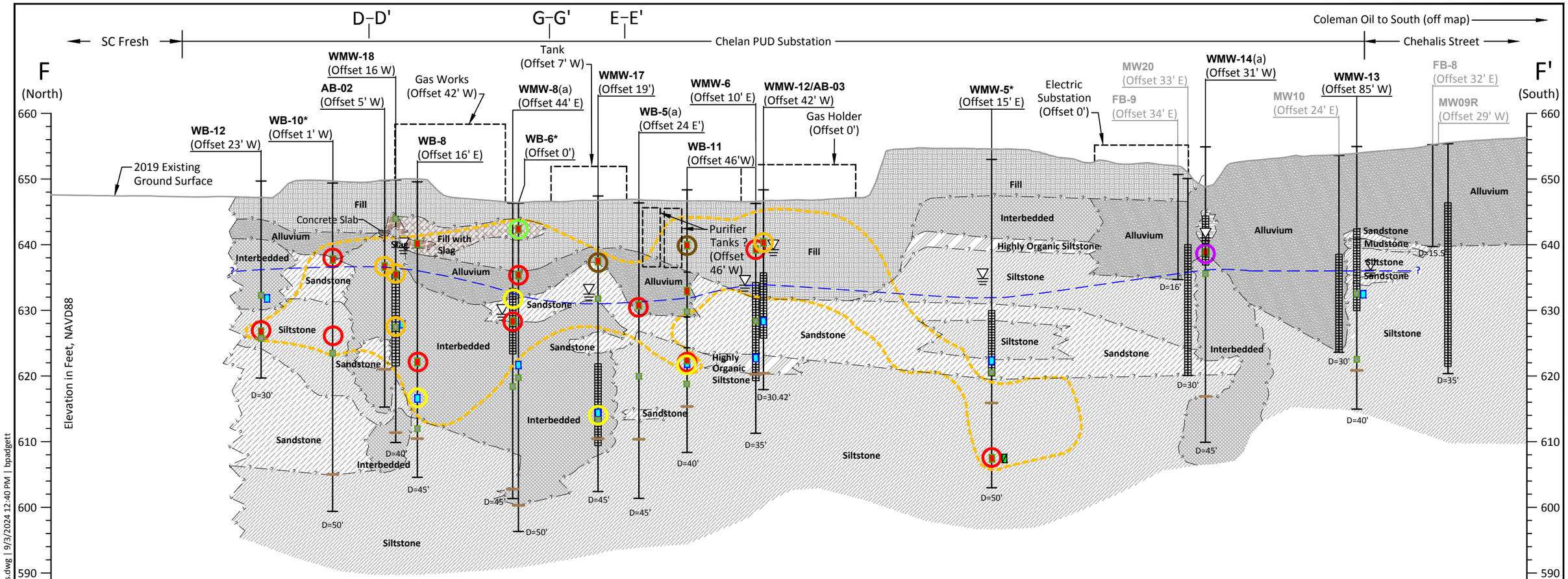
1. Analytical data for BNSF-related soil contamination not shown (no recent data available).
2. Bedrock units with thicknesses of 4 ft or greater called out individually. Consecutive bedrock units less than 4 ft in thickness called out as interbedded.
3. (a) Water-bearing interval in unconsolidated material.
4. (b) Proposed investigation location.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Sources: Navionics Bathymetry; GeoEngineers, SEACOR; Chelan County PUD.

Chelan PUD Worthen Substation Site Wenatchee, Washington	**Geologic Cross-Section E-E'**	Figure 12

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Legend

- * — NAPL Observed in Soil During Drilling
- SB7 — Adjacent Property Exploration Designation
- WB5 — Exploration Designation
- (Offset 7' S) — Offset Distance in Feet and Direction
- Top of Exploration
- Groundwater Level Measured During January 2024 Monitoring Event
- Groundwater Bearing Interval in Weathered Bedrock
- Well Screen Interval
- Soil Sample Interval < Screening Level
- Soil Sample Interval > Screening Level
- Inferred Groundwater Potentiometric Elevation Surface (January 2024)
- Inferred Geologic Contact
- Competent Bedrock
- D=35 — Depth of Exploration (feet)

- Historical MGP / Steam Plant Infrastructure (Sanborn and Great Northern Railway Maps)
- Estimated Extent of Impacted Soil Associated with Site
- DNAPL Coal Tar Observed, TPH > 10,000 mg/kg, or Chromatograms Indicate Presence of Coal Tar / MGP Waste in Soil
- Chromatograms Indicate Presence of Coal Tar / MGP Waste in Groundwater, or DNAPL Observed in Monitoring Well during Groundwater Sampling or Drilling
- Chromatograms Indicate Presence of Bunker-C / Diesel #6 in Soil
- Chromatograms Indicate Presence of R99 Biodiesel in Soil
- Chromatograms Indicate Presence of Petroleum and Non-Petroleum Mixture in Soil
- Chromatograms Indicate Presence of Diesel #2, #4/Fuel Oil in Soil

- Sandstone
- Siltstone
- Interbedded Sandstone/Siltstone
- Slag
- Clay
- Alluvium
- Fill
- Highly Organic Siltstone
- Mudstone
- Schist Boulder
- Fill with Slag

Geologic Profile Alignment F-F'

Horizontal Scale in Feet: 1"=45'
Vertical Scale in Feet: 1"=15'

0 — 45 — 90

Scale in Feet
3x Vertical Exaggeration

Acronyms

DNAPL = dense non-aqueous phase liquid
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
NAVD88 = North American Vertical Datum of 1988
TPH = total petroleum hydrocarbons
NAPL = non-aqueous phase liquid
PUD= Public Utility District

Notes

1. Analytical data for Coleman-Oil related soil contamination not shown (no recent data available).
2. Bedrock units with thicknesses of 4 ft or greater called out individually. Consecutive bedrock units less than 4 ft in thickness called out as interbedded.
3. (a) Water-bearing interval in unconsolidated material.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

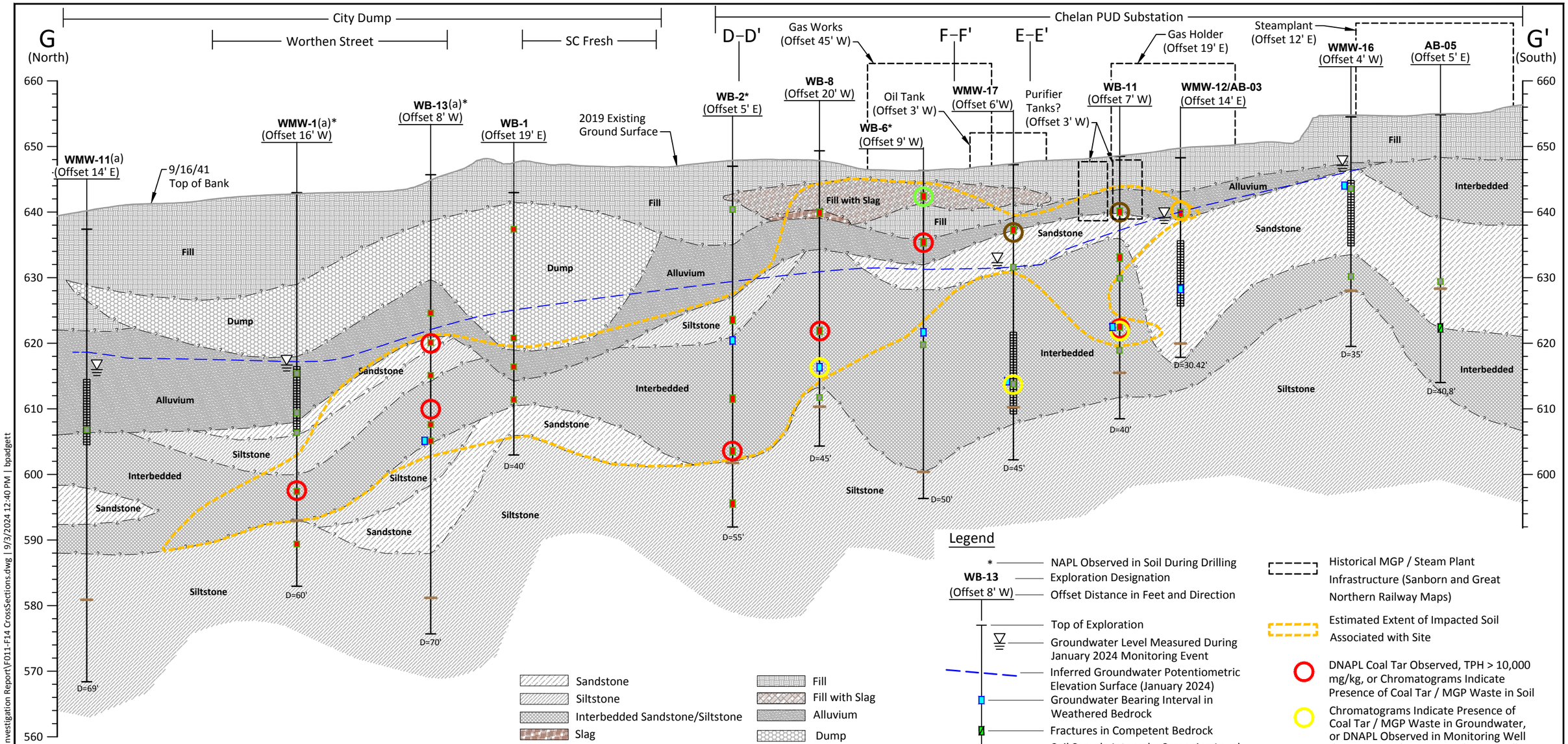
Sources: Navionics Bathymetry; GeoEngineers, HydroCon.

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Chelan PUD
Worthen Substation Site
Wenatchee, Washington

Geologic Cross-Section F-F'

Figure 13



Legend

- * — NAPL Observed in Soil During Drilling
- WB-13 — Exploration Designation
- (Offset 8' W) — Offset Distance in Feet and Direction
- Top of Exploration
- Groundwater Level Measured During January 2024 Monitoring Event
- Inferred Groundwater Potentiometric Elevation Surface (January 2024)
- Groundwater Bearing Interval in Weathered Bedrock
- Fractures in Competent Bedrock
- Soil Sample Interval < Screening Level
- Soil Sample Interval > Screening Level
- Well Screen Interval
- Inferred Geologic Contact
- Competent Bedrock
- D=35 — Depth of Exploration (feet)

- Historical MGP / Steam Plant Infrastructure (Sanborn and Great Northern Railway Maps)
- Estimated Extent of Impacted Soil Associated with Site
- DNAPL Coal Tar Observed, TPH > 10,000 mg/kg, or Chromatograms Indicate Presence of Coal Tar / MGP Waste in Soil
- Chromatograms Indicate Presence of Coal Tar / MGP Waste in Groundwater, or DNAPL Observed in Monitoring Well during Groundwater Sampling or Drilling
- Chromatograms Indicate Presence of Bunker-C / Diesel #6 in Soil
- Chromatograms Indicate Presence of Petroleum and Non-Petroleum Mixture in Soil
- Chromatograms Indicate Presence of Diesel #2, #4/Fuel Oil in Soil

Acronyms

DNAPL = dense non-aqueous phase liquid
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
NAVD88 = North American Vertical Datum of 1988
TPH = total petroleum hydrocarbons
NAPL = non-aqueous phase liquid
PUD= Public Utility District

Notes

1. Analytical data for Coleman-Oil related soil contamination not shown (no recent data available).
2. Bedrock units with thicknesses of 4 ft or greater called out individually. Consecutive bedrock units less than 4 ft in thickness called out as interbedded.
3. (a) Water-bearing interval in unconsolidated material.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Geologic Profile G-G'

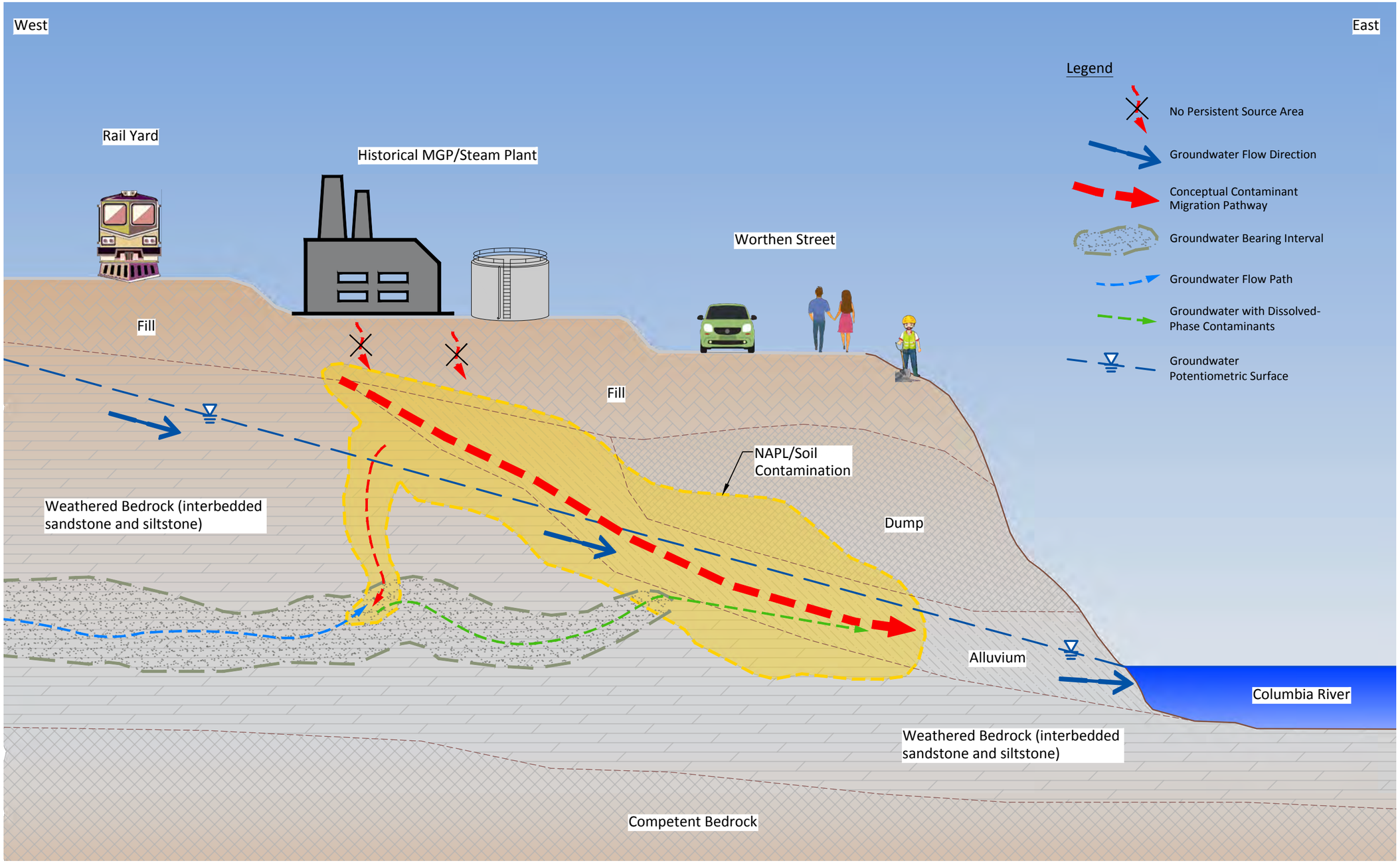
0 — 45 — 90
Scale in Feet
3x Vertical Exaggeration

Sources: Navionics Bathymetry; GeoEngineers, HydroCon.

Chelan PUD Worthen Substation Site Wenatchee, Washington	**Geologic Cross-Section G-G'**	Figure 14

LANDAU ASSOCIATES

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Notes

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

Acronyms

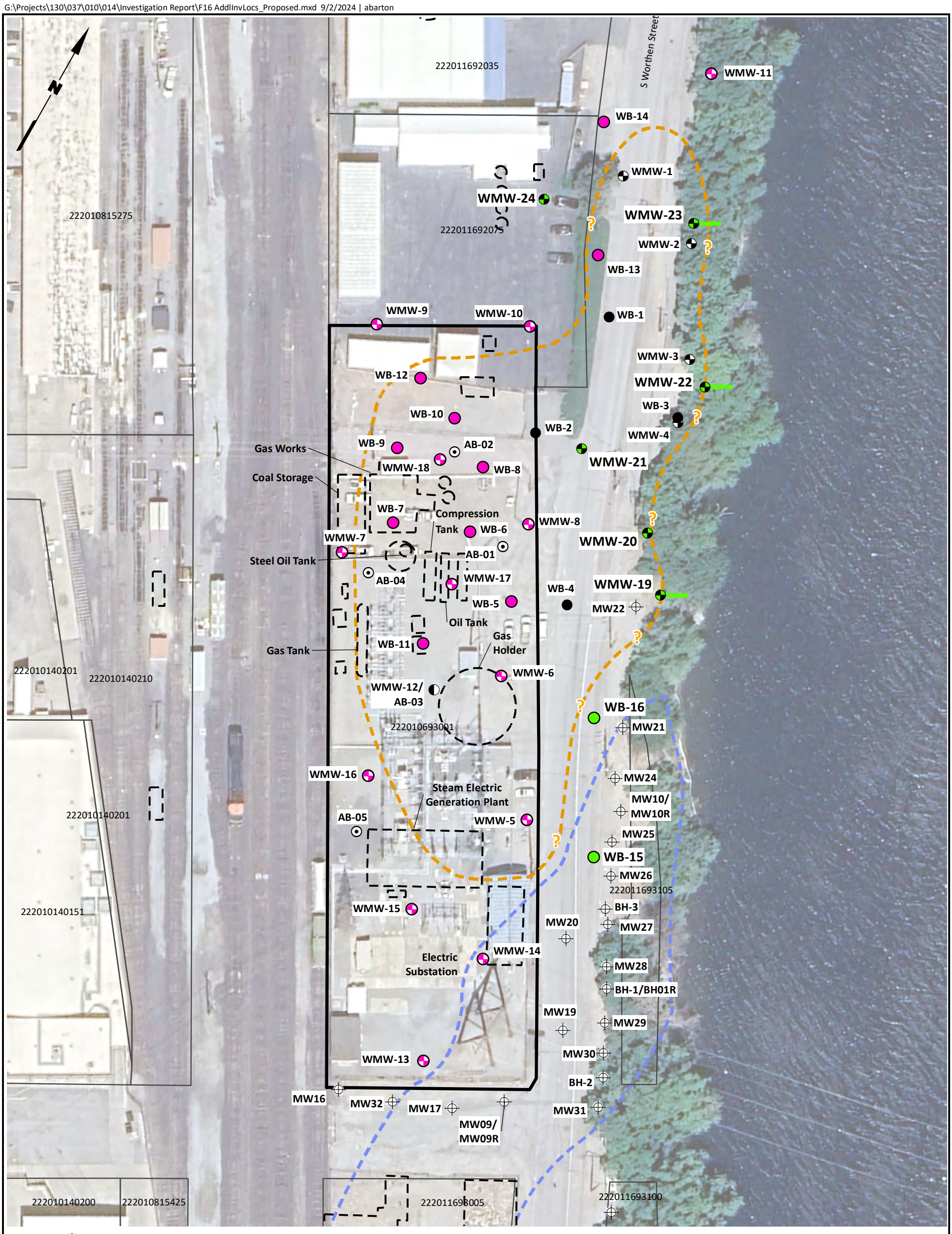
MGP = manufactured gas plant
NAPL = non-aqueous phase liquid

Chelan PUD Worthen Substation Site Wenatchee, Washington	**Preliminary Conceptual Site Model**	Figure 15

LANDAU ASSOCIATES

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Legend

- Proposed Monitoring Well Location (Vertical)
- Proposed Monitoring Well Location (Angled)
- Proposed Soil Boring Location
- Monitoring Well (Landau 2023)
- Soil Boring (Landau 2023)
- Monitoring Well (Aspect 2023)
- Soil Boring (Aspect 2023)
- Monitoring Well (HydroCon 2018 and 2019)
- Monitoring Well (GeoEngineers 2022)
- Soil Boring (GeoEngineers 2022)
- Worthen Substation Property
- Chelan County Parcels
- Historical MGP/Steam Plant Infrastructure (Sanborn and Great Northern Railway Maps)
- Estimated Extent of Impacted Soil Associated with Site
- Estimated Extent of Coleman Oil R-99 Biodiesel Plume

Acronyms

MGP = manufactured gas plant

Notes

1. Analytical data for BNSF and Coleman Oil related soil contamination not shown (no recent data available).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 70 140

Scale in Feet

Sources: City of Wenatchee GIS, GeoEngineers, HydroCon.

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Chelan PUD Worthen Substation Site Wenatchee, Washington	**Proposed Investigations Locations**	Figure 16

Table 1
Soil Boring and Well Construction Details
Worthen Substation Site – Wenatchee, Washington

Location ID	Boring Type	Date Installed	X Coordinate (easting)	Y Coordinate (northing)	Drilling Method	Total Boring Depth (ft bgs)	Ground Surface Elevation (ft NAVD88)	Total Well Depth (ft bgs)	Well Diameter/ Material/ Monument Type (inches)	Length of Screen (ft)	Top of Screen Interval (ft bgs)	Bottom of Screen Interval (ft bgs)	TOC Elevation (ft NAVD88)
WB-1(a)	Soil Boring	10/5/2021	1771546.287	153552.2687	Sonic	40	642.87	-	-	-	-	-	-
WB-2(a)	Soil Boring	10/7/2021	1771540.963	153451.8972	Sonic	55	647.1	-	-	-	-	-	-
WB-3(a)	Soil Boring	10/4/2021	1771627.141	153512.8549	Sonic	48.5	639.67	-	-	-	-	-	-
WB-4(a)	Soil Boring	10/6/2021	1771624.317	153352.7605	Sonic	45	644.57	-	-	-	-	-	-
WB-5(b)	Soil Boring	6/19/2023	1771583.309	153333.5718	Sonic	45	645.372	-	-	-	-	-	-
WB-6(b)	Soil Boring	6/22/2023	1771531.364	153363.2970	Sonic	50	646.299	-	-	-	-	-	-
WB-7(b)	Soil Boring	6/20/2023	1771478.500	153341.3516	Sonic	60	648.304	-	-	-	-	-	-
WB-8(b)	Soil Boring	6/20/2023	1771516.230	153409.9953	Sonic	45	649.579	-	-	-	-	-	-
WB-9(b)	Soil Boring	6/19/2023	1771453.913	153390.9961	Sonic	30	650.126	-	-	-	-	-	-
WB-10(b)	Soil Boring	6/26/2023	1771479.952	153431.0084	Sonic	50	649.537	-	-	-	-	-	-
WB-11(c)	Soil Boring	12/19/2023	1771549.562	153273.9349	Sonic	40	648.350	-	-	-	-	-	-
WB-12(c)	Soil Boring	12/15/2023	1771452.435	153442.3186	Sonic	30	649.693	-	-	-	-	-	-
WB-13(c)	Soil Boring	12/14/2023	1771529.152	153586.2714	Sonic	70	643.024	-	-	-	-	-	-
WB-14(c)	Soil Boring	12/14/2023	1771483.493	153677.3933	Sonic	45	642.721	-	-	-	-	-	-
AB-01(c)	Soil Boring	8/25/2023	1771562.376	153366.1446	Hollow Stem Auger	25.25	645.437	-	-	-	-	-	-
AB-02(c)	Soil Boring	8/24/2023	1771498.942	153401.3378	Hollow Stem Auger/ HQ3	35	649.757	-	-	-	-	-	-
AB-04(c)	Soil Boring	8/23/2023	1771487.007	153301.1372	Hollow Stem Auger/ HQ3	30.33	649.096	-	-	-	-	-	-
AB-05(c)	Soil Boring	8/22/2023	1771569.947	153126.6033	Hollow Stem Auger/ HQ3	40.8	654.844	-	-	-	-	-	-
WMW-1(a)	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
WMW-2(a)	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
WMW-3(a)	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
WMW-4(a)	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
WMW-5(b)	Monitoring Well	6/23/2023	1771673.153	153199.1254	Sonic	50	648.250	33.80	2 / PVC / Flush	10	23.50	33.50	647.83
WMW-6(b)	Monitoring Well	6/15/2023	1771604.173	153282.4178	Sonic	35	645.883	26.80	2 / PVC / Flush	15	11.70	26.70	645.32
WMW-7(b)	Monitoring Well	6/22/2023	1771456.702	153304.1634	Sonic	60	649.932	36.40	2 / PVC / Flush	10	26.00	36.00	649.36
WMW-8(b)	Monitoring Well	6/29/2023	1771566.460	153390.1450	Sonic	45	645.319	23.50	2 / PVC / Flush	10	13.40	23.40	644.73
WMW-9(b)	Monitoring Well	6/28/2023	1771395.996	153463.5243	Sonic	50	647.059	36.50	2 / PVC / Flush	10	26.40	36.40	646.51
WMW-10(b)	Monitoring Well	6/28/2023	1771495.336	153517.9489	Sonic	40	647.147	24.50	2 / PVC / Flush	10	14.40	24.40	646.60
WMW-11(b)	Monitoring Well	6/27/2023	1771520.172	153746.6411	Sonic	69	638.895	33.00	2 / PVC / Flush	10	22.90	32.90	638.08
WMW-12/ AB-03(c)	Monitoring Well	8/24/2023	1771565.849	153249.0439	Hollow Stem Auger	30.42	648.385	23.00	2 / PVC / Flush	10	12.65	22.65	647.88
WMW-13(c)	Monitoring Well	12/22/2023	1771694.368	153006.3326	Sonic	40	654.958	25.30	2 / PVC / Flush	10	15.00	25.00	654.42
WMW-14(c)	Monitoring Well	12/22/2023	1771695.614	153093.6096	Sonic	45	654.906	18.30	2 / PVC / Flush	6.5	11.50	18.00	654.34
WMW-15(c)	Monitoring Well	12/20/2023	1771631.391	153099.7185	Sonic	35	654.858	25.80	2 / PVC / Flush	10	15.50	25.50	654.41
WMW-16(c)	Monitoring Well	12/21/2023	1771554.741	153169.8174	Sonic	35	654.600	20.00	2 / PVC / Flush	10	9.70	19.70	654.09
WMW-17(c)	Monitoring Well	12/18/2023	1771538.938	153323.4217	Sonic	45	647.414	37.50	2 / PVC / Flush	10	27.20	37.20	646.71
WMW-18(c)	Monitoring Well	12/19/2023	1771486.011	153399.3898	Sonic	40	649.870	24.30	2 / PVC / Flush	10	14.00	24.00	649.41

Notes:

(a) Elevations and coordinates surveyed by Erlandsen under contract with GeoEngineers in May 2022.

(b) Elevations and coordinates surveyed by Erlandsen under contract with Landau Associates in July 2023.

(c) Elevations and coordinates surveyed by Erlandsen under contract with Landau Associates in January 2024.

- = Not applicable

Vertical elevations are with respect to NAVD88. Horizontal northings and eastings are with respect to the Washington State Plane coordinate system, north zone, grid (NAD83-1996).

Acronyms and Abbreviations:

ft = foot/feet

NAD83 = North American Datum of 1983

NAVD88 = North American Vertical Datum of 1988

TOC = top of casing

WMW = Worthen Monitoring Well

WB = Worthen Boring

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG									
		WB5		WB6			WB7		WB8		
		WB5-(15-16)-230619 6/19/2023 A3F1369	WB5-(26-27)-230619 6/19/2023 A3F1369	WB6-(4-4.5)-230615 6/15/2023 A3F1267	WB6-(11-11.5)-230622 6/22/2023 A3F1506	WB6-(26-27)-230622 6/22/2023 A3F1506	WB7-(6-7)-230620 6/20/2023 A3F1466	WB7-(21-22)-230621 6/21/2023 A3F1466	WB8-(9-10)-230620 6/20/2023 A3F1369	WB8-(27-28)-230620 6/20/2023 A3F1369	WB8-(37-38)-230620 6/20/2023 A3F1369
Forensic Chemistry											
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Coal Tar/ MGP Waste**	--	**Mixture of Petroleum and Non-Petroleum Material**	**Coal Tar/ MGP Waste**	--	**Diesel #2, #4/ Fuel Oil**	--	--	**Coal Tar/ MGP Waste**	--
General Chemistry											
Total Cyanide (mg/kg; ASTM D7511-12)	50	**0.0974 J**	**0.168**	**2,150**	**0.230**	0.115 U	**0.0891 J**	0.110 U	--	0.108 U	0.106 UJ
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)											
Gasoline-Range Organics	30	**2,130**	4.63 U	13.0 U	**4,240**	**3.22 J**	**101**	**8.01**	--	**460**	**5.13 J**
Diesel-Range Organics	2,000	**1,900**	20.4 U	**7,760 J**	**13,400**	**91.5**	**4,500**	**20.9 J**	--	**2,160**	**108**
Residual-Range Organics	2,000	**298**	40.8 U	1,340 U	842 U	**141**	492 U	42.8 U	--	**392**	**164**
Total Metals (mg/kg; SW-846 6020B)											
Arsenic	20	**2.68**	1.07 U	--	**1.66**	**6.56**	**3.57**	**4.16**	**8.43**	**0.964 J**	**7.12**
Barium	16,000	**82.4**	**136**	--	**96.8**	**170**	**217**	**158**	**269**	**139**	**182**
Cadmium	2.0	0.262 U	0.215 U	--	0.245 U	**0.393**	**0.459**	**0.212 J**	0.231 U	0.234 U	**0.428**
Chromium, Total	NL	**29.3**	**44.1**	--	**37.3**	**72.3**	**58.5**	**72.3**	**9.51**	**25.2**	**75.9**
Lead	250	**4.70**	**3.97**	--	**2.36**	**17.2**	**13.9**	**13.4**	**4.98**	**2.72**	**14.2**
Mercury	2.0	0.105 U	0.0860 U	--	0.0978 U	**0.0558 J**	0.103 U	0.0955 U	0.0926 U	0.0938 U	0.0939 U
Selenium	400	1.31 U	1.07 U	--	1.22 U	**1.42**	1.28 U	**0.824 J**	1.16 U	1.17 U	**1.15 J**
Silver	400	0.262 U	0.215 U	--	0.245 U	**0.183 J**	**0.161 J**	**0.162 J**	0.231 U	0.234 U	**0.178 J**
Volatiles (mg/kg; SW-846 8260D)											
Benzene	0.03	0.0551 U	0.00926 U	**0.0547**	**2.29**	0.0119 U	0.0123 U	0.0107 U	--	0.0424 U	0.0108 U
Ethylbenzene	6.00	**19.5**	0.0232 U	0.0651 U	**47.7**	0.0297 U	0.0307 U	**0.0310**	--	**0.233**	0.0269 U
Toluene	7.00	**0.353**	0.0463 U	**0.151**	**3.48**	0.0593 U	0.0614 U	0.0535 U	--	0.212 U	0.0539 U
Xylenes, Total	9.00	**27.1**	0.0695 U	**0.100 J**	**70.8**	0.0890 U	0.0922 U	**0.199**	--	**1.99**	0.0808 U
Semivolatiles (mg/kg; SW-846 8270E)											
1-Methylnaphthalene	34	**96.8**	**0.00878**	4.38 U	**321**	**0.0361**	0.264 U	0.0235 U	**0.497**	**69.4**	**0.0961**
2-Methylnaphthalene	320	**141**	**0.0112**	**2.66 J**	**142**	**0.0222 J**	0.264 U	0.0235 U	**0.233**	**29.6**	**0.0891**
Acenaphthene	4,800	**45.2**	**0.00418**	2.20 U	**213**	0.0380 U	0.445 U	0.0118 U	0.0640 U	7.69 U	0.0717 U
Acenaphthylene	NL	6.51 U	0.00282 U	**10.8**	42.9 U	0.0122 U	0.237 U	0.0118 U	**0.270**	**35.2**	0.0273 U
Anthracene	24,000	**11.3**	**0.00157 J**	**3.46**	**85.1**	0.0339 U	0.272 U	0.0118 U	**0.155**	**23.1**	0.0273 U
Benzo(a)anthracene	NL	**6.16**	**0.00196 J**	**8.96**	**41.4**	**0.0272**	**0.104 J**	**0.0140**	**0.137**	**11.1**	**0.0314**
Benzo(a)pyrene	0.10	**5.49**	**0.00251 J**	**4.96**	**40.1**	**0.0149 J**	0.198 U	**0.0172 J**	**0.137**	**8.67**	**0.0337 J**
Benzo(b)fluoranthene	NL	**3.47**	**0.00215 J**	**15.8**	**27.0**	**0.0100 J**	0.198 U	**0.0171 J**	**0.0912**	**5.68**	**0.0229 J**
Benzo(g,h,i)perylene	NL	**1.87**	0.00282 U	**9.26**	**14.9**	**0.0149**	0.132 U	**0.00598 J**	**0.0470**	**2.79**	**0.0169 J**
Benzo(k)fluoranthene	NL	**1.29 J**	0.00423 U	**7.17 J**	**9.46 J**	0.0183 U	0.198 U	0.0176 U	**0.0446 J**	**1.92 J**	0.0410 U
Chrysene	NL	**6.26**	0.00282 U	**18.5**	**45.1**	**0.0584**	**0.189 J**	**0.0226**	**0.161**	**12.4**	**0.0571**
Dibenzo(a,h)anthracene	NL	**0.474**	0.00282 U	**1.89 J**	**3.23**	0.0122 U	0.132 U	0.0118 U	0.0300 U	**0.768**	0.0273 U
Dibenzofuran	80	**5.51**	0.00282 U	2.20 U	**20.8**	0.0122 U	0.341 U	0.0118 U	**0.0353**	**3.16**	0.0273 U
Fluoranthene	3,200	**12.0**	**0.00300**	**7.53**	**90.9**	**0.154**	**0.198**	**0.0321**	**0.222**	**22.3**	**0.117**
Fluorene	3,200	**25.0**	**0.00249 J**	2.20 U	**113**	**0.0379**	**0.961**	**0.00834 J**	**0.175**	**25.5**	**0.125**
Indeno(1,2,3-cd)pyrene	NL	**1.72**	0.00282 U	**9.17**	**13.3**	0.0122 U	0.132 U	0.0118 U	**0.0457**	**2.62**	0.0273 U
Naphthalene	5.00	**209**	**0.0329**	**3.69 J**	**612**	**0.0921**	0.264 U	0.0235 U	**0.401**	**75.9**	0.0546 U
Phenanthrene	NL	**49.9**	**0.00745**	**3.45**	**299**	**0.268**	0.132 U	**0.0444**	**0.707**	**74.5**	**0.605**
Pyrene	2,400	**17.6**	**0.00366**	**17.0**	**140**	**0.0809**	**0.304**	**0.0264**	**0.328**	**32.0**	**0.0862**
cPAH TEQ (b)	0.10	**6.86**	**0.0034 J**	**9.44 J**	**50**	**0.021 J**	**0.144 J**	**0.023 J**	**0.172 J**	**11.003**	**0.044**

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG								
		WB9		WB10		WB11				
		WB9-(14-15)-230619 6/19/2023 A3F1369	WB9-(22-23)-230619 6/19/2023 A3F1369	WB10-(11.5-12)-230626 6/26/2023 A3F1639	WB10-(25.5-26)-230626 6/26/2023 A3F1639	WB-11-(8-9)-231219 12/19/2023 A3L1589	WB-11-(15.5-16)-231219 12/19/2023 A3L1589	WB-11-(18.5-19)-231219 12/19/2023 A3L1589	WB-11-(26-26.5)-231219 12/19/2023 A3L1589	WB-11-(29-30)-231219 12/19/2023 A3L1589
Forensic Chemistry										
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	--	--	**Coal Tar/ MGP Waste**	--	**Bunker C/ Diesel #6**	--	--	**Coal Tar/ MGP Waste**	--
General Chemistry										
Total Cyanide (mg/kg; ASTM D7511-12)	50	0.114 U	0.109 U	**0.169**	0.115 U	R	R	R	R	R
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)										
Gasoline-Range Organics	30	6.04 U	**3.17 J**	**1,300**	6.56 U	**149**	**43.5**	6.65 U	**609**	8.27 U
Diesel-Range Organics	2,000	**21.8 J**	**94.3**	**1,880**	22.8 U	**3,140 J-**	**118 J-**	R	**1,370 J-**	R
Residual-Range Organics	2,000	44.4 U	**116**	45.0 U	45.6 U	R	R	R	R	**71.4 J-**
Total Metals (mg/kg; SW-846 6020B)										
Arsenic	20	**7.00**	**10.7**	**1.49**	**0.684 J**	**0.775 J**	1.41 U	**1.61**	**2.77**	**1.77**
Barium	16,000	**153**	**120**	**229**	**187**	**145**	**212**	**178**	**180**	**213**
Cadmium	2.0	**0.243**	**0.557**	0.241 U	0.257 U	0.285 U	**0.254 J**	0.298 U	**0.171 J**	0.280 U
Chromium, Total	NL	**69.2**	**64.3**	**76.1**	**62.8**	**53.3**	**76.6**	**65.4**	**78.0**	**83.8**
Lead	250	**14.3**	**13.5**	**8.66**	**6.39**	**5.01**	**11.6**	**6.00**	**10.5**	**11.3**
Mercury	2.0	**0.0605 J**	**0.0939**	0.0965 U	0.103 U	R	R	R	R	R
Selenium	400	**0.579 J**	**1.59**	1.21 U	1.28 U	1.43 U	1.41 U	1.49 U	1.47 U	**0.728 J**
Silver	400	**0.193 J**	**0.164 J**	0.241 U	0.257 U	0.285 U	0.283 U	0.298 U	0.294 U	**0.144 J**
Volatiles (mg/kg; SW-846 8260D)										
Benzene	0.03	0.0121 U	0.0111 U	0.105 U	0.0131 U	**0.0293**	0.0145 U	0.0133 U	**0.0146**	0.0165 U
Ethylbenzene	6.00	**0.0290 J**	0.0277 U	**3.03**	0.0328 U	**0.180**	**0.0463**	0.0332 U	**5.43**	**0.0240 J**
Toluene	7.00	0.0604 U	0.0555 U	0.523 U	0.0656 U	**0.0429 J**	0.0724 U	0.0665 U	**0.768**	0.0827 U
Xylenes, Total	9.00	0.0906 U	0.0832 U	**5.60**	0.0983 U	**0.294**	**0.0854 J**	0.0997 U	**10.0**	0.124 U
Semivolatiles (mg/kg; SW-846 8270E)										
1-Methylnaphthalene	34	**1.06**	**0.102**	**23.4**	0.00607 U	**1.05 J-**	**0.742 J-**	R	**9.59 J-**	**0.0402 J-**
2-Methylnaphthalene	320	**0.0862**	**0.0802**	**29.7**	0.00607 U	**0.566 J-**	R	R	**12.4 J-**	**0.0527 J-**
Acenaphthene	4,800	0.0858 U	0.0640 U	2.26 U	0.00304 U	R	R	R	R	R
Acenaphthylene	NL	**0.168**	0.0285 U	**16.2**	0.00304 U	**0.787 J-**	R	R	**3.26 J-**	R
Anthracene	24,000	**0.346**	0.0640 U	**7.75**	0.00304 U	**0.446 J-**	**0.307 J-**	**0.00240 J-**	**1.47 J-**	R
Benzo(a)anthracene	NL	**0.189**	**0.0618**	**3.49**	**0.00163 J**	**0.617 J-**	**0.177 J-**	R	**0.791 J-**	**0.00307 J-**
Benzo(a)pyrene	0.10	**0.188**	**0.0480**	**3.19**	**0.00260 J**	**0.678 J-**	**0.170 J-**	R	**0.720 J-**	**0.00370 J-**
Benzo(b)fluoranthene	NL	**0.112**	**0.0350 J**	**2.09**	**0.00248 J**	**0.438 J-**	**0.103 J-**	R	**0.465 J-**	R
Benzo(g,h,i)perylene	NL	**0.0634**	0.0285 U	**1.08**	**0.00157 J**	**0.242 J-**	**0.0522 J-**	R	**0.237 J-**	**0.00277 J-**
Benzo(k)fluoranthene	NL	**0.0522 J**	0.0427 U	**0.905 J**	0.00456 U	**0.144 J-**	**0.0352 J-**	R	**0.156 J-**	R
Chrysene	NL	**0.184**	**0.106**	**3.42**	**0.00171 J**	**0.776 J-**	**0.201 J-**	R	**0.848 J-**	**0.00386 J-**
Dibenzo(a,h)anthracene	NL	0.0306 U	0.0285 U	**0.267 J**	0.00304 U	**0.0746 J-**	R	R	R	R
Dibenzofuran	80	**0.0937**	0.0285 U	**2.13**	0.00304 U	R	**0.0875 J-**	R	**0.521 J-**	**0.00221 J-**
Fluoranthene	3,200	**0.404**	**0.244**	**7.72**	**0.00268 J**	**0.906 J-**	**0.353 J-**	**0.00239 J-**	**1.51 J-**	**0.00746 J-**
Fluorene	3,200	**0.192**	**0.106**	**8.50**	**0.00219 J**	**0.408 J-**	**0.116 J-**	R	**2.09 J-**	**0.00952 J-**
Indeno(1,2,3-cd)pyrene	NL	**0.0559**	0.0285 U	**0.954**	0.00304 U	**0.223 J-**	**0.0482 J-**	R	**0.214 J-**	R
Naphthalene	5.00	**0.696**	**0.124**	**48.0**	0.00607 U	**0.707 J-**	R	R	**15.2 J-**	**0.0994 J-**
Phenanthrene	NL	**1.42**	**0.693**	**24.0**	**0.0101**	**1.21 J-**	**1.22 J-**	R	**5.10 J-**	**0.0309 J-**
Pyrene	2,400	**0.687**	**0.183**	**12.5**	**0.00195 J**	**1.54 J-**	**0.571 J-**	**0.00342 J-**	**2.53 J-**	**0.00807 J-**
cPAH TEQ (b)	0.10	**0.232**	**0.064 J**	**3.99 J**	**0.0036 J**	**0.835 J-**	NC (c)	NC (c)	NC (c)	NC (c)

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG									
		WB12			WB13					WB14	
		WB12-(17-18)-231215 12/15/2023 A3L1381	WB12-(22.5-23)-231215 12/15/2023 A3L1381	WB12-(23.5-24)-231215 12/15/2023 A3L1381	WB13-(20.5-21.5)-231212 12/12/2023 A3L1298	WB13-(25.5-26)-231212 12/12/2023 A3L1298	WB13-(30.5-31)-231212 12/12/2023 A3L1298	WB13-(37.5-38.5)-231212 12/12/2023 A3L1298	WB13-(40-41)-231213 12/13/2023 A3L1381	WB14-(30-31)-231214 12/14/2023 A3L1381	WB14-(33-34)-231214 12/14/2023 A3L1381
Forensic Chemistry											
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	--	**Coal Tar/ MGP Waste**	--	--	**Coal Tar/ MGP Waste**	**Coal Tar/ MGP Waste**	**Coal Tar/ MGP Waste**	**Coal Tar/ MGP Waste**	--	--
General Chemistry											
Total Cyanide (mg/kg; ASTM D7511-12)	50	0.114 U	0.608 U	0.104 U	0.107 U	**0.0775 J**	R	0.106 U	R	0.106 U	0.104 U
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)											
Gasoline-Range Organics	30	4.87 U	**1,450**	4.62 U	4.10 U	**804**	**47.6**	**138**	**270**	4.64 U	4.58 U
Diesel-Range Organics	2,000	**11.4 J**	**3,070**	18.7 U	18.9 U	**3,730**	**404 J**	**749 J**	**568**	18.1 U	18.9 U
Residual-Range Organics	2,000	41.3 U	212 U	**34.2 J**	**53.7**	383 U	**150 J**	37.2 U	38.7 U	**19.5 J**	**43.3**
Total Metals (mg/kg; SW-846 6020B)											
Arsenic	20	**1.56**	**18.0**	**2.73**	**7.53**	**0.733 J**	**3.06**	**2.49**	**0.675 J**	**1.01 J**	**1.04 J**
Barium	16,000	**207**	**186**	**239**	**270**	**106**	**155**	**121**	**71.4**	**234**	**138**
Cadmium	2.0	**0.209 J**	**0.669**	**0.134 J**	**2.30**	0.223 U	**0.458**	**0.153 J**	0.232 U	0.222 U	0.221 U
Chromium, Total	NL	**66.3**	**64.4**	**82.8**	**33.0**	**30.5**	**72.1**	**53.9**	**24.6**	**35.4**	**53.8**
Lead	250	**5.02**	**16.1**	**10.6**	**280**	**3.52**	**12.1**	**7.62**	**3.55**	**7.95**	**6.72**
Mercury	2.0	0.0972 U	**0.197**	0.0884 U	**0.731**	0.0892 U	0.0944 U	0.0874 U	0.0926 U	0.0889 U	0.0885 U
Selenium	400	1.21 U	**2.35**	**0.575 J**	1.16 U	1.11 U	**1.09 J**	1.09 U	1.16 U	1.11 U	1.11 U
Silver	400	0.243 U	**0.230 J**	0.221 U	**0.223 J**	0.223 U	**0.155 J**	0.218 U	0.232 U	0.222 U	0.221 U
Volatiles (mg/kg; SW-846 8260D)											
Benzene	0.03	0.00973 U	**0.356**	0.00923 U	**0.0107**	**0.0221 J**	**0.295**	**1.52**	**1.05**	0.00927 U	0.00916 U
Ethylbenzene	6.00	0.0243 U	**0.878**	0.0231 U	0.0205 U	**1.19**	**0.316**	**5.94**	**4.35**	0.0232 U	0.0229 U
Toluene	7.00	0.0487 U	**1.00**	0.0462 U	0.0410 U	**0.0903 J**	**0.210**	**0.597**	**0.301**	0.0464 U	0.0458 U
Xylenes, Total	9.00	0.0730 U	**8.75**	0.0693 U	0.0615 U	**8.03**	**0.822**	**8.86**	**7.27**	0.0695 U	0.0687 U
Semivolatiles (mg/kg; SW-846 8270E)											
1-Methylnaphthalene	34	0.0243 U	**76.3**	**0.0536**	**0.0348**	**29.5**	**4.78**	**9.51**	**9.82**	**0.0568**	0.0221 U
2-Methylnaphthalene	320	0.0243 U	**9.20**	**0.0129 J**	**0.0431**	**9.45**	**0.571**	**14.9**	**14.8**	**0.0863**	0.0221 U
Acenaphthene	4,800	0.0122 U	6.74 U	0.0107 U	0.0113 U	5.15 U	0.584 U	**5.34**	**5.69**	**0.0397**	0.0111 U
Acenaphthylene	NL	**0.00643 J**	**45.8**	0.0144 U	0.0113 U	**14.1**	0.501 U	1.06 U	1.25 U	0.0113 U	0.0111 U
Anthracene	24,000	0.0122 U	**24.0**	0.0136 U	0.0113 U	**8.01**	**0.765**	**2.59**	**2.86**	**0.0206**	0.0111 U
Benzo(a)anthracene	NL	**0.00821 J**	**10.6**	**0.0106 J**	**0.0158**	**3.89**	**0.347**	**1.38**	**1.43**	**0.0142**	**0.0149**
Benzo(a)pyrene	0.10	**0.0187**	**8.83**	**0.0140 J**	**0.0310**	**3.31**	**0.319**	**1.39**	**1.38**	**0.0170**	**0.0251**
Benzo(b)fluoranthene	NL	**0.0194**	**6.21**	**0.0127 J**	**0.0387**	**2.18**	**0.261**	**0.953**	**0.926**	**0.0142 J**	**0.0264**
Benzo(g,h,i)perylene	NL	**0.0126**	**2.34**	**0.0117**	**0.0344**	**1.02**	**0.136**	**0.440**	**0.463**	**0.0112 J**	**0.0267**
Benzo(k)fluoranthene	NL	0.0182 U	**1.96 J**	0.0160 U	**0.0166 J**	**0.808 J**	**0.110 J**	**0.373 J**	**0.381 J**	**0.00852 J**	**0.00897 J**
Chrysene	NL	**0.0144**	**10.0**	**0.0113**	**0.0300**	**4.63**	**0.402**	**1.48**	**1.49**	**0.0133**	**0.0267**
Dibenzo(a,h)anthracene	NL	0.0122 U	**0.597**	0.0107 U	**0.00657 J**	**0.245**	0.111 U	**0.112 J**	**0.103 J**	0.0113 U	0.0111 U
Dibenzofuran	80	0.0122 U	**7.91**	0.0107 U	**0.0122**	1.46 U	0.125 U	**0.543**	**0.562**	0.0113 U	0.0111 U
Fluoranthene	3,200	**0.0161**	**24.7**	**0.0241**	**0.0416**	**8.43**	**0.753**	**3.07**	**3.21**	**0.0270**	**0.0403**
Fluorene	3,200	0.0122 U	**28.2**	**0.0220**	0.0113 U	4.14 U	**0.319**	**3.44**	**3.77**	**0.0288**	0.0111 U
Indeno(1,2,3-cd)pyrene	NL	**0.00616 J**	**2.20**	0.0107 U	**0.0237**	**0.875**	**0.0685 J**	**0.382**	**0.409**	0.0113 U	0.0111 U
Naphthalene	5.00	0.0243 U	**123**	**0.0876**	**0.0358**	**33.3**	**2.19**	**21.7**	**19.5**	**0.0921**	0.0221 U
Phenanthrene	NL	**0.0705**	**76.2**	**0.0929**	**0.0526**	**24.1**	**1.70**	**9.34**	**9.59**	**0.0899**	0.0211 U
Pyrene	2,400	**0.0133**	**38.8**	**0.0274**	**0.0385**	**13.2**	**1.10**	**4.54**	**4.85**	**0.0414**	**0.0292**
cPAH TEQ (b)	0.10	**0.0237 J**	**11.1 J**	**0.0183 J**	**0.0414 J**	**4.16 J**	**0.407 J**	**1.72 J**	**1.72 J**	**0.0220 J**	**0.0315 J**

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG									
		WMW5		WMW6		WMW7	WMW8		WMW9	WMW10	WMW11
		WMW5-(32-33)-230623 6/23/2023 A3F1506	WMW5-(45-46)-230623 6/23/2023 A3F1506	WMW6-(6.5-7)-230615 6/15/2023 A3F1267	WMW6-(17.5-18)-230615 6/15/2023 A3F1267	WMW7-(32-33)-230621 6/21/2023 A3F1466	WMW8-(17.5-18)-230629 6/29/2023 A3G0729	WMW8-(27.5-28)-230629 6/29/2023 A3G0729	WMW9-(35.5-36)-230628 6/28/2023 A3G0729	WMW10-(23.5-24)-230629 6/29/2023 A3G0729	WMW11-(30.5-31)-230627 6/27/2023 A3G0729
Forensic Chemistry											
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	--	**Coal Tar/ MGP Waste**	**Coal Tar/ MGP Waste**	--	--	**Coal Tar/ MGP Waste**	--	--	--	--
General Chemistry											
Total Cyanide (mg/kg; ASTM D7511-12)	50	0.123 U	0.110 U	**0.172**	0.103 U	0.108 U	**5.13**	0.106 U	0.104 U	0.104 U	0.109 U
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)											
Gasoline-Range Organics	30	6.44 U	**411**	**12,300**	**3.98 J**	**48.7**	**183**	4.64 U	5.14 U	4.76 U	5.73 U
Diesel-Range Organics	2,000	23.8 U	**354**	**12,900**	**44.9**	**32.4**	**5,960**	**20.8**	**15.1 J**	20.6 U	21.1 U
Residual-Range Organics	2,000	47.6 U	44.1 U	**2,800**	**70.7**	**51.6**	2,230 U	41.1 U	38.5 U	41.3 U	**73.4**
Total Metals (mg/kg; SW-846 6020B)											
Arsenic	20	**1.22 J**	**1.26**	**3.46**	**0.824 J**	**7.77**	**2.31**	**0.690 J**	**1.06 J**	**1.33**	**1.93**
Barium	16,000	**163**	**221**	**112**	**156**	**123**	**77.6**	**99.8**	**139**	**161**	**70.9**
Cadmium	2.0	**0.177 J**	**0.180 J**	0.240 U	**0.204 J**	**0.397**	**0.137 J**	0.215 U	0.223 U	0.205 U	**0.124 J**
Chromium, Total	NL	**14.2**	**35.5**	**24.2**	**61.5**	**47.5**	**25.5**	**33.5**	**51.0**	**55.3**	**18.7**
Lead	250	**14.7**	**7.78**	**5.56**	**9.20**	**14.1**	**4.32**	**3.36**	**5.82**	**5.93**	**25.9**
Mercury	2.0	0.102 U	0.0860 U	0.0959 U	0.0868 U	**0.0513 J**	0.0979 U	0.0861 U	0.0891 U	0.0819 U	0.0903 U
Selenium	400	1.28 U	1.07 U	1.20 U	1.09 U	**1.09**	1.22 U	1.08 U	1.11 U	1.02 U	1.13 U
Silver	400	0.256 U	0.215 U	0.240 U	0.217 U	**0.194 J**	0.245 U	0.215 U	0.223 U	0.205 U	0.226 U
Volatiles (mg/kg; SW-846 8260D)											
Benzene	0.03	0.0129 U	**0.0316**	0.425 U	0.00978 U	0.0112 U	0.0117 U	0.00929 U	**0.00616 J**	0.00953 U	0.0115 U
Ethylbenzene	6.00	0.0322 U	**0.657**	**164**	**0.0337**	**0.383**	**0.707**	0.0232 U	0.0257 U	0.0238 U	0.0286 U
Toluene	7.00	0.0644 U	**0.0968**	**102**	0.0489 U	**0.120**	0.0583 U	0.0464 U	0.0514 U	0.0476 U	0.0573 U
Xylenes, Total	9.00	0.0966 U	**1.43**	**468**	**0.0773**	**1.28**	**0.914**	0.0696 U	0.0770 U	0.0714 U	0.0859 U
Semivolatiles (mg/kg; SW-846 8270E)											
1-Methylnaphthalene	34	**0.0265**	**5.52**	**334**	**0.0963**	**1.14**	**68.9**	**0.0312**	**0.0900**	**0.00393 J**	0.0230 U
2-Methylnaphthalene	320	**0.0401**	**8.08**	**476**	**0.0836**	**0.973**	**56.0**	**0.0250**	**0.0948**	0.00544 U	0.0230 U
Acenaphthene	4,800	**0.00661**	**2.98**	24.7 U	0.0128 U	0.133 U	**32.6**	0.0130 U	0.0224 U	0.00272 U	0.0115 U
Acenaphthylene	NL	0.00673 U	0.991 U	**161**	0.0114 U	0.0286 U	7.37 U	0.0112 U	0.0109 U	0.00272 U	0.0115 U
Anthracene	24,000	0.00321 U	**1.64**	**94.2**	0.0162 U	0.0643 U	**14.5**	0.0112 U	0.0109 U	0.00272 U	0.0115 U
Benzo(a)anthracene	NL	**0.00169 J**	**0.746**	**56.5**	**0.0248**	**0.0525**	**6.56**	**0.00862 J**	**0.0118**	0.00272 U	**0.00707 J**
Benzo(a)pyrene	0.10	**0.00273 J**	**0.698**	**47.6**	**0.0282**	0.0429 U	**5.56**	**0.0148 J**	0.0163 U	0.00408 U	**0.0116 J**
Benzo(b)fluoranthene	NL	0.00481 U	**0.447**	**33.2**	**0.0317**	0.0429 U	**3.72**	0.0168 U	0.0163 U	**0.00509**	0.0173 U
Benzo(g,h,i)perylene	NL	0.00321 U	**0.221**	**18.0**	**0.0172**	0.0286 U	**1.98**	0.0112 U	**0.00688 J**	**0.00422**	0.0115 U
Benzo(k)fluoranthene	NL	0.00481 U	**0.199 J**	**11.5 J**	**0.00874 J**	0.0429 U	**1.28 J**	0.0168 U	0.0163 U	0.00408 U	0.0173 U
Chrysene	NL	0.00321 U	**0.858**	**58.3**	**0.0559**	**0.0838**	**7.65**	**0.0134**	**0.0136**	0.0102 U	0.0115 U
Dibenzo(a,h)anthracene	NL	0.00321 U	0.115 U	**4.39**	0.0114 U	0.0286 U	**0.517**	0.0112 U	0.0109 U	0.00272 U	0.0115 U
Dibenzofuran	80	**0.00283 J**	**0.314**	**23.1**	**0.0285**	**0.104**	2.74 U	0.0112 U	**0.00655 J**	**0.00171 J**	0.0115 U
Fluoranthene	3,200	**0.00316 J**	**1.74**	**110**	**0.0843**	**0.157**	**15.6**	**0.0211**	**0.0263**	**0.00637**	**0.00634 J**
Fluorene	3,200	**0.0107**	**2.10**	**119**	**0.0332**	**0.411**	**21.1**	**0.0112 J**	**0.0399**	0.00272 U	0.0115 U
Indeno(1,2,3-cd)pyrene	NL	0.00321 U	**0.199**	**17.1**	0.0114 U	0.0286 U	**1.78**	0.0112 U	0.0109 U	0.00272 U	0.0115 U
Naphthalene	5.00	**0.601**	**7.37**	**664**	**0.150**	**0.476**	**102**	**0.0677**	**0.116**	**0.00421 J**	0.0230 U
Phenanthrene	NL	**0.0208**	**5.70**	**336**	**0.261**	**1.23**	**46.3**	**0.0563**	**0.143**	**0.0135**	**0.00745 J**
Pyrene	2,400	**0.00394**	**2.71**	**167**	**0.0747**	**0.126**	**23.9**	**0.0210**	**0.0333**	**0.00488**	**0.00767 J**
cPAH TEQ (b)	0.10	**0.0037 J**	**0.871**	**60.5**	**0.036 J**	**0.035**	**7.02**	**0.019 J**	**0.012**	**0.0032**	**0.015 J**

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG									
		WMW13		WMW14		WMW15				WMW16	
		WMW-13-(22-23)-231221 12/21/2023 A3L1686	WMW-13-(32-32.5)-231221 12/21/2023 A3L1686	WMW-14-(15.5-16)-231221 12/21/2023 A3L1627	WMW-14-(19-20)-231221 12/21/2023 A3L1627	WMW-15-(12-12.5)-231220 12/20/2023 A3L1589	WMW-15-(14-14.5)-231220 12/20/2023 A3L1589	WMW-15-(16-16.5)-231220 12/20/2023 A3L1589	WMW-15-(18-18.5)-231220 12/20/2023 A3L1589	WMW-16-(10.5-11)-231220 12/20/2023 A3L1627	WMW-16-(24-24.5)-231220 12/20/2023 A3L1627
Forensic Chemistry											
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	--	--	**R-99 Biodiesel**	--	**Kerosene/Jet-A**	--	**Kerosene/Jet-A**	--	--	--
General Chemistry											
Total Cyanide (mg/kg; ASTM D7511-12)	50	0.121 U	0.117 U	**0.148**	0.110 U	0.110 U	0.108 U	**0.0576 J**	0.105 U	0.106 U	0.106 U
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)											
Gasoline-Range Organics	30	6.19 U	5.39 U	**146**	4.57 U	**8.59**	4.43 U	**59.2**	4.67 U	3.90 U	4.50 U
Diesel-Range Organics	2,000	21.2 U	20.1 U	**1,120**	19.4 U	**86.7**	18.9 U	**557**	18.0 U	19.3 U	19.0 U
Residual-Range Organics	2,000	**21.4 J**	40.3 U	38.9 U	38.8 U	38.8 U	37.8 U	39.0 U	36.1 U	38.5 U	**83.5**
Total Metals (mg/kg; SW-846 6020B)											
Arsenic	20	**3.80**	**1.18 J**	**1.67**	1.09 U	**1.23**	1.12 U	**1.08 J**	**0.896 J**	1.06 U	**1.40**
Barium	16,000	**291**	**198**	**90.0**	**79.6**	**196**	**159**	**79.5**	**137**	**79.5**	**240**
Cadmium	2.0	**0.152 J**	**0.209 J**	0.238 U	0.219 U	**0.269**	0.224 U	0.219 U	0.228 U	0.213 U	**0.250**
Chromium, Total	NL	**34.6**	**15.8**	**26.4**	**26.0**	**85.6**	**61.4**	**30.8**	**50.5**	**24.6**	**86.3**
Lead	250	**10.2**	**16.1**	**2.93**	**3.35**	**15.0**	**5.86**	**4.28**	**4.65**	**2.88**	**9.38**
Mercury	2.0	0.0962 U	0.0947 U	0.0953 U	0.0876 U	0.0948 U	0.0897 U	0.0875 U	0.0914 U	0.0851 U	0.0863 U
Selenium	400	1.20 U	**0.670 J**	1.19 U	1.09 U	1.18 U	1.12 U	1.09 U	1.14 U	1.06 U	**0.554 J**
Silver	400	0.241 U	0.237 U	0.238 U	0.219 U	**0.141 J**	0.224 U	0.219 U	0.228 U	0.213 U	0.216 U
Volatiles (mg/kg; SW-846 8260D)											
Benzene	0.03	0.0124 U	0.0108 U	0.00874 U	0.00914 U	0.00962 U	0.00886 U	0.00996 U	0.00934 U	0.00779 U	0.00899 U
Ethylbenzene	6.00	0.0310 U	0.0269 U	0.0218 U	0.0229 U	0.0241 U	0.0222 U	0.0249 U	0.0234 U	0.0195 U	0.0225 U
Toluene	7.00	0.0619 U	0.0539 U	0.0437 U	0.0457 U	0.0481 U	0.0443 U	0.0498 U	0.0467 U	0.0390 U	0.0450 U
Xylenes, Total	9.00	0.0929 U	0.0808 U	0.0655 U	0.0686 U	0.0722 U	0.0665 U	0.0747 U	0.0701 U	0.0584 U	0.0675 U
Semivolatiles (mg/kg; SW-846 8270E)											
1-Methylnaphthalene	34	0.00648 U	**0.0153**	0.0556 U	0.00542 U	0.0221 U	0.00542 U	0.0220 U	0.00528 U	0.00536 U	**0.0267**
2-Methylnaphthalene	320	0.00648 U	**0.0136**	0.0556 U	0.00542 U	0.0221 U	0.00542 U	0.0220 U	0.00528 U	0.00536 U	**0.0247**
Acenaphthene	4,800	0.00325 U	0.00581 U	0.0278 U	0.00272 U	0.0124 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	0.0106 U
Acenaphthylene	NL	0.00325 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	0.0106 U
Anthracene	24,000	0.00325 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	0.0106 U
Benzo(a)anthracene	NL	0.00325 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	**0.00673 J**	0.00264 U	0.00269 U	**0.00846 J**
Benzo(a)pyrene	0.10	**0.00332 J**	**0.00377 J**	0.0417 U	0.00407 U	0.0166 U	0.00407 U	**0.00853 J**	0.00396 U	0.00403 U	**0.0136 J**
Benzo(b)fluoranthene	NL	**0.00494**	**0.00318 J**	0.0417 U	0.00407 U	0.0166 U	0.00407 U	0.0165 U	0.00396 U	0.00403 U	0.0159 U
Benzo(g,h,i)perylene	NL	**0.00962**	**0.00420**	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	**0.0178**
Benzo(k)fluoranthene	NL	0.00487 U	0.00474 U	0.0417 U	0.00407 U	0.0166 U	0.00407 U	0.0165 U	0.00396 U	0.00403 U	0.0159 U
Chrysene	NL	0.00669 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	**0.00605 J**	0.00264 U	0.00269 U	**0.0185**
Dibenzo(a,h)anthracene	NL	0.00325 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	0.0106 U
Dibenzofuran	80	0.00325 U	**0.00336**	0.246 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	**0.0113**
Fluoranthene	3,200	**0.00379**	**0.00287 J**	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	**0.0322**
Fluorene	3,200	0.00325 U	**0.0112**	0.0323 U	0.00272 U	**0.0150**	0.00272 U	0.0110 U	0.00264 U	0.00269 U	**0.0135**
Indeno(1,2,3-cd)pyrene	NL	0.00325 U	0.00317 U	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	0.0106 U
Naphthalene	5.00	0.00648 U	0.00632 U	0.0556 U	0.00542 U	0.0221 U	0.00542 U	0.0220 U	0.00528 U	0.00536 U	0.0211 U
Phenanthrene	NL	**0.0162**	**0.0370**	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	0.00269 U	**0.137**
Pyrene	2,400	**0.00386**	**0.00368**	0.0278 U	0.00272 U	0.0111 U	0.00272 U	0.0110 U	0.00264 U	**0.00175 J**	**0.0277**
cPAH TEQ (b)	0.10	**0.00458 J**	**0.00482 J**	0.0293 U	0.00286 U	0.0117 U	0.00286 U	**0.0120 J**	0.00278 U	0.00283 U	**0.0173 J**

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Field Sample ID, Sampling Date, Lab SDG									
		WMW17			WMW18			AB01		AB02	AB03/ WMW-12
		WMW-17-(10-10.5)-231218 12/18/2023 A3L1589	WMW-17-(15-16)-231218 12/18/2023 A3L1589	WMW-17-(33-34.5)-231218 12/18/2023 A3L1589	WMW-18-(5.5-6)-231220 12/20/2023 A3L1589	WMW18-(14-14.5)-231215 12/15/2023 A3L1381	WMW18-(22-23)-231215 12/15/2023 A3L1381	AB01-(15-16)-230825 8/25/2023 A3H1440	AB01-(25-25.5)-230825 8/25/2023 A3H1440	AB02-(12.5-13.7)-230823 8/23/2023 A3H1389	AB03-(7.5-9.0)-230824 8/24/2023 A3H1440
Forensic Chemistry											
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Bunker C/ Diesel #6**	--	--	--	**Diesel #2, #4/ Fuel Oil**	**Diesel #2, #4/ Fuel Oil**	**Coal Tar/ MGP Waste**	**Coal Tar/ MGP Waste**	**Diesel #2, #4/ Fuel Oil (d)**	**Diesel #2, #4/ Fuel Oil**
General Chemistry											
Total Cyanide (mg/kg; ASTM D7511-12)	50	**0.418 J-**	R	R	--	**0.0612 J**	0.110 U	**0.0810 J**	**0.144**	**0.332**	0.107 U
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)											
Gasoline-Range Organics	30	**201**	7.15 U	8.07 U	--	**39.6 J**	**16.4 J**	**4,710**	**51.6**	**77.9**	**19.5 J**
Diesel-Range Organics	2,000	**4,380 J-**	**18.1 J-**	**20.3 J-**	--	**1,890**	**202**	**11,700**	**960**	**2,760**	**2,560**
Residual-Range Organics	2,000	R	R	R	--	39.2 U	39.6 U	451 U	43.4 U	48.0 U	78.3 U
Total Metals (mg/kg; SW-846 6020B)											
Arsenic	20	**3.21**	1.43 U	1.39 U	**9.78**	**1.30**	**2.36**	**5.32**	**0.697 J**	**5.45**	**1.36**
Barium	16,000	**354 J**	**125**	**148**	**320**	**176**	**151**	**93.1**	**163**	**152**	**154**
Cadmium	2.0	0.305 U	0.286 U	0.279 U	0.301 U	**0.133 J**	**0.241**	0.250 U	0.234 U	**0.336**	0.219 U
Chromium, Total	NL	**87.4**	**36.5**	**53.1**	**7.01**	**38.3**	**63.4**	**33.6**	**55.7**	**48.2**	**53.3**
Lead	250	**9.53**	**3.80**	**5.27**	**3.22**	**8.21**	**10.3**	**5.38**	**5.56**	**11.7**	**6.23**
Mercury	2.0	R	R	R	R	0.0905 U	0.0871 U	0.0999 U	0.0935 U	**0.0582 J**	0.0875 U
Selenium	400	1.52 U	1.43 U	1.39 U	1.50 U	1.13 U	1.09 U	1.25 U	1.17 U	**0.813 J**	1.09 U
Silver	400	0.305 U	0.286 U	0.279 U	0.301 U	0.226 U	**0.109 J**	0.250 U	0.234 U	**0.150 J**	0.219 U
Volatiles (mg/kg; SW-846 8260D)											
Benzene	0.03	0.0165 U	0.0143 U	0.0161 U	--	0.0109 U	0.0106 U	0.0433 U	0.00949 U	0.0116 U	**0.00390 J**
Ethylbenzene	6.00	**0.0247 J**	0.0358 U	0.0403 U	--	0.0274 U	0.0264 U	**30.1**	**0.187**	0.0291 U	0.0195 U
Toluene	7.00	0.0824 U	0.0715 U	0.0807 U	--	0.0547 U	0.0529 U	0.216 U	0.0474 U	0.0581 U	0.0390 U
Xylenes, Total	9.00	0.124 U	0.107 U	0.121 U	--	0.0821 U	0.0793 U	**43.5**	**0.260**	0.0872 U	0.0585 U
Semivolatiles (mg/kg; SW-846 8270E)											
1-Methylnaphthalene	34	**0.699 J-**	R	**0.00467 J-**	**0.00703 J-**	**1.06**	**0.820**	**263**	**16.5**	0.251 U	**0.0959**
2-Methylnaphthalene	320	R	R	**0.00358 J-**	**0.00613 J-**	0.230 U	0.235 U	**17.1**	**4.41**	0.251 U	**0.0973**
Acenaphthene	4,800	R	R	R	R	0.259 U	0.118 U	23.4 U	**5.00**	0.908 U	0.0662 U
Acenaphthylene	NL	R	R	R	R	0.216 U	**0.300**	**85.2**	**4.79**	0.414 U	0.0588 U
Anthracene	24,000	R	R	R	R	0.172 U	**0.238**	**39.4**	**3.04**	0.531 U	0.0280 U
Benzo(a)anthracene	NL	**0.317 J-**	**0.00261 J-**	R	**0.00590 J-**	**0.0773 J**	**0.154**	**17.4**	**1.25**	**0.196**	**0.0192 J**
Benzo(a)pyrene	0.10	**0.351 J-**	R	R	**0.00813 J-**	**0.105 J**	**0.174 J**	**15.9**	**1.14**	**0.157 J**	0.0420 U
Benzo(b)fluoranthene	NL	**0.274 J-**	R	R	**0.00840 J-**	**0.0908 J**	**0.145 J**	**9.91**	**0.719**	0.188 U	0.0420 U
Benzo(g,h,i)perylene	NL	**0.191 J-**	R	R	**0.00628 J-**	0.115 U	**0.0930 J**	**5.35**	**0.411**	0.126 U	0.0280 U
Benzo(k)fluoranthene	NL	**0.149 J-**	R	R	**0.00409 J-**	0.172 U	**0.0890 J**	**4.25 J**	**0.328 J**	0.188 U	0.0420 U
Chrysene	NL	**0.444 J-**	**0.00255 J-**	R	**0.00687 J-**	**0.0676 J**	**0.145**	**19.7**	**1.40**	**0.306**	**0.0182 J**
Dibenzo(a,h)anthracene	NL	R	R	R	R	0.115 U	0.118 U	**1.38**	**0.0886 J**	0.126 U	0.0280 U
Dibenzofuran	80	R	R	R	R	0.129 U	0.118 U	**8.02**	**0.666**	0.447 U	0.0452 U
Fluoranthene	3,200	**0.650 J-**	**0.00455 J-**	R	**0.00622 J-**	**0.118**	**0.322**	**39.7**	**2.84**	**0.411**	**0.0462**
Fluorene	3,200	**1.01 J-**	R	R	R	**0.432**	**0.141**	**48.6**	**3.98**	**2.18**	0.0620 U
Indeno(1,2,3-cd)pyrene	NL	**0.124 J-**	R	R	**0.00415 J-**	0.115 U	0.118 U	**4.59**	**0.372**	0.126 U	0.0280 U
Naphthalene	5.00	R	R	**0.0257 J-**	**0.00738 J-**	0.230 U	**0.285**	**689**	**32.1**	0.251 U	**0.495 J**
Phenanthrene	NL	R	R	**0.00271 J-**	**0.00883 J-**	**0.664**	**0.935**	**127**	**10.9**	0.550 U	0.159 U
Pyrene	2,400	**0.926 J-**	**0.00751 J-**	R	**0.00940 J-**	**0.190**	**0.510**	**59.8**	**4.45**	**0.650**	**0.0791**
cPAH TEQ (b)	0.10	NC (c)	NC (c)	NC (c)	NC (c)	**0.143 J**	**0.226 J**	**19.9 J**	**1.43 J**	**0.211 J**	**0.030 J**

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Sampling Location, Sample ID, Sampling Date, Lab SDG		
		AB04		AB05
		AB04-(7.5-7.9)-230823 8/23/2023 A3H1389	AB04-(7.9-8.9)-230823 8/23/2023 A3H1389	AB05-(25-25.4)-230822 8/22/2023 A3H1389
Forensic Chemistry				
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Bunker C/ Diesel #6**	--	
General Chemistry				
Total Cyanide (mg/kg; ASTM D7511-12)	50	**0.266**	**0.0603 J**	0.104 U
Total Petroleum Hydrocarbons (mg/kg; NWTPH-Dx/-Gx)				
Gasoline-Range Organics	30	**266**	**4.95**	5.11 U
Diesel-Range Organics	2,000	**6,090**	**191**	**102**
Residual-Range Organics	2,000	1,880 U	40.4 U	40.2 U
Total Metals (mg/kg; SW-846 6020B)				
Arsenic	20	**1.10 J**	**1.11 J**	**0.964 J**
Barium	16,000	**123**	**171**	**227**
Cadmium	2.0	0.257 U	0.235 U	0.213 U
Chromium, Total	NL	**28.9**	**41.8**	**33.2**
Lead	250	**2.83**	**3.70**	**3.21**
Mercury	2.0	0.103 U	0.0938 U	0.0853 U
Selenium	400	1.28 U	1.17 U	1.07 U
Silver	400	0.257 U	0.235 U	**16.3**
Volatiles (mg/kg; SW-846 8260D)				
Benzene	0.03	0.0100 U	0.00913 U	0.0102 U
Ethylbenzene	6.00	0.0250 U	0.0228 U	0.0256 U
Toluene	7.00	0.0500 U	0.0456 U	0.0511 U
Xylenes, Total	9.00	0.0750 U	0.0685 U	0.0767 U
Semivolatiles (mg/kg; SW-846 8270E)				
1-Methylnaphthalene	34	0.245 U	0.0568 U	0.0545 U
2-Methylnaphthalene	320	0.245 U	0.0568 U	0.0545 U
Acenaphthene	4,800	0.123 U	0.0285 U	0.0273 U
Acenaphthylene	NL	0.123 U	0.0285 U	0.0273 U
Anthracene	24,000	0.216 U	0.0285 U	0.0273 U
Benzo(a)anthracene	NL	0.123 U	0.0285 U	0.0273 U
Benzo(a)pyrene	0.10	0.184 U	0.0427 U	0.0409 U
Benzo(b)fluoranthene	NL	0.184 U	0.0427 U	0.0409 U
Benzo(g,h,i)perylene	NL	0.123 U	0.0285 U	0.0273 U
Benzo(k)fluoranthene	NL	0.184 U	0.0427 U	0.0409 U
Chrysene	NL	0.382 U	0.0285 U	0.0273 U
Dibenzo(a,h)anthracene	NL	0.123 U	0.0285 U	0.0273 U
Dibenzofuran	80	0.123 U	0.0285 U	0.0273 U
Fluoranthene	3,200	**0.112 J**	0.0285 U	0.0273 U
Fluorene	3,200	**0.697**	**0.0145 J**	0.0273 U
Indeno(1,2,3-cd)pyrene	NL	0.123 U	0.0285 U	0.0273 U
Naphthalene	5.00	0.245 U	0.0568 U	0.0545 U
Phenanthrene	NL	0.226 U	0.0285 U	0.0273 U
Pyrene	2,400	**0.252**	**0.0162 J**	0.0273 U
cPAH TEQ (b)	0.10	0.131 U	0.0300 U	0.0288 U

Table 2
Soil Analytical Results
Worthen Substation Site – Wenatchee, Washington

Notes:

(a) Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).

(b) cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.

(c) cPAH TEQs were not calculated for samples where one or more cPAH analytes were rejected during the data validation process.

(d) Based on the boiling range and UCM present in sample AB02-(12.5-13.7)-230823, it appears that it is impacted by a material similar to Diesel #2, #4/Fuel Oil but the presence or absence of isoprenoids in the sample could not be readily determined by Method ASTM D2887-14.

Bold text indicates detected analyte**.**

Blue shading indicates detected exceedance of associated screening level.

Purple shading indicates non-detect reporting limit exceedance of associated screening level.

Brown border = Chromatograms indicate presence of Bunker C/Diesel #6 in soil.

Red Border = Chromatograms indicate presence of coal tar/MGP waste in soil.

Orange Border = Chromatograms indicate presence of diesel #2, diesel #4/fuel oil in soil.

Green Border = Chromatograms indicate presence of a mixture of petroleum and non-petroleum material in soil.

Blue Border = Chromatograms indicate presence of kerosene/Jet-A in soil.

Purple Border = Chromatograms indicate presence of R-99 Biodiesel in soil.

U = The analyte was analyzed for, but was not detected above the level of 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.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity and the result may be biased low.

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

Acronyms/Abbreviations:

ASTM = ASTM International
cPAH = carcinogenic polycyclic aromatic hydrocarbon
GC = gas chromatograph
ID = identification
Lab = laboratory
mg/kg = milligrams per kilogram
MGP = manufactured gas plant
-- = not analyzed
NC = not calculated
NL = not listed
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
SDG = sample delivery group
TEQ = toxicity equivalence
WAC = Washington Administrative Code

Table 3
Soil Synthetic Precipitation Leaching Procedure Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Field Sample ID, Sampling Date, Lab SDG WB6-(4-4.5)-230615 6/15/2023 A3F1267	 WB6-(11-11.5)-230622 6/22/2023 A3F1506	 WMW6-(6.5-7)-230615 6/15/2023 A3F1267
SPLP Volatiles (µg/L; SW-846 8260D)			
Benzene	**0.150 J**	**7.50 J**	**0.750 J**
Ethylbenzene	0.500 U	**370**	**1,230**
m-&p-Xylenes	1.00 U	**180**	**2,380**
Naphthalene	2.00 UJ	**5,190**	**6,980 J**
o-Xylene	0.500 U	**172**	**1,210**
Toluene	1.00 U	**26.0 J**	**976**

Notes:

Bold text indicates detected analyte**.**

U = The analyte was analyzed for, but was not detected above the level of 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.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Acronyms/Abbreviations:

ID = identification

Lab = laboratory

µg/L = micrograms per liter

SDG = sample delivery group

SPLP = synthetic precipitation leaching procedure

Table 4
Soil Low-Level Polycyclic Aromatic Hydrocarbon and Homolog Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Sampling Location, Field Sample ID, Sampling Date, Lab SDG			
		WB6 WB6-(4-4.5)-230615 6/15/2023 A3F1267	WB-11 WB-11-(8-9)-231219 12/19/2023 A3L1589	WB12 WB12-(22.5-23)-231215 12/15/2023 A3L1381	WMW18 WMW18-(14-14.5)-231215 12/15/2023 A3L1381
Forensics 8270E LL PAH and Homologs (mg/kg; EPA 8270M)					
cis-Decalin	493-01-6	2.64 U	R	0.826 U	R
C1-Decalin	C1-D	13.2 U	**4.81 J-**	2.07 U	**3.84 J-**
C2-Decalin	C2-D	13.2 U	**11.6 J-**	**5.36**	**7.95 J-**
C3-Decalin	C3-D	26.4 U	**16.6 J-**	**7.90**	**11.5 J-**
C4-Decalin	C4-D	26.4 U	**13.5 J-**	**6.94**	**10.3 J-**
Naphthalene	91-20-3	**7.58**	**0.393 J-**	**155**	R
1-Methylnaphthalene	90-12-0	5.28 U	**0.877 J-**	**97.8**	**1.29 J-**
2-Methylnaphthalene	91-57-6	**3.98**	**0.516 J-**	**12.2**	**0.0959 J-**
C1-Naphthalenes	C1-N	13.2 U	**1.39 J-**	**112**	**1.49 J-**
C2-Naphthalenes	C2-N	**13.2**	**2.87 J-**	**208**	**13.0 J-**
C3-Naphthalenes	C3-N	**15.5**	**4.63 J-**	**78.8**	**14.6 J-**
C4-Naphthalenes	C4-N	**22.9**	**7.23 J-**	**20.0**	**7.60 J-**
Acenaphthene	83-32-9	2.64 U	R	9.61 U	R
Acenaphthylene	208-96-8	**17.4**	**0.931 J-**	**63.5**	R
Dibenzofuran	132-64-9	2.64 U	R	**12.4**	R
Fluorene	86-73-7	2.71 U	**0.480 J-**	**40.0**	**0.492 J-**
C1-Fluorenes	C1-F	13.2 U	**1.69 J-**	**32.9 J**	**1.14 J-**
C2-Fluorenes	C2-F	13.2 U	**1.60 J-**	**19.6 J**	**0.652 J-**
C3-Fluorenes	C3-F	**19.1**	**2.13 J-**	**4.54**	**0.658 J-**
Dibenzothiophene	132-65-0	2.64 U	**0.348 J-**	**10.2**	**0.194 J-**
C1-Dibenzothiophene	C1-DBT	13.2 U	R	**7.97**	**0.377 J-**
C2-Dibenzothiophene	C2-DBT	13.2 U	**1.69 J-**	**6.23**	**0.632 J-**
C3-Dibenzothiophene	C3-DBT	13.2 U	**1.58 J-**	**3.02**	**0.475 J-**
C4-Dibenzothiophene	C4-DBT	26.4 U	R	4.13 U	R
Phenanthrene	85-01-8	**5.47**	**1.35 J-**	**109**	**0.741 J-**
Anthracene	120-12-7	**5.63**	**0.591 J-**	**35.6**	R
1-Methylphenanthrene	832-69-9	**2.88**	**0.483 J-**	**18.2 J**	**0.444 J-**
C1-Phenanthrenes/Anthracenes	C1-P/A	**26.7**	**3.31 J-**	**116 J**	**2.32 J-**
C2-Phenanthrenes/Anthracenes	C2-P/A	**47.4**	**5.57 J-**	**43.8 J**	**2.43 J-**
C3-Phenanthrenes/Anthracenes	C3-P/A	**35.6**	**6.35 J-**	**12.7 J**	**1.74 J-**
C4-Phenanthrenes/Anthracenes	C4-P/A	26.4 U	**3.69 J-**	4.13 U	**0.624 J-**
Fluoranthene	206-44-0	**12.5**	**0.890 J-**	**35.3 J**	**0.131 J-**
Pyrene	129-00-0	**27.8**	**1.36 J-**	**47.7**	**0.154 J-**
C1-Fluoranthenes/Pyrenes	C1-F/P	**45.6**	**2.59 J-**	**45.6 J**	**0.265 J-**
C2-Fluoranthenes/Pyrenes	C2-C/PA	**34.0**	**2.23 J-**	**11.4 J**	**0.204 J-**
C3-Fluoranthenes/Pyrenes	C3-C/PA	**19.0**	**1.28 J-**	**2.99**	R
C4-Fluoranthenes/Pyrenes	C4-C/PA	26.4 U	R	4.13 U	R
Chrysene	218-01-9	**31.9**	**0.732 J-**	**15.8 J**	**0.0693 J-**
Benz(a)anthracene	56-55-3	**17.5**	**0.617 J-**	**17.4 J**	**0.0595 J-**
C1-Chrysenes/Benz(a)anthracenes	C1-C/BA	**43.5**	**1.49 J-**	**17.7 J**	R
C2-Chrysenes/Benz(a)anthracenes	C2-C/BA	**23.6**	**2.00 J-**	**6.21**	R
C3-Chrysenes/Benz(a)anthracenes	C3-C/BA	**13.7**	**2.04 J-**	**2.94**	R
C4-Chrysenes/Benz(a)anthracenes	C4-C/BA	26.4 U	R	4.13 U	R

Table 4
Soil Low-Level Polycyclic Aromatic Hydrocarbon and Homolog Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Sampling Location, Field Sample ID, Sampling Date, Lab SDG			
		WB6 WB6-(4-4.5)-230615 6/15/2023 A3F1267	WB-11 WB-11-(8-9)-231219 12/19/2023 A3L1589	WB12 WB12-(22.5-23)-231215 12/15/2023 A3L1381	WMW18 WMW18-(14-14.5)-231215 12/15/2023 A3L1381
Benzo(b)fluoranthene	205-99-2	**41.3**	**0.539 J-**	**9.92 J**	**0.0518 J-**
Benzo(k)fluoranthene	207-08-9	**12.8**	**0.280 J-**	**3.54 J**	R
Benzo(a)pyrene	50-32-8	**14.6**	**0.723 J-**	**14.5 J**	**0.0552 J-**
Benzo(e)pyrene	192-97-2	**28.8**	**0.414 J-**	**6.05 J**	**0.0237 J-**
Perylene	198-55-0	**2.99**	**0.135 J-**	**2.47**	R
Indeno(1,2,3-cd)pyrene	193-39-5	**21.1**	**0.233 J-**	**3.84 J**	R
Dibenz(a,h)anthracene	53-70-3	**5.40**	R	**1.07**	R
Benzo(g,h,i)perylene	191-24-2	**20.2**	**0.239 J-**	**4.07 J**	R
1,1'-Biphenyl	92-52-4	2.64 U	**0.162 J-**	**24.2**	R
2,6-Dimethylnaphthalene	581-42-0	**2.53**	**0.601 J-**	**50.6**	**3.09 J-**
1,6,7-Trimethylnaphthalene	2245-38-7	**1.80**	**0.376 J-**	**14.4 J**	**2.04 J-**

Notes:

Bold text indicates detected analyte**.**

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

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity and the result may be biased low.

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

Acronyms/Abbreviations:

CAS = Chemical Abstracts Service

EPA = US Environmental Protection Agency

ID = identification

Lab = laboratory

mg/kg = milligrams per kilogram

PAH = polycyclic aromatic hydrocarbon

SDG = sample delivery group

Table 5
Groundwater Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Field Sample ID, Sampling Date, Lab SDG, Sample Type													
		WB8-230621	WB-11-231219	WMW1			WMW2			WMW3			WMW4		
		6/21/2023	12/19/2023	7/18/2023	10/11/2023	1/9/2024	7/17/2023	10/11/2023	1/9/2024	7/18/2023	10/11/2023	1/9/2024	7/18/2023	10/11/2023	1/9/2024
		A3F1466	A3L1589	A3G1203	A3J1320	A4A1106	A3G1203	A3J1320	A4A1106	A3G1203	A3J1320	A4A1106	A3G1203	A3J1320	A4A1106
		N	N	N	N	N	N	N	N	N	N	N	N	N	N
Forensic Chemistry															
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	--	--	--	--	--	--	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**
General Chemistry															
Free Cyanide (µg/L; ASTM D7237-15A)	5.0	--	5.00 U	**38.7**	**114 J-EC**	**139 J-EC**	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Total Petroleum Hydrocarbons (µg/L; NWTPH-Dx/-Gx)															
Gasoline-Range Organics	800	**16,400**	**40,100**	**252**	**98.4 J**	**117**	100 U	100 U	100 U	**306**	**1,020**	**531**	**2,670**	**4,480**	**2,840**
Diesel-Range Organics	500	**482,000**	**10,100 J**	**41.2 J**	**44.8 J-**	**69.7 J**	76.2 U	75.5 U	77.7 U	**388 J**	**647**	**513**	**685 J**	**1,710**	**1,410**
Residual-Range Organics	500	8,000 U	176 U	152 U	R	155 U	152 U	151 U	155 U	152 U	154 U	155 U	155 U	151 U	155 U
Volatiles (µg/L; SW-846 8260D)															
Benzene	0.44	**45.0**	**21.5**	**36.8**	**8.66**	**13.3**	0.200 U	0.200 U	**0.170 J**	**5.39**	**23.5**	**3.39**	**120**	**175**	**107**
Ethylbenzene	12	**64.5**	**831**	**3.51**	**1.44**	**2.50**	0.500 U	0.500 U	0.500 U	**0.420 J**	**3.17**	**0.890**	**10.2**	**43.7**	**8.92**
Toluene	53	50.0 U	**294**	**1.05**	**0.550 J**	**0.510 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**1.26**	**1.66**	**1.12**
Xylenes, Total	57	**242**	**1,370**	**5.39**	**2.07**	**3.26**	1.50 U	1.50 U	1.50 U	**3.44**	**8.78**	**6.76**	**29.5**	**63.0**	**44.8**
Semivolatiles (µg/L; SW-846 8270E)															
1-Methylnaphthalene	1.5	--	**453**	**0.987**	**0.645**	**1.27**	0.0381 UJ	0.0381 UJ	**0.0291 J**	**8.56 J-**	**22.3**	**21.8**	**80.2**	**87.5**	**77.8**
2-Methylnaphthalene	32	--	**538**	**0.105**	**0.0420**	**0.0716**	0.0381 UJ	0.0381 UJ	0.0385 U	**3.57 J-**	**8.23**	**13.8**	**37.8**	**56.0**	**50.7**
Acenaphthene	30	--	15.6 U	**0.148**	**0.103**	**0.168**	0.0190 UJ	0.0190 UJ	**0.0186 J**	**3.34 J-**	**7.34**	**7.12**	27.8 U	**30.8**	**26.0**
Acenaphthylene	NL	--	**151**	**0.370**	**0.279**	**0.381**	0.0190 UJ	0.0190 UJ	0.0192 U	0.208 UJ	0.309 U	0.274 U	1.44 U	1.43 U	1.25 U
Anthracene	100	--	**7.91**	**0.0401**	**0.0419**	**0.0414**	0.0190 UJ	0.0190 UJ	0.0192 U	**0.466 J-**	**0.752**	**0.809**	**2.50**	**2.59**	**2.46**
Benzo(a)anthracene	0.1	--	**0.999**	**0.0290**	**0.0363**	**0.0418**	0.0190 UJ	0.0190 UJ	0.0192 U	**0.140 J-**	**0.173 J**	**0.173 J**	**0.231**	**0.284 J**	**0.300 J**
Benzo(a)pyrene	0.1	--	**0.957**	0.0286 U	0.0286 U	**0.0190 J**	0.0286 UJ	0.0286 UJ	0.0288 U	0.312 UJ	0.309 U	0.411 U	0.309 U	0.612 U	0.750 U
Benzo(b)fluoranthene	0.1	--	**0.681**	0.0286 U	0.0286 U	0.0288 U	0.0286 UJ	0.0286 UJ	0.0288 U	0.312 UJ	0.309 U	0.411 U	0.309 U	0.612 U	0.750 U
Benzo(g,h,i)perylene	NL	--	**0.366**	0.0190 U	0.0190 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U	0.208 UJ	0.206 U	0.274 U	0.206 U	0.408 U	0.500 U
Benzo(k)fluoranthene	0.1	--	**0.302 J**	0.0286 U	0.0286 U	0.0288 U	0.0286 UJ	0.0286 UJ	0.0288 U	0.312 UJ	0.309 U	0.411 U	0.309 U	0.612 U	0.750 U
Chrysene	0.1	--	**0.963**	**0.0301**	**0.0346**	**0.0397**	0.0190 UJ	0.0190 UJ	0.0192 U	**0.106 J-**	**0.125 J**	0.274 U	**0.205 J**	0.408 U	0.500 U
Dibenzo(a,h)anthracene	0.1	--	0.222 U	0.0190 U	0.0190 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U	0.208 UJ	0.206 U	0.274 U	0.206 U	0.408 U	0.500 U
Dibenzofuran	1.2	--	**12.1**	**0.0284**	**0.0214**	**0.0295**	0.0190 UJ	0.0190 UJ	0.0192 U	**0.235 J-**	**0.420**	**0.417**	**1.60**	**1.85**	**1.60**
Fluoranthene	6.0	--	**3.09**	**0.0685**	**0.0917**	**0.0781**	0.0190 UJ	0.0190 UJ	0.0192 U	**0.706 J-**	**0.734**	**0.766**	**1.78**	**1.76**	**1.68**
Fluorene	10	--	**34.3**	**0.170**	**0.134**	**0.177**	0.0190 UJ	0.0190 UJ	0.0192 U	**1.23 J-**	**2.64**	**2.73**	**10.6**	**11.0**	**9.81**
Indeno(1,2,3-cd)pyrene	0.1	--	**0.235**	0.0190 U	0.0190 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U	0.208 UJ	0.206 U	0.274 U	0.206 U	0.408 U	0.500 U
Naphthalene	8.9	--	**2,890**	**2.86**	**0.208**	**3.43**	0.0381 UJ	0.0381 UJ	**0.0323 J**	**8.23 J-**	**26.9**	**16.7**	**121**	**158**	**92.8**
Phenanthrene	NL	--	**29.8**	**0.141**	**0.144**	**0.176**	0.0190 UJ	0.0190 UJ	0.0192 U	**2.26 J-**	**3.71**	**3.91**	**12.2**	**13.6**	**12.2**
Pyrene	8.0	--	**4.76**	**0.109**	**0.145**	**0.129**	0.0190 UJ	0.0190 UJ	**0.0105 J**	**1.03 J-**	**1.04**	**1.04**	**2.45**	**2.42**	**2.30**
cPAH TEQ (b)	0.2	--	**1.20 J**	**0.022**	**0.023**	**0.0284 J**	0.020 UJ	0.020 UJ	0.0202 U	**0.223 J-**	**0.225 J**	**0.293 J**	**0.231 J**	**0.438 J**	**0.533 J**
Dissolved Metals (µg/L; SW-846 6020B)															
Arsenic	0.058	--	**0.530 J**	**1.34**	**1.49**	**1.32**	1.00 U	1.00 U	1.00 U	**3.23**	**2.39**	**3.04**	**3.27**	**3.64**	**4.70**
Barium	3,200	--	**97.4**	**24.6**	**13.8**	**17.9**	**57.2**	**57.7**	**93.5**	**548**	**534**	**561**	**506**	**482**	**522**
Cadmium	NL	--	**0.104 J**	0.200 U	0.200 U	0.200 U	**0.184 J**	**0.185 J**	**0.420**	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Chromium, Total	50	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Lead	15	--	0.200 U	0.200 U	0.200 U	0.200 U	**0.133 J**	0.200 U	**0.376**	**2.83**	**0.359**	0.200 U	0.200 U	**0.220**	0.200 U
Mercury	2.0	--	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U
Selenium	80	--	1.00 U	1.00 U	1.00 U	1.00 U	**1.37**	**1.09**	**0.593 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver	80	--	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

Table 5
Groundwater Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Field Sample ID, Sampling Date, Lab SDG, Sample Type										
		WMW5			WMW6					WMW7		
		7/17/2023 A3G1203 N	10/11/2023 A3J1320 N	1/10/2024 A4A1185 N	7/18/2023 A3G1203 N	7/18/2023 A3G1203 FD	10/12/2023 A3J1320 N	10/12/2023 A3J1320 FD	1/10/2024 A4A1185 N	7/17/2023 A3G1203 N	10/11/2023 A3J1320 N	1/10/2024 A4A1185 N
Forensic Chemistry												
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	**Coal Tar/MGP Waste**	--	**Polar/Semi-Polar UCM**	--	**Polar/Semi-Polar UCM**	--	--	--
General Chemistry												
Free Cyanide (µg/L; ASTM D7237-15A)	5.0	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	**290 J-EC**	**735 J-EC**	**470**
Total Petroleum Hydrocarbons (µg/L; NWTPH-Dx/-Gx)												
Gasoline-Range Organics	800	100 U	100 U	100 U	**724 J**	**1,050 J**	**271**	**278**	**498**	100 U	100 U	100 U
Diesel-Range Organics	500	**125 J**	**359**	**204**	**295 J**	**408 J**	**335**	**373**	**215**	81.6 U	**52.7 J-**	76.2 U
Residual-Range Organics	500	155 U	154 U	154 U	152 U	152 U	154 U	154 U	154 U	163 U	R	152 U
Volatiles (µg/L; SW-846 8260D)												
Benzene	0.44	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	**0.280**	0.200 U	0.200 U	0.200 U
Ethylbenzene	12	0.500 U	0.500 U	0.500 U	**4.39 J**	**7.96 J**	**1.00**	**0.840**	**5.58**	0.500 U	0.500 U	0.500 U
Toluene	53	1.00 U	1.00 U	1.00 U	**11.4 J**	**16.2 J**	**8.75**	**7.50**	**51.2**	1.00 U	1.00 U	1.00 U
Xylenes, Total	57	1.50 U	1.50 U	1.50 U	**38.2 J**	**57.8 J**	**16.8**	**14.2**	**61.5**	1.50 U	1.50 U	1.50 U
Semivolatiles (µg/L; SW-846 8270E)												
1-Methylnaphthalene	1.5	0.0385 UJ	**0.0432**	R	**8.87 J**	**14.5 J**	**6.31 J-**	**7.39**	**0.117 J-**	0.0385 U	0.0381 UJ	R
2-Methylnaphthalene	32	0.0385 UJ	**0.0349 J**	R	**6.15 J**	**11.2 J**	**5.10 J**	**6.45 J**	R	0.0385 U	0.0381 UJ	R
Acenaphthene	30	0.0192 UJ	**0.0124 J**	R	0.667 U	1.05 U	**0.435 J-**	**0.438**	**0.0841 J-**	0.0192 U	0.0190 UJ	R
Acenaphthylene	NL	0.0192 UJ	0.0190 U	R	**3.70 J**	**5.90 J**	**3.58 J-**	**3.83**	**0.338 J-**	0.0192 U	0.0190 UJ	R
Anthracene	100	**0.0429 J-**	**0.0293**	R	**1.08 J**	**1.51 J**	**0.773 J-**	**0.785**	**0.0652 J-**	0.0192 U	0.0190 UJ	R
Benzo(a)anthracene	0.1	0.0192 UJ	0.0190 U	R	**0.178 J**	**0.245**	**0.102 J-**	**0.0990 J**	R	0.0192 U	0.0190 UJ	R
Benzo(a)pyrene	0.1	0.0288 UJ	0.0286 U	R	0.286 U	**0.153 J**	0.283 UJ	0.286 U	R	0.0288 U	0.0286 UJ	R
Benzo(b)fluoranthene	0.1	0.0288 UJ	0.0286 U	R	0.286 U	0.286 U	0.283 UJ	0.286 U	R	0.0288 U	0.0286 UJ	R
Benzo(g,h,i)perylene	NL	0.0192 UJ	0.0190 U	R	0.190 U	0.190 U	0.189 UJ	0.190 U	R	0.0192 U	0.0190 UJ	R
Benzo(k)fluoranthene	0.1	0.0288 UJ	0.0286 U	R	0.286 U	0.286 U	0.283 UJ	0.286 U	R	0.0288 U	0.0286 UJ	R
Chrysene	0.1	0.0192 UJ	0.0190 U	R	**0.167 J**	**0.223**	0.189 UJ	0.190 U	R	0.0192 U	0.0190 UJ	R
Dibenzo(a,h)anthracene	0.1	0.0192 UJ	0.0190 U	R	0.190 U	0.190 U	0.189 UJ	0.190 U	R	0.0192 U	0.0190 UJ	R
Dibenzofuran	1.2	0.0192 UJ	0.0190 U	R	**0.414 J**	**0.678 J**	**0.343 J-**	**0.354**	R	0.0192 U	0.0190 UJ	R
Fluoranthene	6.0	0.0192 UJ	0.0190 U	R	**0.628 J**	**1.33 J**	**0.609 J-**	**0.579**	**0.216 J-**	0.0192 U	0.0190 UJ	R
Fluorene	10	0.0192 UJ	0.0190 U	R	**2.13 J**	**3.36 J**	**1.64 J-**	**1.68**	**0.108 J-**	0.0192 U	0.0190 UJ	R
Indeno(1,2,3-cd)pyrene	0.1	0.0192 UJ	0.0190 U	R	0.190 U	0.190 U	0.189 UJ	0.190 U	R	0.0192 U	0.0190 UJ	R
Naphthalene	8.9	0.0385 UJ	**0.117**	R	**13.4 J**	**32.7 J**	**13.0 J**	**16.8 J**	**0.119 J-**	0.0385 U	**0.0277 J-**	R
Phenanthrene	NL	0.0192 UJ	0.0190 U	R	**2.10 J**	**3.17 J**	**2.11 J-**	**2.27**	R	0.0192 U	0.0190 UJ	R
Pyrene	8.0	0.0192 UJ	0.0190 U	R	**0.930 J**	**1.83 J**	**0.810 J-**	**0.759**	**0.391 J-**	0.0192 U	0.0190 UJ	R
cPAH TEQ (b)	0.2	0.020 UJ	0.020 U	NC (c)	**0.210 J**	**0.227 J**	**0.210 J-**	**0.201 J**	NC (c)	0.020 U	0.020 UJ	NC (c)
Dissolved Metals (µg/L; SW-846 6020B)												
Arsenic	0.058	**0.557 J**	**0.920 J**	**0.739 J**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**4.06**	**2.72**	**2.22**
Barium	3,200	**32.3**	**26.4**	**26.3**	**36.2**	**37.5**	**45.2**	**44.7**	**47.3**	**8.21**	**3.48**	**3.05**
Cadmium	NL	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	**0.180 J**
Chromium, Total	50	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	**1.25 J**	2.00 U	2.00 U
Lead	15	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	**1.23**	0.200 U	0.200 U
Mercury	2.0	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U
Selenium	80	1.00 U	1.00 U	1.00 U	**1.55**	**1.64**	**1.24**	**1.13**	**1.50**	1.00 U	1.00 U	1.00 U
Silver	80	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

Table 5
Groundwater Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Field Sample ID, Sampling Date, Lab SDG, Sample Type												
		WMW8				WMW9			WMW10			WMW11		
		7/18/2023 A3G1203 N	10/12/2023 A3J1320 N	1/10/2024 A4A1185 N	1/10/2024 A4A1185 FD	7/18/2023 A3G1203 N	10/12/2023 A3J1320 N	1/9/2024 A4A1106 N	7/18/2023 A3G1203 N	10/12/2023 A3J1320 N	1/9/2024 A4A1106 N	7/17/2023 A3G1203 N	10/11/2023 A3J1320 N	1/9/2024 A4A1106 N
Forensic Chemistry														
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	**Coal Tar/MGP Waste**	--	--	--	--	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	--	--	--
General Chemistry														
Free Cyanide (µg/L; ASTM D7237-15A)	5.0	5.00 U	5.00 U	5.00 U	5.00 U	**158 J-EC**	**695 J-EC**	**287 J-EC**	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Total Petroleum Hydrocarbons (µg/L; NWTPH-Dx/-Gx)														
Gasoline-Range Organics	800	**24,100**	**33,600**	**28,300**	**33,700**	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Diesel-Range Organics	500	**6,270 J**	**9,230**	**7,390 J**	**6,810 J**	76.2 U	**92.4 J-**	**101**	**173 J**	**195**	**137**	76.2 U	76.9 U	77.7 U
Residual-Range Organics	500	152 U	154 U	151 U	154 U	152 U	R	155 U	152 U	154 U	154 U	152 U	154 U	155 U
Volatiles (µg/L; SW-846 8260D)														
Benzene	0.44	**68.0**	**13.7**	**28.1**	**29.6**	**3.59**	**3.16**	**1.25**	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Ethylbenzene	12	**466**	**462**	**566**	**540**	**0.530**	**0.330 J**	**0.260 J**	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Toluene	53	**69.5**	**25.9**	**28.6**	**31.4**	**1.17**	**1.05**	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Xylenes, Total	57	**542**	**496**	**618**	**624**	1.50 U	1.50 U	1.50 U	1.50 U	1.50 U	1.50 U	1.50 U	1.50 U	1.50 U
Semivolatiles (µg/L; SW-846 8270E)														
1-Methylnaphthalene	1.5	**468**	**369**	**428 J-**	**358 J-**	**0.0388**	**0.155 J-**	0.0385 U	**0.0810**	0.0377 U	0.0385 U	0.0381 UJ	0.0381 UJ	**0.0216 J**
2-Methylnaphthalene	32	**292**	**252**	**283 J-**	**259 J-**	**0.0313 J**	**0.0837 J-**	0.0385 U	**0.0500**	0.0377 U	0.0385 U	0.0381 UJ	0.0381 UJ	0.0385 U
Acenaphthene	30	**102**	**99.3**	**104 J-**	**96.0 J-**	**0.0206**	**0.0415 J-**	0.0192 U	**0.0226**	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Acenaphthylene	NL	**33.1**	**25.4**	**27.3 J-**	**25.0 J-**	0.0190 U	**0.0118 J-**	0.0192 U	**0.0252**	**0.0186 J**	**0.0117 J**	0.0190 UJ	0.0190 UJ	0.0192 U
Anthracene	100	**9.40**	**7.41**	**8.01 J-**	**7.60 J-**	0.0190 U	0.0190 UJ	0.0192 U	**0.0481**	**0.0190**	**0.0163 J**	0.0190 UJ	0.0190 UJ	0.0192 U
Benzo(a)anthracene	0.1	0.833 U	5.05 U	R	R	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Benzo(a)pyrene	0.1	1.25 U	7.58 U	R	R	0.0286 U	0.0286 UJ	0.0288 U	0.0286 U	0.0283 U	0.0288 U	0.0286 UJ	0.0286 UJ	0.0288 U
Benzo(b)fluoranthene	0.1	1.25 U	7.58 U	R	R	0.0286 U	0.0286 UJ	0.0288 U	0.0286 U	0.0283 U	0.0288 U	0.0286 UJ	0.0286 UJ	0.0288 U
Benzo(g,h,i)perylene	NL	0.833 U	5.05 U	R	R	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Benzo(k)fluoranthene	0.1	1.25 U	7.58 U	R	R	0.0286 U	0.0286 UJ	0.0288 U	0.0286 U	0.0283 U	0.0288 U	0.0286 UJ	0.0286 UJ	0.0288 U
Chrysene	0.1	0.833 U	5.05 U	R	R	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Dibenzo(a,h)anthracene	0.1	0.833 U	5.05 U	R	R	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Dibenzofuran	1.2	**8.45**	**6.21**	**7.08 J-**	**6.54 J-**	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Fluoranthene	6.0	**3.25**	5.05 U	**2.86 J-**	**2.72 J-**	0.0190 U	0.0190 UJ	0.0192 U	**0.0223**	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Fluorene	10	**42.8**	**34.9**	**38.6 J-**	**35.7 J-**	**0.0108 J**	**0.0251 J-**	**0.0116 J**	**0.0140 J**	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Indeno(1,2,3-cd)pyrene	0.1	0.833 U	5.05 U	R	R	0.0190 U	0.0190 UJ	0.0192 U	0.0190 U	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Naphthalene	8.9	**2,990**	**2,990**	**2,630 J-**	**2,310 J-**	**0.103**	**0.670 J-**	0.0385 U	**0.386**	**0.0770**	0.0385 U	0.0381 UJ	0.0381 UJ	**0.0380 J**
Phenanthrene	NL	**46.4**	**40.5**	**41.6 J-**	**38.7 J-**	**0.0109 J**	**0.0195 J-**	0.0192 U	**0.0147 J**	0.0189 U	0.0192 U	0.0190 UJ	0.0190 UJ	0.0192 U
Pyrene	8.0	**4.00**	**3.11 J**	**3.47 J-**	**3.30 J-**	0.0190 U	0.0190 UJ	0.0192 U	**0.0185 J**	0.0189 U	**0.0154 J**	0.0190 UJ	0.0190 UJ	0.0192 U
cPAH TEQ (b)	0.2	0.879 U	5.33 U	NC (c)	NC (c)	0.020 U	0.020 UJ	0.0203 U	0.020 U	0.020 U	0.0203 U	0.020 UJ	0.020 UJ	0.0203 U
Dissolved Metals (µg/L; SW-846 6020B)														
Arsenic	0.058	**6.34**	**7.97**	**8.42**	**8.33**	**3.83**	**2.92**	**3.77**	**1.59**	**1.45**	**0.958 J**	1.00 U	1.00 U	1.00 U
Barium	3,200	**130**	**155**	**165**	**169**	**2.33**	**1.05**	**0.886 J**	**16.1**	**17.1**	**40.1**	**25.4**	**31.5**	**30.3**
Cadmium	NL	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	**0.106 J**	0.200 U
Chromium, Total	50	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	**1.60 J**	2.00 U	2.00 U	2.00 U
Lead	15	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	**0.578**	**0.677**	**0.416**
Mercury	2.0	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U
Selenium	80	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	**0.515 J**	**0.560 J**	**1.66**	1.00 U	1.00 U	1.00 U
Silver	80	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

Table 5
Groundwater Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Project Screening Level (a)	Field Sample ID, Sampling Date, Lab SDG, Sample Type							
		WMW12		WMW13	WMW14	WMW15	WMW16	WMW17	WMW18
		10/12/2023 A3J1320 N	1/11/2024 A4A1185 N	1/11/2024 A4A1185 N	1/11/2024 A4A1185 N	1/8/2024 A4A1106 N	1/8/2024 A4A1106 N	1/11/2024 A4A1185 N	1/10/2024 A4A1185 N
Forensic Chemistry									
GC Characterization (ASTM D2887-14) or Chromatogram Analysis	NL	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	--	**R-99 Biodiesel**	**Polar/Semi-Polar UCM**	**Polar/Semi-Polar UCM**	**Coal Tar/MGP Waste**	**Polar/Semi-Polar UCM**
General Chemistry									
Free Cyanide (µg/L; ASTM D7237-15A)	5.0	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Total Petroleum Hydrocarbons (µg/L; NWTPH-Dx/-Gx)									
Gasoline-Range Organics	800	100 U	100 U	100 U	**153**	100 U	100 U	**21,500**	**101**
Diesel-Range Organics	500	**1,430**	**2,450**	**71.7 J**	**581**	**129**	**1,170**	**3,530 J**	**1,710**
Residual-Range Organics	500	154 U	154 U	154 U	154 U	152 U	154 U	154 U	151 U
Volatiles (µg/L; SW-846 8260D)									
Benzene	0.44	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	**0.110 J**	**88.5**	**0.470**
Ethylbenzene	12	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	**548**	0.500 U
Toluene	53	1.00 U	1.00 U	**2.61**	1.00 U	1.00 U	**1.41**	**518**	**2.34**
Xylenes, Total	57	1.50 U	1.50 U	**0.840 J**	1.50 U	1.50 U	1.50 U	**718**	**1.62**
Semivolatiles (µg/L; SW-846 8270E)									
1-Methylnaphthalene	1.5	0.381 U	0.769 U	0.0385 U	**0.292 J**	0.0385 UJ	0.385 UJ	**165**	R
2-Methylnaphthalene	32	0.381 U	0.769 U	0.0385 U	**0.252 J**	0.0385 U	0.385 U	**180**	R
Acenaphthene	30	**0.174 J**	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	**18.6**	R
Acenaphthylene	NL	**0.360**	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	**50.4**	R
Anthracene	100	**0.409**	0.385 U	0.0192 U	0.189 U	**0.0441**	**0.123 J**	**2.03**	R
Benzo(a)anthracene	0.1	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	1.96 U	R
Benzo(a)pyrene	0.1	0.286 U	0.577 U	0.0288 U	0.283 U	0.0288 U	0.288 U	2.94 U	R
Benzo(b)fluoranthene	0.1	0.286 U	0.577 U	0.0288 U	0.283 U	0.0288 U	0.288 U	2.94 U	R
Benzo(g,h,i)perylene	NL	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	1.96 U	R
Benzo(k)fluoranthene	0.1	0.286 U	0.577 U	0.0288 U	0.283 U	0.0288 U	0.288 U	2.94 U	R
Chrysene	0.1	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	1.96 U	R
Dibenzo(a,h)anthracene	0.1	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	1.96 U	R
Dibenzofuran	1.2	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	**3.73**	R
Fluoranthene	6.0	**0.218**	0.385 U	**0.0162 J**	0.189 U	0.0192 U	0.192 U	1.96 U	R
Fluorene	10	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	**17.0**	R
Indeno(1,2,3-cd)pyrene	0.1	0.190 U	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	1.96 U	R
Naphthalene	8.9	0.381 U	0.769 U	**0.0687**	**1.82**	**0.0580**	0.385 U	**1,300**	**0.577 J-**
Phenanthrene	NL	**1.29**	0.385 U	0.0192 U	0.189 U	0.0192 U	0.192 U	**18.9**	R
Pyrene	8.0	**0.305**	0.385 U	**0.0227**	0.189 U	0.0192 U	0.192 U	1.96 U	R
cPAH TEQ (b)	0.2	0.020 U	0.406 U	0.0203 U	0.199 U	0.0203 U	0.203 U	2.07 U	NC (c)
Dissolved Metals (µg/L; SW-846 6020B)									
Arsenic	0.058	**0.596 J**	**1.16**	**1.78**	1.00 U	1.00 U	**1.32**	**1.44**	**1.60**
Barium	3,200	**184**	**240**	**69.3**	**120**	**55.6**	**98.3**	**89.9**	**118**
Cadmium	NL	0.200 U	0.200 U	**0.285**	0.200 U	0.200 U	0.200 U	0.200 U	**0.102 J**
Chromium, Total	50	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Lead	15	0.200 U	0.200 U	**0.131 J**	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Mercury	2.0	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U	0.0800 U
Selenium	80	1.00 U	1.00 U	**5.23**	1.00 U	**0.663 J**	1.00 U	1.00 U	**1.24**
Silver	80	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U

Table 5
Groundwater Analytical Results
Worthen Substation Site – Wenatchee, Washington

Notes:

(a) Project screening levels from Quality Assurance Project Plan, Chelan Public Utility District Substation Site, 500 South Worthen Street, Wenatchee, Washington (Landau, June 2023).
(b) cPAH TEQs were calculated following WAC 173-340-708(8)(e)(iii)(A)(II) and using a value of 1/2 reporting limit for non-detected analytes.
(c) cPAH TEQs were not calculated for samples where one or more cPAH analyte was rejected during the data validation process.
(d) Total PAHs are calculated for shoreline wells (WMW-1, WMW-2, WMW-3, WMW-4, and WMW-11) per WAC 173-204-564 2(h). Analytes detected below the sample quantitation limite are not included in the calculation.
Bold text indicates detected analyte.
Blue shading indicates detected exceedance of associated screening level.
Purple shading indicates non-detect reporting limit exceedance of associated screening level.
Red Border = Chromatograms indicate presence of coal tar/MGP waste in groundwater.
Green Border = Chromatograms indicate presence of a polar/ semi-polar UCM in groundwater.
Purple Border = Chromatograms indicate presence of R-99 Biodiesel in groundwater.
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = The result is an estimated quantity and the result may be biased low.
J-EC = The result is an estimated quantity. The concentration detected in the sample exceeded the calibration range of the laboratory instrument.
UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
R = The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control criteria. The analyte may or may not be present in the sample.
-- = not analyzed

Acronyms/Abbreviations:

ASTM = ASTM International
cPAH = carcinogenic polycyclic aromatic hydrocarbon
FD = field duplicate
ID = identification
Lab = laboratory
µg/L = micrograms per liter
MGP = manufactured gas plant
N = primary sample
NL = not listed
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
SDG = sample delivery group
TEQ = toxicity equivalence
UCM = unresolved complex mixture
WAC = Washington Administrative Code

Table 6
Groundwater Forensic Volatiles, Gas-Specific TICs, and Oxygenates Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WMW1-230718 7/18/2023 A3G1203
Forensics Volatiles (µg/L; EPA 8260D)		
1,1,1,2-Tetrachloroethane	630-20-6	0.500 U
1,1,1-Trichloroethane	71-55-6	0.500 U
1,1,2,2-Tetrachloroethane	79-34-5	0.500 U
1,1,2-Trichloroethane	79-00-5	0.500 U
1,1-Dichloroethane	75-34-3	0.500 U
1,1-Dichloroethene	75-35-4	0.500 U
1,1-Dichloropropene	563-58-6	1.00 U
1,2,3-Trichlorobenzene	87-61-6	2.00 U
1,2,3-Trichloropropane	96-18-4	1.00 U
1,2,4-Trichlorobenzene	120-82-1	2.00 U
1,2,4-Trimethylbenzene	95-63-6	**0.640 J**
1,2-Dibromo-3-chloropropane	96-12-8	5.00 U
1,2-Dibromoethane (EDB)	106-93-4	0.500 U
1,2-Dichlorobenzene	95-50-1	0.500 U
1,2-Dichloroethane (EDC)	107-06-2	0.500 U
1,2-Dichloropropane	78-87-5	0.500 U
1,3,5-Trimethylbenzene	108-67-8	1.00 U
1,3-Dichlorobenzene	541-73-1	0.500 U
1,3-Dichloropropane	142-28-9	1.00 U
1,4-Dichlorobenzene	106-46-7	0.500 U
2,2-Dichloropropane	594-20-7	1.00 U
2-Butanone (MEK)	78-93-3	10.0 U
2-Chlorotoluene	95-49-8	1.00 U
2-Hexanone	591-78-6	10.0 U
4-Chlorotoluene	106-43-4	1.00 U
4-Isopropyltoluene	99-87-6	1.00 U
4-Methyl-2-pentanone (MiBK)	108-10-1	10.0 U
Acetone	67-64-1	20.0 U
Acrylonitrile	107-13-1	2.00 U
Benzene	71-43-2	**36.8**
Bromobenzene	108-86-1	0.500 U
Bromochloromethane	74-97-5	1.00 U
Bromodichloromethane	75-27-4	1.00 U
Bromoform	75-25-2	1.00 U
Bromomethane	74-83-9	5.00 U
Carbon disulfide	75-15-0	10.0 U
Carbon tetrachloride	56-23-5	1.00 U
Chlorobenzene	108-90-7	0.500 U
Chloroethane	75-00-3	5.00 U
Chloroform	67-66-3	1.00 U
Chloromethane	74-87-3	5.00 U
cis-1,2-Dichloroethene	156-59-2	0.500 U

Table 6
Groundwater Forensic Volatiles, Gas-Specific TICs, and Oxygenates Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WMW1-230718 7/18/2023 A3G1203
cis-1,3-Dichloropropene	10061-01-5	1.00 U
Dibromochloromethane	124-48-1	1.00 U
Dibromomethane	74-95-3	1.00 U
Dichlorodifluoromethane	75-71-8	1.00 U
Ethylbenzene	100-41-4	**3.51**
Hexachlorobutadiene	87-68-3	5.00 U
Isopropylbenzene	98-82-8	1.00 U
m,p-Xylene	179601-23-1	**2.75**
Methyl tert-butyl ether (MTBE)	1634-04-4	1.00 U
Methylene chloride	75-09-2	10.0 U
n-Butylbenzene	104-51-8	1.00 U
n-Propylbenzene	103-65-1	0.500 U
o-Xylene	95-47-6	**2.64**
sec-Butylbenzene	135-98-8	1.00 U
Styrene	100-42-5	1.00 U
tert-Butylbenzene	98-06-6	1.00 U
Tetrachloroethene (PCE)	127-18-4	0.500 U
Toluene	108-88-3	**1.05**
trans-1,2-Dichloroethene	156-60-5	0.500 U
trans-1,3-Dichloropropene	10061-02-6	1.00 U
Trichloroethene (TCE)	79-01-6	0.500 U
Trichlorofluoromethane	75-69-4	2.00 U
Vinyl chloride	75-01-4	0.500 U
Forensics Gas-Specific TICs (µg/L; EPA 8260D)		
2,3,3-Trimethylpentane	560-21-4	1.00 UJ
3-Methylhexane	589-34-4	1.00 UJ
Isooctane	540-84-1	1.00 UJ
Isopentane	78-78-4	**2.74 J**
Methylcyclohexane	108-87-2	1.00 UJ
n-Butane	106-97-8	**2.19 J**
n-Dodecane	112-40-3	5.00 UJ
n-Heptane	142-82-5	1.00 UJ
n-Octane	111-65-9	5.00 UJ
n-Pentane	109-66-0	**1.93 J**
Forensics Oxygenates (µg/L; EPA 8260D)		
Diisopropyl ether (DIPE)	108-20-3	0.500 U
Ethanol	64-17-5	125 U
Ethyl-tert-butyl ether (ETBE)	637-92-3	0.500 U
tert-Amyl methyl ether (TAME)	994-05-8	0.500 U
tert-Butanol (TBA)	75-65-0	100 U

Table 6
Groundwater Forensic Volatiles, Gas-Specific TICs, and Oxygenates Results
Worthen Substation Site – Wenatchee, Washington

Notes:

Bold text indicates detected analyte**.**

U = The analyte was analyzed for, but was not detected above the level of 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.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Acronyms/Abbreviations:

CAS = Chemical Abstracts Service
EPA = US Environmental Protection Agency
ID = identification
Lab = laboratory
µg/L = micrograms per liter
SDG = sample delivery group
TIC = tentatively identified compound

Table 7
Free Product Analytical and Forensic Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WB13-(FP)-231212 A3L1298 12/12/2023
Forensic Chemistry		
GC Characterization (ASTM D2887-14)	--	**Coal Tar/MGP Waste**
General Chemistry		
Total Cyanide (mg/kg; EPA 9013M/9012B)	57-12-5	0.0978 U
Water Soluble Forensics Petroleum Hydrocarbons (µg/L; NWTPH-Gx/-Dx)		
Gasoline-Range Organics	N/A	**83,700**
Diesel-Range Organics	N/A	**15,100**
Residual-Range Organics	N/A	800 U
SPLP Forensics Volatiles (µg/L; EPA 8260D)		
Benzene	71-43-2	**4,140**
Ethylbenzene	100-41-4	**2,160**
Toluene	108-88-3	**550**
m,p-Xylene	179601-23-1	**2,130**
o-Xylene	95-47-6	**1,210 J+**
Water Soluble Forensics Volatiles (µg/L; EPA 8260D)		
1,1,1,2-Tetrachloroethane	630-20-6	25.0 UJ
1,1,1-Trichloroethane	71-55-6	25.0 U
1,1,2,2-Tetrachloroethane	79-34-5	25.0 U
1,1,2-Trichloroethane	79-00-5	25.0 U
1,1-Dichloroethane	75-34-3	25.0 U
1,1-Dichloroethene	75-35-4	25.0 U
1,1-Dichloropropene	563-58-6	50.0 U
1,2,3-Trichlorobenzene	87-61-6	100 U
1,2,3-Trichloropropane	96-18-4	50.0 U
1,2,4-Trichlorobenzene	120-82-1	100 U
1,2,4-Trimethylbenzene	95-63-6	**319**
1,2-Dibromo-3-chloropropane	96-12-8	250 U
1,2-Dibromoethane (EDB)	106-93-4	25.0 U
1,2-Dichlorobenzene	95-50-1	25.0 U
1,2-Dichloroethane (EDC)	107-06-2	25.0 U
1,2-Dichloropropane	78-87-5	25.0 UJ
1,3,5-Trimethylbenzene	108-67-8	**92.5**
1,3-Dichlorobenzene	541-73-1	25.0 U
1,3-Dichloropropane	142-28-9	50.0 U
1,4-Dichlorobenzene	106-46-7	25.0 U
2,2-Dichloropropane	594-20-7	50.0 U
2-Butanone (MEK)	78-93-3	500 UJ
2-Chlorotoluene	95-49-8	50.0 U
2-Hexanone	591-78-6	500 UJ
4-Chlorotoluene	106-43-4	50.0 U
4-Isopropyltoluene	99-87-6	50.0 U
4-Methyl-2-pentanone (MiBK)	108-10-1	500 U
Acetone	67-64-1	1,000 UJ
Acrylonitrile	107-13-1	100 UJ

Table 7
Free Product Analytical and Forensic Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WB13-(FP)-231212 A3L1298 12/12/2023
Benzene	71-43-2	**6,260**
Bromobenzene	108-86-1	25.0 U
Bromochloromethane	74-97-5	50.0 U
Bromodichloromethane	75-27-4	50.0 U
Bromoform	75-25-2	50.0 U
Bromomethane	74-83-9	250 U
Carbon disulfide	75-15-0	500 U
Carbon tetrachloride	56-23-5	50.0 U
Chlorobenzene	108-90-7	25.0 U
Chloroethane	75-00-3	250 U
Chloroform	67-66-3	50.0 U
Chloromethane	74-87-3	250 UJ
cis-1,2-Dichloroethene	156-59-2	25.0 U
cis-1,3-Dichloropropene	10061-01-5	50.0 U
Dibromochloromethane	124-48-1	50.0 U
Dibromomethane	74-95-3	50.0 U
Dichlorodifluoromethane	75-71-8	50.0 U
Ethylbenzene	100-41-4	**2,690**
Hexachlorobutadiene	87-68-3	250 U
Isopropylbenzene	98-82-8	**77.5**
m,p-Xylene	179601-23-1	**2,650**
Methyl tert-butyl ether (MTBE)	1634-04-4	50.0 U
Methylene chloride	75-09-2	500 U
Naphthalene	91-20-3	**7,620**
n-Butylbenzene	104-51-8	50.0 U
n-Propylbenzene	103-65-1	**23.0**
o-Xylene	95-47-6	**1,450**
sec-Butylbenzene	135-98-8	50.0 U
Styrene	100-42-5	50.0 U
tert-Butylbenzene	98-06-6	50.0 U
Tetrachloroethene (PCE)	127-18-4	25.0 U
Toluene	108-88-3	**700**
trans-1,2-Dichloroethene	156-60-5	25.0 U
trans-1,3-Dichloropropene	10061-02-6	50.0 U
Trichloroethene (TCE)	79-01-6	25.0 U
Trichlorofluoromethane	75-69-4	100 U
Vinyl chloride	75-01-4	10.0 U
Water Soluble Forensics Gas-Specific TICs (µg/L; EPA 8260D)		
2,3,3-Trimethylpentane	560-21-4	50.0 UJ
3-Methylhexane	589-34-4	50.0 UJ
Isooctane	540-84-1	50.0 UJ
Isopentane	78-78-4	50.0 UJ
Methylcyclohexane	108-87-2	50.0 UJ
n-Butane	106-97-8	50.0 UJ
n-Dodecane	112-40-3	250 UJ

Table 7
Free Product Analytical and Forensic Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WB13-(FP)-231212 A3L1298 12/12/2023
n-Heptane	142-82-5	50.0 UJ
n-Octane	111-65-9	250 UJ
n-Pentane	109-66-0	50.0 UJ
Water Soluble Forensics Oxygenates (µg/L; EPA 8260D)		
Diisopropyl ether (DIPE)	108-20-3	25.0 UJ
Ethanol	64-17-5	6,250 UJ
Ethyl-tert-butyl ether (ETBE)	637-92-3	25.0 U
tert-Amyl methyl ether (TAME)	994-05-8	25.0 U
tert-Butanol (TBA)	75-65-0	5,000 U
SPLP Forensics Semivolatiles (µg/L; EPA 8270E)		
1-Methylnaphthalene	90-12-0	**666**
2-Methylnaphthalene	91-57-6	**922**
Naphthalene	91-20-3	**6,410**
Forensics 8270E LL PAH and Homologs (mg/kg; EPA 8270M)		
cis-Decalin	493-01-6	90.9 U
C1-Decalin	C1-D	**455**
C2-Decalin	C2-D	**843**
C3-Decalin	C3-D	**1,370**
C4-Decalin	C4-D	**1,000**
Naphthalene	91-20-3	**15,600**
1-Methylnaphthalene	90-12-0	**7,680**
2-Methylnaphthalene	91-57-6	**11,400**
C1-Naphthalenes	C1-N	**25,500**
C2-Naphthalenes	C2-N	**18,100**
C3-Naphthalenes	C3-N	**8,390**
C4-Naphthalenes	C4-N	**2,510**
Acenaphthene	83-32-9	**4,740**
Acenaphthylene	208-96-8	1,150 U
Dibenzofuran	132-64-9	**522**
Fluorene	86-73-7	**3,080**
C1-Fluorenes	C1-F	**3,060**
C2-Fluorenes	C2-F	**1,460**
C3-Fluorenes	C3-F	**756**
Dibenzothiophene	132-65-0	**743**
C1-Dibenzothiophene	C1-DBT	**662**
C2-Dibenzothiophene	C2-DBT	**661**
C3-Dibenzothiophene	C3-DBT	**365**
C4-Dibenzothiophene	C4-DBT	455 U
Phenanthrene	85-01-8	**7,470**
Anthracene	120-12-7	**2,430**
1-Methylphenanthrene	832-69-9	**1,380 J**
C1-Phenanthrenes/Anthracenes	C1-P/A	**9,020**
C2-Phenanthrenes/Anthracenes	C2-P/A	**4,270**
C3-Phenanthrenes/Anthracenes	C3-P/A	**1,620**
C4-Phenanthrenes/Anthracenes	C4-P/A	455 U

Table 7
Free Product Analytical and Forensic Results
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Field Sample ID, Sampling Date, Lab SDG WB13-(FP)-231212 A3L1298 12/12/2023
Fluoranthene	206-44-0	**2,600**
Pyrene	129-00-0	**3,650 J**
C1-Fluoranthenes/Pyrenes	C1-F/P	**3,770 J**
C2-Fluoranthenes/Pyrenes	C2-C/PA	**1,330**
C3-Fluoranthenes/Pyrenes	C3-C/PA	**337**
C4-Fluoranthenes/Pyrenes	C4-C/PA	455 U
Chrysene	218-01-9	**1,310**
Benz(a)anthracene	56-55-3	**1,330**
C1-Chrysenes/Benz(a)anthracenes	C1-C/BA	**1,460**
C2-Chrysenes/Benz(a)anthracenes	C2-C/BA	**606**
C3-Chrysenes/Benz(a)anthracenes	C3-C/BA	**352**
C4-Chrysenes/Benz(a)anthracenes	C4-C/BA	455 U
Benzo(b)fluoranthene	205-99-2	**830**
Benzo(k)fluoranthene	207-08-9	**320 J**
Benzo(a)pyrene	50-32-8	**1,260**
Benzo(e)pyrene	192-97-2	**517**
Perylene	198-55-0	**160**
Indeno(1,2,3-cd)pyrene	193-39-5	**371**
Dibenz(a,h)anthracene	53-70-3	**98.8**
Benzo(g,h,i)perylene	191-24-2	**366**
1,1'-Biphenyl	92-52-4	**1,670**
2,6-Dimethylnaphthalene	581-42-0	**4,500**
1,6,7-Trimethylnaphthalene	2245-38-7	**1,420 J**

Notes:

Bold text indicates detected analyte**.**

U = The analyte was analyzed for, but was not detected above the level of 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.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ = The result is an estimated quantity and the result may be biased high.

Abbreviations and Acronyms:

CAS = Chemical Abstracts Service
EPA = US Environmental Protection Agency
ID = identification
Lab = laboratory
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
N/A = not applicable
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
SDG = sample delivery group
SPLP = synthetic precipitation leaching procedure
TIC = tentatively identified compound

Table 8
Free Product Physical Parameter Analytical Results
Worthen Substation Site – Wenatchee, Washington

Analyte	Temperature (°F)	Field Sample ID, Laboratory ID, Sampling Date WB13-(FP)-231212 A240222008 12/12/2023
Kinematic Viscosity (cSt; ASTM D445)		
Kinematic Viscosity	50	**91.24**
	100	**23.80**
	200	**3.419**
	212	**2.938**
Density by Pycnometer (g/mL; ASTM D1475)		
Density	71	**1.0390**
	200	**1.0051**
	400	**0.7861**
Interfacial Tension (dynes/cm; ASTM D971)		
Interfacial Tension	--	**28.2000**

Abbreviations and Acronyms:

°F = degrees Fahrenheit
ASTM = ASTM International
cSt = centistokes
g/mL = grams per milliliter
ID = identification
dynes/cm = dynes per centimeter

Table 9
Groundwater Field Parameter Measurements
Worthen Substation Site – Wenatchee, Washington

Monitoring Well ID	Sampling Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH (SU)	Oxygen Reduction Potential (mV)	Turbidity (NTU)
WMW-1	7/18/2023	14.3	0.26	427.3	7.13	-152.3	8.98
	10/11/2023	14.5	0.12	331.1	7.15	-202.4	3.54
	1/9/2024	13.6	0.14	414.2	7.31	-105.6	2.72
WMW-2	7/17/2023	15.3	6.33	161.5	6.17	122.5	4.34
	10/11/2023	15.8	3.54	161.4	6.38	148.6	0.19
	1/9/2024	13.3	3.12	256.9	6.38	179.3	1.67
WMW-3	7/18/2023	16.7	0.26	784	6.57	-172.8	8.91
	10/11/2023	15.9	0.40	732	6.44	-219.8	1.24
	1/9/2024	15.3	1.36	885	6.54	-88.6	1.43
WMW-4	7/18/2023	16.0	0.27	771	6.57	-158.4	4.71
	10/11/2023	15.4	0.34	720	6.47	-184.4	1.4
	1/9/2024	14.7	1.02	909	6.55	-76.1	1.21
WMW-5	7/17/2023	19.7	9.89	8.1	5.39	118.7	3.76
	10/11/2023	14.6	0.59	817	6.61	4.2	0.28
	1/10/2024	13.8	1.12	867	6.68	137.6	0.32
WMW-6	7/18/2023	15.9	0.64	565	6.17	-4.3	4.73
	10/12/2023	16.1	0.32	666	6.95	-7.8	0.4
	1/10/2024	14.7	0.69	631	6.98	105.9	1.34
WMW-7	7/17/2023	16.0	0.19	486.4	7.96	-196.9	65.34
	10/11/2023	15.9	0.12	501	8.12	-230.3	4.28
	1/10/2024	13.4	0.13	493.8	8.17	-69.6	3.01
WMW-8	7/18/2023	16.8	0.42	754	6.47	-142.7	4.99
	10/12/2023	17.2	0.80	918	6.37	-160.3	3.56
	1/10/2024	15.8	2.44	917	6.48	-53.8	4.42
WMW-9	7/18/2023	16.2	2.07	359.6	8.14	-127.9	22.21
	10/12/2023	17.0	0.10	352	8.10	-259.7	3.23
	1/9/2024	12.3	0.19	275.6	8.45	-64.3	3.78
WMW-10	7/18/2023	16.9	1.23	777	6.96	-0.2	4.97
	10/12/2023	17.7	0.60	939	6.82	-55.3	0.99
	1/9/2024	15.4	2.41	833	6.79	204.8	0.33
WMW-11	7/17/2023	15.5	5.61	171.3	6.34	168.4	4.49
	10/11/2023	15.8	3.09	179.3	6.75	136.5	1.45
	1/9/2024	12.3	5.19	158.4	6.60	163.4	2.25
WMW-12	10/12/2023	16.8	2.37	867	6.51	63	4.23
	1/11/2024	14.2	1.29	907	6.67	146.1	0.21
WMW-13	1/11/2024 (a)	12.2	1.98	910	7.36	163.0	1.92
WMW-14	1/11/2024	13.8	2.68	658	6.35	182.3	1.32
WMW-15	1/8/2024	12.8	1.25	566	7.15	146.1	0.00
WMW-16	1/8/2024	12.4	0.57	642	7.16	-152.3	2.53
WMW-17	1/11/2024	13.6	0.62	825	7.21	-64.5	2.01
WMW-18	1/10/2024	12.7	2.27	911	6.71	119.8	2.67

Notes:

(a) Monitoring well ran dry and sample collected prior to parameter stabilization.

Abbreviations and Acronyms:

°C = degrees Celsius
ID = identification
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
mV = millivolt
NTU = nephelometric turbidity unit
SU = standard units

Table 10
Cumulative Monitoring Well Groundwater-Level Elevations
Worthen Substation Site – Wenatchee, Washington

Monitoring Well	WMW-1 (a)		WMW-2 (a)		WMW-3 (a)		WMW-4 (a)		WMW-5 (b)		WMW-6 (b)		WMW-7 (b)		WMW-8 (b)	
TOC Elevation (ft)	642.59		638.94		638.64		639.47		647.83		645.32		649.36		644.73	
Date Measured	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation
4/20/2022 (d)	25.83	616.76	22.62	616.32	22.25	616.39	22.97	616.50	-	-	-	-	-	-	-	-
7/20/2022 (d)	23.53	619.06	22.26	616.68	19.93	618.71	20.68	618.79	-	-	-	-	-	-	-	-
10/19/2022 (d)	26.11	616.48	22.66	616.28	22.76	615.88	23.31	616.16	-	-	-	-	-	-	-	-
1/4/2023 (d)	26.29	616.30	22.32	616.62	21.91	616.73	22.81	616.66	-	-	-	-	-	-	-	-
4/19/2023 (d)	26.11	616.48	22.57	616.37	22.58	616.06	22.37	617.10	-	-	-	-	-	-	-	-
7/17/2023	25.78	616.81	22.91	616.03	22.41	616.23	23.82	615.65	19.31	628.52	13.56	631.76	6.80	642.56	16.64	628.09
10/11/2023	26.23	616.36	22.81	616.13	22.61	616.03	23.41	616.06	19.72	628.11	13.31	632.01	6.16	643.20	16.71	628.02
1/8/2024	26.28	616.31	22.29	616.65	22.19	616.45	22.89	616.58	18.19	629.64	12.08	633.24	5.64	643.72	16.94	627.79

Table 10
Cumulative Monitoring Well Groundwater-Level Elevations
Worthen Substation Site – Wenatchee, Washington

Monitoring Well	WMW-9 (b)		WMW-10 (b)		WMW-11 (b)		WMW-12 (c)		WMW-13 (c)		WMW-14 (c)		WMW-15 (c)	
TOC Elevation (ft)	646.51		646.60		638.08		647.88		654.42		654.34		654.41	
Date Measured	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation
4/20/2022 (d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7/20/2022 (d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10/19/2022 (d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/4/2023 (d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4/19/2023 (d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7/17/2023	7.56	638.95	17.74	628.86	22.13	615.95	-	-	-	-	-	-	-	-
10/11/2023	7.33	639.18	17.98	628.62	21.97	616.11	11.51	636.37	-	-	-	-	-	-
1/8/2024	7.03	639.48	16.39	630.21	21.42	616.66	9.11	638.77	18.79	635.63	13.88	640.46	9.78	644.63

Table 10
Cumulative Monitoring Well Groundwater-Level Elevations
Worthen Substation Site – Wenatchee, Washington

Monitoring Well TOC Elevation (ft)	WMW-16 (c) 654.09		WMW-17 (c) 646.71		WMW-18 (c) 649.41		Columbia River Water Level at River Front Park
Date Measured	Depth	Elevation	Depth	Elevation	Depth	Elevation	Elevation (e)
4/20/2022 (d)	-	-	-	-	-	-	616.91
7/20/2022 (d)	-	-	-	-	-	-	620.12
10/19/2022 (d)	-	-	-	-	-	-	616.50
1/4/2023 (d)	-	-	-	-	-	-	617.74
4/19/2023 (d)	-	-	-	-	-	-	616.66
7/17/2023	-	-	-	-	-	-	617.31
10/11/2023	-	-	-	-	-	-	616.45
1/8/2024	7.41	646.68	14.95	631.76	10.35	639.06	617.01

Notes:

(a) Elevations surveyed by Erlandsen under contract with GeoEngineers in May 2022.
(b) Elevations surveyed by Erlandsen under contract with Landau Associates in July 2023.
(c) Elevations surveyed by Erlandsen under contract with Landau Associates in January 2024.
(d) Depth to water measurements completed by GeoEngineers.
(e) River elevation data obtained from Chelan PUD and is based on backwater curve formulation (converted to NAVD 88)
- = Not measured
Depth measured in ft below TOC.
Elevation datum = NAVD88

Acronyms and Abbreviations:

ft = foot/feet
NAVD88 = North American Vertical Datum of 1988
TOC = top of casing

Table 11
Preliminary Cleanup Levels – Groundwater
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Protection of Drinking Water Criteria						Protection of Surface Water Beneficial Uses Criteria - Fresh Water										Environ-mental Effects[17] (µg/L)	Preliminary Groundwater Screening Level (µg/L)	Modifying Factors		Lowest Groundwater Screening Level (After PQL Adjustment) (µg/L)
						MTCA Method B Formula Value[8]		WAC 173-201A[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			Formula Value[4]		Ecology Guidance					
								Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health		IM #23[16] (µg/L)					
		Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	MTCA Method A (µg/L)	Carc. (µg/L)	Non-Carc. (µg/L)	Acute (µg/L)	Chronic (µg/L)	Water & Organism (µg/L)	Water & Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Water & Organism (µg/L)	Carc. (µg/L)	Non-Carc. (µg/L)				PQL[10] (µg/L)	Natural Background[11] (µg/L)	
Petroleum Hydrocarbons																						
Gasoline-range hydrocarbons	NA	--	--	--	8.0E+02	--		--	--	--	--	--	--	--	--	--	1.0E+03	1.0E+03	8.0E+02	1.0E+02	--	800
Diesel-range hydrocarbons	NA	--	--	--	5.0E+02	--		--	--	--	--	--	--	--	--	--	--	--	5.0E+02	8.0E+01	--	500
Oil-range hydrocarbons	NA	--	--	--	5.0E+02	--		--	--	--	--	--	--	--	--	--	--	--	5.0E+02	1.6E+02	--	500
Diesel + Oil-range hydrocarbons	NA	--	--	--	5.0E+02	--		--	--	--	--	--	--	--	--	--	3.0E+03	3.0E+03	5.0E+02	No PQL	--	500
Volatile Organic Compounds (VOCs)																						
Benzene	71-43-2	5.0E+00	5.0E+00	--	5.0E+00	8.0E-01	3.2E+01	--	1.0E+01	4.4E-01	--	--	--	5.8E-01	2.3E+01	2.0E+03	1.0E+01	N/A	4.4E-01	2.0E-01	--	0.44
Ethylbenzene	100-41-4	7.0E+02	7.0E+02	--	7.0E+02	--	8.0E+02	--	1.2E+01	2.0E+02	2.9E+01	--	--	6.8E+01	--	6.9E+03	1.2E+01	N/A	1.2E+01	5.0E-01	--	12
Total Xylenes	1330-20-7	1.0E+04	1.0E+04	--	1.0E+03	--	1.6E+03	--	5.7E+01	--	--	--	--	--	--	--	5.7E+01	N/A	5.7E+01	1.5E+00	--	57
Polycyclic Aromatic Hydrocarbons (PAHs)																						
1-Methylnaphthalene	90-12-0	--	--	--	--	8.6E-01	5.6E+02	--	--	--	--	--	--	--	--	--	--	2.1E+00	8.6E-01	4.0E-02	--	0.86
2-Methylnaphthalene	91-57-6	--	--	--	--	--	3.2E+01	--	--	--	--	--	--	--	--	--	--	3.3E+02	3.2E+01	4.0E-02	--	32
Acenaphthene	83-32-9	--	--	--	--	--	4.8E+02	--	--	1.1E+02	3.0E+01	--	--	7.0E+01	--	6.4E+02	--	6.0E+00	6.0E+00	2.0E-02	--	6
Acenaphthylene	208-96-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.3E+01	1.3E+01	2.0E-02	--	13
Anthracene	120-12-7	--	--	--	--	--	2.4E+03	--	--	3.1E+03	1.0E+02	--	--	3.0E+02	--	2.6E+04	--	6.5E-02	6.5E-02	2.0E-02	--	0.0645
Benzo(a)anthracene	56-55-3	--	--	--	--	--	--	--	--	1.4E-02	1.6E-04	--	--	1.2E-03	--	--	--	9.7E-01	1.6E-04	2.0E-02	--	0.02
Benzo(a)pyrene	50-32-8	2.0E-01	2.0E-01	--	1.0E-01	2.3E-02	4.8E+00	--	--	1.4E-03	1.6E-05	--	--	1.2E-04	3.5E-02	2.6E+01	--	6.0E-02	1.6E-05	3.0E-02	--	0.03
Benzo(b)fluoranthene	205-99-2	--	--	--	--	--	--	--	--	1.4E-02	1.6E-04	--	--	1.2E-03	--	--	--	2.6E+00	1.6E-04	3.0E-02	--	0.03
Benzo(k)fluoranthene	207-08-9	--	--	--	--	--	--	--	--	1.4E-02	1.6E-03	--	--	1.2E-02	--	--	--	6.4E-01	1.6E-03	3.0E-02	--	0.03
Chrysene	218-01-9	--	--	--	--	--	--	--	--	1.4E+00	1.6E-02	--	--	1.2E-01	--	--	--	2.0E+00	1.6E-02	2.0E-02	--	0.02
Dibenzo(a,h)anthracene	53-70-3	--	--	--	--	--	--	--	--	1.4E-03	1.6E-05	--	--	1.2E-04	--	--	--	1.0E-02	1.6E-05	2.0E-02	--	TEQ[18]
Dibenzofuran	132-64-9	--	--	--	--	--	8.0E+00	--	--	--	--	--	--	--	--	--	--	9.4E+01	8.0E+00	2.0E-02	--	8.0
Fluoranthene	206-44-0	--	--	--	--	--	6.4E+02	--	--	1.6E+01	6.0E+00	--	--	2.0E+01	--	9.0E+01	--	6.2E+00	6.0E+00	2.0E-02	--	6.0
Fluorene	86-73-7	--	--	--	--	--	3.2E+02	--	--	4.2E+02	1.0E+01	--	--	5.0E+01	--	3.5E+03	--	2.0E+00	2.0E+00	2.0E-02	--	2
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	--	--	--	--	--	--	1.4E-02	1.6E-04	--	--	1.2E-03	--	--	--	1.2E-02	1.6E-04	2.0E-02	--	0.02
Naphthalene [12]	91-20-3	--	--	--	1.6E+02	--	1.6E+02	--	--	--	--	--	--	--	--	4.9E+03	--	1.3E+01	1.3E+01	4.0E-02	--	13
Phenanthrene	85-01-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.6E+00	3.6E+00	2.0E-02	--	3.6
Pyrene	129-00-0	--	--	--	--	--	2.4E+02	--	--	3.1E+02	8.0E+00	--	--	2.0E+01	--	2.6E+03	--	3.0E-01	3.0E-01	2.0E-02	--	0.3
cPAH (TEQ)	NA	--	--	--	--	2.3E-02	--	--	--	--	--	--	--	--	3.5E-02	--	--	--	2.3E-02	No PQL	--	0.023
Cyanide																						
WAD Cyanide [13]	NA	--	--	--	--	--	--	8.2E+00	1.9E+00	9.0E+00	--	--	--	--	--	--	--	N/A	1.9E+00	5.0E+00	--	5.0
Free Cyanide [13]	NA	2.0E+02	2.0E+02	--	--	--	5.0E+00	8.2E+00	1.9E+00	9.0E+00	9.0E+00	2.2E+01	5.2E+00	4.0E+00	--	1.6E+03	--	N/A	1.9E+00	5.0E+00	--	5.0

Table 11
Preliminary Cleanup Levels – Groundwater
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	Protection of Drinking Water Criteria						Protection of Surface Water Beneficial Uses Criteria - Fresh Water										Environ-mental Effects[17] (µg/L)	Preliminary Groundwater Screening Level (µg/L)	Modifying Factors		Lowest Groundwater Screening Level (After PQL Adjustment) (µg/L)
						MTCA Method B Formula Value[8]		WAC 173-201A[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			Formula Value[4]		Ecology Guidance					
								Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health		IM #23[16] (µg/L)			PQL[10] (µg/L)	Natural Background[11] (µg/L)	
		Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	MTCA Method A (µg/L)	Carc. (µg/L)	Non-Carc. (µg/L)	Acute (µg/L)	Chronic (µg/L)	Water & Organism (µg/L)	Water & Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Water & Organism (µg/L)	Carc. (µg/L)	Non-Carc. (µg/L)						
Dissolved Metals																						
Arsenic	7440-38-2	1.0E+01	1.0E+01	--	5.0E+00	5.8E-02	4.8E+00	3.6E+02	1.9E+02	1.0E+01	1.8E-02	3.4E+02	1.5E+02	1.8E-02	9.8E-02	1.8E+01	--	N/A	1.8E-02	1.0E+00	6.0E+00	6.0E+00
Barium	7440-39-3	2.0E+03	2.0E+03	--	--	--	3.2E+03	--	--	--	--	--	--	1.0E+03	--	--	--	2.2E+02	2.2E+02	1.0E+00	--	2.2E+02
Cadmium[14]	7440-43-9	5.0E+00	5.0E+00	--	5.0E+00	--	8.0E+00	3.7E+00	1.0E+00	--	--	1.8E+00	7.2E-01	--	--	4.1E+01	--	N/A	7.2E-01	2.0E-01	--	7.2E-01
Chromium (total)[15]	7440-47-3	1.0E+02	1.0E+02	--	5.0E+01	--	2.4E+04	5.5E+02	1.8E+02	--	--	5.7E+02	7.4E+01	--	--	2.4E+05	--	N/A	5.0E+01	2.0E+00	--	50
Copper[14]	7440-50-8	1.3E+03	1.3E+03	--	--	--	6.4E+02	1.7E+01	1.1E+01	1.3E+03	--	--	--	--	--	--	--	N/A	1.1E+01	2.0E+00	--	11
Lead[14]	7439-92-1	1.5E+01	1.5E+01	--	1.5E+01	--	--	6.5E+01	2.5E+00	--	--	6.5E+01	2.5E+00	--	--	--	--	N/A	2.5E+00	2.0E-01	--	2.5
Mercury	7439-97-6	2.0E+00	2.0E+00	--	2.0E+00	--	--	2.1E+00	1.2E-02	--	--	1.4E+00	7.7E-01	--	--	--	--	N/A	1.2E-02	8.0E-02	--	0.08
Nickel[14]	7440-02-0	--	--	--	--	--	3.2E+02	1.4E+03	1.6E+02	1.5E+02	8.0E+01	4.7E+02	5.2E+01	6.1E+02	--	1.1E+03	--	N/A	5.2E+01	2.0E+00	--	52
Selenium	7782-49-2	5.0E+01	5.0E+01	--	--	--	8.0E+01	2.0E+01	5.0E+00	1.2E+02	6.0E+01	--	--	1.7E+02	--	2.7E+03	--	N/A	5.0E+00	1.0E+00	--	5
Silver[14]	7440-22-4	--	--	--	--	--	8.0E+01	3.4E+00	--	--	--	3.2E+00	--	--	--	2.6E+04	--	N/A	3.2E+00	2.0E-01	--	3.2
Zinc[14]	7440-66-6	--	--	--	--	--	8.0E+02	1.1E+02	1.0E+02	2.3E+03	1.0E+03	1.2E+02	1.2E+02	7.4E+03	--	1.7E+04	--	N/A	1.0E+02	4.0E+00	--	100

Notes:

[1] Ambient Water Quality Criteria (AWQC) for protection of aquatic life and human health from Chapter 173-201A WAC; values obtained from CLARC database dated July 2024.

[2] US Environmental Protection Agency (EPA) Federally Promulgated Human Health Criteria applicable to Washington; values obtained from CLARC database dated July 2024.

[3] National Recommended Water Quality Criteria (https://www.epa.gov/wqc/national-recommended-water-quality-criteria-tables); values obtained from CLARC database dated July 2024

[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 database dated July 2024

[5] National Primary Drinking Water Regulation; https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations; values obtained from CLARC database dated July 2024.

[6] Primary maximum contaminant levels, WAC 246-290-310; values obtained from CLARC database dated July 2024.

[7] Secondary maximum contaminant levels, WAC 246-290-310; values obtained from CLARC database dated July 2024

[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 database dated July 2024.

[10] Practical quantitation limit (PQL) is the typical value from Apex Laboratory, Tigard, Oregon.

[11] Natural background value based on Yakima Basin 90% UTL (Natural Background Groundwater Arsenic Concentrations in Washington State; Ecology Publication No. 14-09-044, January 2022)

[12] Naphthalene PCUL based on total value of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

[13] Per CLARC, the oral reference dose for cyanide and calculated CULs are based on free cyanide - therefore, free cyanide results are acceptable for all samples. The freshwater aquatic life chronic CUL under WAC 173-201A for cyanide is based on WAD cyanide analysis.

[14] Surface water acute and chronic cleanup levels under Chapter 173-201A WAC are hardness-dependent and may require future adjustment accordingly.

[15] Groundwater and surface water standard formula values (cancer and non-cancer) and surface water ARARs based on Chromium(III); values obtained from CLARC database dated February 2024.

[16] Ecology Implementation Memorandum No. 23, Concentrations of Gasoline and Diesel Range Organics Predicted to be Protective of Aquatic Receptors in Surface Waters, August 25, 2021. Values protective of freshwater; DRP PCUL value assumes weathered diesel.

[17] Ecological no observable effects values provided by Ecology; based on Risk Assessment Information System (https://rais.ornl.gov/tools/eco_search.php). For barium, the ecological effect number is set at the lower of the chronic (220 µg/L) and acute (2,000 µg/L) freshwater screening values for hazardous waste sites from EPA Region 4 Ecological Risk Assessment Supplemental Guidance (March 2018 Update).

[18] PAH will not have individual screening level but is included in the cPAH TEQ calculation.

-- = No screening criteria available.

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.

Orange shading identifies the groundwater contaminants of potential concern (COPCs).

Yellow shading identifies the groundwater PAHs will not have individual screening level but are included in the cPAH TEQ calculation.

Abbreviations and Acronyms:

ARAR = applicable or relevant and appropriate requirement
Carc. = carcinogenic
CAS = Chemical Abstracts Service
CFR = Code of Federal Regulations
CLARC = Ecology Cleanup Levels and Risk Calculations database
cPAH = carcinogenic polycyclic aromatic hydrocarbon
Ecology = Washington State Department of Ecology
EPA = US Environmental Protection Agency
IM = Ecology Implementation Memorandum
MCL = maximum contaminant level
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
NA = not available
PAHs = polycyclic aromatic hydrocarbons
PCUL = preliminary cleanup level
PQL = practical quantitation limit
TEQ = toxicity equivalence
VOCs = volatile organic compounds
WAC = Washington Administrative Code
WAD = weak acid dissociable (cyanide)

Table 12
Preliminary Cleanup Levels – Soil
Worthen Substation Site – Wenatchee, Washington

Analyte	CAS No.	MTCA Method A	MTCA Method B		MTCA Method B Protection of Groundwater[2]				MTCA Method B	Preliminary Soil Screening Level (mg/kg)	Modifying Factors		Lowest Soil Screening Level (After PQL/ Natural Background Adjustment) (mg/kg)
			Direct Contact Formula Value[1]		Protection of Drinking Water		Protection of Surface Water						
		Unrestricted Land Use (mg/kg)	Carc. (mg/kg)	Non-Carc. (mg/kg)	Vadose Zone (mg/kg)	Saturated Zone (mg/kg)	Vadose Zone (mg/kg)	Saturated Zone (mg/kg)	Protection of Terrestrial Ecological Receptors (TEE)[3] (mg/kg)		PQL[4] (mg/kg)	Natural Background[5] (mg/kg)	
Petroleum Hydrocarbons													
Gasoline-range hydrocarbons	NA	3.0E+01	--	--	--	--	--	--	1.2E+02	3.0E+01	5.0E+00	--	30
Diesel-range hydrocarbons	NA	2.0E+03	--	--	--	--	--	--	2.6E+02	2.6E+02	2.0E+01	--	260
Oil-range hydrocarbons	NA	2.0E+03	--	--	--	--	--	--	--	2.0E+03	4.0E+01	--	2,000
Diesel + Oil-range hydrocarbons	NA	2.0E+03	--	--	--	--	--	--	--	2.0E+03	No PQL	--	2,000
Volatile Organic Compounds (VOCs)													
Benzene	71-43-2	3.0E-02	1.8E+01	3.2E+02	2.7E-02	1.7E-03	2.4E-03	1.5E-04	--	1.5E-04	1.0E-02	--	0.01
Ethylbenzene	100-41-4	6.0E+03	--	8.0E+03	5.9E+00	3.4E-01	1.0E-01	5.9E-03	--	5.9E-03	2.5E-02	--	0.025
Toluene	108-88-3	7.0E+03	--	6.4E+03	4.5E+00	2.7E-01	3.7E-01	2.3E-02	--	2.3E-02	5.0E-02	--	0.05
Total Xylenes	1330-20-7	9.0E+03	--	1.6E+04	1.4E+01	8.3E-01	5.1E-01	3.0E-02	--	3.0E-02	7.5E-02	--	0.075
Polycyclic Aromatic Hydrocarbons (PAHs)													
1-Methylnaphthalene	90-12-0	--	2.0E+01	5.6E+03	4.7E-02	2.4E-03	--	--	--	2.4E-03	5.3E-03	--	0.0053
2-Methylnaphthalene	91-57-6	--	--	3.2E+02	1.7E+00	8.8E-02	--	--	--	8.8E-02	5.3E-03	--	0.088
Acenaphthene	83-32-9	--	--	4.8E+03	4.9E+01	2.5E+00	3.1E+00	1.6E-01	--	1.6E-01	2.7E-03	--	0.16
Anthracene	120-12-7	--	--	2.4E+04	1.1E+03	5.7E+01	4.7E+01	2.4E+00	--	2.4E+00	2.7E-03	--	2.4
Benzo(a)anthracene	56-55-3	--	--	--	--	--	--	--	--	--	2.7E-03	--	TEQ[6]
Benzo(a)pyrene	50-32-8	1.0E-01	1.9E-01	2.4E+01	3.9E+00	1.9E-01	3.1E-04	1.6E-05	3.0E+01	1.6E-05	4.0E-03	--	0.004
Benzo(b)fluoranthene	205-99-2	--	--	--	--	--	--	--	--	--	4.0E-03	--	TEQ[6]
Benzo(k)fluoranthene	207-08-9	--	--	--	--	--	--	--	--	--	4.0E-03	--	TEQ[6]
Chrysene	218-01-9	--	--	--	--	--	--	--	--	--	2.7E-03	--	TEQ[6]
Dibenzo(a,h)anthracene	53-70-3	--	--	--	--	--	--	--	--	--	2.7E-03	--	TEQ[6]
Dibenzofuran	132-64-9	--	--	8.0E+01	1.0E+00	--	--	--	--	1.0E+00	2.7E-03	--	1.0
Fluoranthene	206-44-0	--	--		1.5E+00	7.6E-02	--	--	--	7.6E-02	2.7E-03	--	0.076
Fluorene	86-73-7	--	--	3.2E+03	5.1E+01	2.6E+00	1.6E+00	8.2E-02	--	8.2E-02	2.7E-03	--	0.082
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	--	--	--	--	--	--	--	2.7E-03	--	TEQ[6]
Naphthalene	91-20-3	5.0E+03	--	1.6E+03	4.5E+00	2.4E-01	1.4E+02	7.3E+00	--	2.4E-01	5.3E-03	--	0.24
Pyrene	129-00-0	--	--	2.4E+03	3.3E+02	1.6E+01	1.1E+01	5.5E-01	--	5.5E-01	2.7E-03	--	0.55
cPAH TEQ	NA	1.0E-01	--	--	--	--	--	--	3.0E+01	1.0E-01	No PQL	--	0.1
Cyanide													
Free Cyanide	NA	--	--	5.0E+01	1.0E+00	5.1E-02	8.1E-01	4.1E-02	--	4.1E-02	2.5E-01	--	0.250
Metals													
Arsenic	7440-38-2	2.0E+01	6.7E-01	2.4E+01	2.9E+00	1.5E-01	2.9E+00	1.5E-01	9.5E+01	1.5E-01	1.0E+00	7.0E+00	7
Barium	7440-39-3	--	--	1.6E+04	1.6E+03	8.3E+01	8.2E+02	4.1E+01	1.3E+03	4.1E+01	1.0E+00	--	41
Cadmium	7440-43-9	2.0E+00	--	8.0E+01	6.9E-01	3.5E-02	9.9E-02	5.0E-03	2.5E+01	5.0E-03	2.0E-01	1.0E+00	1
Chromium (total)	7440-47-3	2.0E+03	--	1.2E+05	4.8E+05	2.4E+04	1.5E+03	7.4E+01	4.2E+01	4.2E+01	1.0E+00	4.2E+01	42
Copper	7440-50-8	--	--	3.2E+03	2.8E+02	1.4E+01	4.9E+00	2.5E-01	1.0E+02	2.5E-01	2.0E+00	3.6E+01	36
Lead	7439-92-1	2.5E+02	--	--	3.0E+03	1.5E+02	5.0E+02	2.5E+01	2.2E+02	2.5E+01	2.0E-01	1.7E+01	25
Mercury	7439-97-6	2.0E+00	--	--	2.1E+00	1.0E-01	1.3E-02	6.3E-04	9.0E+00	6.3E-04	8.0E-02	7.0E-02	0.08
Nickel	7440-02-0	--	--	1.6E+03	4.2E+02	2.1E+01	6.8E+01	3.4E+00	1.0E+02	3.4E+00	2.0E+00	3.8E+01	38
Selenium	7782-49-2	--	--	4.0E+02	5.2E+00	2.6E-01	5.2E-01	2.6E-02	8.0E-01	2.6E-02	1.0E+00	--	1
Silver	7440-22-4	--	--	4.0E+02	1.4E+01	6.9E-01	5.4E-01	2.7E-02	--	2.7E-02	2.0E-01	--	0.2
Zinc	7440-66-6	--	--	2.4E+04	6.0E+03	3.0E+02	1.2E+02	6.2E+00	2.7E+02	6.2E+00	4.0E+00	8.6E+01	86

Table 12
Preliminary Cleanup Levels – Soil
Worthen Substation Site – Wenatchee, Washington

Notes:

[1] MTCA Method B soil screening levels protective of human direct contact calculated according to WAC-173-340-740(3)(b)(iii)(B)(equations 740-1 and 740-2); values obtained from CLARC Master Spreadsheet.xlsx dated July 2024.

[2] MTCA Method B soil screening levels protective of drinking water and surface water calculated according to WAC-173-340-747(4)(b)(equation 747-1); values obtained from CLARC Master Spreadsheet.xlsx dated July 2024.

[3] MTCA Method B soil screening levels protective of terrestrial ecological receptors calculated according to WAC-173-340-7490(Tables 749-2 and 749-3).

[4] Practical quantitation limit (PQL) is the typical value from Apex Laboratory, Tigard, Oregon. PQL for free cyanide is the typical value from SVL Analytical Inc. in Kellogg, Idaho.

[5] Natural Background Soil Metals Concentrations in Washington State, Ecology Publication No. 94-115, October 1994.

[6] PAH will not have individual screening level but is included in the cPAH TEQ calculation.

-- = No screening criteria available.

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.

Orange shading identifies the groundwater contaminants of potential concern (COPCs).

Yellow shading identifies the groundwater PAHs will not have individual screening level but are included in the cPAH TEQ calculation.

Abbreviations and Acronyms:

Carc. = carcinogenic
CAS = Chemical Abstracts Service
CLARC = Ecology's Cleanup Levels and Risk Calculations database
COPC = contaminant of potential concern
cPAH = carcinogenic polycyclic aromatic hydrocarbon
Ecology = Washington State Department of Ecology
mg/kg = milligrams per kilogram
MTCA = Washington State Model Toxics Control Act
NA = not available
PAHs = polycyclic aromatic hydrocarbons
PQL = practical quantitation limit
TEE = terrestrial ecological evaluation
TEQ = toxicity equivalence
VOCs = volatile organic compounds
WAC = Washington Administrative Code

APPENDIX A

Boring Logs and Well Construction Details

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

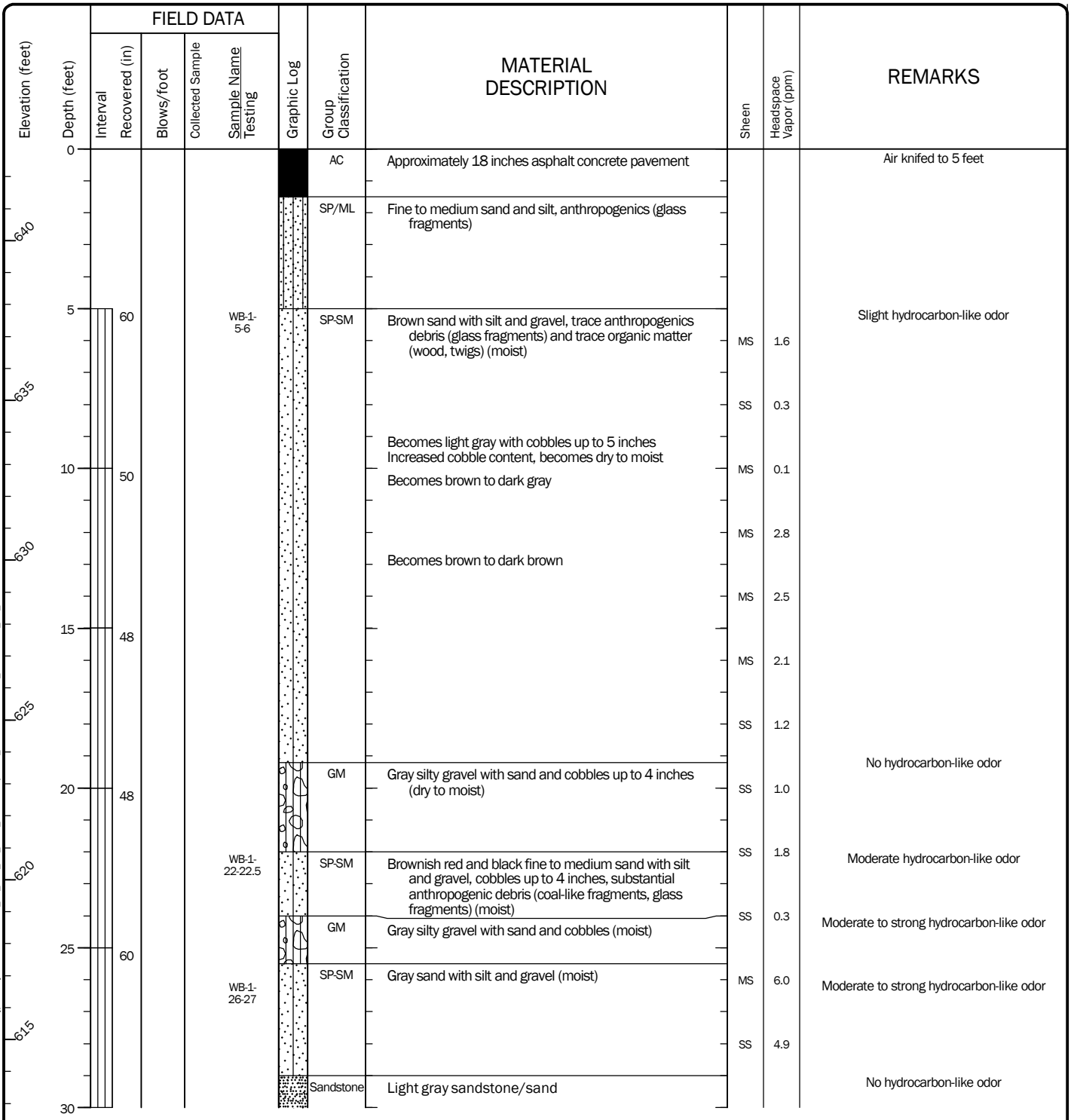
NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative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

Key to Exploration Logs

GeoEngineers

Figure A-1

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) 642.87 Vertical Datum NAVD88		Hammer Data N/A		Drilling Equipment TerraSonicT1150 Crawler	
Easting (X) 1771546.287 Northing (Y) 153552.2687		System Datum WA State Plane North NAD83-1996		Groundwater not observed at time of exploration	
Notes:					



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

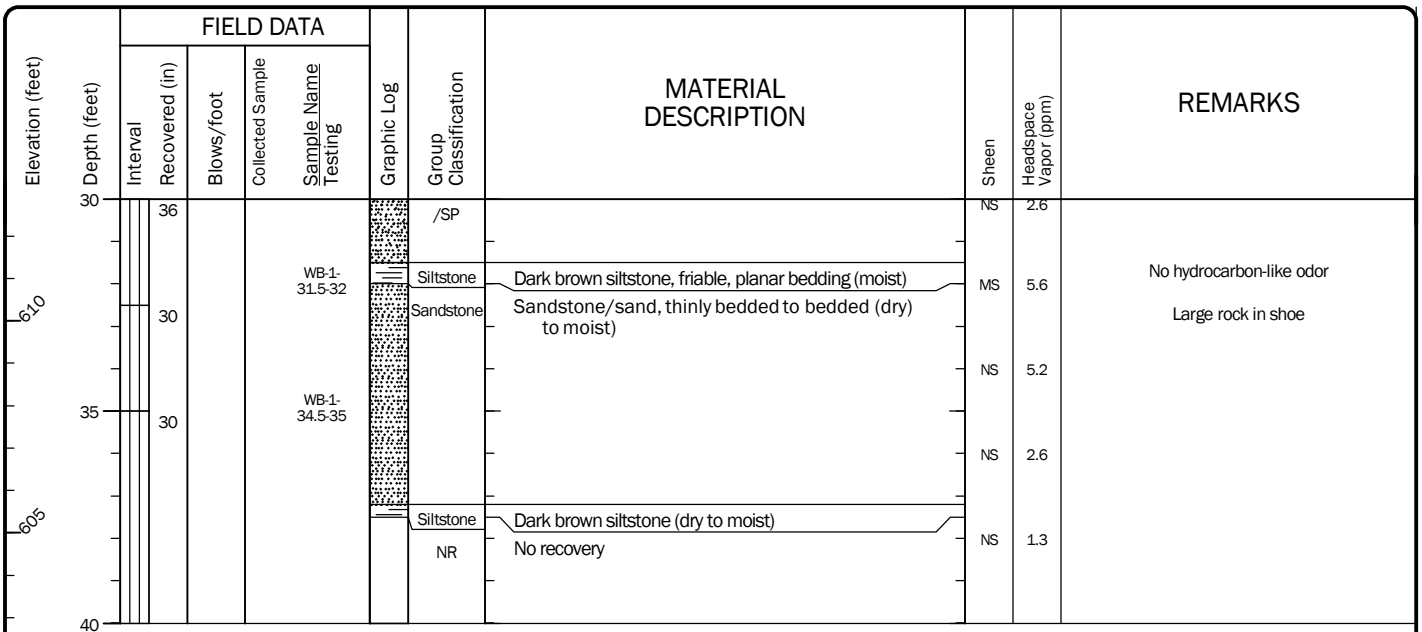
Log of Boring WB-1

GeoEngineers

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

Figure A-2
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_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

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

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) 647.1 Vertical Datum NAVD88		Hammer Data N/A		Drilling Equipment TerraSonicT1150 Crawler	
Easting (X) 1771540.963 Northing (Y) 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
						SP-SM	Sand with silt and anthropogenics debris (burnt debris)			
645							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	
						Siltstone/	Interbedded siltstone and sandstone (dry to moist)			Groundwater observed at approximately 29 feet during drilling
	30									

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

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

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	30		60					Sandstone / Siltstone	Gray siltstone, trace gravel and sand, pieces of friable siltstone (dry to moist)	NS	0.0	
615										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			WB-2-51-52						No hydrocarbon-like odor
595										SS	1.4	
								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

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

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) 1771627.141 Northing (Y) 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)			
						NR	No recovery			
610	30									

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

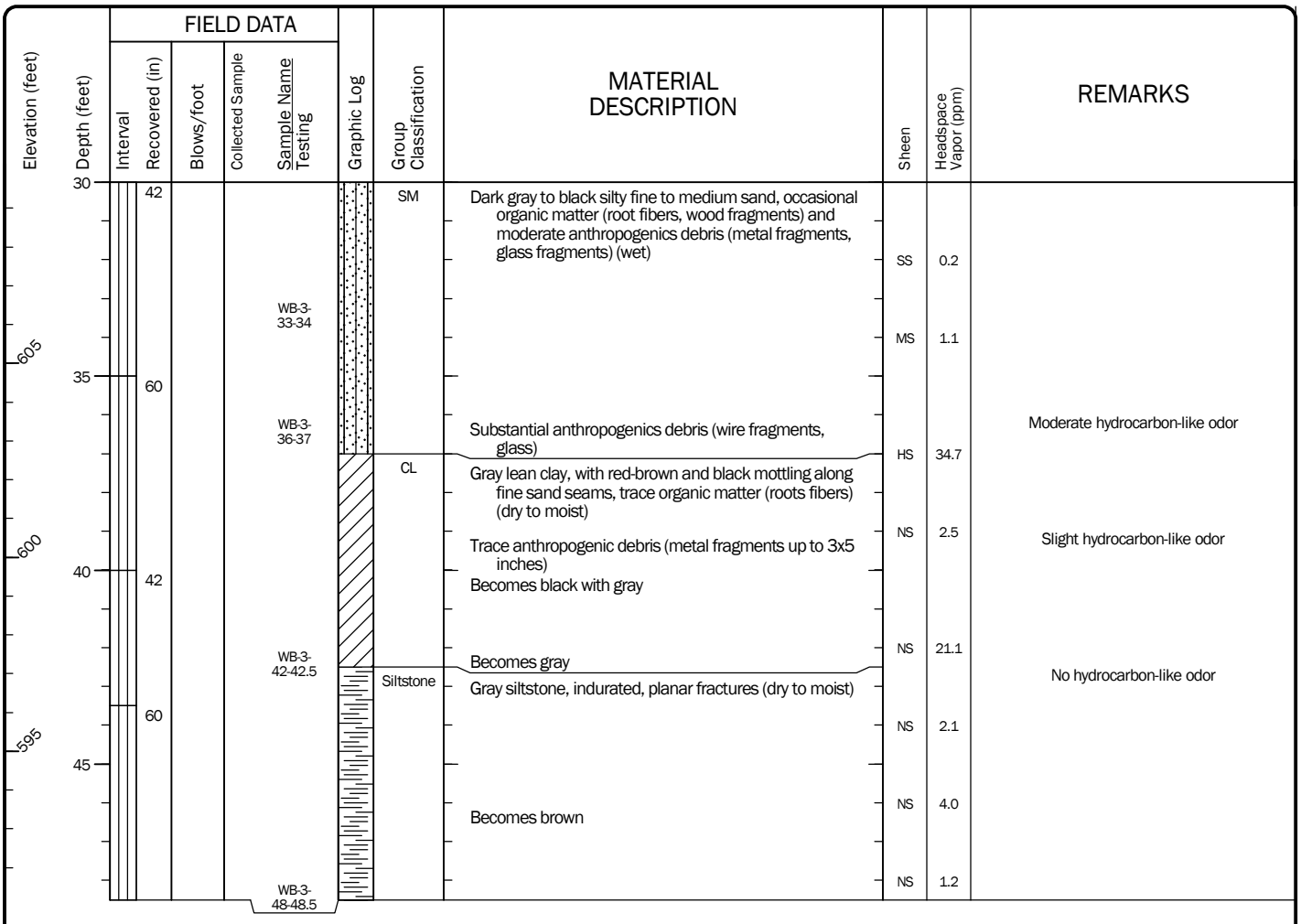
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Log of Boring WB-3

GeoEngineers

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

Figure A-4
Sheet 1 of 2



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 (continued)

GeoEngineers

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

Figure A-4
Sheet 2 of 2

Drilled Start 10/6/2021 End 10/6/2021	Total Depth (ft) 45	Logged By LAH Checked By GRL	Driller Holt Services, Inc.	Drilling Method Sonic	
Surface Elevation (ft) 644.57 Vertical Datum NAVD88		Hammer Data N/A		Drilling Equipment TerraSonicT1150 Crawler	
Easting (X) 1771624.317 Northing (Y) 153352.7605		System Datum 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)	FIELD DATA: Blows/foot	FIELD DATA: 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			
							Becomes dark gray with trace organic matter (wood fragments, fibers) (moist to wet)	SS	10.4	Moderate to strong hydrocarbon-like/solvent-like odor
								SS	24.6	
625	20	60		WB-4-19-20		SP-SM	Brown sand with silt (dry to moist)			
							Becomes gray with gravel	HS	340	Moderate to strong hydrocarbon-like odor
								MS	132	
620	25	60				SP	Gray sand with trace silt (dry to moist)	SS	5.8	
						SP-SM	Dark brown sand with silt (dry to moist)			Hard drilling at 25 feet Strong solvent-like odor
								SS	130	
						SP/ Sandstone	Gray sand and sandstone, friable (dry to moist)			Strong solvent-like odor
615	30			WB-4-29-30				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

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

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		60						<5% fines	MS	140	
								Siltstone	Dark brown siltstone/planar bedding (dry to moist)	MS	52	
610										MS	5.3	
								SP/ Sandstone	Gray sand and sandstone, friable (dry to moist)	SS	4.9	
	35		60					Siltstone	Dark brown siltstone, friable, planar bedding (dry to moist)	SS	2.4	No odor
										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

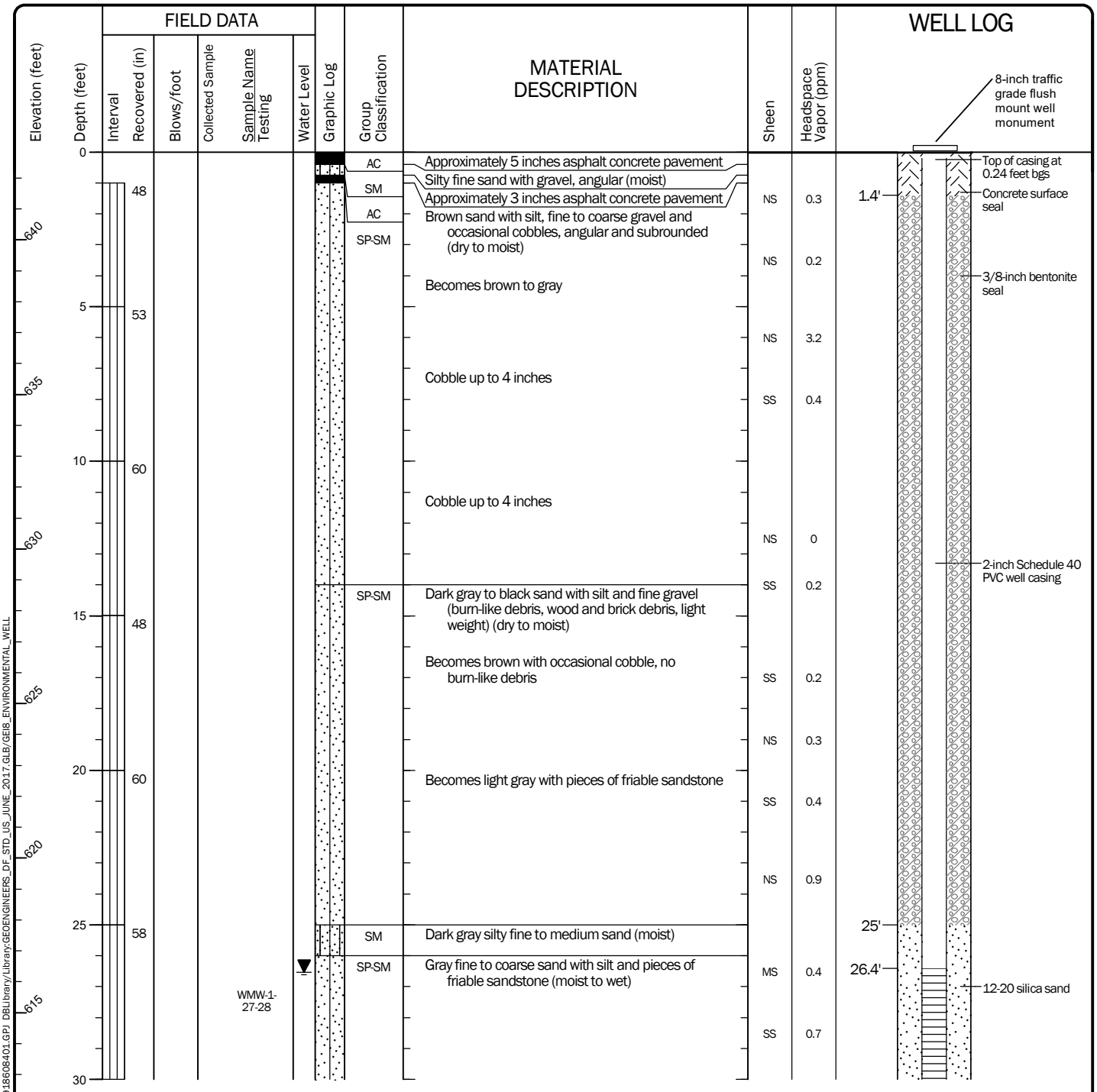
Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	4/4/2022	4/4/2022	60	LAH	GRL	Holt Services, Inc.	Sonic

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



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).

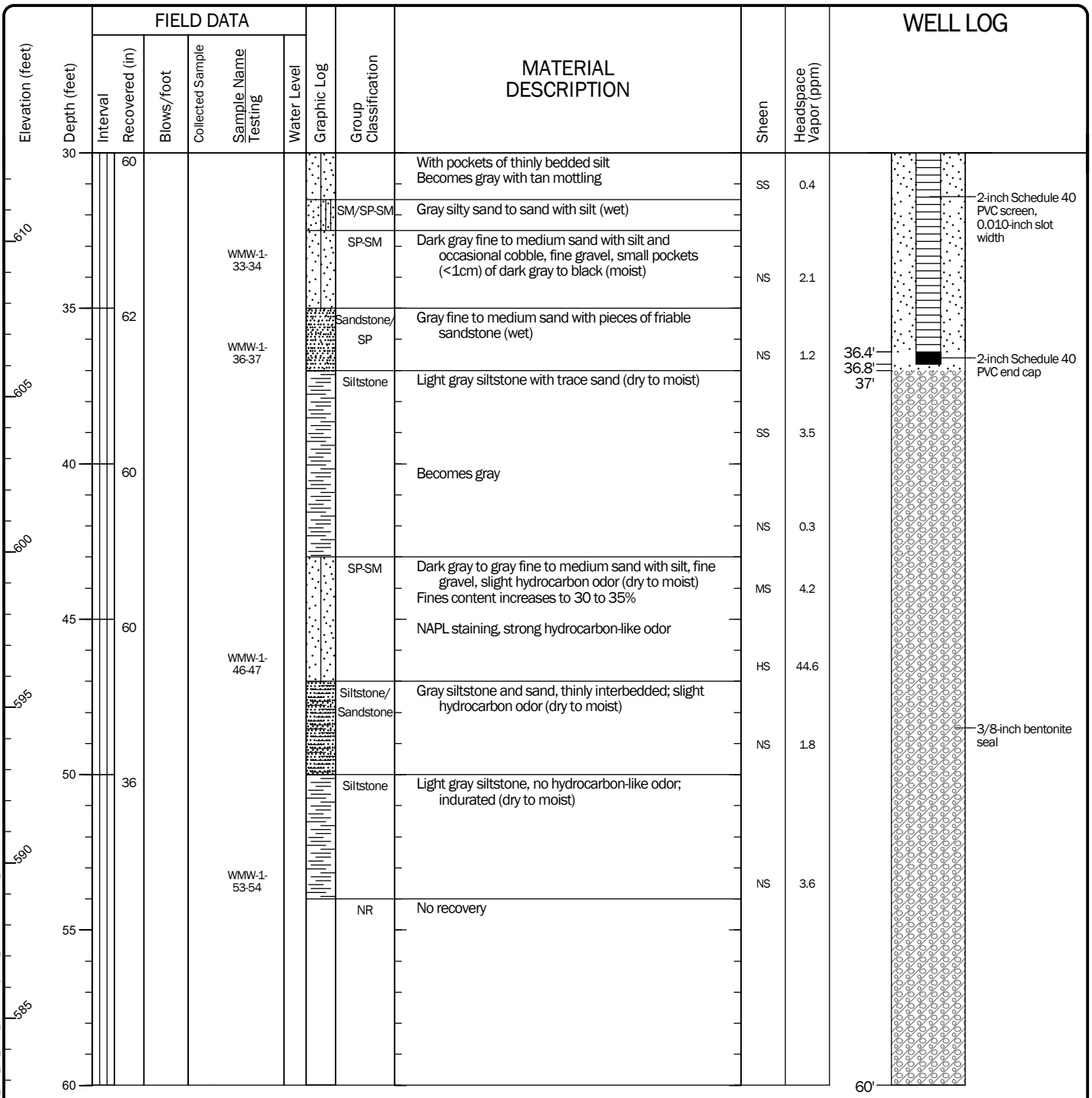
Log of Monitoring Well WMW-1

GeoEngineers

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

Figure A-6
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



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

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

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)	FIELD DATA: 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 to coarse gravel with sand (moist)		
		48						SP-SM	Brown fine to medium sand with silt, gravel, organics (root fibers), and trace anthropogenics (moist)	NS	0.3
635	5	21							Grades to dry to moist	NS	0.4
									Cobble in core barrel		
								NR	No recovery		
630	10	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	15	60							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
								SP-SM	Brown sand with fine to coarse gravel, occasional cobble and trace organics (root fibers) (moist)	NS	0.2
620	20	30			WMW-2-19-20					NS	0.2
								SM	Red-brown silty sand with occasional gravel (wet)	NS	0.4
					WMW-2-22.5-23			SM	Dark gray silty fine to coarse sand with gravel and cobble (wet)		
615	25	0						NR	No recovery		
610	30										

WELL LOG

- 8-inch traffic grade flush mount well monument
- Top of casing at 0.70 feet bgs
- Concrete surface seal — 1.7'
- 3/8-inch bentonite seal
- 2-inch Schedule 40 PVC well casing
- 13'
- 14.78'
- 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).

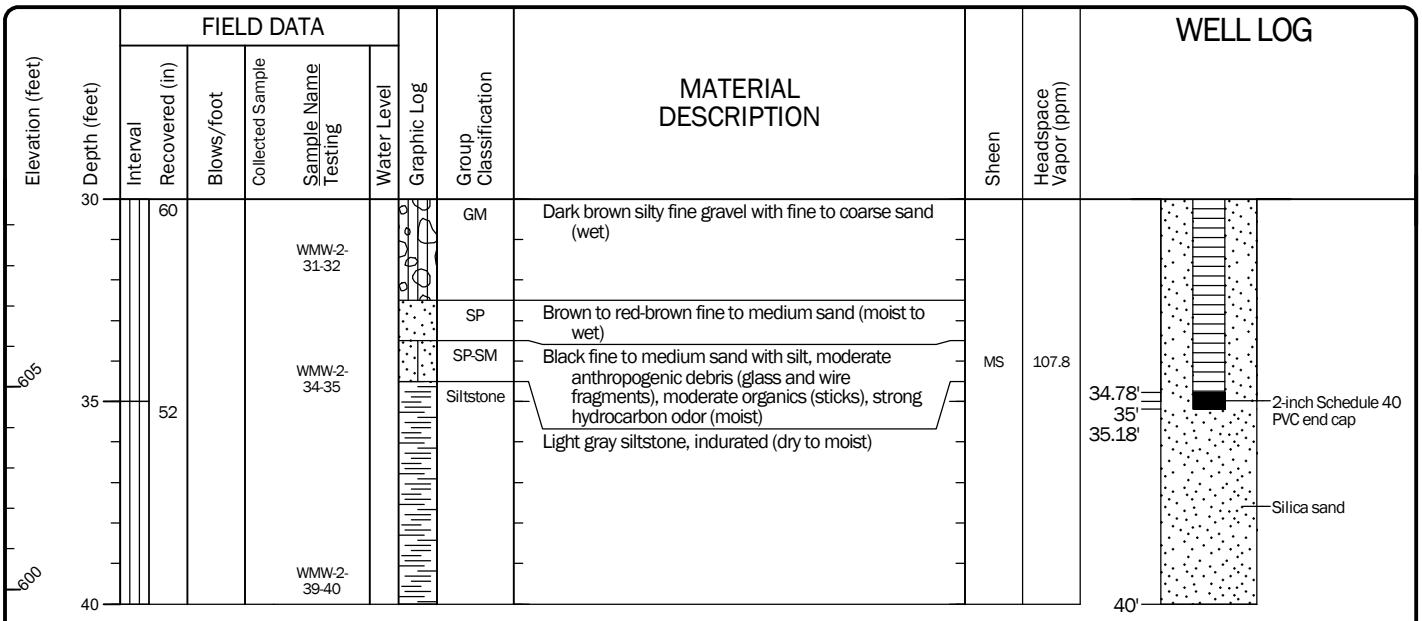
Log of Monitoring Well WMW-2

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:\9\9186084\GINT\9186084401.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_WELL



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

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

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

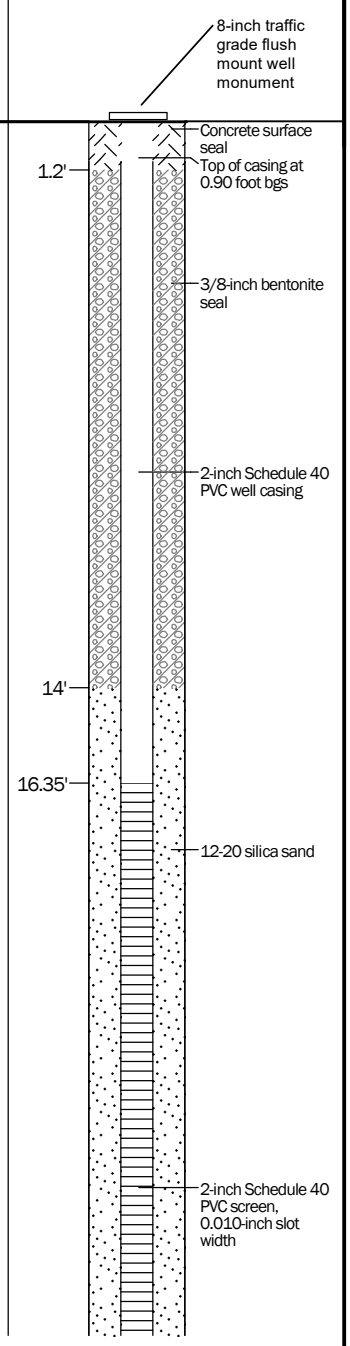
DOE Well I.D.: BNY 887
A 2-in well was installed on 4/6/2022 to a depth of 36.6 ft.

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)	FIELD DATA: 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	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	NS	0.1
630	10	33					SP	Gray fine to coarse sand with fine to coarse gravel, trace silt and occasional cobble (moist)		
								Becomes brown	NS	1.8
625	15	52						With anthropogenics (brick fragments)		
				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	20	50						Becomes dark brown to brown	NS	0.2
								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
615	25	0		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
							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).

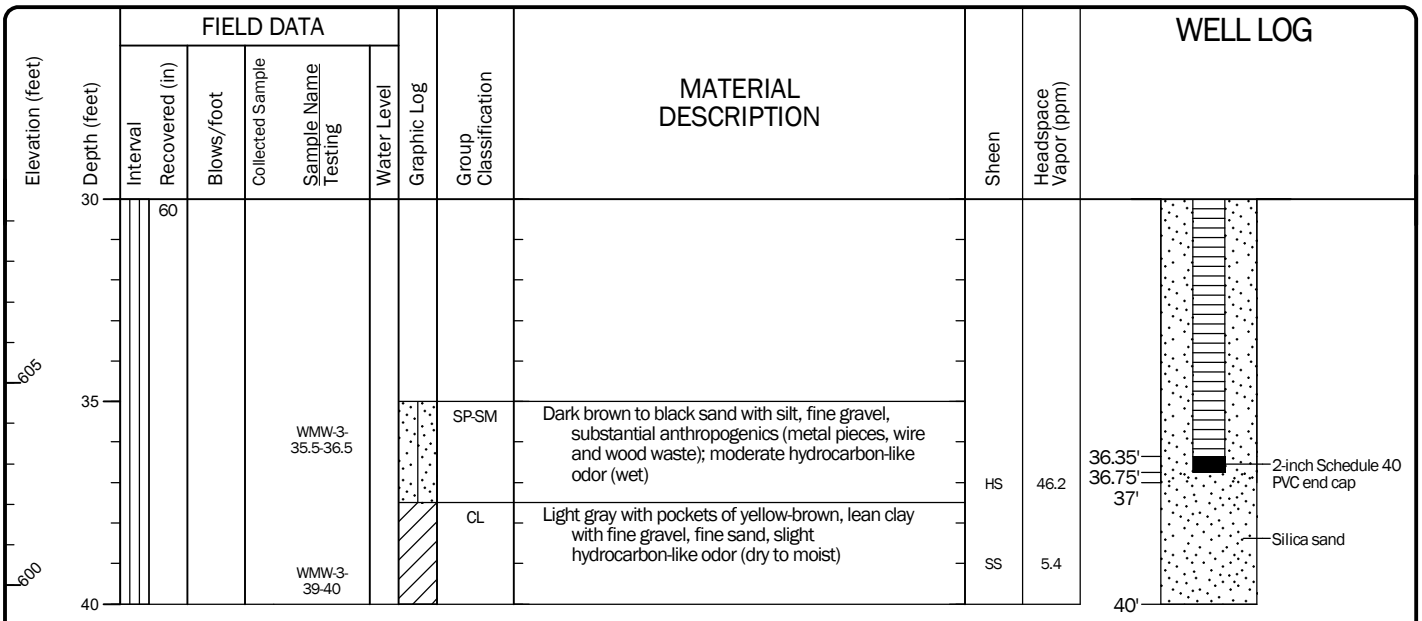
Log of Monitoring Well WMW-3

GeoEngineers

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

Figure A-8
Sheet 1 of 2

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



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

Date:7/8/22 Path:P:\9\9186084\GINT\9186084401.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_ENVIRONMENTAL_WELL

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

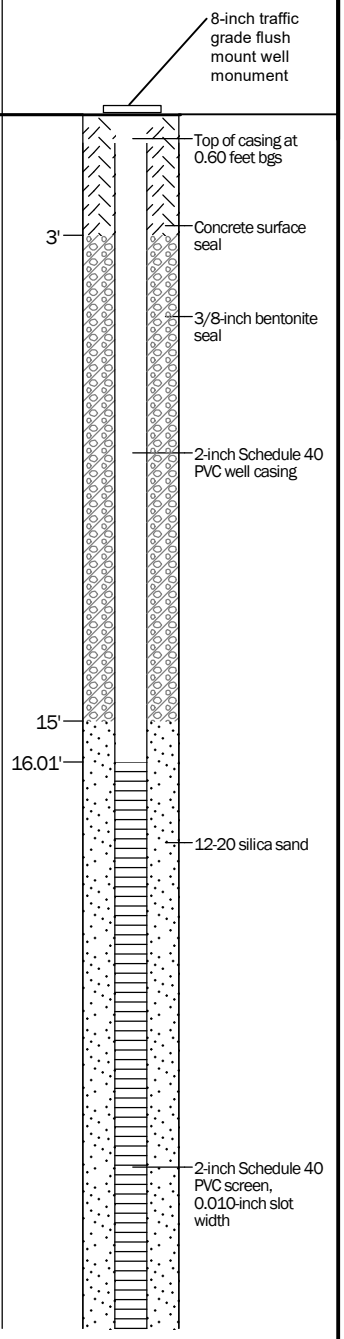
DOE Well I.D.: BNY 886
A 2-in well was installed on 4/5/2022 to a depth of 36.6 ft.

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)	FIELD DATA: 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						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
					WMW-4-6-7						
								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							Dark brown occasional to moderate anthropogenics (brick and wire fragments) (dry to moist)	SS	0
					WMW-4-17-18					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



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).

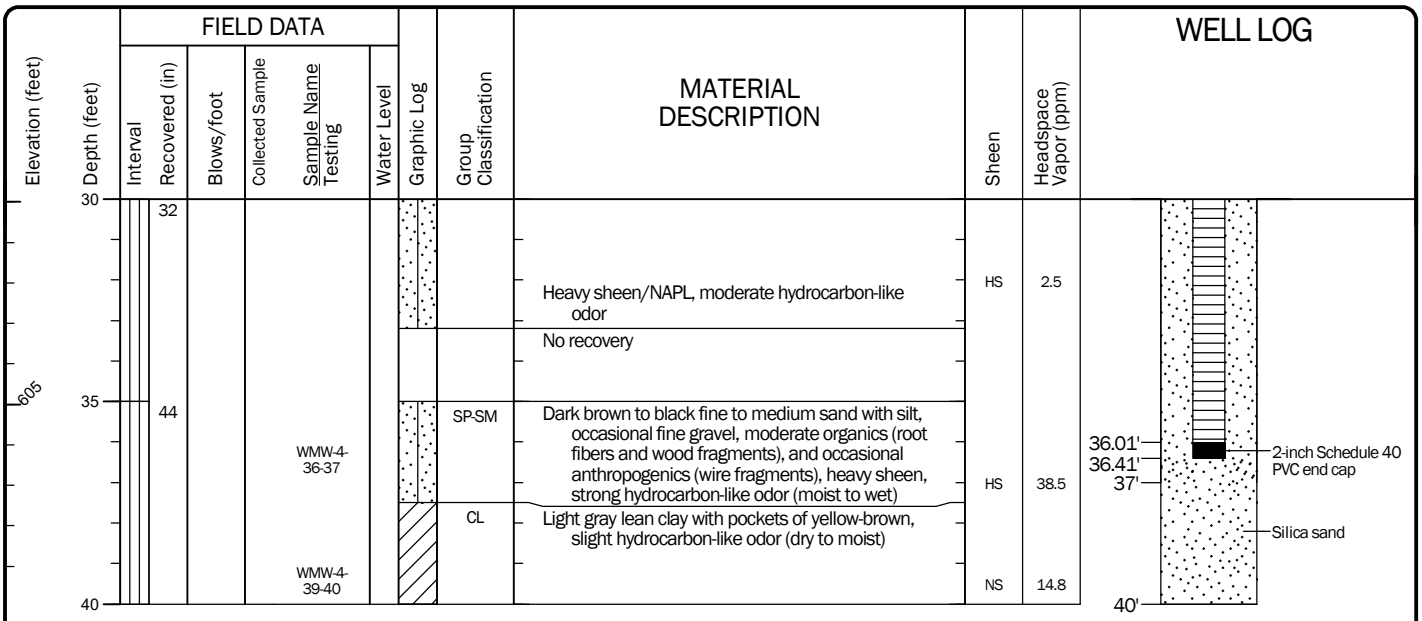
Log of Monitoring Well WMW-4

GeoEngineers

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

Figure A-9
Sheet 1 of 2

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



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

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

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with low plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand; elastic silt
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	- "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	- "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	- "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	- "with gravel," "with sand," "with silt," etc.
	≤ 5%	- "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

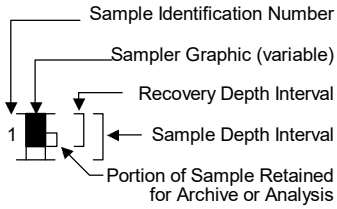
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE & METHOD

Graphic	Code	Description
	a	3.25-in OD, 2.42-in ID Split Spoon
	b	2.00-in OD, 1.50-in ID Split Spoon
	c	Thin-Wall Sampler (aka Shelby Tube)
	d	Grab Sample
	e	Single-Tube Core Barrel
	f	Double-Tube Core Barrel
	g	2.50-in OD, 2.00-in ID WSDOT
	h	3.00-in OD, 2.37-in ID Mod. Calif.
	i	Other - See text if applicable
	1	300-lb Hammer, 30-inch Drop
	2	140-lb Hammer, 30-inch Drop
	3	Direct Push
	4	Vibrocore
	5	Other - See text if applicable
	6	Piston Extraction

SAMPLE NUMBER & INTERVAL



Groundwater

- Approximate water level at time of drilling (ATD)
- Approximate water level at time after drilling/excavation/well

Field and Lab Test Data

Code	Description
WOR	Weight of Rod
WOH	Weight of Hammer
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
UU	Triaxial Unconsolidated Undrained (UU) Strength
CU	Triaxial Consolidated Undrained (CU) Strength
Consol	1-D Consolidation Test
Perm	Permeability Test
CA	Chemical Analysis

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Worthen Substation
Wenatchee, Washington

Soil Classification System and Key

Figure A-1

WB- 5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
							Drilling Method: Rotosonic Ground Elevation (ft): 645.37 Drilled By: Anderson Environmental Contracting
0						SP	Air knife to 5-feet below ground surface
						AC	Brown to light brown, very gravelly SAND; no odor, no sheen (dense, dry) **(FILL)**
2						GP	Weathered asphalt Light brown, fine to coarse GRAVEL with sand, sub-rounded to rounded; no odor, no sheen (dense, dry)
4							
6		b2 e4	7	0.0		SP-SM	Brown, silty fine to medium SAND with gravel and trace cobbles, sub-rounded to rounded; no odor, no sheen (loose, dry to moist) Grades to with trace gravel at 6' below ground surface
8		b2 e4	7	0.0		SM	Brown, very silty, fine to medium SAND; no odor, no sheen (loose, moist) **(ALLUVIUM)**
10		b2 e4	8	0.0			
12							Grades to with trace gravel at 12.5' below ground surface
14		b2 e4	16	0.0			
				29.5			Grades to dark gray with a strong petroleum odor and no sheen at 15' below ground surface
16		b2	55			GM	**Soil Sample: WB5-(15-16)-230619**
		e4		18.8		SNS	▽ ATD Dark gray, silty, medium to coarse GRAVEL with sand and trace cobbles; strong petroleum odor and a light sheen on gravel faces (medium dense, moist to wet)
18							Gray to brown, weathered quartz-rich medium to coarse SANDSTONE, very friable; light petroleum odor, no sheen (medium dense, dry)
				4.5		SLS	**(BEDROCK)**
20		b2	95/	5.4			

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB- 5

Figure
A-2
(1 of 3)

WB- 5

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	SOIL PROFILE	Water Level
							Drilling Method: Rotosonic Ground Elevation (ft): 645.37 Drilled By: Anderson Environmental Contracting	
22			9"			SLS	Gray to brown, weathered SILTSTONE with medium to coarse-grained sandstone interbeds, friable; light petroleum odor, no sheen (medium dense, dry)	
		e4		5.1			Grades to no sandstone interbedding at 21.5' below ground surface	
24				0.0			Grades to no odor, no sheen at 23' below ground surface	
		b2	50/ 3"	0.0			Grades to very dense at 25' below ground surface	
26							**Soil Sample: WB5-(26-27)-230619**	
		e4						
28				0.0				
						SLS	Gray to black, weathered, organic-rich SILTSTONE with plentiful leaf and wood fossils, very friable; no odor, no sheen (very dense, dry to moist)	
30		b2	50/ 4"	0.1				
						SNS	Gray, weathered fine-grained SANDSTONE, friable; no odor, no sheen (very dense, dry)	
32		e4		0.0				
						SLS	Gray to black, weathered, organic-rich SILTSTONE with sparse 1" thick low-grade coal seams and plentiful leaf fossils, friable; no odor, no sheen (very dense, dry to moist)	
34								
		b2	50/ 5"	0.0			Grades to trace organics and fossils at 35' below ground surface	
36						SLS	Gray, competent SILTSTONE with trace leaf fossils, non-friable; no odor, no sheen (very dense, dry)	
		e4						
38				0.0				
40		b2	50/ 3"					
42				0.0				

Notes:
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130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 5

Figure
A-2
(2 of 3)

WB- 5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 645.37 Drilled By: Anderson Environmental Contracting	Water Level
42		e4		0.0		SLS	Gray, competent SILTSTONE with trace leaf fossils, non-friable; no odor, no sheen (very dense, dry)	
44							Grades to without leaf fossils	
46							Boring Completed 06/19/23 Total Depth of Boring = 45.0 ft.	
48								
50								
52								
54								
56								
58								
60								
62								

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 5

Figure
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(3 of 3)

WB- 6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic

Ground Elevation (ft): 646.30

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sampler Type	PID (ppm)	USCS Symbol	
0			GP	Air knife to 5-feet below ground surface
				Fine to coarse GR AVEL with silt, sand, and cobbles; sub rounded to rounded; no odor, no sheen. (medium dense, dry)
2				**(FILL)**
			SM	Black to gray, silty, fine to medium SAND with gravel and slag pieces; no odor, no sheen (medium dense, dry to damp)
4				At 4-feet, turns black and viscous with a strong petroleum odor
				Soil Sample: WB6-(4-4.5)-230619 collected from sidewall of air knife hole
		5.6		
6				At 5-feet, turns brown without slag and gravel, with a strong petroleum odor
	e4	59.9		At 7-feet, turns back with gray-black mottling. Soil grains appear to be wetted with oil
8				
10				
		75.4	SP	Brown to gray, medium to coarse SAND with trace silt, sand grains wetted with brown oil; strong petroleum odor, light sheen (loose to dense, damp)
	e4	95.1	GP	
12			SNS	**(ALLUVIUM)**
				Soil Sample: WB6-(11-11.5)-230622
		58.9		Gray, coarse GRAVEL with cobbles and sand, cobbles wetted with brown-black oil; strong petroleum odor and a light sheen on gravel faces (medium dense, damp)
	e4	92.1		
14		15.2		
		6.3		Gray, weathered, fine to medium SANDSTONE, occasional brown mottling, very friable; petroleum odor, no sheen (medium dense to dense, dry)
16				**(BEDROCK)**
	e4	7.5		At 14-feet, brown with gray mottling
			SLS	At 16.5-feet, light gray, medium to coarse
18				Gray-brown SILTSTONE with fine to medium sandstone interbeds, friable; mild petroleum odor, no sheen (dense, dry)
	e4	5.5		
		5.2		
20		0.3		

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 6

Figure
A-3
(1 of 3)

WB- 6

Drilling Method: Rotosonic

Ground Elevation (ft): 646.30

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22		e4				SLS		
						SNS	Brown, fine to medium weathered SANDSTONE, friable; slight petroleum odor, no sheen (dense, dry)	
						SLS	Dark gray, weathered SILTSTONE with abundant leaf and wood fossils, very friable; no odor, no sheen (medium dense, moist to wet)	
24		e4		0.4				ATD
				0.5			Moderate sheen and petroleum odor observed in groundwater	
						SNS	Brown, fine to medium weathered SANDSTONE, friable; no odor, no sheen (dense, dry)	
26						SLS		
				0.0			Gray to black, organic-rich SILTSTONE with abundant leaf and wood fossils, occasional low-grade coal seams, very friable; no odor, no sheen (medium dense, moist)	
		e4					**Soil Sample: WB6-(26-27)-230622**	
28								
						SLS	Gray to brown SILTSTONE with sandstone interbeds, non-friable; no odor, no sheen (dense, dry)	
30				0.0				
						SNS	Light gray, quartz-rich, fine to coarse grained SANDSTONE, somewhat friable; no odor, no sheen (dense, dry)	
32				0.0				
		e4						
						SLS	Gray SILTSTONE with occasional sandstone and fossil interbeds, non-friable; no odor, no sheen (dense, dry)	
34				0.0				
36				0.0				
						SNS	Light gray, quartz-rich, medium to coarse-grained SANDSTONE, somewhat friable; no odor, no sheen (dense, dry)	
38		e4		0.0				
						SLS	Gray to light gray SILTSTONE with coarse-grained sandstone interbeds, friable; no odor, no sheen (dense, dry)	
40				0.0				
42								

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 6

Figure
A-3
(2 of 3)

WB- 6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 646.30 Drilled By: Anderson Environmental Contracting	Water Level
42		e4		0.0		SLS	Gray to light gray SILTSTONE with coarse-grained sandstone interbeds, friable; no odor, no sheen (dense, dry)	
44				0.0		SNS	Light gray, coarse-grained SANDSTONE, friable; no odor, no sheen (dense, dry)	
46				0.0		SLS	Dark gray SILTSTONE, competent; no odor, no sheen (dense, dry)	
48		e4		0.0				
50								
52								
54								
56								
58								
60								
62								

Boring Completed 06/22/23
Total Depth of Boring = 50.0 ft.

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 6

Figure
A-3
(3 of 3)

WB- 7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0						GP	Drilling Method: Rotosonic Ground Elevation (ft): 648.30 Drilled By: Anderson Environmental Contracting Air knife to 6-feet below ground surface Brown, fine to coarse GRAVEL with sand; no odor, no sheen. (dense, dry) **(FILL)**
4						CONC	Concrete slab and a semi-circular, rusted piece of steel at 4' below ground surface
6		e4 b2	18	13.8 40.9		SP-SM	Brown, silty, fine to medium SAND with gravel; no odor, no sheen (loose to medium dense, dry) Turns gray with charcoal fragments and light petroleum odor at 6' below ground surface **Soil Sample: WB7-(6-7)-230620**
8		b2 e4	62	6.2 10.5		SNS	Light brown to brown, weathered, fine to medium SANDSTONE, very friable; light petroleum odor, no sheen. (medium dense, dry) **(BEDROCK)** Becomes gray with a strong petroleum odor from 9 to 9.25' below ground surface
10		b2 e4	90	4.5			
12		b2 e4	50/ 4"	0.4			**Soil Sample: WB7-(13-14)-230620**
14							▽ 6/23/23
16		b2	50/ 4"	0.1			▽ ATD
18		e4					Slight petroleum odor in groundwater
20				0.0		SLS	Gray to black, weathered SILTSTONE with leaf and wood fossils, friable; no odor, no sheen (dense, moist)
				0.0		SLS	

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 7

Figure
A-4
(1 of 3)

WB- 7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 648.30 Drilled By: Anderson Environmental Contracting	Water Level
22		b2	77	0.0		SLS	Gray, weathered SILTSTONE, friable in some instances; no odor, no sheen (dense, dry)	
		e4				SNS	**Soil Sample: WB7-(21-22)-230621** Light gray, quartz-rich, fine to coarse SANDSTONE, non-friable. No odor, no sheen. (dense, dry)	
24				0.0				
		b2	50/ 4"	0.0				
26						SLS	Gray to black, weathered, organic-rich SILTSTONE with plentiful leaf and wood fossils, low grade coal seams, very friable; no odor, no sheen (dense, dry to moist)	
		e4		0.0				
28								
				0.0				
30		b2	50/ 5"					
				0.0		SNS	Light gray, fine-grained SANDSTONE, non-friable; no odor, no sheen (dense, dry)	
32		e4						
				0.0				
34								
				0.0				
36								
		e4		0.0				
38								
				0.0				
40								
				0.0				
42								

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 7

Figure
A-4
(2 of 3)

WB- 7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
42		e4				SNS	
44							
46				0.0			
48		e4					
50				0.0			
52		e4		0.0		SLS	
54				0.0		SLS	
56							
58		e4					
60							
62							

Drilling Method: Rotosonic

Ground Elevation (ft): 648.30

Drilled By: Anderson Environmental Contracting

Light gray, fine-grained SANDSTONE, non-friable; no odor, no sheen (dense, dry)

Grades to coarse-grained and friable

Gray to black, weathered, organic-rich SILTSTONE with leaf and wood fossils, friable; no odor, no sheen (dense, dry to moist)

Gray SILTSTONE with occasional interbeds of leaf and wood fossils, non-friable; no odor, no sheen. (dense, dry)

Grades to without fossils at 57.5' below ground surface

Boring Completed 06/21/23
Total Depth of Boring = 60.0 ft.

Notes:
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Worthen Substation Wenatchee, Washington	Log of Boring WB- 7	Figure A-4 (3 of 3)

WB- 8

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.58 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-feet below ground surface Brown, silty, fine to coarse GRAVEL with sand; no odor, no sheen (dense, dry) **(FILL)**	
2								
4								
6		b2 e4	24	0.0			With trace slag pieces at 5' below ground surface	
8		b2 e4	5	0.0			With slag pieces at 8.5' below ground surface	
10						CND	Dark gray to black, SLAG with gravel, silt, and sand; no odor, no sheen. (loose, dry)	
				0.0		SP-SM	**Slag Sample: WB8-(9-10)-230620**	
12		b2 e4	6			SM	Brown, silty, fine to medium SAND with gravel and trace slag pieces; no odor, no sheen (loose, dry to moist)	▽ 6/23/23
							Brown, silty, fine SAND; no odor no sheen (medium dense, moist) **(ALLUVIUM)**	
14		b2 e4	47	0.4			Mild petroleum odor, no sheen at 14' below ground surface	
				26.3		SNS	Brown, fine to medium-grained weathered SANDSTONE with gray siltstone interbeds less than 1-inch thick, friable; strong petroleum odor, no sheen (medium dense, dry) **(BEDROCK)**	
16		b2	29					
		e4		33.8				
18								
				17.3		SLS	Gray to brown, weathered SILTSTONE, friable; Strong petroleum odor, no sheen (medium dense, dry)	
20		b2	50/3"	0.1				

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 8

Figure
A-5
(1 of 3)

WB- 8

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 649.58

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
						SLS		
22						SNS	Light gray to brown, medium to coarse grained, quartz-rich weathered SANDSTONE, very friable to crumbly; light petroleum odor, no sheen (medium dense, dry)	
		e4		0.2				
24								
							Strong petroleum odor at 25' below ground surface	
		b2	50/ 5"	1.2				
26						SLS	Gray to brown, weathered SILTSTONE, friable; strong petroleum odor, no sheen. (dense, dry)	
				1.8				
						SNS	Brown, weathered, medium-grained SANDSTONE, very friable, grains appear to be stained with brown-orange oil; strong petroleum odor, no sheen (dense, moist to wet)	
		e4		99.8				
28						SLS	**Soil Sample WB8-(27-28)-230620**	
				1.8				
							Gray to brown, weathered SILTSTONE, friable; slight petroleum odor, no sheen. (dense, dry)	
30		b2	50/ 4"					
						SNS	Strong petroleum odor at 30' below ground surface	
				8.2				
32							Brown, weathered, fine to medium-grained SANDSTONE, friable; mild petroleum odor, no sheen (dense, dry)	
		e4		0.3		SLS		
							Gray to brown, weathered SILTSTONE, friable; no odor, no sheen. (dense, moist to wet)	▽ ATD
34								
				0.4			**Groundwater Grab Sample: WB8-230621**	
						SNS	**0.01-feet of orange-brown LNAPL observed on the top of the groundwater table.**	
				0.6				
36						SLS	Brown, fine to medium-grained weathered SANDSTONE, friable; mild petroleum odor, no sheen (dense, moist to wet)	
		e4		0.0			Gray to black, organic-rich SILTSTONE with plentiful leaf and wood fossils, low grade coal seams, very friable; no odor, no sheen (dense, dry to moist)	
38								
							Soil Sample: WB8-(37-38)-230620	
						SLS	Gray, SILTSTONE, non-friable, competent; No odor, no sheen (dense, dry)	
40				0.0				
42								

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 8

Figure
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(2 of 3)

WB- 8

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.58 Drilled By: Anderson Environmental Contracting	Water Level
42		e4		0.0		SLS	Gray, SILTSTONE, non-friable, competent; No odor, no sheen (dense, dry)	
44								
46							Boring Completed 06/20/23 Total Depth of Boring = 45.0 ft.	
48								
50								
52								
54								
56								
58								
60								
62								

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB- 8

Figure
A-5
(3 of 3)

WB- 9

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 650.13 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-feet below ground surface Brown, silty, fine to coarse GRAVEL with sand and cobbles, sub rounded to rounded; no odor, no sheen (medium dense to dense, dry) **(FILL)**	
2								
4								
6		b2 e4	41	0.0				
8				0.0		SP-SM	Brown, silty, fine to medium SAND with gravel and trace cobbles, sub-rounded to rounded; no odor, no sheen (medium dense, moist)	
		b2 e4	48	0.0		SLS	**(ALLUVIUM)** Brown to gray, very weathered SILTSTONE, friable; no odor, no sheen (medium dense, moist to wet)	
10				0.0			**(BEDROCK)**	ATD
		b2 e4	73	6.2			**Soil Sample: WB9-(9-10)-230619** Strong petroleum odor and small 1-2mm globules of red-black free product on rock fracture faces from 11 to 11.5' below ground surface	6/21/23
12							Trace of free product LNAPL and a strong petroleum odor encountered in groundwater.	
		b2 e4	42	0.4			**Groundwater Grab Sample: WB9-230619**	
14						SNS	Brown, very weathered fine SANDSTONE, very friable, small amounts of red-black free product globules on rock fracture faces; strong petroleum odor, no sheen (dense, dry)	
		b2	50/ 2"			SLS	**Soil Sample: WB9-(14-15)-230619**	
16		e4		0.2			Brown to gray, weathered SILTSTONE, friable, yellow-brown free product thinly smeared on rock fracture faces; strong petroleum odor, no sheen (dense, dry)	
18						SLS	Gray, weathered SILTSTONE with leaf and wood fossils, friable; no odor, no sheen (dense, dry)	
		e4		0.0				
20						SNS	Gray to brown, weathered, fine-grained SANDSTONE, friable; no odor, no sheen (dense, dry)	
			100/	0.1			Slight petroleum odor from 20 to 20.5' below	

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB- 9

Figure
A-6
(1 of 2)

WB- 9

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
		b2	11"			SNS	ground surface
22		e4		0.0		SLS	Gray to black, weathered, organic-rich SILTSTONE with leaf and wood fossils, friable; no odor, no sheen (dense, dry to moist)
						SLS	Gray, SILTSTONE, friable in some locations; no odor, no sheen (dense, dry)
24				0.0		SNS	**Soil Sample: WB9-(22-23)-230619**
		b2	50/ 5"				Gray to brown, fine to medium-grained SANDSTONE with siltstone interbeds, friable in some locations; no odor, no sheen (dense, dry)
26				0.0			
		e4				SLS	Gray, SILTSTONE, non-friable, competent; no odor, no sheen (dense, dry)
28				0.0			
30							

Drilling Method: Rotosonic

Ground Elevation (ft): 650.13

Drilled By: Anderson Environmental Contracting

Boring Completed 06/19/23
Total Depth of Boring = 30.0 ft.

32
34
36
38
40
42

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

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Worthen Substation
Wenatchee, Washington

Log of Boring WB- 9

Figure
A-6
(2 of 2)

WB-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.54 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-feet below ground surface Brown, fine to medium, silty GRAVEL with sand; no odor, no sheen (medium dense, dry) **(FILL)**	Groundwater not encountered ATD
4						SM	Brown, silty, medium to coarse SAND with gravel, asphalt and brick fragments; no odor, no sheen (loose to medium dense, dry)	
6				0.0				
8		e4		0.0		ML	Brown to black SILT with fine sand; no odor, no sheen (loose, damp) **(ALLUVIUM)**	
10								
12				73		SNS	Blue to gray, weathered SANDSTONE; petroleum odor, no sheen (medium dense to dense, dry) **(BEDROCK)** **Soil Sample: WB10-(11.5-12)-230626** Grades to light brown at 13-feet below ground surface	
14		e4		30				
16								
18		e4		43 9.5 5		SLS	Light brown, weathered SILTSTONE, friable; petroleum odor, no sheen (dense, dry)	
20				5.8 2.0		SLS	Brown to black, organic rich weathered SILTSTONE, friable; no odor, no sheen (dense, damp)	

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB-10

Figure
A-7
(1 of 3)

WB-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.54 Drilled By: Anderson Environmental Contracting	Water Level
22		e4		0.1		SLS	Brown to black, organic rich weathered SILTSTONE, friable; no odor, no sheen (dense, damp) **Soil Sample: WB10-(22-22.5)-230626**	
24				50 7.8			A strong petroleum odor and small blotches of brown to orange free product observed from 23 to 23.5-feet below ground surface **Soil Sample: WB10-(23-23.5)-230626**	
26		e4		0.6		SLS	Gray, weathered SILTSTONE, massive; no odor, no sheen (very dense, dry) **Soil Sample: WB10-(25.5-26)-230626**	
28				0.9				
30		e4						
32				0.0				
34		e4				SNS	Light gray, quartz-rich, fine to medium, weathered SANDSTONE; no odor, no sheen (very dense, dry)	
36								
38		e4		0.0				
40								
42								

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB-10

Figure
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(2 of 3)

WB-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.54 Drilled By: Anderson Environmental Contracting	Water Level
42		e4		0.1		SNS	Light gray, quartz-rich, fine to medium, weathered SANDSTONE; no odor, no sheen (very dense, dry)	
44								
46						SLS	Gray SILTSTONE, competent; no odor, no sheen (very dense, dry)	
		e4		0.0				
48								
50								

Boring Completed 06/26/23
Total Depth of Boring = 50.0 ft.

52
54
56
58
60
62

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB-10

Figure
A-7
(3 of 3)

WB-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 648.35 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-ft bgs. Brown, silty, fine to coarse, angular to sub-rounded gravel with fine to medium sand and trace sub-rounded cobbles; no odor, no sheen (medium dense, moist) **(FILL)**	
2							With sub-rounded to rounded cobbles at 3-ft bgs.	
4						ML	Brown, fine, fine sandy SILT; slight petroleum odor, no sheen (stiff, moist to wet) **(ALLUVIUM)**	
6				0.1				
		e4		0.6			At 7-ft bgs, turns moist with, sub-angular to rounded, fine to coarse gravel and cobbles	
8				8.3		SNS	At 7.5-ft to 8-ft, large granitic boulder present. Gray to brown, fine to coarse grained SANDSTONE with red-brown mottling, completely weathered; strong petroleum odor, no sheen (very soft, dry) **(CHUMSTICK FORMATION)** **Soil Sample: WB-11-(8-9)-231219**	
10				6.3				
12				1.2		SLS	Brown SILTSTONE with occasional fine-grained sandstone interbeds and trace fossilized organics, highly weathered; slight petroleum odor in the upper 1.5-ft, no sheen (very soft, dry)	
		e4		0.1				
14				0.0			At 14-ft bgs, turns medium hard without sandstone interbeds; no odor, no sheen	
				6.3			At 15.25-ft for 9 inches, turns gray, soft, and highly weathered with a moderate petroleum odor and red-brown staining	
16				0.3		SNS	**Soil Sample: WB-11-(15.5-16)-231219**	
				0.1			Light brown, fine to medium grained SANDSTONE, highly weathered; slight petroleum odor, no sheen	
		e4				SLS		
18				0.0				
						SNS	Brown SILTSTONE with fine-grained sandstone interbeds and trace fossilized organics and low grade coal seams, highly weathered; no odor, no sheen (soft, dry)	
20				0.0			Light brown, fine to coarse-grained SANDSTONE, moderately weathered; no odor, no sheen (soft, dry)	

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB-11

Figure
A-8
(1 of 2)

WB-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic

Ground Elevation (ft): 648.35

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sampler Type	PID (ppm)	USCS Symbol	Description
22			SLS	**Soil Sample: WB-11-(18.5-19)-231219**
				At 20.5-ft, turns gray for 3-in.
	e4	0.0		Gray to dark brown, organic-rich SILTSTONE with abundant fossilized plant matter, moderately weathered; no odor, no sheen (soft, damp)
24			SNS	Light brown, fine to coarse-grained SANDSTONE, moderately weathered; no odor, no sheen (soft, dry)
		0.0		
26		131.8	SLS	Dark brown, organic-rich SILTSTONE, completely weathered; strong petroleum odor and moderate sheen (very soft, wet)
		3.8	SNS	**Soil Sample: WB-11-(26-26.5)-231219**
	e4			
28		2.1		Gray to light brown, fine-grained SANDSTONE, medium hard, fresh; slight petroleum odor, no sheen (medium hard, dry)
		0.0	SLS	
		0.0		Gray SILTSTONE with trace plant fossils, slightly weathered; no odor, no sheen (soft, dry)
30				At 29.5-ft, without fossils
		0.0		**Soil Sample: WB-11-(29-30)-231219**
32				
	e4			
		0.0	SNS	Light gray, fine to medium-grained SANDSTONE with occasional siltstone interbeds, fresh, competent; no odor, no sheen (medium hard, dry)
34		0.0		
36		0.0	SLS	Gray, SILTSTONE with occasional fine-grained sandstone interbeds, fresh; no odor, no sheen (hard, dry)
		0.0		
	e4			
38		0.0		**Groundwater Grab Sample: WB-11-231219**
				Free product not observed in soil but observed in groundwater infiltrating into the open boring.
40				
42				

Water Level: ATD

Boring Completed 12/19/23
Total Depth of Boring = 40.0 ft.

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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Worthen Substation
Wenatchee, Washington

Log of Boring WB-11

Figure
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(2 of 2)

WB-12

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic

Ground Elevation (ft): 649.69

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Description	Water Level
0				SM	Air knife to 5-ft bgs. Brown, silty, fine to medium SAND with fine, sub-rounded gravel and trace sub-rounded cobbles; no odor, no sheen (medium dense, moist) **(FILL)**	
2			0.0		Beginning at 1.5-ft, gravel size and cobble amount increases. From 3 to 4-ft, slight petroleum odor.	
4			0.0	GM	Brown, silty, fine to coarse, sub angular to rounded GRAVEL with fine to medium sand, cobbles, boulders, and trace slag fragments; no odor, no sheen (loose to medium dense, damp)	
6			0.0	SP-SM	Brown, fine to coarse SAND with silt and trace, sub-rounded cobbles; no odor, no sheen (loose to medium dense, damp) **(ALLUVIUM)**	
8		e4	0.0			
10			0.0	SNS	Gray, medium to coarse-grained SANDSTONE, highly weathered; no odor, no sheen (medium hard, dry) **(CHUMSTICK FORMATION)**	
12		e4	0.0	SLS	Brown to black SILTSTONE, highly weathered; no odor, no sheen (medium hard, dry)	
14			0.0	SNS	Light brown, medium to coarse-grained, micaceous SANDSTONE, highly weathered; no odor, no sheen (very soft, dry)	
16			0.0	SLS	Brown to black SILTSTONE, moderately weathered; no odor, no sheen (hard, dry)	
18		e4	0.0		**Soil Sample: WB12-(17-18)-231215** At 17.5-ft, becomes soft and moist to wet	▽ ATD
20				SNS	Light brown, fine to medium-grained SANDSTONE with siltstone interbeds; no odor, no sheen (soft to medium hard, dry)	
				SLS	Gray SILTSTONE, moderately weathered; no odor, no sheen (medium hard, dry)	

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB-12

Figure
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(1 of 2)

WB-12

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.69 Drilled By: Anderson Environmental Contracting	Water Level
22				1.0		SLS	Gray SILTSTONE, moderately weathered; no odor, no sheen (medium hard, dry)	
		e4		3.5				
				0.0			From 22.5 to 23-ft, black petroleum product staining on fracture faces; strong petroleum odor, no sheen	
24							**Soil Sample: WB12-(22.5-23)-231215**	
							Soil Sample: WB12-(23.5-24)-231215	
				0.0			At 24-ft, becomes hard and slightly weathered	
26						SNS	Gray, fine to medium-grained SANDSTONE, fresh, competent; no odor, no sheen (hard to very hard, dry)	
		e4						
28				0.0				
30								

Boring Completed 12/15/23
Total Depth of Boring = 30.0 ft.

32
34
36
38
40
42

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB-12

Figure
A-9
(2 of 2)

WB-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 643.02 Drilled By: Anderson Environmental Contracting	Water Level
0						AC	Air knife to 5-ft.	
						GM	Asphalt	
						AC	Brown, silty, sub-angular, fine GRAVEL; no odor, no sheen (dense, dry)	
2						GM	**(FILL)**	
							Asphalt	
				0.0			Brown, silty, sub-angular, fine GRAVEL with fine to medium sand; no odor, no sheen (dense, dry to damp)	
4							At 2-ft, with sub-rounded cobbles and boulders	
				0.0			At 5-ft, without cobbles and boulders	
6						ML	At 5.75-ft, light brown, fine to medium-grained sandstone boulder, fresh, micaceous	
		d4		0.0		SP-SM	Brown, gravelly SILT with fine to medium sand, fine to coarse gravels; no odor, no sheen (loose, dry to damp)	
8							At 6.75-ft, light brown, fine to medium-grained sandstone boulder, fresh, micaceous	
							Brown, gravelly, fine to medium SAND with silt; fine to coarse, sub-angular to sub-rounded gravel; no odor, no sheen (loose, dry to damp)	
10				0.0		SP		
				0.0		DB	At 7.5-ft for 6-inches, with burnt woody debris	
						GP		
12							Brown, gravelly, fine to medium SAND with burned woody debris; fine to coarse, sub-angular to sub-rounded gravel; no odor, no sheen (loose, dry to damp)	
		d4		0.0		GP-GM		
				0.0			Orange to black slightly burned woody debris; no odor, no sheen (loose, dry to damp)	
14								
				0.0			Orange to brown, sandy, fine GRAVEL with sub-rounded cobbles; fine to medium sand; no odor, no sheen (loose, dry to damp)	
16						SP		
				0.0			Light brown to brown, sandy, fine to coarse, angular to sub-rounded GRAVEL with silt and trace glass and porcelain debris; fine to medium sand; no odor, no sheen (loose, dry to damp)	
		d4						
18							At 15.5-ft, granitic boulder	
							Brown, gravelly, fine to medium SAND; fine gravel; no odor, no sheen (medium dense, dry)	
							(ALLUVIUM)	
20				0.0			**Soil Sample: WB13-(20.5-21.5)-231212**	
								ATD

Notes:
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Worthen Substation
Wenatchee, Washington

Log of Boring WB-13

Figure
A-10
(1 of 4)

WB-13

Drilling Method: Rotosonic

Ground Elevation (ft): 643.02

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22						GM	Brown, silty, sub-angular to rounded, fine GRAVEL; no odor, no sheen (medium dense, damp)	
		d4		0.0		SP-SM	Brown to black, gravelly, fine to medium SAND with silt; fine to coarse, sub-angular to rounded gravel; no odor, no sheen (medium dense, moist)	
				0.1		ML		
24				0.0			At 23-ft, slight petroleum odor observed	
						SNS	Brown, gravelly SILT with sub-rounded cobbles; fine to coarse, sub-rounded gravel; no odor, no sheen (medium stiff, moist)	
26				87			Light brown to gray, medium to coarse-grained SANDSTONE; highly weathered; petroleum odor, no sheen (soft, dry)	
						SLS	**(CHUMSTICK FORMATION)**	
		d4					**Soil Sample: WB13-(25.5-26)-231212**	
28				4.7			Gray to dark gray, SILTSTONE, completely weathered; slight petroleum odor, no sheen (soft, dry)	
				1.6			At 29-ft, 6-inch seam of black, organic-rich siltstone with low grade coal	
30							At 30-ft, no petroleum odor	
				1.1			**Soil Sample: WB13-(30.5-31)-231212**	
						SNS	Gray, fine to medium-grained SANDSTONE, highly weathered; slight petroleum odor, no sheen (very soft, dry)	
32		d4		8.3				
34							At 34-ft, becomes medium hard and moderately weathered	
						SLS	Dark brown to black, decomposed SILTSTONE, completely weathered; significant amounts of black, viscous free product from 35-ft to 36.5-ft; strong petroleum odor, no sheen (very soft, moist)	
				100			**Free Product Sample (35 to 36-ft): WB13-(FP)-231212**	
36		d4		0.3			**Soil Sample: WB13-(35.5-36)-231212**	
38							At 36.5-ft, transitions to a dark gray, highly weathered, soft SILTSTONE with no odor and no sheen	
						SNS	*Once drilled to 40-ft using 6-inch casing and a 4-inch core barrel, through free product encountered from 35-ft to 36.5-ft, the boring was overdrilled to 40-ft using 8-inch casing and a 6-inch core barrel. A bentonite plug, consisting of hydrated bentonite chips, was installed from 30-ft to 40-ft and allowed to set for 2 hours and 10 minutes. Drilling then*	
40				2.5				
						SLS		
42								

Notes:
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WB-13

Drilling Method: Rotosonic

Ground Elevation (ft): 643.02

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
42		d4		0.5		SLS	*advanced past 40-ft using 6-inch casing and a 4-inch core barrel through the plug. Based on visual observations the bentonite seal was in good condition and kept free product from migrating downward in the boring.*	
				0.0			**Soil Sample: WB13-(37.5-38.5)-231212**	
44							Gray, medium to coarse-grained SANDSTONE, highly weathered; slight petroleum odor, no sheen. (very soft, dry to moist)	
							40-ft to 41.5-ft moist	
46				0.0			**Soil Sample: WB13-(40-41)-231212**	
		d4					Brown to gray SILTSTONE, moderately weathered; no odor, no sheen (very soft, dry to moist)	
48				0.0		SNS	45-ft, becomes medium hard to hard	
							47-ft becomes very soft to extremely soft	
50							Gray, medium to coarse-grained SANDSTONE, moderately weathered; no odor no sheen (very soft, dry)	
				3.1				
52		d4						
							52-ft to 55-ft very slight petroleum odor	
54				10.2				
							55-ft to 56.5 ft seams of gray siltstone within sandstone	
				8.5				
56						SLS	Gray to dark gray SILTSTONE, highly weathered; no odor, no sheen (very soft, dry)	
				0.0				
		d4				SNS	Gray, medium to coarse-grained SANDSTONE, moderately to highly weathered; no odor, no sheen (very soft to hard, dry)	
58								
				0.0			Rock competency increasing downwards	
60				1.1				
62				0.5				
		d4						

Notes:
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB-13

Figure
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WB-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
64				0.0		SLS	
66				0.0			
68		d4		0.0			
70				0.0			

Drilling Method: Rotosonic

Ground Elevation (ft): 643.02

Drilled By: Anderson Environmental Contracting

Brown to black, organic rich SILTSTONE, moderately to slightly weathered; no odor, no sheen (very soft to hard, dry)

64.5-ft becomes hard and fresh (competent bedrock)

Boring Completed 12/12/23
Total Depth of Boring = 70.0 ft.

72
74
76
78
80
82
84

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
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3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

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Worthen Substation
Wenatchee, Washington

Log of Boring WB-13

Figure
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WB-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 642.72 Drilled By: Anderson Environmental Contracting	Water Level
0						AC	Air knife to 5-ft. Asphalt	
2						GP-GM	Brown, sub-rounded, fine to coarse GRAVEL with fine to coarse sand and silt; no odor, no sheen (medium dense, dry to moist) **(FILL)**	
4								
6				0.0		ML	Brown SILT with sub-rounded, fine gravel; no odor, no sheen (medium stiff, damp to moist)	
8				0.0		GM	Brown to light brown, silty, sub-rounded, fine to coarse GRAVEL; no odor, no sheen (medium dense, damp)	
10				0.0		ML	Light brown SILT, no odor, no sheen (medium stiff to stiff, damp)	
12				0.0		DB SP	Black, burned debris with small wood fragments; no odor, no sheen (loose, damp) Light brown to brown, gravelly, fine to medium SAND; sub-rounded, fine to coarse gravel; no odor, no sheen (loose, damp) **(ALLUVIUM)**	
14								
16				0.0		ML	Brown SILT; no odor, no sheen (very soft, dry) At 17-ft, becomes black, organic rich, and damp	
18				0.0		SNS	Light brown, medium to coarse-grained SANDSTONE, highly to completely weathered; no odor no sheen (very soft to hard,) **(CHUMSTICK FORMATION)**	
20				0.0			20-ft becomes dark gray, fine to medium-grained, micaceous, soft to medium hard, and moderately weathered	

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB-14

Figure
A-11
(1 of 3)

WB-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 642.72 Drilled By: Anderson Environmental Contracting	Water Level
22				0.0		SNS	Light brown, medium to coarse-grained SANDSTONE, highly to completely weathered; no odor no sheen (very soft to hard,) **(CHUMSTICK FORMATION)**	
24				0.0				
				0.0				
26							26-ft becomes gray, medium-grained, non-micaceous, medium hard, and slightly weathered	
				0.0				
28							27.5-ft becomes medium to coarse-grained and soft to medium hard	
				0.0				
30				0.6			30-ft becomes medium hard to hard **Soil Sample: WB14-(30-31)-231214**	
32							32-ft to 33-ft becomes brown	
				0.0			**Soil Sample: WB14-(33-34)-231214** *Water bearing zone observed at 33 to 34-ft based on observed water seepage into boring.*	▽ Moisture not encountered in sample core. Water level measured in open boring at 34-ft.
34							34-ft becomes dark gray, fine to medium-grained, very hard, and fresh (competent bedrock)	
36								
38								
40				0.0		SLS	Dark gray SILTSTONE, fresh; no odor, no sheen (very hard, dry)	
42								

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring WB-14

Figure
A-11
(2 of 3)

WB-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 642.72 Drilled By: Anderson Environmental Contracting	Water Level
42				0.0		SLS	Dark gray SILTSTONE, fresh; no odor, no sheen (very hard, dry)	
44						SNS	Gray, medium to coarse-grained SANDSTONE, fresh; no odor, no sheen (hard to very hard, dry)	
46								
48								
50								
52								
54								
56								
58								
60								
62								

Boring Completed 12/14/23
Total Depth of Boring = 45.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

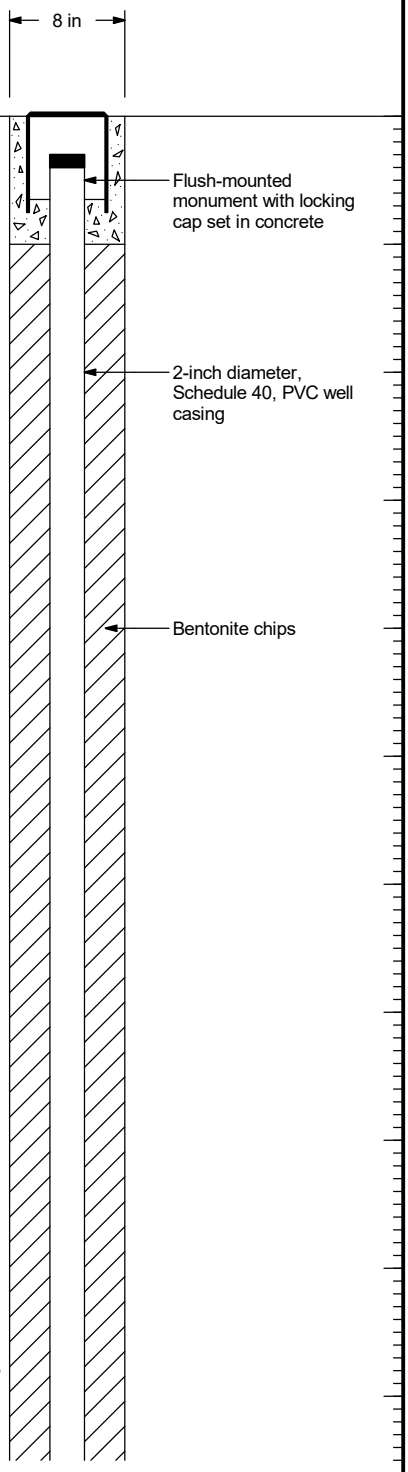
Log of Boring WB-14

Figure
A-11
(3 of 3)

WMW-5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 648.25 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-feet below ground surface. Brown, silty, GRAVEL with sand and cobbles, sub-rounded to rounded; no odor, no sheen (medium dense, dry) **(FILL)**	
4						SM	Brown, silty, fine to medium SAND with gravel, sub-rounded to rounded; no odor, no sheen (medium dense, moist)	
6				0.0		SNS	Brown, weathered, fine-grained SANDSTONE, very friable, micaceous; no odor, no sheen (medium dense, dry) **(BEDROCK)**	
8		e4		0.0		SLS	Brown, weathered SILTSTONE with trace fossil interbeds, very friable; no odor, no sheen (medium dense to dense, dry)	
10				0.0		SNS	Brown, fine to medium-grained SANDSTONE, quartz-rich, very friable; no odor, no sheen (medium dense to dense, dry)	
12		e4		0.2		SLS	Brown, weathered SILTSTONE with sandstone interbeds; no odor, no sheen (medium dense to dense, moist)	
14				0.0		SLS	Gray to black, highly organic SILTSTONE with abundant organics including leaf and wood fossils, low grade coal seams, and siltstone interbeds, very friable; no odor, no sheen (medium dense, moist)	
16		e4				SLS	Brown to light brown, weathered SILTSTONE, friable; no odor, no sheen (dense, dry)	
18						SLS	Gray, organic-rich SILTSTONE, interbeds of leaf and wood fossils, peat, and low-grade coal, very friable; no odor, no sheen (dense, moist)	
20				0.0		SLS	Brown to light brown, weathered SILTSTONE, friable; no odor, no sheen (dense, dry)	
				0.0		SLS	Gray, organic-rich SILTSTONE, interbeds of leaf and wood fossils and low-grade coal, very friable; no odor, no sheen (dense, moist)	▽ 7/17/23

Monitoring Well Detail (DOE#: BNW 276)



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

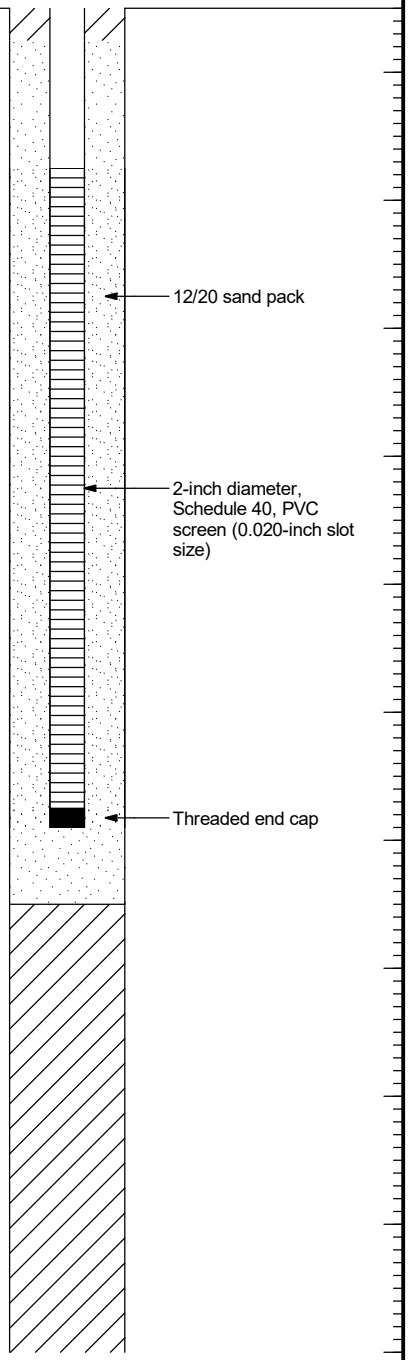
Log of Monitoring Well
WMW-5

Figure
A-12
(1 of 3)

WMW-5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 648.25 Drilled By: Anderson Environmental Contracting	Water Level
22						SLS	Gray, weathered SILTSTONE, friable; no odor, no sheen (dense, dry)	
		e4		0.0		SNS	Brown to light brown, weathered, fine to medium-grained SANDSTONE, friable in some areas; no odor, no sheen (dense, dry)	
24				0.0		SLS	Gray, SILTSTONE, interbeds of leaf fossils, friable in some areas; no odor, no sheen (dense, dry)	
26				0.0				
		e4						
28				0.0				
30				0.0		SNS	Light gray, fine-grained SANDSTONE, very friable; no odor, no sheen (dense, wet)	ATD
32		e4		0.0			**Soil Sample: WMW5-(32-33)-230623**	
34				0.0		SLS	Gray SILTSTONE with trace leaf fossils, friable; no odor, no sheen (dense, dry)	
36				0.0				
		e4					At 37-feet, becomes competent	
38				0.0				
40				0.0				
42								

Monitoring Well Detail
(DOE#: BNW 276)



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-5	Figure A-12 (2 of 3)

WMW-5

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic

Ground Elevation (ft): 648.25

Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BNW 276)

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Soil Description
42		e4		SLS	Gray SILTSTONE with trace leaf fossils, friable; no odor, no sheen (dense, dry)
44			1.8		Strong petroleum odor at 44-feet below ground surface. Yellow-orange free product smeared on rock fracture faces at 45 to 46-feet below ground surface.
46			70.8		**Soil Sample: WMW5-(45-46)-230623**
			0.8		
48		e4			At 47.5-feet, no odor, no sheen
			0.0		
50					

Bentonite chips

Boring Completed 06/23/23
Total Depth of Boring = 50.0 ft.

Monitoring Well Completed 06/23/23
Elevation at Top of Monitoring Well Casing = 647.83 ft.
Total Depth of Monitoring Well = 50.0 ft.

52
54
56
58
60
62

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-5	Figure A-12 (3 of 3)

WMW-6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0						SP	
2						SP	
4							
6		b2 e4	2			ML	
8		b2 e4	2				
10		b2 e4	7	198			
12		b2	50/ 0"				▽ 6/26/23
14		e4				SNS	
16		b2	100/ 6"				
18		e4				SNS	
20		b2	50/ 2"				

Drilling Method: Rotosonic

Ground Elevation (ft): 645.88

Drilled By: Anderson Environmental Contracting

Air knife to 5-feet below ground surface

Light brown, very gravelly fine to medium SAND, trace concrete fragments; no odor, no sheen (medium dense, dry)

(FILL)

Brown, fine to medium SAND with gravel; petroleum odor, no sheen (loose to medium dense, dry to moist)

Brown, sandy, SILT with gravel, occasional blue soil staining; strong petroleum odor, no sheen (stiff, damp)

Soil Sample: WMW6-(6.5-7)-230619

Brown to blue, fine-grained, very weathered SANDSTONE with occasional micaceous siltstone interbeds, very friable; strong petroleum odor, no sheen (dense, dry)

(BEDROCK)

Light brown, fine, very weathered quartz-rich, silty SANDSTONE, micaceous; no odor, no sheen (dense, dry)

Soil Sample: WMW6-(17.5-18)-230619

Monitoring Well Detail
(DOE#: BNW 274)

8 in

Flush-mounted monument with locking cap set in concrete

2-inch diameter, Schedule 40, PVC well casing

Bentonite chips

16/30 sand pack

2-inch diameter, Schedule 40, PVC screen (0.010-inch slot size)

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-6

Figure
A-13
(1 of 2)

WMW-6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
22		e4		0.2		SNS	
				0.0		SLS	ATD
24		e4					
		b2	85/ 3"				
26						SLS	
		e4		0.0			
28							
30		b2	50/ 4"				
32		e4		0.0			
34							
36							
38							
40							
42							

Drilling Method: Rotosonic

Ground Elevation (ft): 645.88

Drilled By: Anderson Environmental Contracting

Light brown, fine, very weathered quartz-rich, silty SANDSTONE, micaceous; no odor, no sheen (dense, dry)

Gray to black, highly organic SILTSTONE with abundant leaf and wood fossils; no odor, no sheen (loose to medium dense, moist to wet)

Soil Sample: WMW6-(23.5-24.5)-230619

Gray, SILTSTONE, competent; no odor, no sheen (dense, dry)

Monitoring Well Detail
(DOE#: BNW 274)

Threaded end cap

Bentonite chips

Boring Completed 06/15/23
Total Depth of Boring = 35.0 ft.

Monitoring Well Completed 06/16/23
Elevation at Top of Monitoring Well Casing = 645.32 ft.
Total Depth of Monitoring Well = 35.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

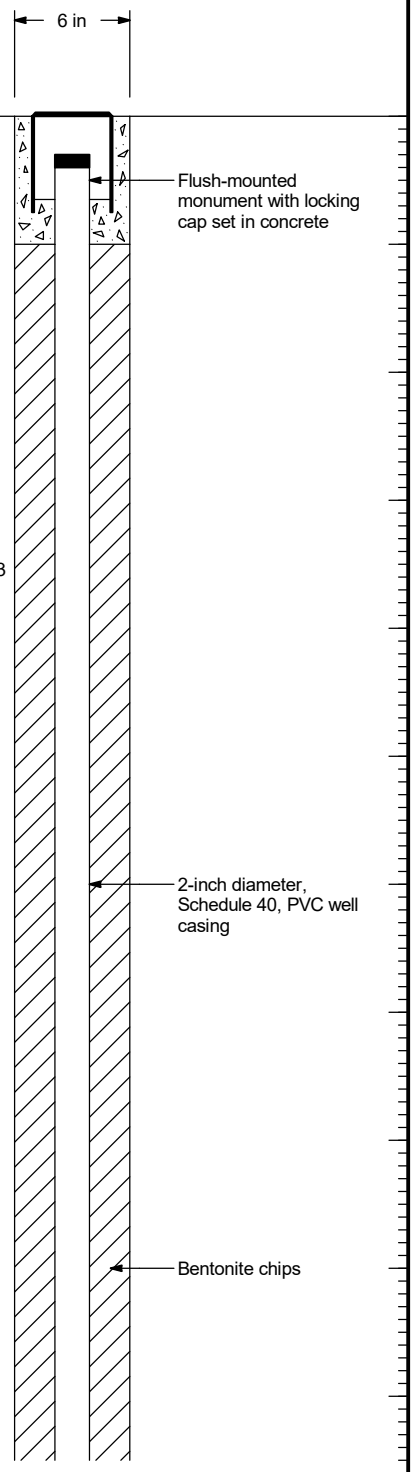
LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-6	Figure A-13 (2 of 2)

WMW-7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 649.93 Drilled By: Anderson Environmental Contracting	Water Level
0						GM	Air knife to 5-feet below ground surface. Brown, silty, fine to coarse GRAVEL with sand, cobbles, and trace brick fragments; no odor, no sheen (medium dense, dry) **(FILL)**	
2				0.0				
4						SM	Brown, silty, fine to medium, SAND with gravel, sub-rounded to rounded; no odor, no sheen (medium dense, moist)	
6				0.0		SLS	Brown, weathered SILTSTONE, friable; no odor, no sheen (medium dense, dry) **(BEDROCK)**	▽ 6/21/23
8		e4 e		0.0		SLS	Gray, weathered SILTSTONE with abundant leaf and wood fossils, friable; no odor, no sheen (medium dense, dry)	
10				0.4			Grades to moist and dark gray with a faint organic odor at 11-feet (medium dense,)	
12		e4		0.0		SLS	Light brown, weathered SILTSTONE, friable; no odor, no sheen (medium dense to dense, dry)	
14				0.1		SNS	Light brown, fine-grained, weathered SANDSTONE, friable; no odor, no sheen (medium dense to dense, dry)	
16				0.0		SNS	Light gray, quartz-rich, medium to coarse-grained, SANDSTONE, friable; no odor, no sheen (medium dense to dense, dry)	
18		e4						
20				0.0		SLS	Dark gray, organic-rich SILTSTONE with abundant plant fossils, very friable; no odor, no sheen (medium dense to dense, moist)	
				0.0		SNS		

Monitoring Well Detail
(DOE#: BNW 275)



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-7

Figure
A-14
(1 of 3)

WMW-7

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 649.93
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
22		e4		0.0		SNS	Light gray, quartz-rich, fine to coarse-grained SANDSTONE, friable; no odor, no sheen (medium dense to dense, dry)
24				0.0		SLS	Gray to dark gray SILTSTONE, occasional interbeds of fossils, friable; no odor, no sheen (dense, dry)
26				0.0			
28		e4					
30				0.0		SLS	Gray SILTSTONE with fine to medium-grained sandstone interbeds, friable in some areas; no odor, no sheen (dense, dry)
32		e4		0.0		SLS	Dark gray, organic-rich SILTSTONE with abundant plant fossils and trace low-grade coal seams, very friable; no odor, no sheen (dense, moist to wet)
34				2.5			Mild petroleum odor between 32 and 33-feet below ground surface **Soil Sample: WMW7-(32-33)-230621** Becomes wet at 35-feet
36				0.0		SNS	Light gray, quartz-rich, fine to coarse-grained SANDSTONE, friable; no odor, no sheen (dense, wet)
38		e4		0.0		SLS	**Soil Sample: WMW7-(36-37)-230621** Gray SILTSTONE with fine to medium-grained sandstone interbeds, abundant plant fossils, friable in some areas; no odor, no sheen (dense, moist to wet)
40				0.0		SNS SLS	Light gray, quartz-rich, fine to medium-grained SANDSTONE, friable; no odor, no sheen (dense, moist to wet)
42				0.0			Gray to dark gray SILTSTONE, occasional interbeds of fossils, friable; no odor, no sheen (dense, dry)

Water Level: ATD

Monitoring Well Detail (DOE#: BNW 275)

- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)
- Threaded end cap

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-7

Figure
A-14
(2 of 3)

WMW-7

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 649.93

Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BNW 275)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description	Water Level
42		e4				SLS	Gray to dark gray SILTSTONE, occasional interbeds of fossils, friable; no odor, no sheen (dense, dry)	
44								
46							Litholigies from the interval from 40 to 50-feet based on conversations with the driller and logging of hole cleanout.	
48		e4		0.0		SNS	Light gray, quartz-rich, fine to medium-grained SANDSTONE, non-friable; no odor, no sheen (dense, dry)	
50				0.0		SLS	Gray to dark gray, competent SILTSTONE with trace plant fossils; no odor, no sheen (very dense, dry)	
52		e4						
54				0.0				
56				0.0				
58		e4						
60						SNS	Light gray, quartz-rich, fine to medium-grained SANDSTONE, non-friable; no odor, no sheen (very dense, dry)	
62								

Bentonite chips

Boring Completed 06/21/23
Total Depth of Boring = 60.0 ft.

Monitoring Well Completed 06/22/23
Elevation at Top of Monitoring Well Casing = 649.36 ft.
Total Depth of Monitoring Well = 60.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-7	Figure A-14 (3 of 3)

WMW-8

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 645.32
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile
0						SP	Air knife to 5-feet below ground surface Light brown, very gravelly, SAND; no odor, no sheen (dense, dry) **(FILL)**
2						AC	Weathered ASPHALT **(ASPHALT)**
						GP-GM	Light brown, GRAVEL with sand and silt; no odor, no sheen (dense, dry) **(FILL)**
4						ML	Brown to light brown, SILT with gravel and coarse sand and organics; no odor, no sheen (soft, damp)
6							
8		e4		0.0			
10						SP	Black, gravelly, medium to coarse SAND; slight asphalt odor, no sheen (loose, damp) Becomes light brown at 10.5-feet below ground surface
12		e4		0.0			Becomes brown at 12.5-feet below ground surface
14						ML	Brown, gravelly, SILT; no odor, no sheen (soft to medium stiff, damp) **(ALLUVIUM)**
16				8.0 21.7			At 15 feet below ground surface, grades to with gravel with strong petroleum odor and heavy staining At 16.5 to 18-feet below ground surface, sheen observed
18		e4		47.8		SNS	**Soil Sample: WMW8-(17.5-18)-230629** Gray, weathered SANDSTONE; petroleum odor, no sheen (medium dense to dense, dry)
20						SLS	**(BEDROCK)** **Soil Sample: WMW8-(18-18.5)-230629**

GROUNDWATER

Water Level: 06/30/23 ATD

Monitoring Well Detail (DOE#: BNW 280)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-8

Figure
A-15
(1 of 3)

WMW-8

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 645.32 Drilled By: Anderson Environmental Contracting	Water Level	Monitoring Well Detail (DOE#: BNW 280)
22				4.8		SLS	Gray SILTSTONE with sandstone interbeds; petroleum odor, no sheen (medium dense to dense, dry)		
		e4		15.6		SNS	Brown, weathered SILTSTONE, friable; petroleum odor, no sheen (medium dense to dense, dry)		
24				11			Light gray, quartz-rich, weathered SANDSTONE, friable; petroleum odor, no sheen (dense, dry) Becomes competent at 25-feet below ground surface		Threaded end cap
26				2.2					
				2.7		SLS	Brown to gray weathered SILTSTONE; slight petroleum odor, no sheen (dense, dry)		
		e4							
28				1.3			**Soil Sample: WMW8-(27.5-28)-230629**		
				1.8		SNS	Light gray, fine to medium-grained, weathered SANDSTONE; slight petroleum odor, no sheen (dense, dry)		
30						SLS	Brown, weathered SILTSTONE; petroleum odor, no sheen (dense, moist)		
				2.5		SLS	Gray SILTSTONE, competent; no odor, no sheen (very dense, dry)		
32		e4		2.0					
34				8.0		SNS	Light gray, fine to medium-grained SANDSTONE; slight petroleum odor, no sheen (very dense, dry)		Bentonite chips
				2.4					
36				1.0		SLS	Gray SILTSTONE; no odor, no sheen (very dense, dry)		
				0.8					
		e4				SNS	Light gray, fine to medium-grained SANDSTONE; no odor, no sheen (very dense, dry)		
38						SLS	**Soil Sample: WMW8-(37.5-38)-230629**		
							Brown to black, organic-rich SILTSTONE with abundant plant fossils, friable; no odor, no sheen (very dense, dry)		
40									
42									

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-8

Figure
A-15
(2 of 3)

WMW-8

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 645.32 Drilled By: Anderson Environmental Contracting	Water Level
42		e4		0.4		SLS	Brown to black, organic-rich SILTSTONE with abundant plant fossils, friable; no odor, no sheen (very dense, dry)	Monitoring Well Detail (DOE#: BNW 280)
44						SLS	Gray SILTSTONE, competent; no odor, no sheen (very dense, dry)	
46							Boring Completed 06/29/23 Total Depth of Boring = 45.0 ft.	Monitoring Well Completed 06/29/23 Elevation at Top of Monitoring Well Casing = 644.74 ft. Total Depth of Monitoring Well = 45.0 ft.
48								
50								
52								
54								
56								
58								
60								
62								

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-8

Figure
A-15
(3 of 3)

WMW-9

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 647.06
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description
0						AC	Asphalt
						GM	**(ASPHALT)**
							Air knife to 5-feet below ground surface
2							Brown, silty, GRAVEL with sand; no odor, no sheen (medium dense, moist)
							(FILL)
4							
						SP	Brown to gray, very gravelly SAND; no odor, no sheen (loose, dry)
6							
		e4		0.0			
8						SNS	Light brown, weathered quartz-rich SANDSTONE; no odor, no sheen (dense, dry)
							(BEDROCK)
10							Becomes brown with coarsening from medium downward to coarse quartz grains at 10-feet below ground surface
		e4		0.0			
12							
14							Becomes light brown at 14.5-feet below ground surface
						SLS	Brown, weathered micaceous SILTSTONE; no odor, no sheen (dense, dry)
16						SNS	Gray, weathered, medium grained, quartz-rich SANDSTONE; no odor, no sheen (dense, dry)
		e4		0.0			
18							
20							

Water Level: 6/30/23

Monitoring Well Detail (DOE#: BNW 278)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-9

Figure
A-16
(1 of 3)

WMW-9

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 647.06
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22		e4		0.0		SLS	Black, weathered SILTSTONE; no odor, no sheen (dense, dry)	
24						SNS	Black, weathered SANDSTONE; no odor, no sheen (dense, dry)	
26								
28		e4		0.0				
30						SLS	Gray to black, weathered SILTSTONE; no odor, no sheen (dense, dry)	
32		e4		0.1 0.4		SNS	Gray, SANDSTONE with abundant siltstone layers; no odor, no sheen (dense, damp to wet)	
34								ATD
36				2.1		SLS	**Soil Sample: WMW9-(35.5-36)-230628** Gray, SILTSTONE; no odor, no sheen (dense, dry)	
38		e4		2.1			Becomes friable at 37-feet below ground surface	
40								
42				0.3				

Monitoring Well Detail
(DOE#: BNW 278)

- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)
- Threaded end cap

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-9

Figure
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(2 of 3)

WMW-9

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
42		e4		0.0 0.3		SLS	
44							
46						SNS	
48		e4		0.0			
50							
52							
54							
56							
58							
60							
62							

Drilling Method: Rotosonic

Ground Elevation (ft): 647.06

Drilled By: Anderson Environmental Contracting

Gray, SILTSTONE; no odor, no sheen (dense, dry)

Gray, quartz-rich SANDSTONE, competent; no odor, no sheen (dense, dry)

Monitoring Well Detail
(DOE#: BNW 278)

Bentonite chips

Boring Completed 06/28/23
Total Depth of Boring = 50.0 ft.

Monitoring Well Completed 06/28/23
Elevation at Top of Monitoring Well Casing = 646.51 ft.
Total Depth of Monitoring Well = 50.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-9

Figure
A-16
(3 of 3)

WMW-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 647.15 Drilled By: Anderson Environmental Contracting	Water Level
0						AC GP-GM	Asphalt **(ASPHALT)** Air knife to 5-feet below ground surface	
2							Brown, silty, fine to coarse GRAVEL with sand and cobbles; no odor, no sheen (medium dense, moist) **(FILL)**	
4								
6						ML	Brown, SILT with gravel, cobbles, and sand; no odor, no sheen (soft to medium stiff, moist) **(ALLUVIUM)** Lithologies based on conversations with the driller and observations of cleanout from 5.5 to 10-feet below ground surface	
8		e4		0.0				
10							Grades to trace gravel and medium stiff at 10-feet below ground surface	
12		e4		0.0		SNS	Gray, weathered SANDSTONE; no odor, no sheen (medium dense to dense, dry) **(BEDROCK)**	
14				0.0		SLS	Light brown, SILTSTONE; no odor, no sheen (dense, dry)	
16								
18		e4		0.0 0.4		SNS	Light brown to brown, weathered SANDSTONE with gray siltstone interbeds; no odor, no sheen (dense, dry)	▽ 7/17/23
20				0.1		SLS	Brown to gray, organic-rich SILTSTONE with abundant plant fossils, friable; no odor, no sheen (dense, moist)	

Monitoring Well Detail
(DOE#: BNW 279)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-10

Figure
A-17
(1 of 2)

WMW-10

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic
Ground Elevation (ft): 647.15
Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BNW 279)

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Description
22		e4	0.0	SLS	
				SNS	Light gray to brown, quartz-rich, weathered SANDSTONE with siltstone interbeds; no odor, no sheen (dense, damp)
				SLS	Light brown SILTSTONE; no odor, no sheen (dense, dry)
24				SNS	Light gray to brown, quartz-rich, weathered SANDSTONE with siltstone interbeds; no odor, no sheen (dense, dry)
				SLS	**Soil Sample: WMW10-(23.5-24)-230628**
26					Dark gray to black SILTSTONE, competent; no odor, no sheen (dense, dry)
		e4	0.0		Becomes brown and friable at 26.5-feet below ground surface (dense, dry)
28			0.1	SNS	Light gray to brown, quartz-rich, SANDSTONE with siltstone interbeds; no odor, no sheen (dense, dry)
			0.1	SLS	Dark gray to black SILTSTONE, competent; no odor, no sheen (dense, dry)
30			0.1		
				SNS	Light gray to brown, quartz-rich, SANDSTONE with siltstone interbeds; no odor, no sheen (dense, dry)
32			0.0	SLS	Brown to black SILTSTONE, competent; no odor, no sheen (very dense, dry)
		e4			**Soil Sample: WMW10-(31.5-32)-230628**
34			0.1		
36					
			0.4		
38		e4	0.0		
40					
42					

Threaded end cap

Bentonite chips

Boring Completed 06/28/23
Total Depth of Boring = 40.0 ft.

Monitoring Well Completed 06/29/23
Elevation at Top of Monitoring Well Casing = 646.60 ft.
Total Depth of Monitoring Well = 40.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-10	Figure A-17 (2 of 2)

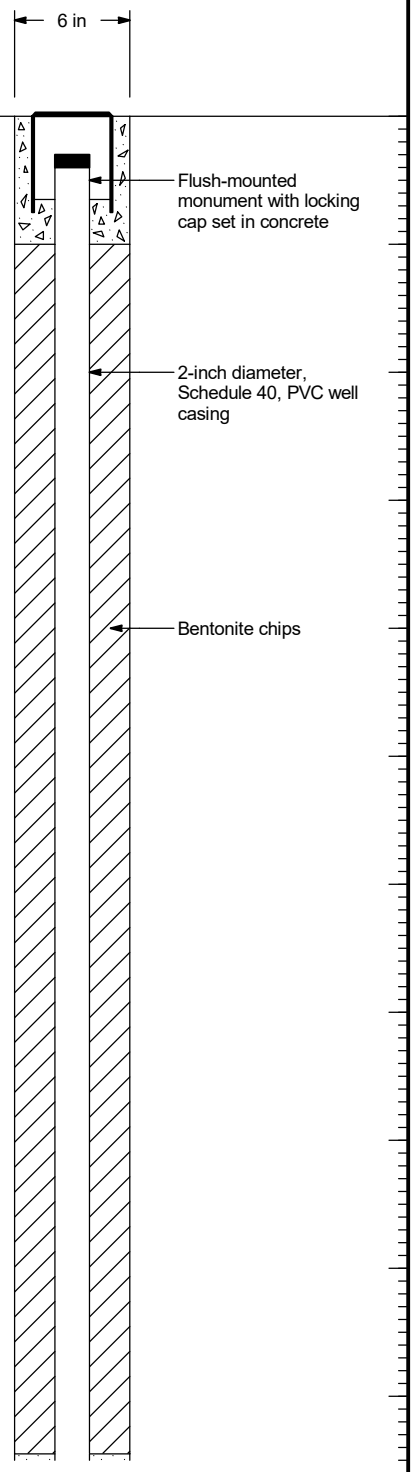
WMW-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic
Ground Elevation (ft): 638.90
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Soil Description
0				SM	Air knife to 5-feet below ground surface
2				GM	Brown, silty, SAND with gravel, root fragments; non odor, no sheen (loose, moist) **(FILL)**
4					Brown, silty, GRAVEL with sand and cobbles; no odor, no sheen (loose, moist)
6				SP	Light brown to brown, SAND with gravel; no odor, no sheen (loose, dry)
8		e4	0.0		Micaceous schist boulder at 6.5-feet
10				GP	Brown to black, sandy, GRAVEL, glass and wood fragments; no odor, no sheen (loose, moist)
12		e4	0.0	SM	Brown to black, silty, SAND; no odor, no sheen (loose, moist)
14				SP	Light brown to brown, very gravelly, SAND; no odor, no sheen (loose, moist)
16				ML	Brown, gravelly, SILT; no odor, no sheen (stiff, damp) **(ALLUVIUM)**
18		e4	0.0	SP	Brown, gravelly, SAND; no odor, no sheen (loose, damp to moist)
20					

Monitoring Well Detail
(DOE#: BNW 277)



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-11	Figure A-18 (1 of 4)

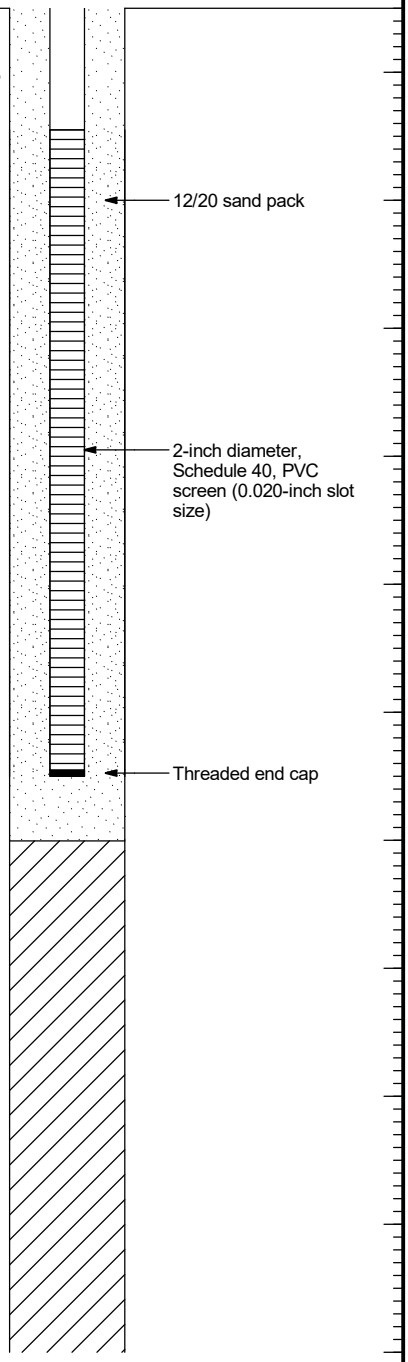
WMW-11

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 638.90
Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BNW 277)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22		e4		0.0		GP	Brown to black, sandy, GRAVEL; no odor, no sheen (medium dense, wet)	6/30/23 ATD
24						SP	Brown, medium to coarse SAND with gravel; no odor, no sheen (medium dense, wet)	
26								
28		e4		0.0				
30				0.0			Grades to with cobbles at 30-feet below ground surface	
							Soil Sample: WMW11-(30.5-31)-230627	
32		e4				SLS	Light brown to brown, very weathered SILTSTONE; no odor, no sheen (medium dense to dense, dry) **(BEDROCK)**	
34				0.2				
						SNS	Light brown, quartz-rich, very weathered SANDSTONE; no odor, no sheen (medium dense to dense, dry)	
36						SLS	Gray, weathered SILTSTONE; no odor, no sheen (medium dense to dense, dry)	
38		e4		0.2 0.0				
40						SNS	Gray, quartz-rich, weathered SANDSTONE with siltstone interbeds; no odor, no sheen (medium dense to dense, dry)	
							Grades to without interbedded siltstone at 40-feet below ground surface (dense, dry)	
42								



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-11	Figure A-18 (2 of 4)

WMW-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic
Ground Elevation (ft): 638.90
Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BNW 277)

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Description
42		e4	0.1 0.3	SNS	Gray, quartz-rich, weathered SANDSTONE with siltstone interbeds; no odor, no sheen (medium dense to dense, dry)
44					
				SLS	Black, weathered SILTSTONE with plant fossils; no odor, no sheen (dense, dry)
46				SNS	Gray, quartz-rich, weathered SANDSTONE with siltstone interbeds; no odor, no sheen (dense, dry)
		e4	0.2		
48					
				SLS	Light gray SILTSTONE; no odor, no sheen (dense, dry)
50					
52		e4	0.0		
54					
56		e4	0.0		Becomes competent at 56.5-feet below ground surface
58		e4			
60					
62		e4			

Bentonite chips

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-11

Figure
A-18
(3 of 4)

WMW-11

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 638.90 Drilled By: Anderson Environmental Contracting	Water Level	Monitoring Well Detail (DOE#: BNW 277)
64						SLS	Light gray SILTSTONE; no odor, no sheen (dense, dry)		
66		e4							
68									
70							Boring Completed 06/27/23 Total Depth of Boring = 69.0 ft.		Monitoring Well Completed 06/27/23 Elevation at Top of Monitoring Well Casing = 638.08 ft. Total Depth of Monitoring Well = 69.0 ft.
72									
74									
76									
78									
80									
82									
84									

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-11

Figure
A-18
(4 of 4)

WMW-12/AB-03

Drilling Method: Hollow-Stem Auger
Ground Elevation (ft): 648.38
Drilled By: Western States Soil Conservation

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Groundwater
0						GP-GM	Grayish brown, medium to coarse, GRAVEL with silt, sand, and cobbles; no odor, no sheen (dense, dry) **(FILL)**	Monitoring Well Detail (DOE#: BPQ 382); 8.25 in; Flush-mounted monument with locking cap
2							Cleared with vacuum truck to 3' below ground surface	
4								
4				0.0		SM	Dark brown, silty, fine to medium SAND with gravel; no odor, no sheen (very loose, moist) **(ALLUVIUM)**	3/8" Bentonite chip seal; 2-inch diameter, Schedule 40, PVC well casing
6		b2	3					
8		b2	32	1.8			Grades to gray with faint petroleum-like odor at 7' below ground surface	
8							**Soil sample: AB-03-(7.5-9.0)-230824**	
10		b2	44			SNS	Gray, moderately weathered, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry) **(CHUMSTICK FORMATION BEDROCK)**	#12 (10-20) sand pack
12		b2	50/5"	0.0			Grades to brown and becomes damp at 12.5' below ground surface	
14		b2	30				Trace fossil organics at 15' below ground surface	
16							No samples collected between 16.5' and 20' below ground surface where drill cuttings would have transitioned from damp to wet. Exact depth of this transition is unknown. Water level was measured at time of drilling, using a water level meter in the open boring, at 19.15' below ground surface.	2-inch diameter, Schedule 40, PVC screen (0.010-inch slot size); ATD
18								
20		b2	87				Grades to fine to medium grains, no odor, no sheen at 20' below ground surface (hard, wet)	2-inch diameter, Schedule 40, PVC

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-12/AB-03

Figure
A-19
(1 of 2)

WMW-12/AB-03

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Hollow-Stem Auger

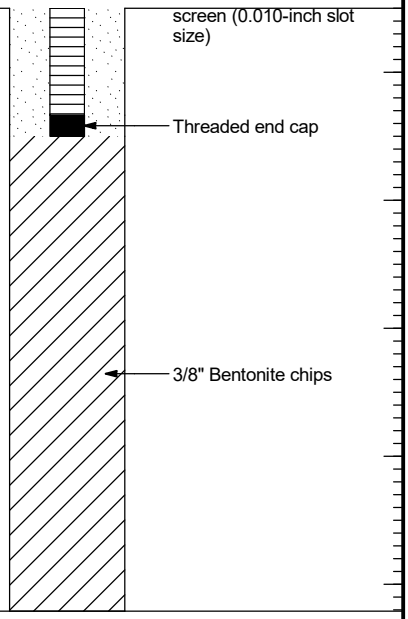
Ground Elevation (ft): 648.38

Drilled By: Western States Soil Conservation

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
22				0.2		SNS	Gray, moderately weathered, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry) **(CHUMSTICK FORMATION BEDROCK)**
24							
26		b2	50/ 4"	0.0			Becomes damp at 25' below ground surface (hard, damp)
28							
30		b2	50/ 5"	0.4			
32							
34							
36							
38							
40							
42							

Water Level

Monitoring Well Detail
(DOE#: BPQ 382)



Boring Completed 08/24/23
Total Depth of Boring = 30.4 ft.

Monitoring Well Completed 08/24/23
Elevation at Top of Monitoring Well Casing = 647.88 ft.
Total Depth of Monitoring Well = 23.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-12/AB-03	Figure A-19 (2 of 2)

WMW-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 654.96 Drilled By: Anderson Environmental Contracting	Water Level

Monitoring Well Detail
(DOE#: BQG 919)

6 in

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description
0						GM	Air knife to 5-ft.
						SP	Brown to black, silty, angular, fine to coarse GRAVEL with fine to medium sand; no odor, no sheen (medium dense, damp) **(FILL)**
2							Brown, fine to medium SAND with fine to coarse, sub-rounded gravel, cobbles, and trace boulders; no odor, no sheen (medium dense, damp to moist) **(ALLUVIUM)**
4				0.0			
6				0.0			
				0.0		GM	Brown, silty, sub-angular to rounded, fine to coarse GRAVEL with fine to medium sand and sub-rounded cobbles, no odor, no sheen (medium dense, moist)
8		e4					
10				0.0			
				0.0			
						SNS	Brown, fine to coarse-grained SANDSTONE, highly weathered; no odor, no sheen (medium hard, dry)
12		e4				GM	**(BOULDER)**
				0.0		SNS	Brown to black, silty, rounded, fine to coarse GRAVEL with fine to medium sand and clasts of organic-rich silt (medium dense, moist)
14						CLS	**(ALLUVIUM)**
				0.0			Gray to light brown, fine to medium-grained SANDSTONE, moderately weathered; no odor, no sheen (medium hard, dry)
						SLS	**(CHUMSTICK FORMATION)**
16				0.0			Dark brown to black MUDSTONE with organic inclusions, massive, friable, veins of oxidation moderately weathered; no odor, no sheen (medium hard, damp)
18		e4					Dark gray SILTSTONE with trace organic interbeds, highly weathered; no odor, no sheen (soft, dry)
				0.0			At 17-ft, turns brown with occasional weathered, low-grade coal seams
20						SNS	At 18.5-ft, turns light brown without organics
				0.0			

Flush-mounted monument with locking cap set in concrete

2-inch diameter, Schedule 40, PVC well casing

Bentonite chips

12/20 sand pack

2-inch diameter, Schedule 40, PVC screen (0.020-inch slot

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-13

Figure
A-20
(1 of 2)

WMW-13

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Rotosonic

Ground Elevation (ft): 654.96

Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BQG 919)

Depth (ft)	Sample Number & Interval	Sampler Type	PID (ppm)	USCS Symbol	Soil Description
22		e4	0.0	SNS	At 19-ft, turns hard with veins of oxidation between siltstone bedding and occasional fine-grained sandstone interbeds
				SLS	Light brown, fine-grained SANDSTONE with occasional siltstone interbeds, moderately weathered; no odor, no sheen (medium hard, dry)
24			0.0		Gray SILTSTONE with yellow oxidation banding, highly weathered; no odor, no sheen (soft, damp)
					Water bearing zone observed at 22 to 23-ft based on observed water seepage into boring after boring remained open for 16 hours.
26			0.0		**Soil Sample: WMW-13-(22-23)-231221**
		e4			At 23-ft, turns gray, hard, dry, and slightly weathered
28			0.0		At 26-ft, with occasional organics, soft and moderately weathered
					At 28-ft, turns light gray with low-grade coal seams
30			0.0		At 29.5-ft, with fine-grained sandstone interbeds and without organics, slightly weathered, medium hard
32		e4	0.0		**Soil Sample: WMW-13-(32-32.5)-231221**
					At 32.5-ft, becomes soft with organic interbeds
34			0.0		At 34-ft, becomes competent (hard, fresh) without organics
36			0.0		From 36 to 37-ft, with trace leaf fossils interbedded; planar bedding.
38		e4	0.0		
40					
42					

size)

Moisture not encountered in sample core. Water level measured in open boring at 24.5-ft.

Threaded end cap

At 27-ft, borehole was not cased and diameter changed to 4-inches.

Bentonite chips

Boring Completed 12/21/23
Total Depth of Boring = 40.0 ft.

Monitoring Well Completed 12/22/23
Elevation at Top of Monitoring Well Casing = 654.42 ft.
Total Depth of Monitoring Well = 26.3 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-13	Figure A-20 (2 of 2)

WMW-14

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 654.91
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
0						GP	Air knife to 5-ft.	
						DB	Gray, coarse, crushed, angular GRAVEL; no odor, no sheen (loose, dry) **(FILL)**	
						SM	Laid brick pathway	
2				0.0			Brown, silty, fine to medium SAND with coarse, sub-rounded gravel and cobbles; no odor, no sheen (medium dense, moist) **(ALLUVIUM)**	
4				0.0				
6				0.0		GM	Brown, silty, sub-angular to rounded, fine to coarse GRAVEL with fine to coarse sand and sub-rounded cobbles; no odor, no sheen (medium dense, moist)	
8		e4		0.0				
10				0.0		SHS	Light gray to gold, micaceous schist, minor iron oxidation (very hard, dry) **(BOULDER)**	
12		e4						
14		e4						ATD
16				0.0		SP SM	Brown, fine to coarse SAND with trace silt; no odor, no sheen (loose to medium dense, moist) **(ALLUVIUM)**	
				10.9 2.6			Brown, silty, fine to medium SAND with sub-rounded, fine to coarse gravel and trace rounded cobbles; no odor, no sheen (medium dense, wet)	
		e4		0.0		SNS	At 15.5-ft, turns gray with a strong petroleum odor and slight sheen on water running off of soil.	
18				0.1		SLS SNS	**Soil Sample: WMW-14-(15.5-16)-231221**	
20				0.0			Brown, fine to coarse SANDSTONE, completely weathered; faint petroleum odor, no sheen (very soft, damp) **(CHUMSTICK FORMATION)**	
				0.0				

Monitoring Well Detail (DOE#: BQG 918)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)
- Threaded end cap
- Bentonite chips

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-14

Figure
A-21
(1 of 3)

WMW-14

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 654.91
Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BQG 918)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
22				0.0		SNS	
						SLS	
						SNS	
		e4		0.0			
24				0.0		SLS	
26				0.0		SNS	
		e4					
28				0.0		SLS	
30				0.0		SNS	
32		e4		0.0			
34				0.0		SLS	
36				0.0			
		e4					
38				0.0		SNS	
						SLS	
40				0.0			
42							

Gray to dark brown SILTSTONE, highly weathered; faint petroleum odor, no sheen (soft, damp)

Soil Sample: WMW-14-(19-20)-231221

At 20.5-ft, becomes light brown and dry

Light gray to light brown, fine to coarse SANDSTONE, completely weathered; no odor, no sheen (very soft, damp)

Brown SILTSTONE, friable, highly weathered; no odor, no sheen (soft, dry)

Light brown, fine to medium-grained SANDSTONE, highly weathered; no odor, no sheen (soft, dry)

Gray SILTSTONE with organic interbeds, yellow oxidation banding in upper 4-inches, highly weathered; no odor, no sheen (soft, dry)

At 25.5-ft, grain size gradually increasing

Gray to brown, fine to coarse-grained SANDSTONE, slightly weathered; no odor, no sheen (medium hard, dry)

Gray SILTSTONE with fine to medium-grained sandstone interbeds and trace leaf fossils and low-grade, weathered coal seams, slightly weathered; no odor, no sheen (soft, dry)

At 30.5-ft, without organics

Gray, fine to medium-grained SANDSTONE with frequent siltstone interbeds, fresh to slightly weathered; no odor, no sheen (medium hard, dry)

Gray to dark brown SILTSTONE, fresh to slightly weathered; no odor, no sheen (medium hard, dry to damp)

Gray, fine to medium-grained SANDSTONE with occasional fossilized plant matter, fresh, competent; no odor, no sheen (hard, dry)

Brown to gray SILSTONE with a low to medium-grade coal seam and plant fossils, fresh; no odor, no sheen (hard, dry)

At 25-ft, borehole was not cased and diameter changed to 4-inches.

Bentonite chips

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-14

Figure
A-21
(2 of 3)

WMW-14

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
42		e4		0.0		SNS	
44				0.0			

Drilling Method: Rotosonic

Ground Elevation (ft): 654.91

Drilled By: Anderson Environmental Contracting

Gray to light gray, fine to medium-grained SANDSTONE, fresh; no odor, no sheen (hard, dry)

Monitoring Well Detail
(DOE#: BQG 918)

Boring Completed 12/21/23
Total Depth of Boring = 45.0 ft.

Monitoring Well Completed 12/21/23
Elevation at Top of Monitoring Well Casing = 654.33 ft.
Total Depth of Monitoring Well = 18.5 ft.

46
48
50
52
54
56
58
60
62

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-14

Figure
A-21
(3 of 3)

WMW-15

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 654.86
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
0						GP	Air knife to 5-ft.
						SM	Gray, coarse, crushed, angular GRAVEL; no odor, no sheen (loose, dry) **(FILL)**
2							Brown, silty, fine to medium SAND with sub-angular to sub-rounded, fine to coarse gravel and sub-rounded cobbles; no odor, no sheen (medium dense, moist) **(ALLUVIUM)**
4						SP-SM	Brown, fine to coarse SAND with angular to rounded, fine to coarse gravel, silt, and cobbles; no odor, no sheen (medium dense, moist)
6				0.0			
				0.0			
8		e4		0.0			
				0.0		SNS	Gray to brown, fine to coarse-grained SANDSTONE, very friable, highly weathered; no odor, no sheen (soft to medium hard, dry) **(CHUMSTICK FORMATION)**
10							
				0.0			
12		e4		0.4		SLS	Gray to brown SILTSTONE with trace fossilized plant matter, highly weathered, gray mottling and staining throughout; moderate petroleum odor, no sheen (soft, dry to damp)
						SNS	**Soil Sample: WMW-15-(12-12.5)-231220**
14				0.0			Brown, fine to medium-grained SANDSTONE, very friable, highly weathered, gray mottling and staining in upper 6-inches; slight petroleum odor, no sheen (very soft, dry to damp)
				0.0		SLS	
16				1.5		SNS	**Soil Sample: WMW-15-(14-14.5)-231220**
		e4		0.0			Light brown SILSTONE with fine to medium-grained SANDSTONE interbeds, highly weathered; no odor no sheen (soft, damp)
18				0.0		SLS	Brown, fine to medium-grained SANDSTONE, very friable, highly weathered; no odor, no sheen (very soft, damp)
				0.0			
20				0.0			From 16 to 17-ft, gray staining and a strong petroleum odor present

Monitoring Well Detail (DOE#: BQG 917)

6 in

Water Level

ATD

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)

Moisture not encountered in sample core. Water level measured in open boring at 17.9-ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-15

Figure
A-22
(1 of 2)

WMW-15

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 654.86

Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BQG 917)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
22		e4		0.0		SLS	**Soil Sample: WMW-15-(16-16.5)-231220**
				0.0		SNS	*Water bearing zone observed at 16 to 17-ft based on observed water seepage into boring.*
				0.0		SLS	At 17-ft, becomes medium hard and moderately weathered
24				0.0		SNS	**Soil Sample: WMW-15-(18-18.5)-231220**
				0.0		SLS	At 19.75-ft, becomes fresh without organics
26				0.0			Gray to brown, organic-rich SILTSTONE with low grade coal seams and plant fossils, moderately weathered, friable; no odor, no sheen (medium hard, dry)
		e4		0.0			At 21-ft, with fine to medium-grained sandstone interbeds
28				0.0			Brown, fine to coarse-grained SANDSTONE, friable, moderately weathered; no odor, no sheen (soft to medium hard, dry)
30				0.0			Gray to brown SILTSTONE with fine to medium-grained sandstone interbeds, fresh; no odor, no sheen
							Brown, fine to coarse-grained SANDSTONE, friable, moderately weathered; no odor, no sheen (soft to medium hard, damp)
32		e4		0.0			Brown, organic-rich SILTSTONE with plant fossils, moderately weathered; no odor, no sheen (soft, dry)
							At 25-ft, without organics, fresh, medium hard to hard, competent
34							From 28 to 29-ft, with fine to medium-grained sandstone interbeds, medium soft, friable
							At 29-ft, with planar bedding, medium hard, slightly friable
36							
38							
40							
42							

Water Level

Threaded end cap

Bentinite chips

At 30-ft, borehole was not cased and diameter changed to 4-inches.

Boring Completed 12/20/23
Total Depth of Boring = 35.0 ft.

Monitoring Well Completed 12/20/23
Elevation at Top of Monitoring Well Casing = 654.42 ft.
Total Depth of Monitoring Well = 28.9 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-15

Figure
A-22
(2 of 2)

WMW-16

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 654.60

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
0						GP	Air knife to 5-ft.	
						SM	Gray, coarse, crushed, angular GRAVEL; no odor, no sheen (loose, dry) **(FILL)**	
2							Brown, silty, fine to coarse SAND with angular to rounded, fine to coarse gravel; no odor, no sheen (medium dense, moist)	
4						GM	Brown, silty, angular to sub-rounded, fine to coarse GRAVEL with fine to medium sand and angular cobbles; no odor, no sheen (medium dense, moist)	
				0.0			At 5.25-ft, color change to reddish brown	
6				0.0			At 5.5-ft, large sub-rounded cobbles and boulders	
		e4		0.0		GP-GM	Brown, sub-rounded to rounded GRAVEL with fine to medium sand, silt, and sub-rounded cobbles; no odor, no sheen (medium dense, moist) **(ALLUVIUM)**	
8						SNS	Gray, fine to coarse-grained SANDSTONE with occasional siltstone interbeds, highly weathered, very friable; no odor, no sheen (soft, dry to damp) **(CHUMSTICK FORMATION)**	ATD ▽
10				0.0			At 10-ft, turns brown and wet without siltstone interbeds	
				0.0			From 10.5 to 14-ft, moist	
12		e4					**Soil Sample: WMW-16-(10.5-11)-231220**	
				0.0			At 14-ft, turns gray, medium hard and moderately weathered with siltstone interbeds, dry	
14								
				0.0			At 15.5-ft, brown and soft to medium hard with layers of harder material	
16								
		e4		0.0				
18								
				0.0				
20								
				0.0		SLS		

GROUNDWATER

Monitoring Well Detail
(DOE#: BQG 916)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)
- Threaded end cap

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-16

Figure
A-23
(1 of 2)

WMW-16

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 654.60

Drilled By: Anderson Environmental Contracting

Monitoring Well Detail
(DOE#: BQG 916)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22		e4		0.0		SLS	Gray to brown, organic-rich SILTSTONE with leaf fossils and low-grade coal seams, moderately weathered; no odor, no sheen (soft to medium hard, dry)	
						SNS	Brown, fine to medium-grained SANDSTONE, slightly weathered, friable; no odor, no sheen (medium hard, dry)	
24				0.0		SLS	Gray, organic-rich SILTSTONE with brown mottling, friable, slightly weathered to fresh; no odor, no sheen (medium hard, dry)	
							Soil Sample: WMW-16-(24-24.5)-231220	Bentonite chips
26				0.0		SNS	Gray, fine to coarse-grained SANDSTONE, friable, fresh; no odor, no sheen (medium hard, dry)	
		e4				SLS	Gray SILTSTONE, fresh, competent, planar bedding; no odor, no sheen (hard, dry)	
28				0.0				
30								At 30-ft, borehole was not cased and diameter changed to 4-inches.
32		e4		0.0			From 31 to 32-ft, with fine to coarse-grained sandstone interbeds	
34				0.0				
36								
38								
40								
42								

Boring Completed 12/20/23
Total Depth of Boring = 35.0 ft.

Monitoring Well Completed 12/21/23
Elevation at Top of Monitoring Well Casing = 654.09 ft.
Total Depth of Monitoring Well = 20.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-16	Figure A-23 (2 of 2)

WMW-17

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile
							Drilling Method: Rotosonic Ground Elevation (ft): 647.41 Drilled By: Anderson Environmental Contracting
0						GP	Air knife to 4.2-ft
						GM	Gray, coarse, crushed, angular GRAVEL; no odor, no sheen (loose, dry) **(FILL)**
2							Brown, angular to sub-rounded, fine to coarse GRAVEL with fine to medium sand, silt, and cobbles; no odor, no sheen (medium dense, moist)
4						SP	Dark brown to black, fine to coarse SAND with fine to coarse gravel and trace slag pieces (medium dense, moist)
				0.0		CND	Light brown SLAG; no odor, no sheen (hard, dry)
6				0.0		ML	Dark brown, fine sandy SILT with fine to coarse, rounded gravel and cobbles, slag pieces in the upper 0.2-ft; no odor, no sheen (medium stiff, moist)
				0.0		SP	At 6-ft, without gravel and cobbles, turns moist to wet
8				0.4		SM	Light brown, fine to coarse SAND, micaceous, relatively lightweight compared to surrounding material; no odor, no sheen (loose, damp)
				8.7		SNS	Gray to dark gray, silty, fine to medium SAND; strong petroleum odor, no sheen (medium dense, moist)
10				32.7			**(ALLUVIUM)**
				27.1			With sub-rounded to rounded cobbles at 9.6-ft
12				21.8			Gray to dark gray, fine to medium-grained SANDSTONE, friable, highly to completely weathered; strong petroleum odor that dissipates with depth, no sheen (very soft, damp)
				3.2			**(CHUMSTICK FORMATION)**
14				3.1			**Soil Sample: WMW-17-(10-10.5)-231218** At 11.5-ft, turns light brown, highly weathered, soft
				0.0			At 13-ft, quartz-rich, medium to coarse-grained, dry
16				0.0		SLS	At 14.5-ft, no odor, no sheen
							At 15-ft, with interbeds of fine-grained sandstone
18						SNS	**Soil Sample: WMW-17-(15-16)-231218**
				0.0			Brown SILTSTONE, planar bedding, friable, highly weathered; no odor, no sheen (soft, dry)
				0.3		SLS	
20							Light brown, fine-grained SANDSTONE, very friable, highly weathered; no odor, no sheen (soft, dry)
				0.1		SNS	

Groundwater

Water Level

Monitoring Well Detail
(DOE#: BNM 600)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-17

Figure
A-24
(1 of 3)

WMW-17

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 647.41
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
22				0.0		SNS	Gray to brown SILTSTONE with organic inclusions and plant fossils, moderately weathered; no odor, no sheen (medium hard to hard, dry)
							Brown, fine to medium-grained SANDSTONE, very friable, highly weathered; no odor, no sheen (soft to medium hard, dry)
24				0.0		SLS	Gray SILTSTONE, trace plant fossils, fresh to slightly weathered; no odor, no sheen (medium hard, dry)
						SNS	Light brown, fine to medium-grained SANDSTONE with trace plant fossils and low grade coal seams, friable, fresh to slightly weathered; no odor, no sheen (medium hard, dry)
26				0.0			
						SLS	At 25.5-ft, becomes quartz rich and moderately weathered without organics
28				0.0		SNS	Gray to dark brown, organic-rich SILTSTONE, plant fossils, fossilized peat, moderately weathered; no odor, no sheen (very soft, dry)
							Gray, fine to medium-grained SANDSTONE with gray siltstone interbeds, friable, fresh to slightly weathered; no odor, no sheen (medium hard, dry)
30				0.0		SLS	At 29.75-ft, turns slightly weathered
				0.0			Gray to dark brown, organic-rich SILTSTONE, plant fossils, moderately weathered; no odor, no sheen (medium hard, damp)
32				0.0		SNS	At 32-ft, without organics and turns hard and fresh
							Light gray, fine to coarse-grained SANDSTONE, friable, fresh to slightly weathered; no odor, no sheen (soft to medium hard, moist)
34				0.0			
				0.0		SLS	**Soil Sample: WMW-17-(33-34.5)-231218**
36							At 34.5-ft, becomes hard, fine to medium-grained with trace fossils
				0.0			Gray, organic-rich SILTSTONE with plant fossils, fresh; no odor, no sheen (soft to medium hard, dry)
38							
				0.0		SNS	At 37-ft, becomes competent without organics
				0.0		SLS	Light gray, fine to coarse SANDSTONE, fresh; no odor, no sheen (hard, dry)
40				0.0			Gray SILTSTONE, minor planar bedding, fresh; no odor, no sheen (hard, dry)
42							

Water Level: ATD ▽

Monitoring Well Detail (DOE#: BNM 600)

- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.010-inch slot size)
- Threaded end cap
- Bentonite chips
- At 40-ft, borehole was not cased and diameter changed to 4-inches.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-17

Figure
A-24
(2 of 3)

WMW-17

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Rotosonic Ground Elevation (ft): 647.41 Drilled By: Anderson Environmental Contracting	Water Level	Monitoring Well Detail (DOE#: BNM 600)
42				0.0		SLS	At 41.5, with fine to medium-grained sandstone interbeds. Gray SILTSTONE, minor planar bedding, fresh; no odor, no sheen (hard, dry)		Bentonite chips
44									
46									
48									
50									
52									
54									
56									
58									
60									
62									

Boring Completed 12/18/23
Total Depth of Boring = 45.0 ft.

Monitoring Well Completed 12/18/23
Elevation at Top of Monitoring Well Casing = 646.71 ft.
Total Depth of Monitoring Well = 37.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-17	Figure A-24 (3 of 3)

WMW-18

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic

Ground Elevation (ft): 649.87

Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Description
0						SP	Air-knife to 5-ft Brown, damp, fine to medium SAND with silt, sub-angular to sub-rounded cobbles, and trace fine gravel; no odor, no sheen (medium dense, damp) **(FILL)**
				0.0			
4							**Soil Sample: WMW18-(5.5-6)-231220**
6				0.0		CND	Light brown to black SLAG with medium to coarse sand; no odor, no sheen (loose, dry)
						ML	Brown SILT with fine, sub-rounded gravel; no odor, no sheen (soft, moist)
				0.0		SNS	Light brown, fine to coarse-grained SANDSTONE, completely weathered; no odor no sheen (very soft, dry) **(CHUMSTICK FORMATION)**
8		d4		0.0			
				20		SLS	Gray to blue SILTSTONE, completely weathered; petroleum odor, no sheen (very soft, dry)
10							
				13.1			
12						SNS	Gray to blue, fine to medium-grained SANDSTONE, completely weathered; petroleum odor, no sheen (very soft, dry)
		d4		10.4			
						SLS	Light brown to brown SILTSTONE, highly weathered; slight petroleum odor, no sheen (soft, dry)
14				28.4		SNS	**Soil Sample: WMW18-(14-14.5)-231215**
				0.0			Light brown, fine to medium-grained SANDSTONE, completely weathered; petroleum odor, no sheen (very soft, dry)
				0.0		SLS	
16						SNS	At 15-ft becomes gray to blue with no petroleum odor
						SLS	Brown SILTSTONE, highly weathered; no odor, no sheen (soft to medium hard, dry)
		d4		17.9			
18							Gray to blue, fine to medium-grained SANDSTONE, completely weathered; no odor, no sheen (very soft, dry)
				1.2			Brown SILTSTONE with blue spots, highly weathered; petroleum odor, no sheen (soft, dry to damp)
20				2.5		SNS	

GROUNDWATER

Water Level

Monitoring Well Detail
(DOE#: BQG 920)

6 in

- Flush-mounted monument with locking cap set in concrete
- 2-inch diameter, Schedule 40, PVC well casing
- Bentonite chips
- 12/20 sand pack
- 2-inch diameter, Schedule 40, PVC screen (0.020-inch slot size)

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Monitoring Well
WMW-18

Figure
A-25
(1 of 2)

WMW-18

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Rotosonic
Ground Elevation (ft): 649.87
Drilled By: Anderson Environmental Contracting

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
22		d4		0.7		SNS	At 18-ft becomes black to brown, damp, and organic rich	ATD
						SLS		
						SNS	Light brown to gray, fine to medium-grained SANDSTONE, highly weathered; very slight petroleum odor, no sheen (very soft, dry)	
						SLS		
24				0.0		SNS	Brown SILTSTONE, highly weathered; very slight petroleum odor, no sheen (soft, dry)	
				0.0		SLS	Light brown to gray, fine to medium-grained SANDSTONE, highly weathered; very slight petroleum odor, no sheen (very soft, dry)	
26				0.1			*Water bearing zone observed at 22 to 23-ft based on observed water seepage into boring.*	
							Soil Sample: WMW18-(22-23)-231215	
		d4		0.1		SNS	Brown to gray SILSTONE, moderately weathered; no odor, no sheen (soft to hard, dry)	
28						SLS		
				0.1			Light brown to gray, fine to medium-grained SANDSTONE, moderately weathered; no odor, no sheen (soft, dry)	
							Brown SILTSTONE, moderately weathered; no odor, no sheen (soft, dry)	
30						SNS	Gray, fine to medium-grained SANDSTONE, slightly to moderately weathered; no odor, no sheen (medium hard, dry)	
				0.0			Brown SILTSTONE, slightly to moderately weathered; no odor, no sheen (soft to medium hard, dry)	
32		d4					From 28.75-ft to 29.25 ft seams of sandstone in siltstone	
				0.0			Gray, fine to medium-grained SANDSTONE, slightly to moderately weathered; no odor no sheen (hard, dry)	
34						SLS		
				0.0			At 33-ft becomes medium to coarse-grained and soft to hard	
36						SNS	Gray SILTSTONE, slightly weathered to fresh; no odor no sheen (hard, dry)	
		d4					Gray, medium to coarse-grained SANDSTONE, slightly weathered to fresh; no odor, no sheen (medium hard to hard, dry)	
38				0.0		SLS		
						SNS	Gray SILTSTONE, slightly weathered to fresh; no odor no sheen (hard, dry)	
				0.0			Gray, medium to coarse-grained SANDSTONE, fresh, competent; no odor, no sheen (hard, dry)	
40								
42								

Monitoring Well Detail
(DOE#: BQG 920)

Moisture not encountered in sample core. Water level measured in open boring at 21.7-ft.

Threaded end cap

Bentonite chips

Boring Completed 12/15/23
Total Depth of Boring = 40.0 ft.

Monitoring Well Completed 12/19/23
Elevation at Top of Monitoring Well Casing = 649.41 ft.
Total Depth of Monitoring Well = 24.3 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ WELL LOG

LANDAU ASSOCIATES

Worthen Substation Wenatchee, Washington	Log of Monitoring Well WMW-18	Figure A-25 (2 of 2)

AB-01

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger Ground Elevation (ft): 645.44 Drilled By: Western States Soil Conservation	Water Level
0						GP	Grayish brown, medium to coarse GRAVEL with sand; no odor, no sheen (dense, dry) **(FILL)**	Groundwater Not Encountered
4						GP	Cleared with vacuum truck to to 5' below ground surface	
6		b2	49	0.0			Brown, sandy, fine to medium GRAVEL; no odor, no sheen (dense, dry)	
8		b2	13	0.1		SM	Brown, silty, fine to medium SAND; no odor, no sheen (loose to medium dense, moist) **(ALLUVIUM)**	
10		b2	8	0.1			Grades to light brown at 10.0' below ground surface	
12		b2	12	0.0				
14		b2	100/ 6"	0.8			**Soil sample: AB-01-(15-16)-230825**	
16						SNS	Dark grayish brown, slightly weathered, fine to medium grained SANDSTONE, very strong petroleum-like odor, moderate sheen (hard, dry) **(CHUMSTICK FORMATION BEDROCK)**	
20		b2	50/ 3"	9.0			Moderate petroleum-like odor, moderate sheen, friable at 20.0' below ground surface	

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-01

Figure
A-26
(1 of 2)

AB-01

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger Ground Elevation (ft): 645.44 Drilled By: Western States Soil Conservation	Water Level
22						SNS	Dark grayish brown, slightly weathered, fine to medium grained SANDSTONE, very strong petroleum-like odor, moderate sheen (hard, dry) **(CHUMSTICK FORMATION BEDROCK)** Faint petroleum-like odor, moderate sheen, friable at 22.5' below ground surface	
24	b2		50/ 3"	1.0			**Soil sample: AB-01-(25-25.5)-230825**	
26							Boring Completed 08/25/23 Total Depth of Boring = 25.5 ft.	
28								
30								
32								
34								
36								
38								
40								
42								

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-01

Figure
A-26
(2 of 2)

AB-02

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0				0.0		GP	Sandy, medium to coarse GRAVEL; no odor, no sheen (dense, dry) **(FILL)**
2							Cleared with vacuum truck to 1.5' below ground surface
		b2	28	0.0		SM	Brown, silty, fine to medium SAND with gravel; no odor, no sheen (medium dense, dry)
4							
		b2	12	0.0			
6							
8		b2	7			CND	Grades to no gravel at 7.0' below ground surface (loose, dry)
						SM	Gray to black slag with silt and fine to medium sand (dense, dry)
10		b2	4				Brown, silty, fine to medium SAND; no odor, no sheen (medium dense, dry)
12						SLS	Brownish gray, completely weathered SILTSTONE; petroleum-like odor, no sheen (very soft, dry) **(CHUMSTICK FORMATION BEDROCK)** **Soil sample: AB-02-(12.5-13.7)-230824**
		b2	16	5.1			
14							
		b2	27	4.0			
16						SNS	Brownish gray, moderately weathered, fine to medium grained SANDSTONE; slight petroleum-like odor, no sheen (soft, dry)
18							
20						SLS	Grayish brown, highly weathered SILTSTONE; slight petroleum-like odor, no sheen (very soft, dry)
		b2	92/	1.0			

Drilling Method: Hollow-Stem Auger / HQ3

Ground Elevation (ft): 649.77

Drilled By: Western States Soil Conservation

Groundwater Not Encountered

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-02

Figure
A-27
(1 of 2)

AB-02

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger / HQ3 Ground Elevation (ft): 649.77 Drilled By: Western States Soil Conservation	Water Level
22			8"			SLS	Grayish brown, highly weathered SILTSTONE; slight petroleum-like odor, no sheen (very soft, dry)	
							Switched to HQ3 Rock Core at 25' below ground surface	
24						SNS	Gray, slightly weathered, fine to medium grained SANDSTONE; slight petroleum-like odor, no sheen (hard, dry)	
		b2	50/ 4"	2.0			Approximately 45 degree fracture plane with petroleum-like odor along plane surface, slight sheen at 25.6' below ground surface	
26							Grades to grayish brown, with quartz crystals at 26.5' below ground surface	
							Approximately 45 degree bedding planes at 26.8' below ground surface; slight petroleum like odor, no sheen	
28		e5					Medium to coarse quartz crystals at 28.1' below ground surface; slight petroleum-like odor, no sheen	
						SLS	Gray, fresh SILTSTONE; no odor, no sheen (hard, dry)	
30				0.0				
						SNS	Grayish brown, fresh, fine to medium grained SANDSTONE, with visible mica, biotite, and quartz; no odor, no sheen (hard, dry)	
32						SLS	Gray, fresh SILTSTONE, with plant fossils at top of contact; no odor, no sheen (hard, dry)	
		e5				SNS	Gray, fresh, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry)	
34				0.6				
36								
38								
40								
42								

Boring Completed 08/24/23
Total Depth of Boring = 35.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-02

Figure
A-27
(2 of 2)

AB-04

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger / HQ3 Ground Elevation (ft): 649.10 Drilled By: Western States Soil Conservation	Water Level
0						GP	Crushed basalt, medium GRAVEL; no odor, no sheen (very loose, dry)	
						GP-GM	**(FILL)** Brown, medium to coarse GRAVEL with silt and sand; no odor, no sheen (medium dense, dry)	
2							Cleared with vacuum truck to 3' below ground surface	
4						SNS	Brown, micaceous, highly weathered, fine to medium grained SANDSTONE; no odor, no sheen (very soft, dry)	
		b2	50/ 2"				**(CHUMSTICK FORMATION BEDROCK)**	
6								
8		b2	88/ 10"	5.4 0.1		SNS SNS	Brown, highly weathered, fine to medium grained SANDSTONE; petroleum-like odor, spots of free product on grains (very soft, moist)	
							Soil sample: AB-04-(7.5-7.9)-230823	
10		b2	50/ 5"				Gray, quartz-rich, highly weathered, fine to medium grained SANDSTONE; no odor, no sheen (very soft, dry)	
							Soil sample: AB-04-(7.9-8.9)-230823	
12		e5				SLS	Grades to grayish brown and wet at 9.5' below ground surface	
							Switched to HQ3 rock core at 10.4' below ground surface	
14						SNS	Fracture zone with strong petroleum-like odor and staining from 10.5' to 12' below ground surface	▽ ATD
						SLS	Brown, fresh SILTSTONE with plant fossil organics; no odor, no sheen (hard, wet)	
16							Grayish brown, fresh, fine to medium grained SANDSTONE; no odor, no sheen (hard, wet)	
							Fracture at 14' below ground surface	
18							Brown, fresh SILTSTONE with plant fossil organics; no odor, no sheen (hard, wet)	
							Switched back to Hollow Stem Auger at 20' below ground surface	
20		b2	91/	0.0			with coal seams 20' to 21' below ground surface	

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-04

Figure
A-28
(1 of 2)

AB-04

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger / HQ3 Ground Elevation (ft): 649.10 Drilled By: Western States Soil Conservation	Water Level
22			10"			SLS	Brown, fresh SILTSTONE with plant fossil organics; no odor, no sheen (hard, wet)	
		b2	50/ 5"	0.0				
24								
		b2	50/ 3"	0.0		SNS	Gray, fresh, fine grained SANDSTONE; no odor, no sheen (hard, dry to moist)	
26								
28								
30		b2	50/ 4"	0.1			Grades to quartz-rich at 30.0' below ground surface	
32								
34								
36								
38								
40								
42								

Boring Completed 08/23/23
Total Depth of Boring = 30.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-04

Figure
A-28
(2 of 2)

AB-05

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger / HQ3 Ground Elevation (ft): 654.84 Drilled By: Western States Soil Conservation	Water Level
0						GP	Crushed basalt, medium GRAVEL; no odor, no sheen (very loose, dry)	Groundwater Not Encountered
						GP-GM	**(FILL)**	
2							Brown, medium to coarse GRAVEL with silt, sand, and cobbles; no odor, no sheen (very dense, dry)	
							Cleared with vacuum truck to 3.5' below ground surface	
4		b2	50/ 4"					
6						SNS	Brown, highly weathered, fine to medium grained, quartz-rich SANDSTONE; no odor, no sheen (very soft, dry)	
8		b2	81	0.0			**(CHUMSTICK FORMATION BEDROCK)**	
10		b2	50/ 3"	0.0		SLS	Brown, highly weathered SILTSTONE; no odor, no sheen (very soft, dry)	
12		b2	50/ 1"			SNS	Brown, moderately weathered, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry)	
14		b2	50/ 4"	0.0		SLS	Brown, moderately weathered SILTSTONE; no odor, no sheen (hard, dry)	
16						SNS	Brown, moderately weathered, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry)	
18								
20		b2	50/ 3"	0.0				

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-05

Figure
A-29
(1 of 2)

AB-05

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-Stem Auger / HQ3 Ground Elevation (ft): 654.84 Drilled By: Western States Soil Conservation	Water Level
22						SNS	Brown, moderately weathered, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry)	
24								
		b2	50/ 3"	0.0			**Soil sample: AB-05-(25-25.4)-230825** Driller switched to HQ3 Rock Core at 25.0' below ground surface	
26						SNS	Brown to gray, fresh, fine to medium grained SANDSTONE; no odor, no sheen (hard, dry)	
28								
		e5						
30							Becomes gray with fracture at 29.8' below ground surface	
32								
		e5				SLS	Fracture zone with slight petroleum-like odor at 32.2' below ground surface Gray, fresh SILTSTONE; slight petroleum-like odor, no sheen (hard, dry)	
34								
						SNS	Gray fresh, fine to medium grained SANDSTONE, with fossils and organics; no odor, no sheen (hard, dry)	
36		e5				SLS	Gray, fresh SILTSTONE, with fossil organics; no odor, no sheen (hard, dry)	
38								
		e5				SNS	Gray fresh, fine to medium grained SANDSTONE with abundant fossils and organics; no odor, no sheen (hard, dry)	
40								
42								

Boring Completed 08/22/23
Total Depth of Boring = 40.8 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

130037.01 12/13/24 N:\PROJECTS\0130037.GPJ SOIL BORING LOG

LANDAU ASSOCIATES

Worthen Substation
Wenatchee, Washington

Log of Boring AB-05

Figure
A-29
(2 of 2)

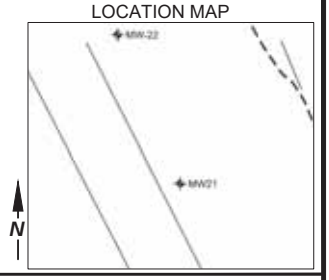
HydroCon

Phone: 360-703-6079

WELL/BORING NUMBER MW22

PROJECT NAME: Coleman Oil - Wenatchee
PROJECT NUMBER: 2017-074
PROJECT LOCATION: Wenatchee, WA
LOGGED BY: C. Daschel
REVIEWED BY: C. Hultgren
DATE: 04-13-18

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
Rock stuck in core barrel, no recovery.	0							
GRAVELLY SAND (SP/SM) with silt, brown, fine grained sand, 10% low plastic fines, 10% rounded gravels less than 1", no odor/sheen, dry. Rock stuck in core barrel, poor recovery.	5				0.1			
	10				0.1			
GRAVELLY SAND (SP/SM) with silt, brown/gray, fine to medium grained sand, 10% low plastic fines, 35% rounded gravels and cobbles up to 6" in diameter, no odor/sheen, moist.	15			MW22-15	0.0			
NOTE: Possible burn debris between 19.5-25' bgs, reddish brick debris, very light weight, black burned debris with wood and building material fill.	20				0.0			
	25			MW22-25	0.0			
NOTE: Free product, resembling black oil in sampler at 31.5' bgs.	30			MW22-30	153			
CLAY (possible bentonite), light bluish gray, gummy, sticky, fill material.								
SILT (ML), brown, low to moderate plastic, 5% sand, 5% rounded gravels up to 2.5" in diameter, moderate petroleum odor, no sheen, damp, fill material.					279			
GRAVELLY SAND (SP/SM) with silt, brown/gray, fine to medium grained sand, 10% low plastic fines, 35% rounded gravels and cobbles up to 6" in diameter, no odor/sheen, moist.	35							

WELL CONSTRUCTION

Depths (feet bgs)

Borehole: 34.42
Sump: 34.19 - 34.42
Screen: 9.19 - 34.19
Casing: 0 - 9.19
Backfill:
Sand Pack: 13 - 34.42
Bentonite: 1 - 13
Concrete: 0 - 1
Stabilizers: Yes

MATERIALS USED

Casing: 4" PVC
Well Screen: 25', 0.010" slotting
End Cap: Flat sump
Sand Pack: 14 50lbs bag
Bentonite: 4 50lbs bag
Concrete: 1 50lbs bag
Monument: Flush
Well Cap: Locking J-plug
Other:

LEGEND:

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS/BACKFILL
- WATER LEVEL DURING DRILLING

DRILLING CONTRACTOR: Budinger
DRILLING METHOD: Sonic
BOREHOLE DIAMETER: 6"
SAMPLING METHOD: Continuous
START CARD NUMBER: BIU621

CASING ELEVATION: 641.85
GROUND SURFACE ELEVATION: 642.17
COORDINATES: 153375.5679
COORDINATES: 1771666.283

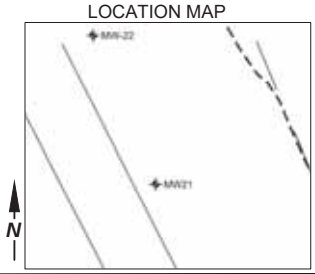
HydroCon

Phone: 360-703-6079

WELL/BORING NUMBER MW22

PROJECT NAME: Coleman Oil - Wenatchee
PROJECT NUMBER: 2017-074
PROJECT LOCATION: Wenatchee, WA
LOGGED BY: C. Daschel
REVIEWED BY: C. Hultgren
DATE: 04-12-18

LOCATION MAP



DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	DEPTH (FT.)	SYMBOL	WELL DETAILS	SAMPLE ID	PID	FIRST WATER	BLOW COUNTS	BOREHOLE/WELL CONSTRUCTION DETAILS
MUDSTONE, dark blackish brown, soft, friable, planar fracturing, waxy, clay rich, moderate odor, no sheen, **Chumstick Formation at 35' bgs.**	35				94			
					203			
	40			MW22-40	205			
BOTTOM OF BORING AT 40' B.G.S.	45							
	50							
	55							
	60							
	65							
	70							

WELL CONSTRUCTION

Depths (feet bgs)

Borehole: 34.42
Sump: 34.19 - 34.42
Screen: 9.19 - 34.19
Casing: 0 - 9.19
Backfill:
Sand Pack: 13 - 34.42
Bentonite: 1 - 13
Concrete: 0 - 1
Stabilizers: Yes

MATERIALS USED

Casing: 4" PVC
Well Screen: 25', 0.010" slotting
End Cap: Flat sump
Sand Pack: 14 50lbs bag
Bentonite: 4 50lbs bag
Concrete: 1 50lbs bag
Monument: Flush
Well Cap: Locking J-plug
Other:

LEGEND:

- FILTER PACK
- BENTONITE
- CEMENT GROUT
- CUTTINGS/BACKFILL
- WATER LEVEL DURING DRILLING

DRILLING CONTRACTOR: Budinger
DRILLING METHOD: Sonic
BOREHOLE DIAMETER: 6"
SAMPLING METHOD: Continuous
START CARD NUMBER: BIU621

CASING ELEVATION: 641.85
GROUND SURFACE ELEVATION: 642.17
COORDINATES: 153375.5679
COORDINATES: 1771666.283

APPENDIX B

Sampling and Analysis Plan

LANDAU ASSOCIATES

FINAL
SAMPLING AND ANALYSIS PLAN

Chelan PUD Worthen Substation Site
500 South Worthen Street
Wenatchee, Washington

February 3, 2025

Prepared for

Puget Sound Energy
10885 NE 4th Street, PSE 095
Bellevue, Washington

Public Utility District No. 1 of Chelan County
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Wenatchee, Washington

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TABLES

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LIST OF ABBREVIATIONS AND ACRONYMS

ASTM ..... ASTM International
BTEX ..... benzene, toluene, ethylbenzene, and xylenes
DO ..... dissolved oxygen
Ecology ..... Washington State Department of Ecology
EIM ..... Ecology's Environmental Information Management system
EPA ..... US Environmental Protection Agency
ft ..... foot/feet
ID ..... identification
Landau ..... Landau Associates, Inc.
mL ..... milliliter
MS ..... matrix spike
MSD ..... matrix spike duplicate
NAPL ..... non-aqueous phase liquid
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 ..... quality assurance
QC ..... quality control
QAPP ..... quality assurance project plan
SAP ..... sampling and analysis plan
Site ..... 500 South Worthen Street in Wenatchee, Washington
SOP ..... standard operating procedure
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) and Public Utility District No. 1 of Chelan County (PUD), Landau Associates, Inc. (Landau) prepared this sampling and analysis plan (SAP; Appendix B of the remedial investigation work plan [RIWP]), which describes the procedures for conducting field activities during investigation and characterization activities at the Chelan PUD Worthen Substation site (Site).The Site is generally located at 500 South Worthen Street in Wenatchee, Washington (Figure 1 of the RIWP). 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 RIWP, 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:

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

2.0 UPLAND SUBSURFACE INVESTIGATION

All upland subsurface explorations involving drilling will be completed by a driller licensed in Washington State and will be monitored by an environmental professional. Other upland subsurface explorations (air knifing) will be completed by personnel trained in operating the required equipment. Prior to initiation of drilling or any other intrusive upland subsurface activity, 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. An air knife/vactor truck will be used to clear each soil boring location to a depth of at least 5 feet (ft) below ground surface (bgs) to confirm the absence of shallow utilities or other obstructions at each drilling location. 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 upland 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 ft bgs.

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 relatively undisturbed sample with approximately 100 percent recovery can often be retrieved from the core barrel.
- The soil core recovered in the core barrel is removed via vibration into tubular polyethylene 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 non-aqueous phase liquid (NAPL) 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 NAPL.

If groundwater is encountered in a boring that will not be converted to a monitoring well, a groundwater grab sample may be collected using a disposable bailer.

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 grab 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 will 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 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 profile (e.g., with gravel and asphalt patch).

3.0 MONITORING WELL INSTALLATION AND DEVELOPMENT

Boreholes completed in the upland 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 in accordance with Chapter 173-160 WAC by a Washington-licensed drilling contractor. 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 and monitored by a weighted sounding tape 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 that will be poured into the borehole very slowly and monitored by a weighted sounding tape to minimize bridging. 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 (well 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 will 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 or more well casing volumes 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 NON-AQUEOUS PHASE LIQUID SAMPLING

This section describes procedures for soil logging and field screening during upland subsurface exploration, methodology for collecting soil and NAPL 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 impacts; 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 upland exploration locations on soil and NAPL. 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 within the first 90 seconds 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. One additional soil sample will be collected at the groundwater interface at each boring location.

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

4.3 Soil Sampling Method

Soil samples for volatile parameters analysis (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 bag 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 stated in the project Quality Assurance Project Plan (QAPP; Appendix C of the RIWP). If the EnCore sampler is used, then close the sampler for transport to the laboratory.

In addition to collecting soil samples with the coring device, an additional 2 ounces of soil will be collected and placed 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 decontaminated, 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 WB-100 on July 12, 2025, spanning a depth from 12 to 14 ft bgs, would be: WB100-(12-14)-250712.

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 the following constituents (Table B-1):

- 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 with silica-gel cleanup

- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method SW-846 8260D
- Total metals – arsenic, barium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc – by EPA Method 6020B
- Polycyclic aromatic hydrocarbons (PAHs) identified in Table B-1 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)
- Free cyanide by SOP SVL 4131.

Select soil samples collected downgradient of or within areas of the Site known to contain NAPL with detections of dissolved-phase constituents may be submitted for fingerprinting analysis by ASTM Method D2887-14. The analyses may include low-level PAHs and homologs by EPA Method 8270m. If BTEX or naphthalene is detected in a submitted soil sample, that sample may be submitted for synthetic precipitation leaching procedure (SPLP) analysis for BTEX and naphthalene. Additional forensic analyses that may be run on select soil samples are listed in Table B-1.

In addition to the above-mentioned analyses, soil samples collected from the screen interval of the angled shoreline monitoring wells (WMW-19, WMW-22, and WMW-23) will be analyzed for following constituents (Table B-1):

- Total organic carbon by EPA Method 9060Amod
- Total solids by EPA Method SM 2540G
- Grain size by ASTM Method D6913.

4.5 Non-Aqueous Phase Liquid Sampling Method

Free product NAPL samples may be collected from locations that NAPL is encountered and at other locations where the observed NAPL characteristics differ from the previously collected samples. NAPL samples will be obtained from the recovered soil core of the associated boring and/or from above or below the groundwater table. NAPL 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 NAPL-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.

NAPL samples will be shipped in separate coolers from other soil and groundwater samples to minimize the potential for cross-contamination of those other samples. All available volume of NAPL from the sampling interval that is not used to fill the sampling kits as described above will be placed in laboratory-

supplied 1-liter amber glass bottles and stored in Landau's hazardous materials cabinet for potential additional analysis.

4.6 Non-Aqueous Phase Liquid Laboratory Analysis

The following nomenclature will be used to label and identify free product NAPL samples during the field activities: Worthen Boring (or Worthen Monitoring Well) #-(FP)-YYMMDD. For example, a free product NAPL sample collected from boring WB95 collected on May 23, 2025 would be: WB95-(FP)-250523.

NAPL 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/TPH-O and TPH-G by NWTPH-Dx/NWTPH-Gx, water-soluble VOCs, gas-specific tentatively identified compounds (TICs), and oxygenates by EPA Method 8260 to determine the quantities and ratios of the water-soluble fractions of free product dense NAPL (DNAPL)
- Forensic fingerprinting with or without simulated distillation by ASTM Method D2887-14
- SPLP for BTEX and naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene by EPA Methods 1312/8260.

Additional forensic analyses that may be run on select NAPL samples are listed in Table B-1.

Based on the results of the above-noted leachability and fingerprinting analyses and/or if characteristics of the identified free product differ from the sample previously collected from boring WB-13, all or a subset of the NAPL samples may be analyzed for specialty physical characteristics, as follows:

- Kinematic viscosity by ASTM Method D445. The viscosity of free product NAPL 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 D1475. The density of free product NAPL will be determined at up to three elevated temperatures. Data from the density analyses can then be plotted on a log, which may inform density at additional temperatures.
- Interfacial tension of oil against water by modified ASTM Method D971(m).
- Surface tension by ASTM D971(b).

5.0 GROUNDWATER SAMPLING

Groundwater sampling will be conducted in conjunction with 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 as well as from the existing Site monitoring wells (WMW-1 through WMW-18) and may also include the Coleman Oil site monitoring well MW-22. 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 NAPL 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 goal 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; observations regarding color, turbidity, or other factors that may have been important in evaluating sample quality; and field measurements of pH, conductivity, temperature, DO, turbidity, 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, turbidity, and ORP).

- 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, compresses the bladder, 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 collecting groundwater samples 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 will be 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, 2025 would be: WMW105-250505.

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 the following constituents (Table B-2):

- TPH-G by NWTPH-Gx
- TPH-D and TPH-O by NWTPH-Dx[1]
- VOCs (benzene, ethylbenzene, and xylenes) by EPA Method 8260D
- PAHs identified in Table B-2 will be analyzed for only in samples with low turbidity (i.e., 5 nephelometric turbidity units or less) by EPA Method 8270E (reporting limits for Method 8270 scan meet project screening levels; however, samples may be run with SIM if screening levels are not achieved).

In addition, the following constituents will be analyzed for during high- and low-groundwater quarterly groundwater monitoring events (expected to be performed in spring and summer 2025). Analysis for these constituents during additional groundwater monitoring events will be determined based on analytical results and in consultation with Ecology.

- Dissolved metals (arsenic, barium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc) by EPA Method 6020B
- Free cyanide by ASTM Method D7237-15A
- WAD Cyanide by SM 4500-CN.

[1] Selected groundwater samples may be analyzed with and without silica-gel cleanup. Analysis with silica-gel cleanup will be performed if it is suspected or demonstrated that there are high levels of naturally occurring organics in groundwater (e.g., groundwater is found in or near a peat layer or other organic material such as anthropogenic waste in the City dump area) or it is deemed important to understand if there are polar metabolite breakdown products in the groundwater. Collection of data pertaining to silica-gel cleanup will be consistent with Ecology's Guidance for Silica Gel Cleanup in Washington State (Ecology 2023) and Guidance for the WDOE NWTPH-Dx Method for Testing Groundwater (Hobbs et al. 2024).

The following additional forensic analyses may also be included for selected groundwater samples if doing so would help fill a data gap or provide beneficial information for the conceptual Site model or feasibility study:

- Forensic volatiles, gas-specific TICs, and oxygenates by EPA Method 8260D.

In addition to the above-mentioned analytes, selected groundwater samples collected downgradient of or within areas of the Site known to contain NAPL with detections of dissolved-phase constituents may be submitted for fingerprinting analysis by NWTPH-Dx gas chromatography/flame ionization detection characterization. The analyses may include PAH homologs by EPA Method 8270m and forensics volatiles, gas-specific TICs, and oxygenates by EPA Method 8260D.

In addition to the above-noted analytes, groundwater samples from the angled monitoring wells will also be collected for analysis for the following constituents ("angled well groundwater analytical suite"; Table B-2):

- Semivolatile organic compounds 4-methylphenol, benzoic acid, bis(2-ethylhexyl)phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, pentachlorophenol, phenol, and total PAHs,[2] by EPA Method 8270E
- Semivolatile organic compounds dibutyltin, monobutyltin, tetrabutyltin, and tributyltin by EPA Method 8270E SIM
- Pesticides beta-hexachlorocyclohexane, dieldrin, endrin ketone, total DDDs, total DDEs, and total DDTs by EPA Method 8081B
- Polychlorinated biphenyls (PCBs) by EPA Method 8082A
- Ammonia (as N) by ASTM Method 4500-NH_3 G
- Total sulfides by SM-4500-S2-D.

5.3.1 Sample Handling

Samples will be collected in the appropriate sample containers and preserved as specified in Table C-4 of the QAPP (Appendix C of the RIWP).

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of collection. The following information will be recorded on the container label at the time of collection:

- Project name
- Sample ID (uniquely identified with a sample ID as described in the above sections)
- Date and time of sample collection
- Preservative type (if applicable)

[2] Total PAHs are the sum of 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes (b+j+k), benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

- Initials of the person preparing the sample.

Samples will be stored in coolers containing ice to maintain the samples at <6°C, as needed, until delivery to the analytical laboratory.

Working surfaces and instruments will be thoroughly cleaned, decontaminated, and as appropriate, covered with aluminum foil to minimize outside contamination between sampling events. Disposable gloves will be discarded after processing each core sample and replaced prior to handling decontaminated instruments or work surfaces.

5.4 Field Quality Control Samples

Field quality control (QC) samples will be collected to identify possible issues resulting from sample collection or sample processing in the field. The collection of field QC samples includes field duplicates and matrix spikes (MSs)/matrix spike duplicates (MSDs), as described below. Equipment blanks may be collected, as appropriate for the media and sample collection process. Field QC samples will be documented in the field logbook and verified by the quality assurance (QA) manager or designee. Field QC sample frequency is specified in Table C-1 of the QAPP (Appendix C of the RIWP).

Field Duplicate

A field duplicate is an additional sample collected from the same sample material as the parent sample. Field duplicates are not expected to be collected from soil; however, any field duplicate samples for solid matrices will be prepared by homogenizing sufficient sample volume from each sampling location. The field duplicate will be labeled as described in the appropriate sample-naming section above and analyzed for the same constituent list as the parent sample. Consistent with Table C-1 of the QAPP, a field duplicate sample will be collected at a frequency of one per 10 analytical samples.

Matrix Spike/Matrix Spike Duplicate

MSs/MSDs are additional aliquots of a sample, submitted to the laboratory for analysis to evaluate the potential effects of matrix interference. MS/MSD samples will be identified on sample labels and the chain-of-custody form and will retain the same sample identifier as the original sample. Consistent with Table C-1 of the QAPP, an MS/MSD sample will be collected at a frequency of one per 20 samples.

5.5 Sample Containers, Preservation, and Holding Times

The analytical laboratory will provide certified, pre-cleaned, EPA-approved containers for all samples (see Table C-4 of the QAPP), with appropriate preservation in accordance with guidance provided in the EPA's SW-846 Compendium (EPA; accessed August 2024).

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Analytical samples collected during the field investigation will follow QA/QC procedures and standards outlined in the project QAPP (Appendix C of the RIWP). 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 10 samples collected. 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 C-4 of the QAPP (Appendix C of the RIWP).

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, 2025, would be named WMWDUP1-250508.
- 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 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 2016). 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 will be documented in field records. Decontamination fluids will be managed per the procedures described in Section 10.0.

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 evidence of NAPL 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) will be cleaned using a four-step process, as follows:

1) Scrub surfaces of equipment that were 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) will occur between each sample collected and will follow the above-noted steps. At least 5 gallons of each decontamination liquid will be pumped through non-dedicated pump systems or sampling equipment that cannot be fully disassembled.

The decontamination procedure is as follows:

1) Perform pre-wash rinse with tap or site water.
2) Wash with solution of laboratory-grade, non-phosphate-based soap (e.g., Alconox).
3) Rinse with tap or site water.
4) Rinse with distilled water to remove tap or site water impurities.

All decontaminated supplies will be covered with aluminum foil and stored in a clean area or closed container until used.

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 high-pressure, hot water 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

This section outlines training requirements and certifications for managing, handling, storage, and transporting residual waste.

9.1 Special Training Requirements / Certifications

Specific training requirements for performing fieldwork at the Site are as follows:

- Field personnel assigned to the Site must have successfully completed 40 hours of training for Hazardous Materials Emergency Response and personal protection site work in accordance with US Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(e)(3) and be current with their 8-hour refresher training in accordance with OSHA 29 CFR 1910.120(e)(8). Documentation of OSHA training is required prior to personnel being permitted to work on Site.
- Personnel assigned to the Site must be enrolled in a medical surveillance program meeting the requirements of OSHA 29 CFR 1910.120(f). Personnel must have successfully passed an occupational physical during the past 12 months and be medically cleared to work on a hazardous waste site and capable of wearing appropriate personal protective equipment and respiratory protection as required.
- Personnel assigned to the Site who must wear a respirator must be familiar with the OSHA respiratory standard (29 CFR 1910.134). Personnel who are required to wear respirator protection must have successfully passed a respirator fit test within the past 12 months.
- Transporters hauling waste from the Site, non-hazardous and hazardous, must have current Hazardous Materials Certificate of Registration, per 49 CFR Part 107(G) with the US Department of Transportation and actions performed by the transporter in the event of hauling a dangerous waste shipment must be in accordance with WAC 173-303-370(6).

It is the responsibility of the employing organization to provide their employees with the required training, medical monitoring, and fit testing prior to assigning them to work at this Site. Each employing organization will be responsible for providing documentation of training, monitoring, and fit testing (with make/model of respirator) to the Project Manager and Health and Safety Manager prior to sending their employees to the Site to work.

Personnel certification documentation is provided as an attachment to the Site's Health and Safety Plan (Appendix D of the RIWP).

9.2 Waste Material 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 (e.g., evidence of NAPL, 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 sheeting 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 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. Drums containing liquids will be stored within a 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; 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
- 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. Able Clean-up Technologies, Inc. of Spokane, Washington will transport the waste drums to the appropriate disposal facility. Non dangerous and non-hazardous waste will be disposed of at a regional Subtitle D landfill once a waste profile and waste manifest are generated. Hazardous waste will be disposed of at a regional Subtitle C landfill.

9.3 Contingency Plan and Emergency Spill Response

In the event of an emergency such as unplanned sudden or non-sudden release of dangerous waste, hazardous substances, or dangerous waste constituents to the environment at the Site, the Site's contingency plan and emergency response plan will be followed. Refer to the Health and Safety Plan (Appendix D of the RIWP) for more information on contingency planning, emergency coordinator contact numbers, and emergency response procedures.

10.0 REFERENCES

Ecology. 2016. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030. Washington State Department of Ecology. Revised December. https://apps.ecology.wa.gov/publications/documents/0403030.pdf.

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Hobbs, William, Karin Bailey, Joan Protasio, and Christina Frans. 2024. *Guidance for the WDOE NWTPH-Dx Method for Testing Groundwater: Silica Gel Cleanup Protocol Revision*. Publication No. 24-03-001. Washington State Department of Ecology. Revised April. https://apps.ecology.wa.gov/publications/documents/2403001.pdf.

Table B-1
Proposed Soil Sampling Matrix
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Analyte (a)	Method	Soil Boring Designation (f)		Monitoring Well Designation					
		WB-15	WB-16	WMW-19	WMW-20	WMW-21	WMW-22	WMW-23	WMW-24
Total Petroleum Hydrocarbons (TPH-G, TPH-D, TPH-O)	NWTPH-Gx/NWTPH-Dx with SGC	x	x	x	x	x	x	x	x
Volatiles (Benzene, Ethylbenzene, Toluene, and Xylenes [BTEX])	EPA Method 8260	x	x	x	x	x	x	x	x
Free Cyanide	SOP SVL 4131	x	x	x	x	x	x	x	x
Total Metals (b)	EPA Method 6020B	x	x	x	x	x	x	x	x
PAHs (c)	EPA Method 8270E	x	x	x	x	x	x	x	x
TOC (d)	EPA Method 9060Amod			x			x	x	
Total Solids (d)	EPA Method SM 2540G			x			x	x	
Grain Size (d)	ASTM Method D6913			x			x	x	

Forensic Analyte (e)	Method
Fingerprinting with Simulated Distillation	ASTM D2887-14
Forensic LL PAH and Homologs	EPA Method 8270m
SPLP Forensic Semivolatiles	EPA Method 1312/8270E
SPLP Forensic Volatiles	EPA Method 1312/8260D
Forensic Volatiles	EPA Method 8260D
Water-Soluble Gas-Specific TICs	
Water-Soluble Oxygenates	
Water-Soluble Volatiles	
Water-Soluble Petroleum	NWTPH-Dx/-Gx
Physical Parameters:	
Density	ASTM D1475
Kinematic Viscosity	ASTM D445
Surface Tension	ASTM D971B
Interfacial Tension	ASTM D971M

Notes:

(a) Analyses may be conducted on soil and/or free product.
(b) Analysis for total metals will include arsenic, barium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, silver, and zinc.
(c) PAHs will include standard 8270E analytical list from Apex, which is included in Table C-2 of the QAPP.
(d) Will be analyzed in soil samples collected from the screened interval.
(e) Locations where forensic parameters will be collected will be based on field observations and/or the results of the soil and/or groundwater standard analytical suites.

(f) Groundwater grab samples may also be collected from soil borings based on field observations.

Abbreviations and Acronyms:

ASTM = ASTM International
BTEX = benzene, toluene, ethylbenzene, m-&p-xylenes, and o-xylene
EPA = US Environmental Protection Agency
NWTPH-Dx = Northwest TPH extended-range diesel analytical method
NWTPH-Gx = Northwest TPH extended-range gasoline analytical method
PAH = polycyclic aromatic hydrocarbon
SGC = silica-gel cleanup
SOP = Standard Operating Procedure
SPLP = synthetic precipitation leaching procedure
SVL = SVL Analytical, Inc.
TIC = tentatively identified compound
TOC = total organic carbon
TPH = total petroleum hydrocarbons
TPH-D = diesel-range total petroleum hydrocarbons
TPH-G = gasoline-range total petroleum hydrocarbons
TPH-O = oil-range total petroleum hydrocarbons

Table B-2
Proposed Groundwater Sampling Matrix
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Analyte (a)	Method	Monitoring Well Designation																							
		WMW-1	WMW-2	WMW-3	WMW-4	WMW-5	WMW-6	WMW-7	WMW-8	WMW-9	WMW-10	WMW-11	WMW-12	WMW-13	WMW-14	WMW-15	WMW-16	WMW-17	WMW-18	WMW-19	WMW-20	WMW-21	WMW-22	WMW-23	WMW-24	MW-22 (j)
Total Petroleum Hydrocarbons (TPH-G, TPH-D, TPH-O)	NWTPH-Gx/NWTPH-Dx (b)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Volatiles [Benzene, Ethylbenzene, Xylenes]	EPA Method 8260D	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dissolved metals (c, d)	EPA Method 6020B	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Free cyanide (d)	ASTM Method D7237-15A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
WAD Cyanide (d)	SM 4500-CN		x		x															x	x		x	x		x
PAHs (e)	EPA Method 8270E	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Angled Well Groundwater Analytical Suite (f)																										
Ammonia (as N)	ASTM 4500-NH_3 G																			x			x	x		
Total Sulfides	SM 4500-S2-D																			x			x	x		
4-Methylphenol	EPA Method 8270E																			x			x	x		
Benzoic Acid																				x			x	x		
Beta-Hexachlorocyclohexane	EPA Method 8081B																			x			x	x		
Bis(2-ethylhexyl)phthalate	EPA Method 8270E																			x			x	x		
Carbozole	EPA Method 8270E																			x			x	x		
Dibenzofuran																				x			x	x		
Dibutyltin	EPA Method 8270E SIM																			x			x	x		
Dieldrin	EPA Method 8081B																			x			x	x		
Di-n-butyl phthalate	EPA Method 8270E																			x			x	x		
Di-n-octyl phthalate																				x			x	x		
Endrin Ketone	EPA Method 8081B																			x			x	x		
Monobutyltin	EPA Method 8270E SIM																			x			x	x		
Pentachlorophenol	EPA Method 8270E																			x			x	x		
Phenol																				x			x	x		
Tetrabutyltin	EPA Method 8270E SIM																			x			x	x		
Total PCB Aroclors (g)	EPA Method 8082A																			x			x	x		
Total DDDs	EPA Method 8081B																			x			x	x		
Total DDEs																				x			x	x		
Total DDTs																				x			x	x		
Total PAHs (benzo(a)pyrene) (h)	EPA Method 8270E																			x			x	x		
Tributyltin	EPA Method 8270E SIM																			x			x	x		

Forensic Analyte (i)	Method
Fingerprinting	NWTPH-Dx GC/FID Characterization
Forensic LL PAH and Homologs	EPA Method 8270m
Forensic Volatiles	EPA Method 8260D
Forensic Gas-Specific TICs	
Forensic Oxygenates	
Physical Parameters:	
Density	ASTM D1475
Kinematic Viscosity	ASTM D445
Surface Tension	ASTM D971B
Interfacial Tension	ASTM D971M

Notes:

(a) If evidence of free product is observed in soil borings where a monitoring well is installed, Landau will evaluate an appropriate analytical suite for groundwater samples.
(b) Selected groundwater samples may be analyzed with and without silica-gel cleanup.
(c) Analysis for dissolved metals will include arsenic, barium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, silver and zinc.
(d) Dissolved metals, free cyanide, and WAD cyanide will be analyzed for during high- and low-groundwater quarterly groundwater monitoring events (expected to be performed in spring and summer 2025). Analysis for these constituents during future groundwater monitoring events will be determined based on analytical results and in consultation with Ecology.
(e) PAHs will generally be analyzed for in groundwater samples only with low turbidity (<5 NTU). PAHs will include standard 8270E analytical list from Apex, which is included in Table C-2 of the QAPP.
(f) Nearshore vertical wells may also be analyzed for angled well list constituents.
(g) Total will include PCB aroclors listed in Attachment 2 of the QAPP.
(h) Total PAHs are the sum of 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes (b+j+k), benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.
(i) Locations where forensic parameters will be collected will be based on field observations and/or the results of the soil and/or groundwater standard analytical suites.
(j) Monitoring well MW-22 was installed as a part of the Coleman Oil site investigation and may be included in quarterly groundwater monitoring.

Abbreviations and Acronyms:

ASTM = ASTM International
EPA = US Environmental Protection Agency
FID = flame ionization detection
GC = gas chromatography
GW = groundwater
NTU = nephelometric turbidity units
NWTPH-Dx = Northwest TPH extended-range diesel analytical method
NWTPH-Gx = Northwest TPH extended-range gasoline analytical method
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
SIM = selected ion monitoring
SMS - Sediment Management Standards
SPLP = synthetic precipitation leaching procedure
TPH-D = diesel-range total petroleum hydrocarbons
TPH-G = gasoline-range total petroleum hydrocarbons
TPH-O = oil-range total petroleum hydrocarbons
TPH = total petroleum hydrocarbons
TIC = tentatively identified compound
WAD = weak acid dissociable

APPENDIX C

Quality Assurance Project Plan

LANDAU ASSOCIATES

FINAL
QUALITY ASSURANCE PROJECT PLAN

Chelan PUD Worthen Substation Site
500 South Worthen Street
Wenatchee, Washington

February 3, 2025

Prepared for

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ATTACHMENTS

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LIST OF ABBREVIATIONS AND ACRONYMS

ASTM ..... ASTM International
CCV ..... continuing calibration verification
CLP ..... contract laboratory program
COC ..... chain of custody
COPC ..... contaminant of potential concern
DL ..... detection limit
DNAPL ..... dense non-aqueous phase liquid
DQI ..... data quality indicator
DQO ..... data quality objective
Ecology ..... Washington State Department of Ecology
EDD ..... electronic data deliverable
EIM ..... Environmental Information Management
EPA ..... US Environmental Protection Agency
FID ..... flame ionization detector
ft ..... foot/feet
GC ..... gas chromatography
HASP ..... health and safety plan
ICP ..... inductively coupled plasma
ID ..... identification
Landau ..... Landau Associates, Inc.
LCS ..... laboratory control spike
LNAPL ..... light non-aqueous phase liquid
MDL ..... method detection limit
MQO ..... measurement quality objective
MS ..... mass spectrometry
PAH ..... polycyclic aromatic hydrocarbon
PCUL ..... preliminary cleanup level
PID ..... photoionization detector
PM ..... project manager
ppm ..... parts per million
PQL ..... practical quantitation limit
PSE ..... Puget Sound Energy
PSEP ..... Puget Sound Estuary Program
PUD ..... Chelan Public Utility District No. 1
QA ..... quality assurance
QAPP ..... quality assurance project plan

LIST OF ABBREVIATIONS AND ACRONYMS (Continued)

QC.....quality control
QSM ..... quality systems manual
RI ..... remedial investigation
RIWP..... remedial investigation work plan
RL.....reporting limit
SAP ..... sampling and analysis plan
SCUM ..... Sediment Cleanup User's Manual
Site ..... Chelan PUD Worthen substation site
SM ..... Standard Methods
SOP..... standard operating procedure
TBD.....to be determined
TEQ.....toxicity equivalence
VOC ..... volatile organic compound

1.0 BACKGROUND

On behalf of Puget Sound Energy (PSE) and Public Utility District No. 1 of Chelan County (PUD), Landau Associates, Inc. (Landau) prepared this quality assurance project plan (QAPP; Appendix C of the remedial investigation work plan [RIWP]), in support of investigation and characterization activities being conducted at the Chelan PUD Worthen Substation site (Site). The Site is generally located at 500 South Worthen Street in Wenatchee, Washington (Figure 1 of the RIWP). This QAPP details the data quality objectives, laboratory activities and quality assurance/quality control (QA/QC) procedures to be implemented during execution of the RIWP, which will be conducted under Agreed Order No. DE 22971 between PSE, PUD, and the Washington State Department of Ecology (Ecology) in accordance with Washington State Model Toxics Control Act regulations. Landau prepared this QAPP following Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (Ecology 2016). Details related to the scope of work are available in the main body of the RIWP (of which this QAPP is Appendix C), while sample collection methodology is provided in Appendix B of the RIWP, the sampling and analysis plan (SAP). Future QAPP revisions will be addressed in addenda to this QAPP.

2.0 PROJECT DESCRIPTION

Environmental investigation has been ongoing at the Site since 2021 after a dense non-aqueous phase liquid (DNAPL) coal tar or coal-tar based material was encountered in a subsurface boring proximate to the Site during an investigation related to a release of R99 biodiesel at the Coleman Oil Company property south of the Site (HydroCon 2018). Extensive investigation of soil and groundwater has taken place in the upland portion of the Site over the past 3 years; pre-remedial investigation (RI) details are provided in the RIWP.

The RI will further investigate the subsurface soil and groundwater in the uplands portion of the Site where data gaps are present and the groundwater-surface water interface and sediment at the Site will be investigated. The investigation will be conducted for the purpose of further characterizing the chemical nature, concentrations, extent (horizontal and vertical), and the direction and rate of migration of hazardous substances released into the environment from the Site. In addition, the RI will evaluate potential human and environmental receptors and potential pathways to each receptor from each medium and support recommendations for potential interim actions(s).

2.1 Project Goals

The project goals are to further investigate contamination at the Site through evaluation of the extent of contamination, including whether the surface water or sediments of the Columbia River are being impacted by contamination at the Site. The RI is divided into three focused investigation areas: the upland data gaps investigation, the shoreline/groundwater-surface water pathway investigation, and the sediment investigation. The planned scope and strategy for the sediment investigation will be described in a future supplemental RI work plan and will be based on evaluation of the groundwater sampling results from the shoreline/groundwater-surface water pathway investigation, observations made in the field during the time of drilling, groundwater sample results from the angled shorelines wells, and consultation with Ecology.

2.2 Project Objective

The objective for the upland and shoreline/groundwater-surface water pathway investigations is to determine existing concentrations of contaminants of potential concern (COPCs) in soil and groundwater at the Site, as presented in this QAPP and the RIWP. The sediment investigation will be informed by groundwater sample results from the angled shoreline wells, and will be designed in consultation with Ecology. The objective of the future sediment investigation will be to determine existing concentrations of COPCs in sediment.

2.3 Information Needed and Sources

Existing and new data will be used to evaluate Site conditions. Existing data are discussed in detail in the RIWP.

2.4 Tasks Required

Tasks that will be completed as part of the RI include coordinating permitting, utility locates and clearance, the advancement of soil borings, soil screening, soil and free product sample collection and analysis, monitoring well installation and development, groundwater sampling and analysis, conducting a sediment investigation, equipment decontamination and management of investigation-derived waste, and reporting. These activities are discussed in the RIWP.

2.5 Systematic Planning Process

Updates to the RI activities described in this QAPP will be documented in addenda to this QAPP or, if significantly different, will be documented in an updated QAPP and/or RIWP.

3.0 ORGANIZATION AND SCHEDULE

This section describes the roles and responsibilities, as well as schedule and budget considerations, for the RI.

3.1 Key Individuals and Their Responsibilities

The specific roles, activities, and responsibilities of project participants are described in the table below. Before field work commences, project participants listed in the below table will receive a copy of the final approved QAPP. PSE and the PUD have the primary responsibility for managing the work completed at the Site. Ecology will be notified in writing of changes to personnel listed in the table below.

Project Team Roles and Responsibilities

Title/Role	Name	Organization	Responsibilities
PSE Project Manager	Suzanne Dolberg	PSE	Manages the project for PSE.
PUD Project Manager	Jennifer Burns	PUD	Manages the project for PUD.
Ecology Project Manager	John Mefford	Ecology	Oversees the project on behalf of the Washington State Department of Ecology.
Ecology Toxicologist	Pete Adolphson	Ecology	Sediment technical support.
Consultant Project Manager	Piper Roelen	Landau	Supervises and coordinates all work for the project. These responsibilities include project planning and execution, scheduling, staffing, data evaluation, sample archive management, overseeing submittal of data to Ecology's Environmental Information Management (EIM) database, report preparation, subcontracts, and managing deliverables.
Quality Assurance Manager	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.
Data Manager	Morgan DeMell	Landau	Manages project database, provides support for reporting activities, uploads data to EIM per Consultant PM direction.
Field Lead	Dan Gray (Upland), Thai Do (Sediment)	Landau	Leads and coordinates field activities, including documentation, sampling, and sample handling. Reports directly to the Consultant Project Manager (PM).
Health and Safety Manager	Christine Kimmel	Landau	Responsible for review and implementation of the project health and safety plan (HASP).
Field Equipment Manager	Ken Reid	Landau	Ensures equipment is properly maintained and in good condition for project use.

Title/Role	Name	Organization	Responsibilities
Environmental Laboratory Project Manager(s)	Kurt Johnson	Apex Laboratories, LLC	Manages laboratory analysis and reporting, including supervising in-house chain of custody and scheduling sample analyses within required holding times; oversees data review and preparation of laboratory reports and electronic data deliverables (EDDs).
	Kelly Bottem	Analytical Resources, LLC	
	Howard Holms	ALS Environmental	
	Leah Garcia	SPL	
	Gladis Arias	Texas OilTech Laboratories, LP	
	Dave Tyron	SVL Analytical, Inc.	

3.2 Special Training and Certifications

All personnel who conduct field activities are trained on use of soil, groundwater, and sediment sample collection equipment, sample handling, program quality assurance/quality control (QA/QC), and safety. Each person is required to be familiar with this QAPP and associated SAP, HASP, and RIWP, as well as Landau field, safety, and QA/QC procedures.

3.3 Organization Chart

Not applicable – see Section 3.1.

3.4 Proposed Project Schedule

The table below presents the proposed schedule for completing field work, laboratory analysis, reporting, and data submittals.

Proposed Project Schedule

Task	Due Date
Agreed Order Public Comment Period	7/1-7/31/2024
Agreed Order Effective Date	8/2/2024
Progress reports	Monthly due by the 10th day each month following effective date of the AO
Submit agency review draft RIWP	10/1/2024
Submit Final RIWP to Ecology	Within 45 calendar days following receipt of Ecology comments on draft RIWP
Complete field work (uplands investigation/installation of angled wells, quarterly groundwater monitoring)/sediment sampling	Within 12 months following Ecology approval of the final RIWP
Sediment Investigation (including supplemental RIWP and implementation)	Pending evaluation of the groundwater sampling results from the angled shoreline wells and observations made in the field during the time of drilling the angled wells
Submit agency review draft RI report/ EIM submittal	Within 60 days of receipt and validation of all laboratory data
Submit public review draft RI report	Within 60 days following receipt of Ecology comments on draft RI report

3.5 Budget and Funding

This project is funded through a cost-sharing agreement between PSE and the PUD.

4.0 QUALITY OBJECTIVES

This section establishes QA objectives and functional activities associated with soil, groundwater, and sediment chemistry data-gathering at the Site. The methods and QA/QC procedures described in this QAPP will be followed throughout the course of data-collection activities.

The goal of this QAPP is to ensure that data of sufficiently high quality are generated to support the data quality objectives (DQOs). This QAPP was prepared following Ecology's Sediment Cleanup User's Manual (SCUM; Ecology 2021)and QAPP guidance documents (Ecology 2016). Field and laboratory activities must be conducted in such a manner that the results meet specified DQOs and are fully defensible. Guidance for QA/QC is derived from the protocols developed for/by the Puget Sound Estuary Program (PSEP; Ecology 2015; PSEP 1986, 1997a, b), the US Environmental Protection Agency's (EPA's) SW-846 Compendium (EPA; accessed August 14, 2024), EPA's Contract Laboratory Program (EPA 2020a, b), EPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009), and ASTM International (ASTM).

4.1 Data Quality Objectives

DQOs reflect the overall degree of data quality or uncertainty that the decision-maker is willing to accept during the process. DQOs are used to ensure that generated data are scientifically valid, defensible, and of an appropriate level of quality given the intended use for the data (EPA 2000). The quality of the data is assessed by measurement quality objectives (MQOs), which consist of precision, accuracy, representativeness, comparability, completeness, and sensitivity.

DQOs for the upland data gaps investigation, the shoreline-surface water investigation, and (if required), the sediment investigation, are detailed in the RIWP including the study design, decision rules, and plan for obtaining the data. Performance and acceptance criteria necessary to support the project DQOs are provided in Tables C-1 and C-2 of this QAPP, including the following QC considerations:

- Data quality indicators for laboratory analyses (precision, accuracy, representativeness, completeness, comparability, and sensitivity)
- Laboratory QC
- Field QC samples
- Soil, groundwater, and sediment screening levels for petroleum hydrocarbons, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), phthalates, organics and chlorinated organics, pesticides, polychlorinated biphenyls, butyltins, metals, cyanides, and conventional chemistry parameters, are listed in Table C-2 of this QAPP and further outlined in the RIWP.

4.2 Measurement Quality Objectives and Acceptance Criteria

MQOs and their associated data quality indicators (DQIs) and acceptance criteria, are described in the following sections and in Table C-1.

Precision

Precision is the ability of an analytical method or instrument to reproduce its own measurement. It is a measure of the variability, or random error, in sampling, sample handling, and laboratory analysis that includes the following:

- Repeatability: The random error associated with measurements made by a single test operator on identical aliquots of test material in a given laboratory, with the same apparatus, under constant operating conditions
- Reproducibility: The random error associated with measurements made by different test operators, in different laboratories, using the same method but different equipment to analyze identical samples of test material.

In the laboratory, *within-batch* precision is measured using replicate sample or QC analyses and is expressed as the relative percent difference between the measurements. The batch-to-batch precision is determined from the variance observed in the analysis of standard solutions or laboratory control samples from multiple analytical batches. Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit (MDL), where the percent error increases.

The equation used to express precision is as follows:

$$\text{Relative Percent Difference} = [(\text{ABS } (M1 - M2)) / ((M1 + M2) / 2)] \times 100$$

Where:

ABS = Absolute difference between values (meaning no negative values)

M1 = Measured concentration #1

M2 = Measured concentration #2

Frequency and acceptance criteria for precision DQIs, including field duplicates, are provided in Table C-1.

Accuracy and Bias

Accuracy is a measure of the closeness of an individual measurement (or an average of multiple measurements) to the true or expected value. Accuracy is determined by calculating the mean value of results from ongoing analyses of laboratory-fortified blanks, and standard solutions. Laboratory-fortified (i.e., matrix-spiked) samples are also measured; this indicates the accuracy or bias in the actual sample matrix.

Accuracy is expressed as percent recovery (%R) of the measured value, relative to the true or expected value. If a measurement process produces results whose mean is not the true or expected value, the process is said to be biased. Bias is the systematic error either inherent in a method of analysis (e.g., extraction efficiencies) or caused by an artifact of the measurement system (e.g., contamination). Analytical laboratories use several QC measures to infer analytical bias, including systematic analysis of method blanks, and laboratory control samples. Because bias can be positive or negative, and because

several types of bias can occur simultaneously, either the net, or total, bias can be evaluated in a measurement.

Laboratory accuracy will be compared to quantitative matrix spike and surrogate spike recovery performance criteria provided by the laboratory. Accuracy can be expressed as a percentage of the true or reference value, or as a %R in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\text{Percent Recovery} = [(SSR - SR) / SA] \times 100$$

Where:

SSR = Spiked sample result

SR = Sample result

SA = Spike added

Frequency and acceptance criteria for accuracy DQIs are provided in Table C-1.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an environmental condition. Field representativeness will be controlled by adherence to sample collection procedures outlined in the SAP, including the use of trip blanks and method-specified sample preservation requirements.

Comparability

Comparability expresses the confidence with which one dataset can be evaluated in relation to another dataset. For this program, comparability of data will be established through the use of standard analytical methodologies and reporting formats, and of common traceable calibration and reference materials.

Completeness

Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{(\text{Number of acceptable results}) \times 100}{(\text{Total number of results})}$$

Data that have been qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as rejected will not be considered valid for the purpose of assessing completeness.

The acceptance criteria for completeness are listed in Table C-1.

Sensitivity

Analytical sensitivities should be consistent with or lower than the regulated criteria values in order to demonstrate compliance with this QAPP. If reporting limits lower than criteria are not achievable during analysis, the QA manager will work with the laboratory to ensure that, if at all possible, re-analyses are performed and reporting limits lower than criteria are achieved.

The MDL is defined as the minimum concentration at which a given target analyte can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Laboratory MDLs have been used to evaluate the method sensitivity or applicability prior to the acceptance of a method for this program. Laboratory reporting limits (RLs) are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions for that particular method.

The sample practical quantitation limits (PQLs) will be reported by the laboratory and will take into account any factors related to the sample analysis that might decrease or increase the RL (e.g., dilution factor, percent moisture, sample volume, sparge volume). In the event that the PQL is elevated for a sample due to matrix interferences and subsequent dilution or reduction in the sample aliquot causing criteria to be exceeded, the data will be evaluated by the Project PM and/or Data Validator (as appropriate) and the laboratory will be contacted to determine if an alternative course of action is required or possible. If this situation cannot be resolved readily, Ecology may be contacted to discuss an acceptable resolution.

Laboratory RLs and screening levels are provided in Table C-2.

4.3 Acceptance Criteria for Quality of Existing Data

Data from existing investigations conducted by Landau are detailed in the RIWP. Data collected and reported by Landau has undergone Stage 2A validation and been submitted to Ecology's EIM database.

4.4 Model Quality Objectives

Modeling is not expected to be used on this project; this section is not applicable. If it is determined that modeling is necessary for the RIWP effort, then a QAPP addendum will be prepared to cover this additional scope.

5.0 STUDY DESIGN

The section discusses the study design, including boundaries, field data collections, and sampling locations and parameters. Study design is further detailed in the RIWP and the SAP.

5.1 Study Boundaries

The Site is located on the east side of Wenatchee, on the west side of South Worthen Street and the Columbia River, and on the east side of the BNSF Railway Company Wenatchee railyard and tracks. Site boundaries are detailed in the RIWP and are shown on Figure 2 of the RIWP.

5.2 Field Data Collection

The primary types of information collected in the field will be data associated with the upland and shoreline investigations (soil, groundwater) and the sediment investigation.

5.2.1 Sampling Locations and Frequency

RI sampling locations and frequency are detailed in the RIWP.

5.2.2 Field Parameters and Laboratory Analytes

Water quality parameters including temperature, pH, dissolved oxygen, turbidity, and oxidation reduction potential will be measured and recorded as part of the groundwater sample collection process. Soil, groundwater, and sediment samples may be analyzed for petroleum hydrocarbons, VOCs, organics and chlorinated organic chemicals, PAHs, phthalates, pesticides, polychlorinated biphenyls, butyltins, metals, and conventional chemistry. A specific-target analyte list is provided in Table C-2; the RIWP further details the planned analytical suites.

5.3 Modeling and Analysis Design

Modeling is not expected to be used on this project; this section is not applicable.

5.4 Assumptions Underlying Design

An inherent design assumption of quarterly monitoring is that these snapshots are representative of environmental and biotic conditions year-round. However, quarterly measurements are a snapshot of conditions at one point in time and may not fully capture the range of conditions or unique events occurring year-round. In addition, seasonal variability in all parameters may play an important role in shaping conditions within the soil, groundwater, and sediment. Although Landau will take steps to assure representativeness, data users must be careful not to overstate these measurements.

5.5 Possible Challenges and Contingencies

The RI study design was developed to achieve the goals and objectives of the investigations. As necessary, updates to the schedule or scope of work will be documented as an addendum to this QAPP.

Logistical problems or other practical constraints due to budget or staffing are not anticipated. Intentional planning and communication of sample intake and flow are needed to ensure timely processing of samples submitted to environmental laboratories. In the event of unexpected weather conditions that hamper the ability to perform field work, stakeholders will be informed and the schedule adjusted.

6.0 FIELD PROCEDURES

The following subsections discuss the field procedures associated with the RI, including measurement and sampling activities.

6.1 Invasive Species Evaluation

It is possible that during sampling, invasive species of invertebrates or plants could be collected. To avoid the spread of these species to other areas, procedures adapted from Ecology's Standard Operating Procedures to Minimize the Spread of Invasive Species (Parsons et al. 2024) will be followed.

6.2 Measurement and Sampling Procedures

Environmental sampling will be conducted in accordance with Landau field procedures. Project measurement and sampling processes are further detailed in the SAP. If deviations occur, they will be documented in field records, the Landau PM will be notified, and the deviations will be addressed in the client report, as appropriate, and, if necessary, corrective actions as described in this QAPP. Samples will be analyzed by methods as detailed in Tables C-2 and C-3 and as discussed in Section 7.0.

6.3 Containers, Preservation, Holding Times

Samples will be collected in appropriate sample containers and preservatives, as listed in Table C-4. Samples will be submitted to laboratories in a timely fashion, and laboratories will analyze samples within method-specified holding times as listed in Table C-4.

6.4 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 10.0 of the SAP.

6.4.1 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 evidence of light non-aqueous phase liquid (LNAPL) or DNAPL is detected during water-level measurements, the probe head and tape will be decontaminated per the procedures described in Section 9.2.

6.4.2 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 this QAPP.

Decontamination of reusable sampling devices (i.e., stainless-steel drive-point screens, non-dedicated pump housings) 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.

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with suspected contaminated sediment must meet high standards of cleanliness. Equipment and instruments used that are in direct contact with the sediment collected for analysis will be made of glass, stainless steel, or high-density polyethylene, and will be decontaminated at the beginning of each day as well as between sampling locations. Decontamination of sediment sampling equipment and supplies will follow PSEP protocols.

The decontamination procedure is as follows:

1. Perform pre-wash rinse with tap or site water.
2. Wash with solution of laboratory-grade, non-phosphate-based soap (e.g., Alconox).
3. Rinse with tap or site water.
4. Rinse with distilled water to remove tap or site water impurities.

All decontaminated supplies will be covered with aluminum foil and stored in a clean area or closed container until used.

6.4.3 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 high-pressure, hot water wash before each use and at completion of the project. Potable tap water will be used as the cleaning agent.

6.5 Sample Identification

Each sample will be assigned a unique alphanumeric identification (ID) using the following schematic:

- Sample IDs will be formatted by *Sampling Location ID-(Sample Depth)* [for soil and sediment samples only]-*Sampling Date* (for monitoring well groundwater samples only).
  - Sampling Location ID will consist of a 4-digit alphanumeric code identifying the 2-letter location type (e.g., WB for soil boring, WMW for monitoring well, WSC for sediment core, and WSG for sediment grab) and sequential 2-digit location number.
  - Sampling Depth will identify the depth interval (in feet) from which the sample is collected, assigned only to soil boring, sediment core, and surface grab samples.
  - Sampling Date will be recorded in YYYYMMDD format, assigned only to monitoring well groundwater samples.

- Field duplicate sample IDs will be formatted by *Duplicate ID*, [for soil and sediment samples only]-*Sampling Date* (for monitoring well groundwater samples only).
  - Duplicate ID will consist of "DUP" with 2-digit sequential number (assigned in the order each is collected).
  - Sampling Date will be recorded in YYYYMMDD format, assigned only to monitoring well groundwater samples.

For example, a soil boring sample collected from the 23- to 26-foot (ft) depth interval at location 18 will be identified as WB18-(23-26), and a groundwater sample collected on July 12, 2025 from a monitoring well installed at the same location will be identified as WMW18-20250712. Similarly, a sediment core sample collected from the 3.0- to 4.5-ft interval at sediment coring location 03 will be identified as WSC03-(3.0-4.5), and the co-located surface grab sample from the same location will be identified as WSG03-(0-0.5). The second field duplicate during this RI will be identified as WDUP02.

6.6 Chain of Custody

This section addresses the sampling program requirements for maintaining custody of the samples throughout the sample collection and delivery process.

6.6.1 Sample Custody

Samples are considered to be in one's custody if they are in the custodian's possession or view, in a secured location (under lock) with restricted access, or in a container that is secured with an official seal, such that the sample cannot be accessed without breaking the seal.

Chain-of-custody (COC) procedures will be followed for all samples throughout the collection, handling, and analysis process. The principal document used to track possession and transfer of samples is the COC form (Attachment C-1). Each sample will be represented on a COC form on the day it is collected. All data entries will be made using an indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, and then dating and initialing the change. Blank lines or spaces on the COC form will be lined-out and dated and initialed by the individual maintaining custody.

A COC form will accompany each cooler of samples to the analytical laboratory. Each person who has custody of the samples will sign the COC form and ensure that the samples are not left unattended unless properly secured. Copies of all COC forms will be retained in the project files.

6.6.2 Sample Delivery and Receipt

Samples submitted to the laboratory will be collected in the appropriate sample containers and preserved as specified in Table C-4. The storage temperatures and method-specific holding times for chemical analyses are also provided in Table C-4. The persons transferring custody of the sample container will sign the COC form upon transfer of sample possession to the laboratory, unless the samples are shipped via commercial carriers, in which case the custody signature will be that of the individual taking possession of the samples from the carrier at their final destination.

When the samples are delivered to the laboratory, the receiver will record the condition of the samples on a sample receipt form. COC forms will be used internally in the laboratory to track sample handling and final disposition. The laboratory custodian will note if containers arrive with broken custody seals on the COC form, and will immediately notify the Landau PM or Field Lead, as appropriate. Once the laboratory work has been completed and the data report submitted by the laboratory, samples and extracts will be transferred from cold storage to a sample archiving area (as appropriate for the type of media to be handled), where they will be stored for 30 days, unless the PM provides other written instructions. Custody will be maintained in the long-term storage area and upon ultimate disposition, samples will be logged out and the disposition recorded. Disposal will be in accordance with local, state, and federal landfill and wastewater regulations.

6.7 Field Log Requirements

A paper log is available to use as a backup if the electronic form or device should fail. Digital copies of the field and sample logs are stored for future reference on a shared, secure network that is frequently backed up. Field log requirements are further detailed in the SAP.

6.8 Other Activities

Other anticipated activities associated with the RI include the tasks detailed in the following subsections.

6.8.1 Laboratory Notification

Prior to sampling, the Landau PM or their delegate will notify the environmental analytical laboratories as to commencement of work. Project turn-around times and other specifications will be provided to the laboratory in advance of submittal of samples for analysis.

6.8.2 Field Briefings

A meeting will be held with field staff prior to the commencement of field work to review sampling and safety protocols.

6.8.3 Excess Sample and Waste Disposal

Laboratories will dispose of samples at the end of the tests (and in accordance with project-specified archival and storage requirements) using acceptable methods.

Investigation-derived waste (IDW) from the investigations (e.g., soil cuttings, purge water, decontamination water) will be stored in Washington State Department of Transportation-approved 55-gallon drums. IDW will be managed in accordance with the SAP.

7.0 LABORATORY PROCEDURES

The following subsections summarize analytical and physical testing procedures for work to performed as part of the RI.

7.1 Laboratory Methods

Laboratory procedures, including sample preparation, cleanup, and analytical methods, are provided in Table C-3. Laboratory procedures shall be in accordance with applicable methods from the EPA and ASTM, and laboratory quality systems manuals (QSMs).

7.2 Accredited Laboratories

Analytical laboratories performing work under this QAPP shall maintain current accreditation through Ecology for applicable methods and target analytes. The planned laboratories to be used for this work are listed in Section 3.1 and Table C-3; contact information is provided below. Alternate laboratories with comparable analytical methodology and MQOs, and appropriate accreditation, may be used on this RI.

Laboratories to be used for planned analytical testing include:

Analytical Laboratories
Apex Laboratories, LLC 6700 SW Sandburg Street Tigard, OR 97223
Analytical Resources, LLC 4611 South 134th Place, Ste 100 Tukwila, WA 98168
ALS Environmental 1317 13th Avenue South Kelso, WA 98626
SVL Analytical, Inc. 1 Government Gulch Road Kellogg, ID 83837

Laboratories to be used for planned physical testing include:

Physical Testing Laboratories
SPL 1300 Corporate Drive East Arlington, TX 76006
Texas OilTech Laboratories, LP 10630 Fallstone Road Houston, TX 77099

8.0 QUALITY CONTROL PROCEDURES

This section details field and laboratory QC samples and procedures, as well as corrective processes. The American Society for Quality defines QC as "the operational techniques and activities used to fulfill requirements for quality" (ASQ; accessed August 13, 2024). Ongoing project QC activities include personnel training, equipment calibration and maintenance, COC protocols, data and information management, and data verification and validation. These activities will be conducted in accordance with this QAPP; applicable EPA,ASTM, and SM guidelines and standards; and Landau Quality, Field, and Safety manuals.

8.1 Field Quality Control

The QC procedures for measuring field parameters such as pH, redox potential, conductance, dissolved oxygen, turbidity, and temperature in groundwater samples are discussed in the SAP and will include calibrating the instruments, measuring duplicate samples, and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. To ensure that field measurement is accomplished accurately, field equipment will undergo routine maintenance and calibration as described below. Field QC samples, including field duplicates and trip blanks, are listed in Table C-1.

8.1.1 Testing, Inspection, and Maintenance

Landau performs routine inspections and preventive maintenance (parts replacement and cleaning) for all pieces of field equipment in the supply and equipment room. Maintenance activities are conducted by field technicians, who are specifically trained in the use, operation, and maintenance of the equipment. Field equipment used during this project, including water-level indicators, photoionization detectors (PIDs), flame ionization detectors (FIDs), and water field parameter meters (e.g., pH), will be cleaned and decontaminated prior to use. Each piece of equipment will be inspected and tested to ensure proper working function and facilitate replacement or repair of broken or non-operational components. Extra batteries will be included in the equipment cases or in field vehicles for replacing dead batteries during field work. Extra disposables will be packed for equipment requiring disposables for use, such as ferrous iron kits.

Field equipment is maintained by the Landau field equipment manager. Field staff will notify the Field equipment manager when equipment maintenance is needed. This system ensures that the equipment is maintained and working for the next field project.

Meters used to make field measurements will be further inspected and tested during calibration, as described below.

8.1.2 Calibration and Frequency

Field equipment is calibrated according to the manufacturer's guidelines and recommendations. If a FID or PID is used during this project, it will be calibrated on a daily basis according to the manufacturer's specifications.

Prior to use, the FID will be calibrated per the manufacturer's specifications and bump-tested to verify operation. These calibrations will be noted on field forms. The lower limit of detection for the FID will be 1 part per million (ppm). The FID will be used only for monitoring indoor air and other structures, as it is ineffective at detecting methane from subsurface probes due to the typically depleted levels of oxygen associated with landfill gas. The operation of the FID is based on the detection of ions formed during combustion of organic compounds in a hydrogen flame.

The PID preferred by Landau field personnel uses a 10.2-eV probe and will be calibrated per the manufacturer's specifications using a manufacturer-supplied standard gas (isobutylene, equivalent to 34 ppm benzene). Similarly, water field parameter meters will be calibrated at the start of each sampling day with laboratory-prepared calibration standards within the range of the anticipated measurement. An instrument will also be recalibrated at any time an anomalous reading suggests instrument imprecision or inaccuracy.

8.1.3 Inspection/Acceptance of Supplies and Consumables

Supplies are ordered and maintained by the Landau field equipment manager. Disposables and consumables include nitrile gloves, Ziploc® bags for sample ice, field test kits, and polyethylene tubing.

8.2 Laboratory Quality Control

Laboratory analytical procedures will be documented in writing as laboratory standard operating procedures (SOPs), with each SOP including a QA section that addresses the minimum QC requirements for the procedure. Certain QC requirements are matrix- or method-specific, but in general, the QA program must include the following:

- Instrument calibration
- Preparation and analysis of reagent/preparation blanks
- Analysis of instrument and/or method blanks
- Preparation and analysis of matrix spikes and matrix spike duplicates
- Preparation and analysis of surrogate spikes
- Analysis of laboratory duplicates for inorganics
- Preparation and analysis of laboratory control samples and standards
- Identification of internal standard areas and control limits, for gas chromatography/mass spectrometry (GC/MS) analysis
- System performance checks for both organic and total metals analyses.

The results of the QC samples from each sample group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine if control limits have been exceeded. If control limits are exceeded in the sample group, the Landau QA manager will be contacted immediately, and corrective action (e.g., method modifications followed by

reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples. Laboratory QC samples are further discussed below and are detailed in Table C-1.

Laboratory Instrument Calibration

An initial calibration will be performed on each laboratory instrument to be used prior to the start of the project, after each major interruption to the analytical instrument, and when any ongoing calibration does not meet method control criteria. Calibration verification will be analyzed following each initial calibration and will meet method criteria prior to analysis of samples. Continuing calibration verifications (CCV) will be performed daily prior to any sample analysis to track instrument performance. The frequency of CCVs varies with method. For GC/MS methods, one CCV will be analyzed every 12 hours. For GC/MS, metals, and inorganic methods, one CCV will be analyzed for every 10 field samples, or daily, whichever is specified in the method. If the ongoing continuing calibration is out of control, the analysis must come to a halt until the source of the control failure is eliminated or reduced to meet control specifications. All project samples analyzed while instrument calibration was out of control will be reanalyzed.

Instrument blanks or continuing calibration blanks provide information on the stability of the baseline established. Continuing calibration blanks will be analyzed immediately prior to, or immediately following, CCV of the instrument for each type of applicable analysis.

Laboratory Duplicates and Replicates

Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity. Analytical duplicates and replicates are subsamples of the original sample that are prepared and analyzed as separate samples.

Matrix Spikes/Matrix Spike Duplicates

Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing duplicate MS analyses, information on the precision of the method is also provided for organic analyses.

Method Blanks

Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. The method blank for all analyses must be less than the method reporting limit of any single target analyte or compound. If a laboratory method blank exceeds this criterion for any analyte or compound, then the laboratory shall follow corrective action procedures in accordance with the analytical method and laboratory QSM SOPs.

Laboratory Control Spikes/Laboratory Control Spike Duplicates

Laboratory control spikes (LCS) are analyzed to assess possible laboratory bias at all stages of sample preparation and analysis. The LCS is a matrix-dependent spiked sample prepared at the time of sample extraction along with the preparation of the sample and the MSs. The LCS will provide information on

the precision of the analytical process, and when analyzed in duplicate, will provide accuracy information as well.

8.3 Corrective Actions

Corrective action procedures will be implemented based on the type of unacceptable data and will be developed on a case-by-case basis. The following corrective actions may be included:

- Altering procedures in the field
- Using a different batch of sample containers
- Performing an audit of field or laboratory procedures
- Reanalyzing samples (if holding times allow)
- Resampling
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data with no action, acknowledging the level of uncertainty
- Qualification of the data
- Stage 4 data validation
- Rejecting the data as unusable
- Additional training.

During field operations and sampling procedures, the field personnel will be responsible for conducting and reporting required corrective actions. A description of any corrective action taken will be entered in the daily field notebook. If field conditions do not allow for conformance with this QAPP, the Landau PM will be consulted immediately. For any corrective action or field condition resulting in a revision of this QAPP, the Landau PM and Landau QA manager will authorize changes or exceptions to this QAPP, as necessary and appropriate.

Incidents of QA failure and associated corrective action will be documented and reports will be placed in the appropriate project file. Also, corrective action will be taken promptly for deficiencies noted during spot-checks of raw data. As soon as sufficient time has elapsed for corrective action to be implemented, evidence of correction of deficiencies will be presented.

Corrective action in the analytical laboratory may be required due to equipment malfunction, failure of internal QA/QC checks, method blank contamination, non-compliance with QA requirements, or failure of performance or system audits. When measurement equipment or analytical methods fail QA/QC checks, the problem will be immediately brought to the attention of the appropriate persons in the laboratory, in accordance with the laboratory's SOPs. If failure is due to equipment malfunction, the equipment will be repaired, precision and accuracy will be reassessed, and the analysis will be rerun. Attempts will be made to reanalyze all affected parts of the analysis so that, in the end, results are not affected by failure of QA requirements.

During laboratory analysis, the laboratory PM will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet the data quality goals outlined in this QAPP, corrective action generally will follow the guidelines in the EPA analytical methods noted in this QAPP and the EPA guidelines for data validation (EPA 2020a, b). If analytical conditions are such that non-conformance with this QAPP is indicated, the Landau PM and Landau QA manager will be notified as soon as possible so that any additional corrective actions can be taken.

The Landau PM is ultimately responsible for implementation of appropriate corrective actions and maintenance of a complete record of QC issues and corrective actions.

9.0 DATA MANAGEMENT PROCEDURES

The following subsections describe the processes for database management, data recording and reporting activities, and requirements for laboratory data deliverables.

9.1 Data Recording and Reporting

Field data, including reports, logs and sample collection forms, may be completed on electronic forms. Digital copies of the field and sample logs are stored for future reference on a shared, secure network that is frequently backed up. Hard copy forms to be used as backup will be available. Qualified staff will transfer information contained in digital forms and/or field notebooks, as applicable, to EDDs (or other file formats) after they return from the field. Data entries will be independently verified for accuracy by another member of the project team. Field and laboratory data for the project will be uploaded to Ecology's EIM database at the time of RI report submittal.

Laboratory results, including QC data, will be submitted electronically. The electronic formats will include a PDF file of the laboratory report and an EDD in project-specified format. The laboratory PM shall ensure that the EDD matches the laboratory hard copy data report. This data review must be completed before deliverables are reported by the laboratory. Raw and final data will be stored electronically, with regularly scheduled backups performed and maintained at the laboratory. Each data package shall include a detailed case narrative prepared by the laboratory documenting all issues associated with the sample analyses, per its QSM and EPA guidelines.

Calculations will be completed in accordance with SCUM, applicable Ecology Implementation Memoranda, and the RIWP. Calculations done as part of data reduction and reporting processes will be checked by someone other than the individual who performed them. Additional QC checks done as part of reporting are discussed in Section 11.0; the evaluation and use of non-detects in calculations is detailed in Section 12.

9.2 Laboratory Data Deliverables

Environmental analytical laboratories performing work under this QAPP will provide modified Stage 4 data packages, with contract laboratory program (CLP) equivalent forms. Required laboratory report elements are listed in the table below. Laboratories will also provide EDDs in both EIM and the project EDD format. As discussed in Sections 8.3 Corrective Actions and 11.2 Data Verifications, a Stage 4 validation may be necessary in which case the laboratory(ies) will provide a Stage 4 laboratory report.

Data Package Elements

Data Package Element	Modified Stage 4 Laboratory Report (a,b)	Stage 4 Laboratory Report (a,c)
Chain-of-custody documentation, sample receipt, and condition documentation	X	X
Sample summary or equivalent, method summary or equivalent	X	X
Sample results (with date, units, RLs, and/or DLs)	X	X
Laboratory data qualifier definitions	X	X
Method/laboratory blank results	X	X
Sample surrogate results	X	X
Field QC results	X	X
Laboratory control sample results, matrix spike results, duplicate and/or matrix spike duplicate results, post-digestion spike sample results	X	X
ICP serial dilution results	X	X
Standard reference material	X	X
Tuning results summary	X	X
Initial calibration results, continuing calibration results	X	X
Internal standard results	X	X
QC surrogate results	X	X
Secondary column results	X	X
Endrin/DDT breakdown results	X	X
Instrument blanks	X	X
Analytical sequences	X	X
Initial and continuing calibration verification results	X	X
Calibration blank results	X	X
Instrument detection limits	X	X
ICP interference check sample results	X	X
ICP/mass spectrometry internal standard areas	X	X
ICP interelement correction factors, ICP linear ranges, ICP serial dilution results	X	X
Analysis run logs, extraction logs, preparation logs	X	X
Raw data		X
System performance checks (e.g., chromatography, instrument sensitivity drift, baseline shifts, negative absorbances)		X
Mass spectral identifications, target compound identifications		X
Retention time windows		X
Tentatively identified compounds (if applicable)		X

Notes:

a) As applicable, per analytical method.
b) Required for Stage 2B data validation
c) Required for Stage 4 data validation

DDT = dichlorodiphenyltrichloroethane
DL = detection limit
ICP = inductively coupled plasma
RL = reporting limit
QC = quality control

10.0 AUDITS AND REPORTS

The following subsections detail audit and reporting activities for the RI.

10.1 Field and Laboratory Audits

Field and/or laboratory audits are not planned for this project, but may be performed at any time by the appropriate project manager, health and safety manager, or QA manager to ensure that field work is being performed in accordance with this QAPP and associated RIWP, HASP, and SAP.

Laboratories performing work under this QAPP shall maintain current accreditation in Washington State, implemented through Ecology's Laboratory Accreditation unit. The accreditation process includes routine performance and system audits of analytical procedures. It is the responsibility of the laboratory PM to notify the Landau PM if a change in accreditation status occurs.

10.2 Frequency and Distribution of Reports

Data validation memoranda will be prepared by the Data Validator and reviewed by the QA manager and the Landau PM. Data validation memoranda will be provided to the Landau PM after each field event. The RI report and other investigation reports will be prepared by the Landau PM and/or delegate as listed in Section 3.1. If necessary, corrective action reports will be prepared and distributed at a minimum to listed parties, the Landau PM, and Landau QA manager. Reports will be distributed to individuals listed in Section 3.1, as well as other stakeholders, as appropriate.

11.0 DATA VERIFICATION

The EPA guidance on environmental data verification and data validation (EPA 2009) defines verification as "the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements." The following subsections detail the verification process for field and laboratory data.

11.1 Field Data Verification, Requirements, and Responsibilities

Throughout the duration of sampling, all field personnel are responsible for the proper execution of field activities, including documentation and sample collection procedures. Field documentation will be saved to the project folder daily, and will be regularly and systematically reviewed by the Landau PM to ensure it is consistent, correct, and complete. Field data will be loaded to the project database, including water quality parameters and spatial information, and verified by the project data manager or their delegate to confirm that the data are correct and without omissions and errors.

11.2 Laboratory Data Verification and Validation

Analytical data will be provided by the laboratory to the Landau data manager in the specified EDD format(s). Analytical data will be loaded and stored in the project database. Analytical data will be exported from the project database and will undergo a minimum 10 percent check against the laboratory report. If errors are discovered, a 100 percent QC check will be performed and if determined to be laboratory error, the findings will be communicated to the laboratory PM for resolution.

Data will be validated or reviewed manually by the Data Validator, and qualifiers, if assigned, will be entered into a validation EDD and loaded to the project database. The accuracy of all manually entered data will be verified by someone other than the individual who input the data.

Environmental analytical data generated under this QAPP will undergo EPA Stage 2B data validation. Physical parameter testing and forensic analysis will not undergo validation but will be verified through standard QC reporting checks and in accordance with EPA and ASTM guidance. If serious deficiencies are noted during data validation, or if the intended use of the data changes from what is presented in this QAPP, then PSE may choose to have a Stage 4 data validation performed on specific datasets. Validation of the data will be performed by the Landau data validator with guidance from applicable portions of the EPA National Functional Guidelines (EPA 2020a, b), SCUM (Ecology 2021), and Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009).

During EPA Stage 2B (SCUM QA1) data validation, the sample result forms, sample-related QC summary forms, and instrument QC forms are evaluated and used to assess and qualify sample results. Information on the forms is used to verify that QC samples were analyzed with the correct analytes at the proper frequency and concentration and that the acceptance criteria were achieved. Raw data are not reviewed during the Stage 2B data validation process.

The EPA Stage 2B-equivalent verification and validation will include the following:

- Verification that the laboratory data package has 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 LCS results
- Evaluation and review of instrument-related QC
- Evaluation of instrument calibrations
- Evaluation of RLs compared to target RLs specified in this QAPP.

EPA Stage 4 (SCUM QA2) includes the Stage 2B validation elements, with the addition of an examination of sample and QC raw data and instrument printouts to check for technical, calculation, analyte identification, analyte quantitation, and transcription or reduction errors. At a minimum, 10 percent of reported results on summary forms should be confirmed by recalculation.

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 (Section 12).

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 the 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 the EPA 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 validation findings, including qualification of data in accordance with the EPA National Functional Guidelines and a tabular summary of qualifiers and qualified data will be overseen by the QA manager, who will conduct final review and confirmation of the validity of the data. A copy of the data validation report will be submitted by the QA manager and will be provided as an appendix to the appropriate report. Data will be labeled (qualified) in accordance with the EPA's Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009). Data qualifiers will be included with all reported data and will also be included in EIM submittal.

11.3 Model Quality Assessment

Modeling is not expected to be used on this project; this section is not applicable.

12.0 DATA USABILITY ASSESSMENT

A data quality (usability) assessment is defined by EPA as "the scientific and statistical evaluation of environmental data to determine if they meet the planning objectives of the project, and thus are of the right type, quality, and quantity to support their intended use" (EPA 2006). A data usability assessment answers the question: is the quality of the analytical data fit for its intended use?

12.1 Process for Determining Project Objective Achievement

Once data verification and validation have been completed for the project, and data have been evaluated against the MQOs and qualified accordingly, the project percent completeness will be calculated (Section 4.2). Data are considered valid and usable as long as they were not rejected during validation. The Landau PM or designee will review the data along with field documentation to ensure project DQOs were met. The Landau PM is responsible for analyzing the data and determining whether the data are of sufficient quantity and quality to meet the RI objectives.

12.2 Treatment of Non-Detects

For the purposes of toxicity equivalence or summed calculations, one-half the reporting limit will be used. If results are reported down to the method detection limit, the PM may elect to use one-half the MDL for non-detect values.

Specific to sediment calculations and reporting for comparison to Washington Sediment Management Standards (Ecology 2013) are prescribed by statute to use only detected results. For sums of contaminant concentrations (e.g., total high molecular weight PAHs), if all constituent compounds are non-detect, the highest reporting limit is to be used as the total value (Ecology 2013). Contaminant sums consisting of only a single reporting limit will be treated as non-detect for further analyses, for the Sediment Program.

12.3 Data Analysis and Presentation Methods

Data tables will be exported from the project database to Microsoft Excel tables based on reporting requirements. Data will be reported in analytical data tables and where appropriate, graphical displays and figures.

Non-detects will be reported as the RL or, if reported to the MDL, as the MDL. Sediment data will be organic carbon normalized in accordance with SCUM. If a field duplicate is collected from a location, the first sample to be collected will be the sample from which data are reported. In the event a field duplicate concentration exceeds an applicable screening level and the detected concentration from the first sample does not, the greater result of the two results will be reported.

Data will be compared to preliminary cleanup levels (PCULs) as listed in Table C-2. RLs that exceed listed PCULs due to necessary dilutions or elevated moisture will be evaluated by the PM for potential impact to data usability.

12.4 Sampling Design Evaluation

Evaluation of the sampling design is discussed in the RIWP and the SAP.

12.5 Documentation of Assessment

Data that do not meet the criteria detailed in this QAPP will be qualified appropriately (R) during validation. Data usability will be documented in data validation memoranda, the project database, EIM, and in the RI report.

13.0 REFERENCES

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Table C-1
Measurement Quality Objectives
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Method	Pres.	Field Duplicates	Blanks (a)	Surrogates	LCS, MS	LR, LCSD, MSD	Calibrations	Interference Check Samples	Completeness
Soil									
GRO by NWTPH-Gx	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch Trip: No target analytes>1/2 RL, 1/cooler with VOCs	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
DRO, ORO by NWTPH-Dx	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
VOCs by EPA 8260D	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch Trip: No target analytes>1/2 RL, 1/cooler with VOCs	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
PAHs by EPA 8270E	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Metals by EPA 6020B	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Daily ICV: Immediately after ICV:After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample	ICP CS: Beginning and end of each analytical sequence or twice per 8-hour shift, whichever is more frequent SI CS: For UCT-KED, at beginning of analytical run and every 12 hours	95%
Free Cyanide by SOP SVL 4131	See Table C-4	--	Method: No target analytes>1/2 RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
TOC by EPA 9060Amod	See Table C-4	--	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
Groundwater									
GRO by NWTPH-Gx	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch Trip: No target analytes>1/2 RL, 1/cooler with VOCs	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
DRO, ORO by NWTPH-Dx	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
VOCs by EPA 8260D	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch Trip: No target analytes>1/2 RL, 1/cooler with VOCs	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
PAHs/SVOCs by EPA 8270E	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Butyltins by EPA 8270E SIM	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Pesticides by EPA 8081B	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
PCBs by EPA 8082A	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%

Table C-1
Measurement Quality Objectives
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Method	Pres.	Field Duplicates	Blanks (a)	Surrogates	LCS, MS	LR, LCSD, MSD	Calibrations	Interference Check Samples	Completeness
Metals by EPA 6020B	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Daily ICV: Immediately after ICV:After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample	ICP CS: Beginning and end of each analytical sequence or twice per 8-hour shift, whichever is more frequent SI CS: For UCT-KED, at beginning of analytical run and every 12 hours	95%
Free Cyanide by ASTM D7237-15A	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
WAD Cyanide by SM 4500-CN I	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>1/2 RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
Ammonia by SM 4500-NH3 G	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
Sulfide by 'SM 4500-S2-D	See Table C-4	20% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	Method-specified freq.	--	95%
Sediment									
DRO, ORO by NWTPH-Dx	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
SVOCs by EPA 8270E (c)	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Butyltins by EPA 8270E SIM	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Pesticides by EPA 8081B	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
PCBs by EPA 8082A	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	Lab limits (b), Every sample	Lab limits (b), method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Before analysis and when CC does not meet method requirements CC: Method-specific	--	95%
Metals by EPA 6020B	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	LCS: 80%-120% R, MS: 75%-125% R method-specified freq.	Lab limits (b), method-specified freq.	ICAL: Daily ICV: Immediately after ICV:After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample	ICP CS: Beginning and end of each analytical sequence or twice per 8-hour shift, whichever is more frequent SI CS: For UCT-KED, at beginning of analytical run and every 12 hours	95%
Ammonia by SM 4500-NH3 G	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	LCS: 80%-120% R, MS: 75%-125% R method-specified freq.	±20% RSD, method-specified freq.	--	--	95%
Total Sulfides	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	65%-135% R, method-specified freq.	±20% RSD, method-specified freq.	--	--	95%
TOC EPA 9060	See Table C-4	±35% RPD, 1 per 10 samples	Method: No target analytes>RL, 1/batch	--	LCS: 80%-120% R, MS: 75%-125% R method-specified freq.	±20% RSD, method-specified freq.	--	--	95%

Table C-1
Measurement Quality Objectives
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Method	Pres.	Field Duplicates	Blanks (a)	Surrogates	LCS, MS	LR, LCSD, MSD	Calibrations	Interference Check Samples	Completeness
Total Solids	See Table C-4	±35% RPD, 1 per 10 samples	--	--	--	±20% RSD, method-specified freq.	--	--	95%

Abbreviations and Acronyms:

-- = not applicable
% = percent
CC = continuing calibration
CCV = continuing calibration verification
CS = colorimetric spectrophotometry
DRO = diesel-range organics
EPA = US Environmental Protection Agency
GRO = gasoline-range organics
ICAL = initial calibration
ICP = inductively coupled plasma
LCS = laboratory control spike
LCSD = laboratory control spike duplicate
LR = laboratory replicate
MS = matrix spike
MSD = matrix spike duplicate
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
ORO = oil-range organics
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
Pres. = preservative
R = recovery
RL = reporting limit
RPD = relative percent difference
RSD = relative standard deviation
SAP = sampling and analysis plan
SIM = selected ion monitoring
SOP = standard operating procedure
SVL = SVL Analytical, Inc.
SVOC = semivolatile organic compound
TOC = total organic carbon
VOC = volatile organic compound
WAD = Weak Acid Dissociable

Table C-2
Analytes, Reporting Limits, and Screening Levels
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group	Parameter	CAS #	Analytical Method	Soil (mg/kg)		Groundwater (µg/L)		Sediment (mg/kg)	
				RL	SL	RL	SL	RL	SL
Petroleum Hydrocarbons	Gasoline-Range Hydrocarbons	NA	NWTPH-Gx	5	30	100	800	--	--
Petroleum Hydrocarbons	Diesel-Range Hydrocarbons	NA	NWTPH-Dx	20	260	80	500	20	--
Petroleum Hydrocarbons	Oil-Range Hydrocarbons	NA	NWTPH-Dx	40	2,000	160	500	40	--
Petroleum Hydrocarbons	Hydrocarbons	NA	Calculated	No RL	2,000	No RL	500	--	--
Volatile Organic Compounds	Benzene	71-43-2	EPA 8260D	0.01	0.01	0.2	0.44	--	--
Volatile Organic Compounds	Ethylbenzene	100-41-4	EPA 8260D	0.025	0.025	0.5	12	--	--
Volatile Organic Compounds	Toluene	108-88-3	EPA 8260D	0.05	0.05	--	--	--	--
Volatile Organic Compounds	Total Xylenes	1330-20-7	EPA 8260D	0.075	0.075	1.5	57	--	--
Polycyclic Aromatic Hydrocarbons	1-Methylnaphthalene	90-12-0	EPA 8270E	0.00533	0.00533	0.04	1.5	0.00533	(a)
Polycyclic Aromatic Hydrocarbons	2-Methylnaphthalene	91-57-6	EPA 8270E	0.00533	0.088	0.04	32	0.00533	(a)
Polycyclic Aromatic Hydrocarbons	Acenaphthene	83-32-9	EPA 8270E	0.00267	0.16	0.02	6	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Acenaphthylene	208-96-8	EPA 8270E	0.00267	--	0.02	13	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Anthracene	120-12-7	EPA 8270E	0.00267	2.4	0.02	0.0645	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(a)anthracene	56-55-3	EPA 8270E	0.00267	TEQ	0.02	0.00016	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(a)pyrene	50-32-8	EPA 8270E	0.004	0.004	0.03	0.000016	0.004	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(b)fluoranthene	205-99-2	EPA 8270E	0.004	TEQ	0.03	0.00016	0.004	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(b+j)fluoranthene(s)	205-99-2/205-82-3	EPA 8270E	--	--	0.03	--	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(g,h,i)perylene	191-24-2	EPA 8270E	0.00267	--	0.02	--	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Benzo(k)fluoranthene	207-08-9	EPA 8270E	0.004	TEQ	0.03	0.0016	0.004	(a)
Polycyclic Aromatic Hydrocarbons	Chrysene	218-01-9	EPA 8270E	0.00267	0.00267	0.02	0.016	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Dibenzo(a,h)anthracene	53-70-3	EPA 8270E	0.00267	TEQ	0.02	0.000016	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Dibenzofuran	132-64-9	EPA 8270E	0.00267	1	0.02	6.0	0.00267	21.2
Polycyclic Aromatic Hydrocarbons	Fluoranthene	206-44-0	EPA 8270E	0.00267	0.076	0.02	6.0	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Fluorene	86-73-7	EPA 8270E	0.00267	0.082	2	2	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Indeno(1,2,3-c,d)pyrene	193-39-5	EPA 8270E	0.00267	TEQ	0.02	0.00016	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Naphthalene	91-20-3	EPA 8270E	0.00533	0.24	0.04	13	0.00533	(a)
Polycyclic Aromatic Hydrocarbons	Phenanthrene	85-01-8	EPA 8270E	0.00267	--	0.02	3.6	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Pyrene	129-00-0	EPA 8270E	0.00267	0.55	0.02	0.3	0.00267	(a)
Polycyclic Aromatic Hydrocarbons	Total PAHs (benzo(a)pyrene)	50-32-8	Calculated (a)	--	--	--	--	No RL	17.5
Polycyclic Aromatic Hydrocarbons	cPAH (TEQ)	NA	Calculated (b)	No RL	30	No RL	0.023	--	--
Organic and Chlorinated Organic Chemicals	4-Methylphenol (c)	106-44-5	EPA 8270E	--	--	0.200	--	7	443
Organic and Chlorinated Organic Chemicals	Benzoic Acid	65-85-0	EPA 8270E	--	--	2.50	--	333	10,095
Organic and Chlorinated Organic Chemicals	Pentachlorophenol	87-86-5	EPA 8270E	--	--	0.200	--	27	1,366
Organic and Chlorinated Organic Chemicals	Phenol	108-95-2	EPA 8270E	--	--	0.400	--	5.33	253
Phthalates	Bis(2-ethylhexyl)phthalate	117-81-7	EPA 8270E	--	--	0.400	--	40	40
Phthalates	Di-n-butyl phthalate	84-74-2	EPA 8270E	--	--	0.400	--	26.7	205
Phthalates	Di-n-octyl phthalate	117-84-0	EPA 8270E	--	--	0.400	--	26.7	26.7
Butyltins (Organometallics)	Dibutyltin	14488-53-0	EPA 8270E SIM	--	--	0.00770	--	5.78	5.78
Butyltins (Organometallics)	Monobutyltin	78763-54-9	EPA 8270E SIM	--	--	0.00600	--	4.08	4.08

Table C-2
Analytes, Reporting Limits, and Screening Levels
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group	Parameter	CAS #	Analytical Method	Soil (mg/kg)		Groundwater (µg/L)		Sediment (mg/kg)	
				RL	SL	RL	SL	RL	SL
Butyltins (Organometallics)	Tetrabutyltin	1461-25-2	EPA 8270E SIM	--	--	0.0300	--	5	5
Butyltins (Organometallics)	Tributyltin	36643-28-4	EPA 8270E SIM	--	--	0.00520	--	3.86	5.61
Pesticides	Beta-Hexachlorocyclohexane	319-85-7	EPA 8081B	--	--	0.0100	--	1	2.97
Pesticides	Carbozole	86-74-8	EPA 8081B	--	--	0.0100	--	4	4
Pesticides	Dieldrin	60-57-1	EPA 8081B	--	--	0.0100	--	1	1
Pesticides	Endrin Ketone	53494-70-5	EPA 8081B	--	--	0.0100	--	1	1
Pesticides	4,4'-DDD	72-54-8	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	2,4'-DDD	53-19-0	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	Total DDDs (d)	72-54-8	EPA 8081B	--	--	No RL	--	No RL	6.73
Pesticides	4,4'-DDE	72-55-9	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	2,4'-DDE	3424-82-6	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	Total DDEs (d)	72-55-9	EPA 8081B	--	--	No RL	--	No RL	0.242
Pesticides	4,4'-DDT	50-29-3	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	2,4'-DDT	789-02-6	EPA 8081B	--	--	0.0100	--	0.0010	(d)
Pesticides	Total DDTs (d)	50-29-3	EPA 8081B	--	--	No RL	--	No RL	0.147
Polychlorinated Biphyenls	Aroclor 1016	12674-11-2	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1221	11104-28-2	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1242	53469-21-9	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1248	12672-29-6	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1254	11097-69-1	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1260	11096-82-5	EPA 8082A	--	--	0.100	--	0.0100	(e)
Polychlorinated Biphyenls	Aroclor 1268		EPA 8082A			0.100		0.0100	
Polychlorinated Biphyenls	Total PCB Aroclors	--	Calculated (e)	--	--	--	--	No RL	0.838
Metals	Arsenic	7440-38-2	EPA 6020B	1.00	7	1.00	6	1	478
Metals	Barium	7440-39-3	EPA 6020B	1.00	41	1.00	220	--	--
Metals	Cadmium	7440-43-9	EPA 6020B	0.200	1	0.200	0.72	0.20	301
Metals	Chromium (total)	7440-47-3	EPA 6020B	1.00	42	2.00	50	No RL	72.0
Metals	Copper	7440-50-8	EPA 6020B	2.00	36	2.00	11	2	17,948
Metals	Lead	7439-92-1	EPA 6020B	0.200	25	0.200	2.5	0.20	36.0
Metals	Mercury	7439-97-6	EPA 6020B	0.0800	0.08	0.0800	0.08	0.08	12.6
Metals	Nickel	7440-02-0	EPA 6020B	2.00	38	2.00	52	2	398
Metals	Selenium	7782-49-2	EPA 6020B	1.00	1	1.00	5	1	2,081
Metals	Silver	7440-22-4	EPA 6020B	0.200	0.2	0.200	3.2	0.2	66.4
Metals	Zinc	7440-66-6	EPA 6020B	4.00	86	4.00	--	4	51,375
Cyanide	Free Cyanide	NA	SOP SVL 4131 (solid) ASTM D7237-15A (aqueous)	0.250	--	5.00	1.9	--	--
Cyanide	WAD Cyanide	NA	SM 4500-CN I	--	--	5.00	1.9	--	--
Conventional Chemicals	Ammonia (as N)	7664-41-7	SM 4500-NH3 G	--	--	20	--	0.200	--

Table C-2
Analytes, Reporting Limits, and Screening Levels
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group	Parameter	CAS #	Analytical Method	Soil (mg/kg)		Groundwater (µg/L)		Sediment (mg/kg)	
				RL	SL	RL	SL	RL	SL
Conventional Chemicals	Total Sulfides	18496-25-8	EPA 9030M (solid), SM 4500-S2-D (aqueous)	--	--	10	--	0.200	--
Conventional Chemicals	Total Organic Carbon	--	EPA 9060Amod	0.1	--	--	--	0.1	--
Conventional Chemicals	Grain Size	--	ASTM D6913	--	--	--	--	--	--
Conventional Chemicals	Total Solids	--	SM 2540 G	--	--	--	--	--	--

Notes:

Listed RLs are from Apex for all analytes except for the following: butyltins in groundwater (AR), total sulfides in soil (ALS-Kelso), and free cyanide in soil (SVL).
RLs are not listed for values that are calculated for comparsion to screening levels (e.g., total PCBs).
a) Total PAHs will be summed in accordance with Ecology's Sediment Cleanup User's Manual.
b) cPAH TEQs will be calculated following WAC 173-340-708(8)(e)(iii)(A)(II).
c) Will be reported by laboratory as 3+4-Methylphenol(s).
d) Total DDDs, DDEs, and DDTs are the sum of the individual isomers.
e) Total PCBs are the sum of the listed Aroclors, in accordance with Ecology's Sediment Cleanup User's Manual.

Abbreviations and Acronyms:

-- = not applicable
CAS = Chemical Abstracts Service
cPAH = carcinogenic polycyclic aromatic hydrocarbon
EPA = US Environmental Protection Agency
µg/L = microgram per liter
mg/kg = milligram per kilogram
NA = not available
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
RL = reporting limit
SIM = selected ion monitoring
SOP = standard operating procedure
SVL = SVL Analytical, Inc.
SL = screening level
TEQ = toxicity equivalence

Table C-3
Laboratory Procedures
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group	Preparation Method	Analytical Method, Instrument	Special Cleanups	Planned Laboratory
Soil				
Petroleum Hydrocarbons	EPA 5035	NWTPH-Gx, GC-MS	none	Apex
Petroleum Hydrocarbons	EPA 3546	NWTPH-Dx, GC-FID	SGC	Apex
Volatile Organic Compounds	EPA 5035	EPA 8260D, GC-MS	none	Apex
Polycyclic Aromatic Hydrocarbons	EPA 3546	EPA 8270E, GC-MS	none	Apex
Metals	EPA 3051	EPA 6020B, ICP-MS	none	Apex
Metals	EPA 1312	EPA 6020B, ICP-MS	none	Apex
Free Cyanide	--	SOP SVL 4131, GD-AD	none	SVL
Conventional (Total Organic Carbon)	--	EPA 9060A mod	none	Apex
Conventional (Grain size)	--	ASTM D6913	none	Apex
Conventional (Total Solids)	--	SM 2540 G	none	Apex
Groundwater				
Petroleum Hydrocarbons	EPA 5030	NWTPH-Gx, GC-MS	none	Apex
Petroleum Hydrocarbons	EPA 3510	NWTPH-Dx, GC-FID	upon request, SGC	Apex
Volatile Organic Compounds	EPA 5030	EPA 8260D, GC-MS	none	Apex
Polycyclic Aromatic Hydrocarbons, Semimvolatile Organic Compounds	EPA 3510	EPA 8270E, GC-MS	none	Apex
Butyltins	EPA 3510	EPA 8270E SIM, GC-MS	none	AR
Pesticides	EPA 3510	EPA 8081B, GC-MS	none	Apex
Polychlorinated Biphenyls	EPA 3510	EPA 8082A, GC-MS	none	Apex
Dissolved Metals	--	EPA 6020B, ICP-MS	none	Apex
Free Cyanide	--	ASTM D7237-15A, GD-AD	none	Apex
Weak Acid Dissociable Cyanide	--	SM 4500-CN I, distillation	none	Apex
Sulfide	--	SM 4500-NH3 G, methylene blue	none	ALS-K
Ammonia	--	SM 4500-S2-D, GD-CD	none	Apex
Water Quality	--	Landau Field SOPs, water quality meter	none	Field Measurement
Sediment				
Petroleum Hydrocarbons	EPA 5035	NWTPH-Gx, GC-MS	none	Apex
Petroleum Hydrocarbons	EPA 3546	NWTPH-Dx, GC-FID	none	Apex
Polycyclic Aromatic Hydrocarbons	EPA 3546	EPA 8270E, GC-MS	none	Apex
Organics and Chlorinated Organics	EPA 3546	EPA 8270E, GC-MS	none	Apex
Phthalates	EPA 3546	EPA 8270E, GC-MS	none	Apex
Butyltins	EPA 3546	EPA 8270E SIM, GC-MS	none	AR
Pesticides	EPA 3546	EPA 8081B, GC	none	Apex
Polychlorinated Biphenyls	EPA 3546	EPA 8082A, GC	none	Apex
Conventional (Ammonia)	Plumb 1981	SM 4500-NH3 G, GD-CS	none	Apex
Conventional (Total Sulfides)	Plumb 1981	EPA 9030M, Distillation	none	ALS
Conventional (Total Organic Carbon)	EPA 9060	--	none	Apex
Conventional (Total Solids)	PSEP 1986	--	none	Apex

Table C-3
Laboratory Procedures
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Free Product				
Physical Testing (Density)	--	ASTM D1475	none	SPL
Physical Testing (Kinematic Viscosity)	--	ASTM D445	none	SPL
Physical Testing (Surface Tension)	--	ASTM D971B	none	TOL
Physical Testing (Interfacial Tension)	--	ASTM D971M	none	TOL

Abbreviations and Acronyms:

-- = not applicable
AD = amperometric detection
ALS-K = ALS Environmental - Kelso
Apex = Apex Laboratories, LLC
AR = Analytical Resources, LLC
ASTM = ASTM International
CS = colorimetric spectrophotometry
CD = colorimetric detection
EPA = US Environmental Protection Agency
FID = flame ionization detectors
GC = gas chromatography
GD = gas diffusion
ICP = inductively coupled plasma
MS = mass spectrometry
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
PSEP = Puget Sound Estuary Program
SGC = silica-gel cleanup
SIM = selected ion monitoring
SOP = standard operating procedure
SPL = SPL
SVL = SVL Analytical, Inc.
TOL = Texas OilTech Laboratories, LP

Table C-4
Sample Containers, Preservatives, and Holding Times
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group (a)	Analytical Method	Bottle (b)	Preservative	Hold Time (c)	Laboratory
Soil					
Petroleum Hydrocarbons	NWTPH-Gx	3 x 40 mL VOA	Methanol, Cool to ≤6 °C	14 days	Apex
Petroleum Hydrocarbons	NWTPH-Dx	8 oz Glass Jar	Cool to ≤6 °C	14 days	Apex
Volatile Organic Compounds	EPA 8260D	3 x 40 mL VOA	Methanol, Cool to ≤6 °C	14 days	Apex
Polycyclic Aromatic Hydrocarbons	EPA 8270E	8 oz Glass Jar	Cool to ≤6 °C	14 days/ 40 days	Apex
Metals	EPA 6020B	8 oz Glass Jar	Cool to ≤6 °C (d)	6 months	Apex
Free Cyanide	SOP SVL 4131	4oz amber	Keep out of sunlight, Cool to ≤6 °C	14 days	SVL
Conventional (Total Organic Carbon)	EPA 9060Amod	4 oz Glass Jar	Cool to ≤6 °C	28 days	Apex
Conventional (Grain size)	ASTM D6913	16 oz Wide Mouth Glass	Cool to ≤6 °C	180 days	Apex
Conventional (Total Solids)	SM 2540 G	4 oz Glass Jar	Cool to ≤6 °C	14 days	Apex
Groundwater					
Petroleum Hydrocarbons	NWTPH-Gx	3 x 40 mL VOA	Hydrochloric Acid to pH<2, Cool to ≤6 °C	14 days	Apex
Petroleum Hydrocarbons	NWTPH-Dx	1 L Amber Glass	Hydrochloric Acid to pH<2, Cool to ≤6 °C	7 days/ 40 days	Apex
Volatile Organic Compounds	EPA 8260D	3 x 40 mL VOA	Hydrochloric Acid to pH<2, No Headspace, Cool to ≤6 °C	14 days	Apex
Polycyclic Aromatic Hydrocarbons	EPA 8270E	1 L Amber Glass	Cool to ≤6 °C	7 days/ 40 days	Apex
Semivolatile Organic Compounds (e)	EPA 8270E	1 L Amber Glass	Cool to ≤6 °C	7 days/ 40 days	Apex
Butyltins	EPA 8270E SIM	1 L Amber Glass	Cool to ≤6 °C	7 days/ 40 days	AR
Dissolved Metals	EPA 6020B	250 mL Poly	Field Filtered, HNO3 to pH<2 (d)	180 days	Apex
Pesticides	EPA 8081B	1 L Amber Glass	Cool to ≤6 °C	7 days	Apex
Polychlorinated Biphenyls	EPA 8082A	1 L Amber Glass	Cool to ≤6 °C	365 days	Apex
Free Cyanide	ASTM D7237-15A	125 mL Brown Poly	Sodium Hydroxide to pH>10, Cool to ≤6 °C	14 days	Apex
Weak Acid Dissociable Cyanide	SM 4500-CN I	125 mL Brown Poly	Sodium Hydroxide, Cool to ≤6 °C	14 days	Apex
Conventional (Ammonia)	SM 4500-NH3 G	250 mL Poly	Sulfuric Acid to pH<2, Cool to ≤6 °C	28 days	Apex
Conventional (Total Sulfides)	SM 4500-S2-D	4 oz Glass Jar	Cool to ≤6 °C	7 days	ALS-K
Sediment					
Petroleum Hydrocarbons	NWTPH-Dx	8 oz Glass Jar	Cool to 4 ± 2 °C	14 days	Apex
Semivolatile Organic Compounds (e)	EPA 8270E	8 oz Glass Jar	Cool to 4 ± 2 °C	14 days/ 40 days	Apex
			Freeze to -18 °C	1 year	Apex

Table C-4
Sample Containers, Preservatives, and Holding Times
Chelan PUD Worthen Substation Site – Wenatchee, Washington

Parameter Group (a)	Analytical Method	Bottle (b)	Preservative	Hold Time (c)	Laboratory
Butyltins	EPA 8270E SIM	8 oz Glass Jar	Cool to 4 ± 2 °C	14 days/ 40 days	AR
			Freeze to -18 °C	1 year	AR
Pesticides	EPA 8081B	8 oz Glass Jar	Cool to 4 ± 2 °C	14 days/ 40 days	Apex
			Freeze to -18 °C	1 year	Apex
Polychlorinated Biphenyls	EPA 8082A	8 oz Glass Jar	Cool to 4 ± 2 °C	1 year	Apex
			Freeze to -18 °C	1 year	Apex
Metals	EPA 6020B	8 oz Glass Jar	Cool to 4 ± 2 °C (d)	6 months	Apex
			Freeze to -18 °C	2 years	Apex
Conventional (Ammonia)	SM 4500-NH3 G	8 oz Glass Jar	Cool to 4 ± 2 °C	7 days	Apex
Conventional (Total Sulfides)	EPA 9030B	4 oz Glass Jar	Zinc Acetate, No Headspace, Cool to 4 ± 2 °C	7 days	ALS-K
Conventional (Total Organic Carbon)	EPA 9060	4 oz Glass Jar	Cool to 4 ± 2 °C	28 days	Apex
			Freeze to -18 °C	6 months	
Conventional (Total Solids)	PSEP 1986	4 oz Glass Jar	Cool to 4 ± 2 °C	14 days	Apex
			Freeze to -18 °C	6 months	
Free Product (f)					
Physical Testing (Density)	ASTM D1475	250 mL Amber Glass	None	None	SPL
Physical Testing (Kinematic Viscosity)	ASTM D445	250 mL Amber Glass	None	None	SPL
Physical Testing (Surface Tension)	ASTM D971B	250 mL Amber Glass	None	None	TOL
Physical Testing (Interfacial Tension)	ASTM D971M	250 mL Amber Glass	None	None	TOL

Notes:

a) Target analyte lists for each parameter group, by matrix, are provided in Table C-2.

b) Where practical and allowable by method, parameter volumes may be combined into shared bottle for a sample.

c) Extraction/Analysis

d) Thermal preservation is not required for metals (excluding mercury) per SW-846.

e) SVOCs includes PAHs, organics and chlorinated organics, and phthalates, as listed in Table C-2.

f) No requirements for hold time, preservative, or bottle type have been communicated by the laboratory. The minimum amount of sample required for analysis is presented.

Abbreviations and Acronyms:

ASTM = ASTM International
ALS-K = ALS Environmental - Kelso
Apex = Apex Laboratories, LLC
AR = Analytical Resources, LLC
°C = Degrees Celsius
EPA = US Environmental Protection Agency
mL = milliliter
NWTPH-Dx = Northwest total petroleum hydrocarbon extended-range diesel analytical method
NWTPH-Gx = Northwest total petroleum hydrocarbon extended-range gasoline analytical method
PAH = polycyclic aromatic hydrocarbon
PSEP = Puget Sound Estuary Program
SIM = selected ion monitoring
SM = Standard Method
SPL = SPL LLC
SVOC = semivolatile organic compound
SVL = SVL Analytical, Inc.
TOL = Texas OilTech Laboratories
VOA = Volatile Organics Analysis

ATTACHMENT C-1

Field Forms

LANDAU ASSOCIATES

Chain-of-Custody Record

☐ **North Seattle** (206) 631-8660
☐ **Tacoma** (253) 926-2493
☐ **Olympia** (360) 791-3178
☐ **Spokane** (509) 327-9737
☐ **Portland** (503) 542-1080
☐ _____

Date _____

Page _____ of _____

Turnaround Time:
Standard _____
Accelerated _____

Project Name _____ Project No. _____

Project Location/Event _____

Sampler's Name _____

Project Contact _____

Send Results To _____

Special Handling Requirements:

_____

Shipment Method: _____

Stored on ice: Yes / No

Sample I.D.	Date	Time	Matrix	No. of Containers	Testing Parameters	Observations/Comments

__ Allow water samples to settle, collect aliquot from clear portion ☐

__ NWTPH-Dx - Acid wash cleanup ☐
- Silica gel cleanup ☐

__ Dissolved metal samples were field filtered

Other _____

Relinquished by	Received by	Relinquished by	Received by
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Company	Company	Company	Company
Date Time	Date Time	Date Time	Date Time

WHITE COPY - Laboratory YELLOW COPY - Project File PINK COPY - Client Representative

10/2018

LANDAU ASSOCIATES

Field Report

Project No.: _____ Report No.: _____

Client: _____ Date: _____

Project Name: _____ DPD Permit No.: _____

Location: _____

Weather Conditions: _____

Prepared By: _____

Visitors: _____

Unsatisfactory Conditions & Recommended Correction: _____

Attachments: _____

Signed: _____

// GROUNDWATER LOW-FLOW SAMPLE COLLECTION FORM

Project Name: _____ Project Number: _____

Event: _____ Well ID: _____

Weather: _____ Sample ID: _____

Landau Rep.: _____ Date: _____ Time: _____

WELL INFORMATION

Screened Interval: Top (ft): _____ Bottom (ft): _____ Well Secure? ☐ No ☐ Yes Damaged? ☐ No ☐ Yes

DTW After Cap Opened (ft): _____ Time: _____ Describe: _____

Static DTW (ft): _____ Time: _____ Flow-Thru Cell Vol.: _____ WQM No.: _____

Begin Purge (Date/Time): _____ End Purge (Date/Time): _____ Gallons Purged: _____

Water Disposal: ☐ 55-gal drum ☐ Storage tank ☐ Ground ☐ Other: _____

PURGE DATA

Cell shading indicating purge stabilization is for informational purposes only.

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Purge Vol ≥1 flow-thru cell vol.	Comments/ Observations
Stabilization →	**± 3%**	**± 10%**	**± 3%**	**± 0.1 units**	**± 10 mV**	**± 10%**	**± 0.00 ft**	**(Yes/No)**	

Sample Description (turbidity, color, odor, sheen): _____ **Fe 2^+ (mg/L):** _____

PUMP AND MATERIAL INFORMATION

Collection Method: ☐ Bailer ☐ Pump Type: _____

Material: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated

☐ Other (describe sequence): _____

CONFIRMATION PARAMETERS (if applicable per Landau Field Manual)

☐ Applicable

Time	Temp (°C)	DO (mg/L)	Cond (µS/cm)	pH (S.U)	ORP (mV)	Turbidity (NTU)	DTW (ft)	Comments/Observations

Scheduled Analysis (Circle/Bold Applicable)							Bottle Information	
							Number	Type
Volatiles:	8260	8260 SIM	8021	524	624			
Semivolatiles:	8270	8270 SIM	8011	625				
Petroleum Hydrocarbons:	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx SGC				
Total/Dissolved Metals:	6010	6020	200.7	200.8	7471	☐ Field Filtered		
PCBs & Nitroaromatics:	8082	1668	608	8330				
Dioxin-Furans:	1613	8290						
PFAS:	1633	537.1	533	SOP				
Conventionals:	300.0	SM2450C	SM2450D	SM5310C	RSK175			
Other:								

Duplicate or Parent Sample ID: _____ ☐ MS/MSD

Comments: _____

Signature: _____ Date: _____

LANDAU ASSOCIATES

PROJECT _____ PROJECT NO. _____

EVENT _____

SAMPLE NO. _____

DATE COLLECTED _____ TIME _____

Soil/Sediment Sample Collection Form

Weather _____ Collector(s) _____

SAMPLE LOCATION/COMPOSITE DATA

Sample Type: o Soil o Sediment o Other _____

Sample Location: _____

Sample Composited: o Horizontally Locations: _____
o Vertically Depth Ranges: _____
o Not Composited o Other: _____

Elevation and Reference: _____

SAMPLE COLLECTION DATA

Sample Collected From: o Hand-Dug Hole o Test Pit o Boring o Catch Basin/Manhole o Other _____

Sample Collected With: o Bowl o Spoon o Split Barrel o Shovel o Auger o Other _____

Made of: o Stainless Steel o Steel o Other _____

Decon Procedure: *(By Numerical Order)* o Alconox Wash o Tap Rinse o DI Water Rinse o Other _____ o Other _____
o Other _____

SAMPLE DESCRIPTION (color, grain size, density, moisture, etc.): _____

SIZE	QUANTITY	TYPE	LABORATORY ANALYSIS
_____	_____	o Glass o Plastic o Other _____	_____
_____	_____	o Glass o Plastic o Other _____	_____
_____	_____	o Glass o Plastic o Other _____	_____

Co-Located/Duplicate Sample No(s). _____

Photo No. _____ Roll No. _____

Comments: _____

o *Continued on Back*

Signature _____ Date _____

Project:	**Location ID:**
Project No.:	**Attempt No.:**
Date:	**Core Type:**
Weather:	**Field Staff:**

Field Collection Coordinates:

Lat/Northing:	Long/Easting:

A. Depth to Mudline (DTM)	**B. Tide Level Measurement**	**C. Mudline Elevation**
DTM Depth Sounder: ft	Time:	+ or - (ft MLLW)
DTM Lead Line: ft	Height: + or - ft	
	Source:	

Core Collection Recovery Details:

1. Core Tube Length: ft
2. Penetration Depth: ft
3. Headspace Measurement: ft
4. Field Recovery Depth: ft
5. Field Recovery Percentage:
6. Core Accepted: Yes / No
7. Processing Recovery Depth: ft
8. Adjusted Recovery Percentage:

Drive Notes:

Core Nose/Shoe Description:

Core Field Observations and Description:	Sediment type, moisture, color, minor modifier, MAJOR modifier, other constituents, odor, sheen, layering, anoxic layer, debris, plant matter, shells, biota

Additional Notes:

Project:		Location ID:	Attempt No.:
Project No.:		Collection Date/Time:	
No. of Sections:		Processing Date/Time:	
Penetration Depth:	(ft)	Core Processed By:	
Processing Recovery Depth:	(ft)	Core Type:	
Adjusted Recovery Percentage:		Core Diameter (in.):	
Notes:		Core Quality: ☐ Good ☐ Fair ☐ Poor ☐ Disturbed	

Recovered Length ( )	Size % Gravel	Size % Sand	Size % Fines	**Classification and Remarks** (Density, Moisture, Color, Minor Constituent, MAJOR Constituent, with Additional Constituents, Sheen, Odor)	Sample ID	Summary Sketch

LANDAU ASSOCIATES

Sediment Grab Location ID: _____

Date: _____ Time: _____

SURFACE SEDIMENT COLLECTION FORM

Project Name and No. : _____ **Weather Conditions:** _____

Sampling Method: _____ **Boat Operator/Crew:** _____

Tide Data Source: _____ **Sample Collected by:** _____

SURFACE SEDIMENT GRAB SAMPLE DATA

Latitude/Northing (Y): **Longitude/Easting (X):**

Attempt Time	Water Depth (ft)	Penetration Depth (cm)	Acceptable Grab (Y/N)	Tide Level (ft)	Mudline Elevation (ft MLLW)	Comments

* Acceptable grab: Sampler not overfilled; sediment surface relatively flat; overlying water present and low turbidity; desired penetration depth achieved

SAMPLE DATA **Sample ID:**

Analyses:

Sediment Color	Secondary Sediment Type	Primary Sediment Type	Modifiers: with_____	Modifiers: trace ____	Sediment Odor	Other Characteristics or Comments:
Brown	silty	COBBLES	gravel	gravel	None	
Brown-gray	sandy (F M C)	GRAVEL	sand	sand	Slight	
Gray	gravelly	SAND (F M C)	(F M C)	(F M C)	Moderate	
Gray-brown		SILT	silt	silt	Strong	
Dark gray		CLAY	shells	shells	-H_2S	
Black			wood	wood	-Petroleum	
Olive			organics	organics		
Blue			Other:	Other:	Other:	
Red						

ATTACHMENT C-2

Laboratory Limits

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
Diesel and/or Oil Hydrocarbons by NWTPH-Dx in Soil											
NWTPH-Dx	Diesel	10.0	20.0	mg/kg dry wt	-	30	38-132	30	38-132	30	68334-30-5
NWTPH-Dx	Oil	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	Oil
NWTPH-Dx	Diesel Range Organics (C10-C25)	10.0	20.0	mg/kg dry wt	-	30	38-132	30	38-132	30	68334-30-5
NWTPH-Dx	Residual Range Organics (>C25-C40)	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	RRO
NWTPH-Dx	Mineral Oil	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	Needs CAS
NWTPH-Dx	o-Terphenyl (Surr)			Surrogate	50-150	-	-	-	-	-	84-15-1
Diesel and/or Oil Hydrocarbons by NWTPH-Dx in Water											
NWTPH-Dx LL	Diesel	0.0400	0.0800	mg/L	-	30	36-132	30	36-132	30	68334-30-5
NWTPH-Dx LL	Oil	0.0800	0.160	mg/L	-	30	-	-	-	-	Oil
NWTPH-Dx LL	Diesel Range Organics (C10-C25)	0.0400	0.0800	mg/L	-	30	36-132	30	36-132	30	68334-30-5
NWTPH-Dx LL	Residual Range Organics (>C25-C40)	0.0800	0.160	mg/L	-	30	-	-	-	-	RRO
NWTPH-Dx LL	Mineral Oil	0.0800	0.160	mg/L	-	30	-	-	-	-	Needs CAS
NWTPH-Dx LL	o-Terphenyl (Surr)	0.00100	0.00100	Surrogate	50-150	-	-	-	-	-	84-15-1
Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup in Soil											
NWTPH-Dx/SGC	Diesel	10.0	20.0	mg/kg dry wt	-	30	38-132	30	38-132	30	68334-30-5
NWTPH-Dx/SGC	Oil	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	Oil
NWTPH-Dx/SGC	Diesel Range Organics (C10-C25)	10.0	20.0	mg/kg dry wt	-	30	38-132	30	38-132	30	68334-30-5
NWTPH-Dx/SGC	Residual Range Organics (>C25-C40)	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	RRO
NWTPH-Dx/SGC	Mineral Oil	20.0	40.0	mg/kg dry wt	-	30	-	-	-	-	Needs CAS
NWTPH-Dx/SGC	o-Terphenyl (Surr)	1.00	1.00	Surrogate	50-150	-	-	-	-	-	84-15-1
Diesel and/or Oil Hydrocarbons by NWTPH-Dx with Silica Gel Column Cleanup in Water											
NWTPH-Dx/SGC	Diesel	0.0400	0.0800	mg/L	-	30	36-132	30	36-132	30	68334-30-5
NWTPH-Dx/SGC	Oil	0.0800	0.160	mg/L	-	30	-	-	-	-	Oil
NWTPH-Dx/SGC	Diesel Range Organics (C10-C25)	0.0400	0.0800	mg/L	-	30	36-132	30	36-132	30	68334-30-5
NWTPH-Dx/SGC	Residual Range Organics (>C25-C40)	0.0800	0.160	mg/L	-	30	-	-	-	-	RRO
NWTPH-Dx/SGC	Mineral Oil	0.0800	0.160	mg/L	-	30	-	-	-	-	Needs CAS
NWTPH-Dx/SGC	o-Terphenyl (Surr)	0.00400	0.00400	Surrogate	50-150	-	-	-	-	-	84-15-1
NWTPH-Dx/SGC	Decanoic Acid (Surr)	0.0250	0.0250	Surrogate	5-10	-	-	-	-	-	334-48-5
Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx in Liquid											
NWTPH-Gx (MS)	Gasoline Range Organics	2.50	5.00	mg/kg	-	30	79-122	30	80-120	30	8006-61-9
NWTPH-Gx (MS)	4-Bromofluorobenzene (Sur)	0.0500	0.0500	Surrogate	50-150	-	-	-	-	-	460-00-4
NWTPH-Gx (MS)	1,4-Difluorobenzene (Sur)	0.0500	0.0500	Surrogate	50-150	-	-	-	-	-	540-36-3
NWTPH-Gx (MS)	Pentafluorobenzene (IS)			mg/kg	-	-	-	-	-	-	363-72-4
Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx in Soil											
NWTPH-Gx (MS)	Gasoline Range Organics	2.50	5.00	mg/kg dry wt	-	30	79-122	30	80-120	30	8006-61-9
NWTPH-Gx (MS)	4-Bromofluorobenzene (Sur)			Surrogate	50-150	-	-	-	-	-	460-00-4
NWTPH-Gx (MS)	1,4-Difluorobenzene (Sur)			Surrogate	50-150	-	-	-	-	-	540-36-3
NWTPH-Gx (MS)	Pentafluorobenzene (IS)			mg/kg dry wt	-	-	-	-	-	-	363-72-4
Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx in Water											
NWTPH-Gx (MS)	Gasoline Range Organics	0.0500	0.100	mg/L	-	30	78-122	30	80-120	30	8006-61-9
NWTPH-Gx (MS)	4-Bromofluorobenzene (Sur)			Surrogate	50-150	-	-	-	-	-	460-00-4
NWTPH-Gx (MS)	1,4-Difluorobenzene (Sur)			Surrogate	50-150	-	-	-	-	-	540-36-3
NWTPH-Gx (MS)	Pentafluorobenzene (IS)			mg/L	-	-	-	-	-	-	363-72-4

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
BTEX Compounds by EPA 8260D in Soil											
5035A/8260D	Benzene	5.00	10.0	ug/kg dry wt	-	30	77-121	30	80-120	30	71-43-2
5035A/8260D	Toluene	25.0	50.0	ug/kg dry wt	-	30	77-121	30	80-120	30	108-88-3
5035A/8260D	Ethylbenzene	12.5	25.0	ug/kg dry wt	-	30	76-122	30	80-120	30	100-41-4
5035A/8260D	m,p-Xylene	25.0	50.0	ug/kg dry wt	-	30	77-124	30	80-120	30	179601-23-1
5035A/8260D	o-Xylene	12.5	25.0	ug/kg dry wt	-	30	77-123	30	80-120	30	95-47-6
5035A/8260D	Xylenes, total	37.5	75.0	ug/kg dry wt	-	30	78-124	30	80-120	30	1330-20-7
5035A/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
5035A/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
5035A/8260D	4-Bromofluorobenzene (Surr)			Surrogate	79-120	-	-	-	-	-	460-00-4
5035A/8260D	Pentafluorobenzene (ISTD)			ug/kg dry wt	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3114-55-4
5035A/8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3855-82-1
BTEX Compounds by EPA 8260D in Water											
EPA 8260D	Benzene	0.100	0.200	ug/L	-	30	79-120	30	80-120	30	71-43-2
EPA 8260D	Toluene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	108-88-3
EPA 8260D	Ethylbenzene	0.250	0.500	ug/L	-	30	79-121	30	80-120	30	100-41-4
EPA 8260D	m,p-Xylene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	179601-23-1
EPA 8260D	o-Xylene	0.250	0.500	ug/L	-	30	78-122	30	80-120	30	95-47-6
EPA 8260D	Xylenes, total	0.750	1.50	ug/L	-	30	79-121	30	80-120	30	1330-20-7
EPA 8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
EPA 8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
EPA 8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
EPA 8260D	Pentafluorobenzene (ISTD)			ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)			ug/L	-	-	-	-	-	-	3114-55-4
EPA 8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/L	-	-	-	-	-	-	3855-82-1
Volatile Organic Compounds by EPA 5035A/8260D in Liquid											
5035A/8260D	Acetone	500	1000	ug/kg	-	30	36-164	30	80-120	30	67-64-1
5035A/8260D	Acrylonitrile	50.0	100	ug/kg	-	30	65-134	30	80-120	30	107-13-1
5035A/8260D	Benzene	5.00	10.0	ug/kg	-	30	77-121	30	80-120	30	71-43-2
5035A/8260D	Bromobenzene	12.5	25.0	ug/kg	-	30	78-121	30	80-120	30	108-86-1
5035A/8260D	Bromochloromethane	25.0	50.0	ug/kg	-	30	78-125	30	80-120	30	74-97-5
5035A/8260D	Bromodichloromethane	25.0	50.0	ug/kg	-	30	75-127	30	80-120	30	75-27-4
5035A/8260D	Bromoform	50.0	100	ug/kg	-	30	67-132	30	80-120	30	75-25-2
5035A/8260D	Bromomethane	500	500	ug/kg	-	30	53-143	30	80-120	30	74-83-9
5035A/8260D	2-Butanone (MEK)	250	500	ug/kg	-	30	51-148	30	80-120	30	78-93-3
5035A/8260D	n-Butylbenzene	25.0	50.0	ug/kg	-	30	70-128	30	80-120	30	104-51-8
5035A/8260D	sec-Butylbenzene	25.0	50.0	ug/kg	-	30	73-126	30	80-120	30	135-98-8
5035A/8260D	tert-Butylbenzene	25.0	50.0	ug/kg	-	30	73-125	30	80-120	30	98-06-6
5035A/8260D	Carbon disulfide	250	500	ug/kg	-	30	63-132	30	80-120	30	75-15-0
5035A/8260D	Carbon tetrachloride	25.0	50.0	ug/kg	-	30	70-135	30	80-120	30	56-23-5
5035A/8260D	Chlorobenzene	12.5	25.0	ug/kg	-	30	79-120	30	80-120	30	108-90-7
5035A/8260D	Chloroethane	250	500	ug/kg	-	30	59-139	30	80-120	30	75-00-3
5035A/8260D	Chloroform	25.0	50.0	ug/kg	-	30	78-123	30	80-120	30	67-66-3
5035A/8260D	Chloromethane	125	250	ug/kg	-	30	50-136	30	80-120	30	74-87-3
5035A/8260D	2-Chlorotoluene	25.0	50.0	ug/kg	-	30	75-122	30	80-120	30	95-49-8
5035A/8260D	4-Chlorotoluene	25.0	50.0	ug/kg	-	30	72-124	30	80-120	30	106-43-4
5035A/8260D	Dibromochloromethane	50.0	100	ug/kg	-	30	74-126	30	80-120	30	124-48-1
5035A/8260D	1,2-Dibromo-3-chloropropane	125	250	ug/kg	-	30	61-132	30	80-120	30	96-12-8
5035A/8260D	1,2-Dibromoethane (EDB)	25.0	50.0	ug/kg	-	30	78-122	30	80-120	30	106-93-4
5035A/8260D	Dibromomethane	25.0	50.0	ug/kg	-	30	78-125	30	80-120	30	74-95-3
5035A/8260D	1,2-Dichlorobenzene	12.5	25.0	ug/kg	-	30	78-121	30	80-120	30	95-50-1
5035A/8260D	1,3-Dichlorobenzene	12.5	25.0	ug/kg	-	30	77-121	30	80-120	30	541-73-1
5035A/8260D	1,4-Dichlorobenzene	12.5	25.0	ug/kg	-	30	75-120	30	80-120	30	106-46-7
5035A/8260D	Dichlorodifluoromethane	50.0	100	ug/kg	-	30	29-149	30	80-120	30	75-71-8

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
5035A/8260D	1,1-Dichloroethane	12.5	25.0	ug/kg	-	30	76-125	30	80-120	30	75-34-3
5035A/8260D	1,2-Dichloroethane (EDC)	12.5	25.0	ug/kg	-	30	73-128	30	80-120	30	107-06-2
5035A/8260D	1,1-Dichloroethene	12.5	25.0	ug/kg	-	30	70-131	30	80-120	30	75-35-4
5035A/8260D	cis-1,2-Dichloroethene	12.5	25.0	ug/kg	-	30	77-123	30	80-120	30	156-59-2
5035A/8260D	trans-1,2-Dichloroethene	12.5	25.0	ug/kg	-	30	74-125	30	80-120	30	156-60-5
5035A/8260D	1,2-Dichloropropane	12.5	25.0	ug/kg	-	30	76-123	30	80-120	30	78-87-5
5035A/8260D	1,3-Dichloropropane	25.0	50.0	ug/kg	-	30	77-121	30	80-120	30	142-28-9
5035A/8260D	2,2-Dichloropropane	25.0	50.0	ug/kg	-	30	67-133	30	80-120	30	594-20-7
5035A/8260D	1,1-Dichloropropene	25.0	50.0	ug/kg	-	30	76-125	30	80-120	30	563-58-6
5035A/8260D	cis-1,3-Dichloropropene	25.0	50.0	ug/kg	-	30	74-126	30	80-120	30	10061-01-5
5035A/8260D	trans-1,3-Dichloropropene	25.0	50.0	ug/kg	-	30	71-130	30	80-120	30	10061-02-6
5035A/8260D	Ethylbenzene	12.5	25.0	ug/kg	-	30	76-122	30	80-120	30	100-41-4
5035A/8260D	Hexachlorobutadiene	50.0	100	ug/kg	-	30	61-135	30	80-120	30	87-68-3
5035A/8260D	2-Hexanone	250	500	ug/kg	-	30	53-145	30	80-120	30	591-78-6
5035A/8260D	Isopropylbenzene	25.0	50.0	ug/kg	-	30	68-134	30	80-120	30	98-82-8
5035A/8260D	4-Isopropyltoluene	25.0	50.0	ug/kg	-	30	73-127	30	80-120	30	99-87-6
5035A/8260D	Methylene chloride	250	500	ug/kg	-	30	70-128	30	80-120	30	75-09-2
5035A/8260D	4-Methyl-2-pentanone (MiBK)	250	500	ug/kg	-	30	65-135	30	80-120	30	108-10-1
5035A/8260D	Methyl tert-butyl ether (MTBE)	25.0	50.0	ug/kg	-	30	73-125	30	80-120	30	1634-04-4
5035A/8260D	Naphthalene	50.0	100	ug/kg	-	30	62-129	30	80-120	30	91-20-3
5035A/8260D	n-Propylbenzene	12.5	25.0	ug/kg	-	30	73-125	30	80-120	30	103-65-1
5035A/8260D	Styrene	25.0	50.0	ug/kg	-	30	76-124	30	80-120	30	100-42-5
5035A/8260D	1,1,1,2-Tetrachloroethane	12.5	25.0	ug/kg	-	30	78-125	30	80-120	30	630-20-6
5035A/8260D	1,1,2,2-Tetrachloroethane	25.0	50.0	ug/kg	-	30	70-124	30	80-120	30	79-34-5
5035A/8260D	Tetrachloroethene (PCE)	12.5	25.0	ug/kg	-	30	73-128	30	80-120	30	127-18-4
5035A/8260D	Toluene	25.0	50.0	ug/kg	-	30	77-121	30	80-120	30	108-88-3
5035A/8260D	1,2,3-Trichlorobenzene	125	250	ug/kg	-	30	66-130	30	80-120	30	87-61-6
5035A/8260D	1,2,4-Trichlorobenzene	125	250	ug/kg	-	30	67-129	30	80-120	30	120-82-1
5035A/8260D	1,1,1-Trichloroethane	12.5	25.0	ug/kg	-	30	73-130	30	80-120	30	71-55-6
5035A/8260D	1,1,2-Trichloroethane	12.5	25.0	ug/kg	-	30	78-121	30	80-120	30	79-00-5
5035A/8260D	Trichloroethene (TCE)	12.5	25.0	ug/kg	-	30	77-123	30	80-120	30	79-01-6
5035A/8260D	Trichlorofluoromethane	125	250	ug/kg	-	30	62-140	30	80-120	30	75-69-4
5035A/8260D	1,2,3-Trichloropropane	25.0	50.0	ug/kg	-	30	73-125	30	80-120	30	96-18-4
5035A/8260D	1,2,4-Trimethylbenzene	25.0	50.0	ug/kg	-	30	75-123	30	80-120	30	95-63-6
5035A/8260D	1,3,5-Trimethylbenzene	25.0	50.0	ug/kg	-	30	73-124	30	80-120	30	108-67-8
5035A/8260D	Vinyl chloride	12.5	25.0	ug/kg	-	30	56-135	30	80-120	30	75-01-4
5035A/8260D	m,p-Xylene	25.0	50.0	ug/kg	-	30	77-124	30	80-120	30	179601-23-1
5035A/8260D	o-Xylene	12.5	25.0	ug/kg	-	30	77-123	30	80-120	30	95-47-6
5035A/8260D	Xylenes, total	37.5	75.0	ug/kg	-	30	78-124	30	80-120	30	1330-20-7
5035A/8260D	trans-1,4-Dichloro-2-butene	250	500	ug/kg	-	30	62-136	30	80-120	30	110-57-6
5035A/8260D	n-Hexane	250	500	ug/kg	-	30	45-142	30	80-120	30	110-54-3
5035A/8260D	1,1,2-Trichloro-1,2,2-trifluoroethane	50.0	100	ug/kg	-	30	66-136	30	80-120	30	76-13-1
5035A/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
5035A/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
5035A/8260D	4-Bromofluorobenzene (Surr)			Surrogate	79-120	-	-	-	-	-	460-00-4
5035A/8260D	Pentafluorobenzene (ISTD)			ug/kg	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)			ug/kg	-	-	-	-	-	-	3114-55-4
5035A/8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg	-	-	-	-	-	-	3855-82-1
Volatile Organic Compounds by EPA 8260D in Soil											
5035A/8260D	Acetone	500	1000	ug/kg dry wt	-	30	36-164	30	80-120	30	67-64-1
5035A/8260D	Acrylonitrile	50.0	100	ug/kg dry wt	-	30	65-134	30	80-120	30	107-13-1
5035A/8260D	Benzene	5.00	10.0	ug/kg dry wt	-	30	77-121	30	80-120	30	71-43-2
5035A/8260D	Bromobenzene	12.5	25.0	ug/kg dry wt	-	30	78-121	30	80-120	30	108-86-1
5035A/8260D	Bromochloromethane	25.0	50.0	ug/kg dry wt	-	30	78-125	30	80-120	30	74-97-5
5035A/8260D	Bromodichloromethane	25.0	50.0	ug/kg dry wt	-	30	75-127	30	80-120	30	75-27-4
5035A/8260D	Bromoform	50.0	100	ug/kg dry wt	-	30	67-132	30	80-120	30	75-25-2
5035A/8260D	Bromomethane	500	500	ug/kg dry wt	-	30	53-143	30	80-120	30	74-83-9
5035A/8260D	2-Butanone (MEK)	250	500	ug/kg dry wt	-	30	51-148	30	80-120	30	78-93-3

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
5035A/8260D	n-Butylbenzene	25.0	50.0	ug/kg dry wt	-	30	70-128	30	80-120	30	104-51-8
5035A/8260D	sec-Butylbenzene	25.0	50.0	ug/kg dry wt	-	30	73-126	30	80-120	30	135-98-8
5035A/8260D	tert-Butylbenzene	25.0	50.0	ug/kg dry wt	-	30	73-125	30	80-120	30	98-06-6
5035A/8260D	Carbon disulfide	250	500	ug/kg dry wt	-	30	63-132	30	80-120	30	75-15-0
5035A/8260D	Carbon tetrachloride	25.0	50.0	ug/kg dry wt	-	30	70-135	30	80-120	30	56-23-5
5035A/8260D	Chlorobenzene	12.5	25.0	ug/kg dry wt	-	30	79-120	30	80-120	30	108-90-7
5035A/8260D	Chloroethane	250	500	ug/kg dry wt	-	30	59-139	30	80-120	30	75-00-3
5035A/8260D	Chloroform	25.0	50.0	ug/kg dry wt	-	30	78-123	30	80-120	30	67-66-3
5035A/8260D	Chloromethane	125	250	ug/kg dry wt	-	30	50-136	30	80-120	30	74-87-3
5035A/8260D	2-Chlorotoluene	25.0	50.0	ug/kg dry wt	-	30	75-122	30	80-120	30	95-49-8
5035A/8260D	4-Chlorotoluene	25.0	50.0	ug/kg dry wt	-	30	72-124	30	80-120	30	106-43-4
5035A/8260D	Dibromochloromethane	50.0	100	ug/kg dry wt	-	30	74-126	30	80-120	30	124-48-1
5035A/8260D	1,2-Dibromo-3-chloropropane	125	250	ug/kg dry wt	-	30	61-132	30	80-120	30	96-12-8
5035A/8260D	1,2-Dibromoethane (EDB)	25.0	50.0	ug/kg dry wt	-	30	78-122	30	80-120	30	106-93-4
5035A/8260D	Dibromomethane	25.0	50.0	ug/kg dry wt	-	30	78-125	30	80-120	30	74-95-3
5035A/8260D	1,2-Dichlorobenzene	12.5	25.0	ug/kg dry wt	-	30	78-121	30	80-120	30	95-50-1
5035A/8260D	1,3-Dichlorobenzene	12.5	25.0	ug/kg dry wt	-	30	77-121	30	80-120	30	541-73-1
5035A/8260D	1,4-Dichlorobenzene	12.5	25.0	ug/kg dry wt	-	30	75-120	30	80-120	30	106-46-7
5035A/8260D	Dichlorodifluoromethane	50.0	100	ug/kg dry wt	-	30	29-149	30	80-120	30	75-71-8
5035A/8260D	1,1-Dichloroethane	12.5	25.0	ug/kg dry wt	-	30	76-125	30	80-120	30	75-34-3
5035A/8260D	1,2-Dichloroethane (EDC)	12.5	25.0	ug/kg dry wt	-	30	73-128	30	80-120	30	107-06-2
5035A/8260D	1,1-Dichloroethene	12.5	25.0	ug/kg dry wt	-	30	70-131	30	80-120	30	75-35-4
5035A/8260D	cis-1,2-Dichloroethene	12.5	25.0	ug/kg dry wt	-	30	77-123	30	80-120	30	156-59-2
5035A/8260D	trans-1,2-Dichloroethene	12.5	25.0	ug/kg dry wt	-	30	74-125	30	80-120	30	156-60-5
5035A/8260D	1,2-Dichloropropane	12.5	25.0	ug/kg dry wt	-	30	76-123	30	80-120	30	78-87-5
5035A/8260D	1,3-Dichloropropane	25.0	50.0	ug/kg dry wt	-	30	77-121	30	80-120	30	142-28-9
5035A/8260D	2,2-Dichloropropane	25.0	50.0	ug/kg dry wt	-	30	67-133	30	80-120	30	594-20-7
5035A/8260D	1,1-Dichloropropene	25.0	50.0	ug/kg dry wt	-	30	76-125	30	80-120	30	563-58-6
5035A/8260D	cis-1,3-Dichloropropene	25.0	50.0	ug/kg dry wt	-	30	74-126	30	80-120	30	10061-01-5
5035A/8260D	trans-1,3-Dichloropropene	25.0	50.0	ug/kg dry wt	-	30	71-130	30	80-120	30	10061-02-6
5035A/8260D	Ethylbenzene	12.5	25.0	ug/kg dry wt	-	30	76-122	30	80-120	30	100-41-4
5035A/8260D	Hexachlorobutadiene	50.0	100	ug/kg dry wt	-	30	61-135	30	80-120	30	87-68-3
5035A/8260D	2-Hexanone	250	500	ug/kg dry wt	-	30	53-145	30	80-120	30	591-78-6
5035A/8260D	Isopropylbenzene	25.0	50.0	ug/kg dry wt	-	30	68-134	30	80-120	30	98-82-8
5035A/8260D	4-Isopropyltoluene	25.0	50.0	ug/kg dry wt	-	30	73-127	30	80-120	30	99-87-6
5035A/8260D	Methylene chloride	250	500	ug/kg dry wt	-	30	70-128	30	80-120	30	75-09-2
5035A/8260D	4-Methyl-2-pentanone (MiBK)	250	500	ug/kg dry wt	-	30	65-135	30	80-120	30	108-10-1
5035A/8260D	Methyl tert-butyl ether (MTBE)	25.0	50.0	ug/kg dry wt	-	30	73-125	30	80-120	30	1634-04-4
5035A/8260D	Naphthalene	50.0	100	ug/kg dry wt	-	30	62-129	30	80-120	30	91-20-3
5035A/8260D	n-Propylbenzene	12.5	25.0	ug/kg dry wt	-	30	73-125	30	80-120	30	103-65-1
5035A/8260D	Styrene	25.0	50.0	ug/kg dry wt	-	30	76-124	30	80-120	30	100-42-5
5035A/8260D	1,1,1,2-Tetrachloroethane	12.5	25.0	ug/kg dry wt	-	30	78-125	30	80-120	30	630-20-6
5035A/8260D	1,1,2,2-Tetrachloroethane	25.0	50.0	ug/kg dry wt	-	30	70-124	30	80-120	30	79-34-5
5035A/8260D	Tetrachloroethene (PCE)	12.5	25.0	ug/kg dry wt	-	30	73-128	30	80-120	30	127-18-4
5035A/8260D	Toluene	25.0	50.0	ug/kg dry wt	-	30	77-121	30	80-120	30	108-88-3
5035A/8260D	1,2,3-Trichlorobenzene	125	250	ug/kg dry wt	-	30	66-130	30	80-120	30	87-61-6
5035A/8260D	1,2,4-Trichlorobenzene	125	250	ug/kg dry wt	-	30	67-129	30	80-120	30	120-82-1
5035A/8260D	1,1,1-Trichloroethane	12.5	25.0	ug/kg dry wt	-	30	73-130	30	80-120	30	71-55-6
5035A/8260D	1,1,2-Trichloroethane	12.5	25.0	ug/kg dry wt	-	30	78-121	30	80-120	30	79-00-5
5035A/8260D	Trichloroethene (TCE)	12.5	25.0	ug/kg dry wt	-	30	77-123	30	80-120	30	79-01-6
5035A/8260D	Trichlorofluoromethane	125	250	ug/kg dry wt	-	30	62-140	30	80-120	30	75-69-4
5035A/8260D	1,2,3-Trichloropropane	25.0	50.0	ug/kg dry wt	-	30	73-125	30	80-120	30	96-18-4
5035A/8260D	1,2,4-Trimethylbenzene	25.0	50.0	ug/kg dry wt	-	30	75-123	30	80-120	30	95-63-6
5035A/8260D	1,3,5-Trimethylbenzene	25.0	50.0	ug/kg dry wt	-	30	73-124	30	80-120	30	108-67-8
5035A/8260D	Vinyl chloride	12.5	25.0	ug/kg dry wt	-	30	56-135	30	80-120	30	75-01-4
5035A/8260D	m,p-Xylene	25.0	50.0	ug/kg dry wt	-	30	77-124	30	80-120	30	179601-23-1
5035A/8260D	o-Xylene	12.5	25.0	ug/kg dry wt	-	30	77-123	30	80-120	30	95-47-6
5035A/8260D	Xylenes, total	37.5	75.0	ug/kg dry wt	-	30	78-124	30	80-120	30	1330-20-7
5035A/8260D	trans-1,4-Dichloro-2-butene	250	500	ug/kg dry wt	-	30	62-136	30	80-120	30	110-57-6
5035A/8260D	n-Hexane	250	500	ug/kg dry wt	-	30	45-142	30	80-120	30	110-54-3

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
5035A/8260D	1,1,2-Trichloro-1,2,2-trifluoroethane	50.0	100	ug/kg dry wt	-	30	66-136	30	80-120	30	76-13-1
5035A/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
5035A/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
5035A/8260D	4-Bromofluorobenzene (Surr)			Surrogate	79-120	-	-	-	-	-	460-00-4
5035A/8260D	Pentafluorobenzene (ISTD)			ug/kg dry wt	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3114-55-4
5035A/8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3855-82-1
Volatile Organic Compounds by EPA 8260D in Water											
EPA 8260D	Acetone	10.0	20.0	ug/L	-	30	39-160	30	80-120	30	67-64-1
EPA 8260D	Acrylonitrile	1.00	2.00	ug/L	-	30	63-135	30	80-120	30	107-13-1
EPA 8260D	Benzene	0.100	0.200	ug/L	-	30	79-120	30	80-120	30	71-43-2
EPA 8260D	Bromobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	108-86-1
EPA 8260D	Bromochloromethane	0.500	1.00	ug/L	-	30	78-123	30	80-120	30	74-97-5
EPA 8260D	Bromodichloromethane	0.500	1.00	ug/L	-	30	79-125	30	80-120	30	75-27-4
EPA 8260D	Bromoform	0.500	1.00	ug/L	-	30	66-130	30	80-120	30	75-25-2
EPA 8260D	Bromomethane	5.00	5.00	ug/L	-	30	53-141	30	80-120	30	74-83-9
EPA 8260D	2-Butanone (MEK)	5.00	10.0	ug/L	-	30	56-143	30	80-120	30	78-93-3
EPA 8260D	n-Butylbenzene	0.500	1.00	ug/L	-	30	75-128	30	80-120	30	104-51-8
EPA 8260D	sec-Butylbenzene	0.500	1.00	ug/L	-	30	77-126	30	80-120	30	135-98-8
EPA 8260D	tert-Butylbenzene	0.500	1.00	ug/L	-	30	78-124	30	80-120	30	98-06-6
EPA 8260D	Carbon disulfide	5.00	10.0	ug/L	-	30	64-133	30	80-120	30	75-15-0
EPA 8260D	Carbon tetrachloride	0.500	1.00	ug/L	-	30	72-136	30	80-120	30	56-23-5
EPA 8260D	Chlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	108-90-7
EPA 8260D	Chloroethane	5.00	5.00	ug/L	-	30	60-138	30	80-120	30	75-00-3
EPA 8260D	Chloroform	0.500	1.00	ug/L	-	30	79-124	30	80-120	30	67-66-3
EPA 8260D	Chloromethane	2.50	5.00	ug/L	-	30	50-139	30	80-120	30	74-87-3
EPA 8260D	2-Chlorotoluene	0.500	1.00	ug/L	-	30	79-122	30	80-120	30	95-49-8
EPA 8260D	4-Chlorotoluene	0.500	1.00	ug/L	-	30	78-122	30	80-120	30	106-43-4
EPA 8260D	Dibromochloromethane	0.500	1.00	ug/L	-	30	74-126	30	80-120	30	124-48-1
EPA 8260D	1,2-Dibromo-3-chloropropane	2.50	5.00	ug/L	-	30	62-128	30	80-120	30	96-12-8
EPA 8260D	1,2-Dibromoethane (EDB)	0.250	0.500	ug/L	-	30	77-121	30	80-120	30	106-93-4
EPA 8260D	Dibromomethane	0.500	1.00	ug/L	-	30	79-123	30	80-120	30	74-95-3
EPA 8260D	1,2-Dichlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	95-50-1
EPA 8260D	1,3-Dichlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	541-73-1
EPA 8260D	1,4-Dichlorobenzene	0.250	0.500	ug/L	-	30	79-120	30	80-120	30	106-46-7
EPA 8260D	Dichlorodifluoromethane	0.500	1.00	ug/L	-	30	32-152	30	80-120	30	75-71-8
EPA 8260D	1,1-Dichloroethane	0.200	0.400	ug/L	-	30	77-125	30	80-120	30	75-34-3
EPA 8260D	1,2-Dichloroethane (EDC)	0.200	0.400	ug/L	-	30	73-128	30	80-120	30	107-06-2
EPA 8260D	1,1-Dichloroethene	0.200	0.400	ug/L	-	30	71-131	30	80-120	30	75-35-4
EPA 8260D	cis-1,2-Dichloroethene	0.200	0.400	ug/L	-	30	78-123	30	80-120	30	156-59-2
EPA 8260D	trans-1,2-Dichloroethene	0.200	0.400	ug/L	-	30	75-124	30	80-120	30	156-60-5
EPA 8260D	1,2-Dichloropropane	0.250	0.500	ug/L	-	30	78-122	30	80-120	30	78-87-5
EPA 8260D	1,3-Dichloropropane	0.500	1.00	ug/L	-	30	80-120	30	80-120	30	142-28-9
EPA 8260D	2,2-Dichloropropane	0.500	1.00	ug/L	-	30	60-139	30	80-120	30	594-20-7
EPA 8260D	1,1-Dichloropropene	0.500	1.00	ug/L	-	30	79-125	30	80-120	30	563-58-6
EPA 8260D	cis-1,3-Dichloropropene	0.500	1.00	ug/L	-	30	75-124	30	80-120	30	10061-01-5
EPA 8260D	trans-1,3-Dichloropropene	0.500	1.00	ug/L	-	30	73-127	30	80-120	30	10061-02-6
EPA 8260D	Ethylbenzene	0.250	0.500	ug/L	-	30	79-121	30	80-120	30	100-41-4
EPA 8260D	Hexachlorobutadiene	2.50	5.00	ug/L	-	30	66-134	30	80-120	30	87-68-3
EPA 8260D	2-Hexanone	5.00	10.0	ug/L	-	30	57-139	30	80-120	30	591-78-6
EPA 8260D	Isopropylbenzene	0.500	1.00	ug/L	-	30	72-131	30	80-120	30	98-82-8
EPA 8260D	4-Isopropyltoluene	0.500	1.00	ug/L	-	30	77-127	30	80-120	30	99-87-6
EPA 8260D	Methylene chloride	5.00	10.0	ug/L	-	30	74-124	30	80-120	30	75-09-2
EPA 8260D	4-Methyl-2-pentanone (MiBK)	5.00	10.0	ug/L	-	30	67-130	30	80-120	30	108-10-1
EPA 8260D	Methyl tert-butyl ether (MTBE)	0.500	1.00	ug/L	-	30	71-124	30	80-120	30	1634-04-4
EPA 8260D	Naphthalene	2.50	5.00	ug/L	-	30	61-128	30	80-120	30	91-20-3
EPA 8260D	n-Propylbenzene	0.250	0.500	ug/L	-	30	76-126	30	80-120	30	103-65-1
EPA 8260D	Styrene	0.500	1.00	ug/L	-	30	78-123	30	80-120	30	100-42-5

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
EPA 8260D	1,1,1,2-Tetrachloroethane	0.200	0.400	ug/L	-	30	78-124	30	80-120	30	630-20-6
EPA 8260D	1,1,2,2-Tetrachloroethane	0.250	0.500	ug/L	-	30	71-121	30	80-120	30	79-34-5
EPA 8260D	Tetrachloroethene (PCE)	0.200	0.400	ug/L	-	30	74-129	30	80-120	30	127-18-4
EPA 8260D	Toluene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	108-88-3
EPA 8260D	1,2,3-Trichlorobenzene	1.00	2.00	ug/L	-	30	69-129	30	80-120	30	87-61-6
EPA 8260D	1,2,4-Trichlorobenzene	1.00	2.00	ug/L	-	30	69-130	30	80-120	30	120-82-1
EPA 8260D	1,1,1-Trichloroethane	0.200	0.400	ug/L	-	30	74-131	30	80-120	30	71-55-6
EPA 8260D	1,1,2-Trichloroethane	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	79-00-5
EPA 8260D	Trichloroethene (TCE)	0.200	0.400	ug/L	-	30	79-123	30	80-120	30	79-01-6
EPA 8260D	Trichlorofluoromethane	1.00	2.00	ug/L	-	30	65-141	30	80-120	30	75-69-4
EPA 8260D	1,2,3-Trichloropropane	0.500	1.00	ug/L	-	30	73-122	30	80-120	30	96-18-4
EPA 8260D	1,2,4-Trimethylbenzene	0.500	1.00	ug/L	-	30	76-124	30	80-120	30	95-63-6
EPA 8260D	1,3,5-Trimethylbenzene	0.500	1.00	ug/L	-	30	75-124	30	80-120	30	108-67-8
EPA 8260D	Vinyl chloride	0.100	0.200	ug/L	-	30	58-137	30	80-120	30	75-01-4
EPA 8260D	m,p-Xylene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	179601-23-1
EPA 8260D	o-Xylene	0.250	0.500	ug/L	-	30	78-122	30	80-120	30	95-47-6
EPA 8260D	Xylenes, total	0.750	1.50	ug/L	-	30	79-121	30	80-120	30	1330-20-7
EPA 8260D	trans-1,4-Dichloro-2-butene	5.00	10.0	ug/L	-	30	43-140	30	80-120	30	110-57-6
EPA 8260D	n-Hexane	5.00	10.0	ug/L	-	30	48-143	30	80-120	30	110-54-3
EPA 8260D	1,1,2-Trichloro-1,2,2-trifluoroethane	1.00	2.00	ug/L	-	30	70-136	30	80-120	30	76-13-1
EPA 8260D	Acrolein	5.00	10.0	ug/L	-	30	39-155	30	80-120	30	107-02-8
EPA 8260D	2-Chloroethyl vinyl ether	5.00	10.0	ug/L	-	30	51-139	30	80-120	30	110-75-8
EPA 8260D	Iodomethane	10.0	10.0	ug/L	-	30	69-131	30	80-120	30	74-88-4
EPA 8260D	Tetrahydrofuran	5.00	10.0	ug/L	-	30	57-133	30	80-120	30	109-99-9
EPA 8260D	Isobutyl alcohol	250	250	ug/L	-	30	63-133	30	80-120	30	78-83-1
EPA 8260D	Vinyl acetate	5.00	10.0	ug/L	-	30	54-146	30	80-120	30	108-05-4
EPA 8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
EPA 8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
EPA 8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
EPA 8260D	Pentafluorobenzene (ISTD)			ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)			ug/L	-	-	-	-	-	-	3114-55-4
EPA 8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/L	-	-	-	-	-	-	3855-82-1
SPLP Volatile Organic Compounds by EPA 1312/8260D in Liquid											
1312/8260D	Benzene	0.000100	0.000200	mg/L	-	30	79-120	30	80-120	30	71-43-2
1312/8260D	Ethylbenzene	0.000250	0.000500	mg/L	-	30	79-121	30	80-120	30	100-41-4
1312/8260D	Naphthalene	0.00250	0.00500	mg/L	-	30	61-128	30	80-120	30	91-20-3
1312/8260D	Toluene	0.000500	0.00100	mg/L	-	30	80-121	30	80-120	30	108-88-3
1312/8260D	m,p-Xylene	0.000500	0.00100	mg/L	-	30	80-121	30	80-120	30	179601-23-1
1312/8260D	o-Xylene	0.000250	0.000500	mg/L	-	30	78-122	30	80-120	30	95-47-6
1312/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
1312/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
1312/8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
1312/8260D	Pentafluorobenzene (ISTD)			mg/L	-	-	-	-	-	-	363-72-4
1312/8260D	Chlorobenzene-d5 (ISTD)			mg/L	-	-	-	-	-	-	3114-55-4
1312/8260D	1,4-Dichlorobenzene-d4 (ISTD)			mg/L	-	-	-	-	-	-	3855-82-1
SPLP Semivolatile Organic Compounds by EPA 1312/8270E in Liquid											
1312/8270E	Acenaphthene	0.000100	0.000200	mg/L	-	30	47-122	30	47-122	30	83-32-9
1312/8270E	Acenaphthylene	0.000100	0.000200	mg/L	-	30	41-130	30	41-130	30	208-96-8
1312/8270E	Anthracene	0.000100	0.000200	mg/L	-	30	57-123	30	57-123	30	120-12-7
1312/8270E	Benz(a)anthracene	0.000100	0.000200	mg/L	-	30	58-125	30	58-125	30	56-55-3
1312/8270E	Benzo(a)pyrene	0.000150	0.000300	mg/L	-	30	54-128	30	54-128	30	50-32-8
1312/8270E	Benzo(b)fluoranthene	0.000150	0.000300	mg/L	-	30	53-131	30	53-131	30	205-99-2
1312/8270E	Benzo(k)fluoranthene	0.000150	0.000300	mg/L	-	30	57-129	30	57-129	30	207-08-9
1312/8270E	Benzo(g,h,i)perylene	0.000100	0.000200	mg/L	-	30	50-134	30	50-134	30	191-24-2
1312/8270E	Chrysene	0.000100	0.000200	mg/L	-	30	59-123	30	59-123	30	218-01-9
1312/8270E	Dibenz(a,h)anthracene	0.000100	0.000200	mg/L	-	30	51-134	30	51-134	30	53-70-3

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
1312/8270E	Fluoranthene	0.000100	0.000200	mg/L	-	30	57-128	30	57-128	30	206-44-0
1312/8270E	Fluorene	0.000100	0.000200	mg/L	-	30	52-124	30	52-124	30	86-73-7
1312/8270E	Indeno(1,2,3-cd)pyrene	0.000100	0.000200	mg/L	-	30	52-134	30	52-134	30	193-39-5
1312/8270E	1-Methylnaphthalene	0.000200	0.000400	mg/L	-	30	41-120	30	41-120	30	90-12-0
1312/8270E	2-Methylnaphthalene	0.000200	0.000400	mg/L	-	30	40-121	30	40-121	30	91-57-6
1312/8270E	Naphthalene	0.000200	0.000400	mg/L	-	30	40-121	30	40-121	30	91-20-3
1312/8270E	Phenanthrene	0.000100	0.000200	mg/L	-	30	59-120	30	59-120	30	85-01-8
1312/8270E	Pyrene	0.000100	0.000200	mg/L	-	30	57-126	30	57-126	30	129-00-0
1312/8270E	Carbazole	0.000150	0.000300	mg/L	-	30	60-122	30	60-122	30	86-74-8
1312/8270E	Dibenzofuran	0.000100	0.000200	mg/L	-	30	53-120	30	53-120	30	132-64-9
1312/8270E	Nitrobenzene-d5 (Surr)			Surrogate	44-120	-	-	-	-	-	4165-60-0
1312/8270E	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
1312/8270E	p-Terphenyl-d14 (Surr)			Surrogate	50-134	-	-	-	-	-	1718-51-0
1312/8270E	1,4-Dichlorobenzene-d4 (ISTD)			mg/L	-	-	-	-	-	-	3855-82-1
1312/8270E	Naphthalene-d8 (ISTD)			mg/L	-	-	-	-	-	-	1146-65-2
1312/8270E	Acenaphthene-d10 (ISTD)			mg/L	-	-	-	-	-	-	15067-26-2
1312/8270E	Phenanthrene-d10 (ISTD)			mg/L	-	-	-	-	-	-	1517-22-2
1312/8270E	Chrysene-d12 (ISTD)			mg/L	-	-	-	-	-	-	1719-03-5
1312/8270E	Perylene-d12 (ISTD)			mg/L	-	-	-	-	-	-	1520-96-3
1312/8270E	Dibenz(a,h)anthracene-d14 (ISTD)			mg/L	-	-	-	-	-	-	13250-98-1
SPLP Volatile Organic Compounds by EPA 1312/8260D in Soil											
1312/8260D	Benzene	0.000100	0.000200	mg/L	-	30	79-120	30	80-120	30	71-43-2
1312/8260D	Ethylbenzene	0.000250	0.000500	mg/L	-	30	79-121	30	80-120	30	100-41-4
1312/8260D	Naphthalene	0.00250	0.00500	mg/L	-	30	61-128	30	80-120	30	91-20-3
1312/8260D	Toluene	0.000500	0.00100	mg/L	-	30	80-121	30	80-120	30	108-88-3
1312/8260D	m,p-Xylene	0.000500	0.00100	mg/L	-	30	80-121	30	80-120	30	179601-23-1
1312/8260D	o-Xylene	0.000250	0.000500	mg/L	-	30	78-122	30	80-120	30	95-47-6
1312/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
1312/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
1312/8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
1312/8260D	Pentafluorobenzene (ISTD)			mg/L	-	-	-	-	-	-	363-72-4
1312/8260D	Chlorobenzene-d5 (ISTD)			mg/L	-	-	-	-	-	-	3114-55-4
1312/8260D	1,4-Dichlorobenzene-d4 (ISTD)			mg/L	-	-	-	-	-	-	3855-82-1
SPLP Semivolatile Organic Compounds by EPA 1312/8270E in Soil											
1312/8270E	Acenaphthene	0.000100	0.000200	mg/L	-	30	47-122	30	47-122	30	83-32-9
1312/8270E	Acenaphthylene	0.000100	0.000200	mg/L	-	30	41-130	30	41-130	30	208-96-8
1312/8270E	Anthracene	0.000100	0.000200	mg/L	-	30	57-123	30	57-123	30	120-12-7
1312/8270E	Benz(a)anthracene	0.000100	0.000200	mg/L	-	30	58-125	30	58-125	30	56-55-3
1312/8270E	Benzo(a)pyrene	0.000150	0.000300	mg/L	-	30	54-128	30	54-128	30	50-32-8
1312/8270E	Benzo(b)fluoranthene	0.000150	0.000300	mg/L	-	30	53-131	30	53-131	30	205-99-2
1312/8270E	Benzo(k)fluoranthene	0.000150	0.000300	mg/L	-	30	57-129	30	57-129	30	207-08-9
1312/8270E	Benzo(g,h,i)perylene	0.000100	0.000200	mg/L	-	30	50-134	30	50-134	30	191-24-2
1312/8270E	Chrysene	0.000100	0.000200	mg/L	-	30	59-123	30	59-123	30	218-01-9
1312/8270E	Dibenz(a,h)anthracene	0.000100	0.000200	mg/L	-	30	51-134	30	51-134	30	53-70-3
1312/8270E	Fluoranthene	0.000100	0.000200	mg/L	-	30	57-128	30	57-128	30	206-44-0
1312/8270E	Fluorene	0.000100	0.000200	mg/L	-	30	52-124	30	52-124	30	86-73-7
1312/8270E	Indeno(1,2,3-cd)pyrene	0.000100	0.000200	mg/L	-	30	52-134	30	52-134	30	193-39-5
1312/8270E	1-Methylnaphthalene	0.000200	0.000400	mg/L	-	30	41-120	30	41-120	30	90-12-0
1312/8270E	2-Methylnaphthalene	0.000200	0.000400	mg/L	-	30	40-121	30	40-121	30	91-57-6
1312/8270E	Naphthalene	0.000200	0.000400	mg/L	-	30	40-121	30	40-121	30	91-20-3
1312/8270E	Phenanthrene	0.000100	0.000200	mg/L	-	30	59-120	30	59-120	30	85-01-8
1312/8270E	Pyrene	0.000100	0.000200	mg/L	-	30	57-126	30	57-126	30	129-00-0
1312/8270E	Carbazole	0.000150	0.000300	mg/L	-	30	60-122	30	60-122	30	86-74-8
1312/8270E	Dibenzofuran	0.000100	0.000200	mg/L	-	30	53-120	30	53-120	30	132-64-9
1312/8270E	Nitrobenzene-d5 (Surr)			Surrogate	44-120	-	-	-	-	-	4165-60-0
1312/8270E	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
1312/8270E	p-Terphenyl-d14 (Surr)			Surrogate	50-134	-	-	-	-	-	1718-51-0
1312/8270E	1,4-Dichlorobenzene-d4 (ISTD)			mg/L	-	-	-	-	-	-	3855-82-1
1312/8270E	Naphthalene-d8 (ISTD)			mg/L	-	-	-	-	-	-	1146-65-2
1312/8270E	Acenaphthene-d10 (ISTD)			mg/L	-	-	-	-	-	-	15067-26-2
1312/8270E	Phenanthrene-d10 (ISTD)			mg/L	-	-	-	-	-	-	1517-22-2
1312/8270E	Chrysene-d12 (ISTD)			mg/L	-	-	-	-	-	-	1719-03-5
1312/8270E	Perylene-d12 (ISTD)			mg/L	-	-	-	-	-	-	1520-96-3
1312/8270E	Dibenz(a,h)anthracene-d14 (ISTD)			mg/L	-	-	-	-	-	-	13250-98-1
Volatiles Screen by Purge and Trap and GC/MS in Liquid											
5035A/8260D	n-Butane	50.0	50.0	ug/kg	-	-	-	-	-	-	106-97-8
5035A/8260D	Isopentane	50.0	50.0	ug/kg	-	-	-	-	-	-	78-78-4
5035A/8260D	n-Pentane	250	250	ug/kg	-	-	-	-	-	-	109-66-0
5035A/8260D	n-Heptane	50.0	50.0	ug/kg	-	-	-	-	-	-	142-82-5
5035A/8260D	3-Methylhexane	50.0	50.0	ug/kg	-	-	-	-	-	-	589-34-4
5035A/8260D	Isooctane	50.0	50.0	ug/kg	-	-	-	-	-	-	540-84-1
5035A/8260D	Methylcyclohexane	50.0	50.0	ug/kg	-	-	-	-	-	-	108-87-2
5035A/8260D	2,3,3-Trimethylpentane	50.0	50.0	ug/kg	-	-	-	-	-	-	560-21-4
5035A/8260D	n-Octane	250	250	ug/kg	-	-	-	-	-	-	111-65-9
5035A/8260D	n-Dodecane	250	250	ug/kg	-	-	-	-	-	-	112-40-3
5035A/8260D	Pentafluorobenzene (ISTD)			ug/kg	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)			ug/kg	-	-	-	-	-	-	3114-55-4
Volatiles Screen by Purge and Trap and GC/MS in Soil											
5035A/8260D	n-Butane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	106-97-8
5035A/8260D	Isopentane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	78-78-4
5035A/8260D	n-Pentane	250	250	ug/kg dry wt	-	-	-	-	-	-	109-66-0
5035A/8260D	n-Heptane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	142-82-5
5035A/8260D	3-Methylhexane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	589-34-4
5035A/8260D	Isooctane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	540-84-1
5035A/8260D	Methylcyclohexane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	108-87-2
5035A/8260D	2,3,3-Trimethylpentane	50.0	50.0	ug/kg dry wt	-	-	-	-	-	-	560-21-4
5035A/8260D	n-Octane	250	250	ug/kg dry wt	-	-	-	-	-	-	111-65-9
5035A/8260D	n-Dodecane	250	250	ug/kg dry wt	-	-	-	-	-	-	112-40-3
5035A/8260D	Pentafluorobenzene (ISTD)			ug/kg dry wt	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3114-55-4
Volatiles Screen by Purge and Trap and GC/MS in Water											
EPA 8260D	n-Butane	1.00	1.00	ug/L	-	-	-	-	-	-	106-97-8
EPA 8260D	Isopentane	1.00	1.00	ug/L	-	-	-	-	-	-	78-78-4
EPA 8260D	n-Pentane	1.00	1.00	ug/L	-	-	-	-	-	-	109-66-0
EPA 8260D	n-Heptane	1.00	1.00	ug/L	-	-	-	-	-	-	142-82-5
EPA 8260D	3-Methylhexane	1.00	1.00	ug/L	-	-	-	-	-	-	589-34-4
EPA 8260D	Isooctane	1.00	1.00	ug/L	-	-	-	-	-	-	540-84-1
EPA 8260D	Methylcyclohexane	1.00	1.00	ug/L	-	-	-	-	-	-	108-87-2
EPA 8260D	2,3,3-Trimethylpentane	1.00	1.00	ug/L	-	-	-	-	-	-	560-21-4
EPA 8260D	n-Octane	5.00	5.00	ug/L	-	-	-	-	-	-	111-65-9
EPA 8260D	n-Dodecane	5.00	5.00	ug/L	-	-	-	-	-	-	112-40-3
EPA 8260D	Pentafluorobenzene (ISTD)		0.500	ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)		0.500	ug/L	-	-	-	-	-	-	3114-55-4
Oxygenates by EPA 8260D in Liquid											
5035A/8260D	Ethanol	3120	6250	ug/kg	-	30	45-159	30	80-120	30	64-17-5
5035A/8260D	tert-Butanol (TBA)	2500	5000	ug/kg	-	30	68-133	30	80-120	30	75-65-0
5035A/8260D	tert-Amyl ethyl ether (TAEE)	12.5	25.0	ug/kg	-	30	80-130	30	80-120	30	919-94-8
5035A/8260D	Diisopropyl ether (DIPE)	12.5	25.0	ug/kg	-	30	69-127	30	80-120	30	108-20-3

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
5035A/8260D	Ethyl-tert-butyl ether (ETBE)	12.5	25.0	ug/kg	-	30	72-126	30	80-120	30	637-92-3
5035A/8260D	tert-Amyl methyl ether (TAME)	12.5	25.0	ug/kg	-	30	73-126	30	80-120	30	994-05-8
5035A/8260D	Methyl tert-butyl ether (MTBE)	25.0	50.0	ug/kg	-	30	73-125	30	80-120	30	1634-04-4
5035A/8260D	1,2-Dibromoethane (EDB)	25.0	50.0	ug/kg	-	30	78-122	30	80-120	30	106-93-4
5035A/8260D	1,2-Dichloroethane (EDC)	12.5	25.0	ug/kg	-	30	73-128	30	80-120	30	107-06-2
5035A/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
5035A/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
5035A/8260D	4-Bromofluorobenzene (Surr)			Surrogate	79-120	-	-	-	-	-	460-00-4
5035A/8260D	Pentafluorobenzene (ISTD)		25.0	ug/kg	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)		25.0	ug/kg	-	-	-	-	-	-	3114-55-4
5035A/8260D	1,4-Dichlorobenzene-d4 (ISTD)		25.0	ug/kg	-	-	-	-	-	-	3855-82-1
Oxygenates by EPA 8260D in Soil											
5035A/8260D	Ethanol	3120	6250	ug/kg dry wt	-	30	45-159	30	80-120	30	64-17-5
5035A/8260D	tert-Butanol (TBA)	2500	5000	ug/kg dry wt	-	30	68-133	30	80-120	30	75-65-0
5035A/8260D	tert-Amyl ethyl ether (TAEE)	12.5	25.0	ug/kg dry wt	-	30	80-130	30	80-120	30	919-94-8
5035A/8260D	Diisopropyl ether (DIPE)	12.5	25.0	ug/kg dry wt	-	30	69-127	30	80-120	30	108-20-3
5035A/8260D	Ethyl-tert-butyl ether (ETBE)	12.5	25.0	ug/kg dry wt	-	30	72-126	30	80-120	30	637-92-3
5035A/8260D	tert-Amyl methyl ether (TAME)	12.5	25.0	ug/kg dry wt	-	30	73-126	30	80-120	30	994-05-8
5035A/8260D	Methyl tert-butyl ether (MTBE)	25.0	50.0	ug/kg dry wt	-	30	73-125	30	80-120	30	1634-04-4
5035A/8260D	1,2-Dibromoethane (EDB)	25.0	50.0	ug/kg dry wt	-	30	78-122	30	80-120	30	106-93-4
5035A/8260D	1,2-Dichloroethane (EDC)	12.5	25.0	ug/kg dry wt	-	30	73-128	30	80-120	30	107-06-2
5035A/8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
5035A/8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
5035A/8260D	4-Bromofluorobenzene (Surr)			Surrogate	79-120	-	-	-	-	-	460-00-4
5035A/8260D	Pentafluorobenzene (ISTD)		25.0	ug/kg dry wt	-	-	-	-	-	-	363-72-4
5035A/8260D	Chlorobenzene-d5 (ISTD)		25.0	ug/kg dry wt	-	-	-	-	-	-	3114-55-4
5035A/8260D	1,4-Dichlorobenzene-d4 (ISTD)		25.0	ug/kg dry wt	-	-	-	-	-	-	3855-82-1
Oxygenates by EPA 8260D in Water											
EPA 8260D	Ethanol	62.5	125	ug/L	-	30	48-151	30	80-120	30	64-17-5
EPA 8260D	tert-Butanol (TBA)	50.0	100	ug/L	-	30	68-129	30	80-120	30	75-65-0
EPA 8260D	tert-Amyl ethyl ether (TAEE)	0.250	0.500	ug/L	-	30	62-126	30	80-120	30	919-94-8
EPA 8260D	Diisopropyl ether (DIPE)	0.250	0.500	ug/L	-	30	67-128	30	80-120	30	108-20-3
EPA 8260D	Ethyl-tert-butyl ether (ETBE)	0.250	0.500	ug/L	-	30	70-127	30	80-120	30	637-92-3
EPA 8260D	tert-Amyl methyl ether (TAME)	0.250	0.500	ug/L	-	30	68-128	30	80-120	30	994-05-8
EPA 8260D	Methyl tert-butyl ether (MTBE)	0.500	1.00	ug/L	-	30	71-124	30	80-120	30	1634-04-4
EPA 8260D	1,2-Dibromoethane (EDB)	0.250	0.500	ug/L	-	30	77-121	30	80-120	30	106-93-4
EPA 8260D	1,2-Dichloroethane (EDC)	0.200	0.400	ug/L	-	30	73-128	30	80-120	30	107-06-2
EPA 8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
EPA 8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
EPA 8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
EPA 8260D	Pentafluorobenzene (ISTD)		0.500	ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)		0.500	ug/L	-	-	-	-	-	-	3114-55-4
EPA 8260D	1,4-Dichlorobenzene-d4 (ISTD)		0.500	ug/L	-	-	-	-	-	-	3855-82-1
Polychlorinated Biphenyls by EPA 8082A in Water											
EPA 8082A	1016 (1)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	1016 (2)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	1016 (3)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	1016 (4)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	1016 (5)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	1016 (6)	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	NA
EPA 8082A	Aroclor 1016	0.0500	0.100	ug/L	-	30	46-129	30	46-129	30	12674-11-2
EPA 8082A	1221 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1221 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1221 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
EPA 8082A	1221 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1221 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1221	0.0500	0.100	ug/L	-	30	-	-	-	30	11104-28-2
EPA 8082A	1232 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1232 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1232 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1232 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1232 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1232 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1232	0.0500	0.100	ug/L	-	30	-	-	-	30	11141-16-5
EPA 8082A	1242 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1242 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1242 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1242 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1242 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1242 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1242	0.0500	0.100	ug/L	-	30	-	-	-	30	53469-21-9
EPA 8082A	1248 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1248 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1248 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1248 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1248 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1248 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1248	0.0500	0.100	ug/L	-	30	-	-	-	30	12672-29-6
EPA 8082A	1254 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1254 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1254 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1254 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1254 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1254 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1254	0.0500	0.100	ug/L	-	30	-	-	-	30	11097-69-1
EPA 8082A	1260 (1)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	1260 (2)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	1260 (3)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	1260 (4)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	1260 (5)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	1260 (6)	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	NA
EPA 8082A	Aroclor 1260	0.0500	0.100	ug/L	-	30	45-134	30	45-134	30	11096-82-5
EPA 8082A	1262 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1262 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1262 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1262 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1262 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1262 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1262	0.0500	0.100	ug/L	-	30	-	-	-	30	37324-23-5
EPA 8082A	1268 (1)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1268 (2)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1268 (3)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1268 (4)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1268 (5)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	1268 (6)	0.0500	0.100	ug/L	-	30	-	-	-	30	NA
EPA 8082A	Aroclor 1268	0.0500	0.100	ug/L	-	30	-	-	-	30	11100-14-4
EPA 8082A	Decachlorobiphenyl (Surr)			Surrogate	40-135	-	-	-	-	-	2051-24-3
Organochlorine Pesticides by EPA 8081B in Water											
EPA 8081B	Aldrin	0.00500	0.0100	ug/L	-	30	45-134	30	45-134	30	309-00-2
EPA 8081B	Aldrin [2C]	0.00500	0.0100	ug/L	-	30	45-134	30	45-134	30	309-00-2
EPA 8081B	alpha-BHC	0.00500	0.0100	ug/L	-	30	54-138	30	54-138	30	319-84-6
EPA 8081B	alpha-BHC [2C]	0.00500	0.0100	ug/L	-	30	54-138	30	54-138	30	319-84-6

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8081B	beta-BHC	0.00500	0.0100	ug/L	-	30	56-136	30	56-136	30	319-85-7
EPA 8081B	beta-BHC [2C]	0.00500	0.0100	ug/L	-	30	56-136	30	56-136	30	319-85-7
EPA 8081B	delta-BHC	0.00500	0.0100	ug/L	-	30	52-142	30	52-142	30	319-86-8
EPA 8081B	delta-BHC [2C]	0.00500	0.0100	ug/L	-	30	52-142	30	52-142	30	319-86-8
EPA 8081B	gamma-BHC (Lindane)	0.00500	0.0100	ug/L	-	30	59-134	30	59-134	30	58-89-9
EPA 8081B	gamma-BHC (Lindane) [2C]	0.00500	0.0100	ug/L	-	30	59-134	30	59-134	30	58-89-9
EPA 8081B	cis-Chlordane	0.00500	0.0100	ug/L	-	30	60-129	30	60-129	30	5103-71-9
EPA 8081B	cis-Chlordane [2C]	0.00500	0.0100	ug/L	-	30	60-129	30	60-129	30	5103-71-9
EPA 8081B	trans-Chlordane	0.00500	0.0100	ug/L	-	30	56-136	30	56-136	30	5103-74-2
EPA 8081B	trans-Chlordane [2C]	0.00500	0.0100	ug/L	-	30	56-136	30	56-136	30	5103-74-2
EPA 8081B	4,4'-DDD	0.00500	0.0100	ug/L	-	30	56-143	30	56-143	30	72-54-8
EPA 8081B	4,4'-DDD [2C]	0.00500	0.0100	ug/L	-	30	56-143	30	56-143	30	72-54-8
EPA 8081B	4,4'-DDE	0.00500	0.0100	ug/L	-	30	57-135	30	57-135	30	72-55-9
EPA 8081B	4,4'-DDE [2C]	0.00500	0.0100	ug/L	-	30	57-135	30	57-135	30	72-55-9
EPA 8081B	4,4'-DDT	0.00500	0.0100	ug/L	-	30	51-143	30	51-143	30	50-29-3
EPA 8081B	4,4'-DDT [2C]	0.00500	0.0100	ug/L	-	30	51-143	30	51-143	30	50-29-3
EPA 8081B	Dieldrin	0.00500	0.0100	ug/L	-	30	60-136	30	60-136	30	60-57-1
EPA 8081B	Dieldrin [2C]	0.00500	0.0100	ug/L	-	30	60-136	30	60-136	30	60-57-1
EPA 8081B	Endosulfan I	0.00500	0.0100	ug/L	-	30	62-126	30	62-126	30	959-98-8
EPA 8081B	Endosulfan I [2C]	0.00500	0.0100	ug/L	-	30	62-126	30	62-126	30	959-98-8
EPA 8081B	Endosulfan II	0.00500	0.0100	ug/L	-	30	52-135	30	52-135	30	33213-65-9
EPA 8081B	Endosulfan II [2C]	0.00500	0.0100	ug/L	-	30	52-135	30	52-135	30	33213-65-9
EPA 8081B	Endosulfan sulfate	0.00500	0.0100	ug/L	-	30	62-133	30	62-133	30	1031-07-8
EPA 8081B	Endosulfan sulfate [2C]	0.00500	0.0100	ug/L	-	30	62-133	30	62-133	30	1031-07-8
EPA 8081B	Endrin	0.00500	0.0100	ug/L	-	30	60-138	30	60-138	30	72-20-8
EPA 8081B	Endrin [2C]	0.00500	0.0100	ug/L	-	30	60-138	30	60-138	30	72-20-8
EPA 8081B	Endrin aldehyde	0.00500	0.0100	ug/L	-	30	51-132	30	51-132	30	7421-93-4
EPA 8081B	Endrin aldehyde [2C]	0.00500	0.0100	ug/L	-	30	51-132	30	51-132	30	7421-93-4
EPA 8081B	Endrin ketone	0.00500	0.0100	ug/L	-	30	58-134	30	58-134	30	53494-70-5
EPA 8081B	Endrin ketone [2C]	0.00500	0.0100	ug/L	-	30	58-134	30	58-134	30	53494-70-5
EPA 8081B	Heptachlor	0.00500	0.0100	ug/L	-	30	54-130	30	54-130	30	76-44-8
EPA 8081B	Heptachlor [2C]	0.00500	0.0100	ug/L	-	30	54-130	30	54-130	30	76-44-8
EPA 8081B	Heptachlor epoxide	0.00500	0.0100	ug/L	-	30	61-133	30	61-133	30	1024-57-3
EPA 8081B	Heptachlor epoxide [2C]	0.00500	0.0100	ug/L	-	30	61-133	30	61-133	30	1024-57-3
EPA 8081B	Methoxychlor	0.0350	0.0700	ug/L	-	30	54-145	30	54-145	30	72-43-5
EPA 8081B	Methoxychlor [2C]	0.0350	0.0700	ug/L	-	30	54-145	30	54-145	30	72-43-5
EPA 8081B	Chlordane 1	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane 2	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane 3	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane (Technical)	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	12789-03-6
EPA 8081B	Chlordane 1 [2C]	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane 2 [2C]	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane 3 [2C]	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	NA
EPA 8081B	Chlordane (Technical) [2C]	0.188	0.375	ug/L	-	30	62-140	30	62-140	30	12789-03-6
EPA 8081B	Toxaphene 1	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 2	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 3	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 4	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 5	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 6	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene (Total)	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	8001-35-2
EPA 8081B	Toxaphene 1 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 2 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 3 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 4 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 5 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene 6 [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	NA
EPA 8081B	Toxaphene (Total) [2C]	0.188	0.375	ug/L	-	30	33-134	30	33-134	30	8001-35-2
EPA 8081B	cis-Nonachlor	0.00500	0.0100	ug/L	-	30	66-120	30	66-120	30	5103-73-1
EPA 8081B	cis-Nonachlor [2C]	0.00500	0.0100	ug/L	-	30	66-120	30	66-120	30	5103-73-1

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8081B	trans-Nonachlor	0.00500	0.0100	ug/L	-	30	55-120	30	55-120	30	39765-80-5
EPA 8081B	trans-Nonachlor [2C]	0.00500	0.0100	ug/L	-	30	55-120	30	55-120	30	39765-80-5
EPA 8081B	2,4'-DDD	0.00500	0.0100	ug/L	-	30	66-120	30	66-120	30	53-19-0
EPA 8081B	2,4'-DDD [2C]	0.00500	0.0100	ug/L	-	30	66-120	30	66-120	30	53-19-0
EPA 8081B	2,4'-DDE	0.00500	0.0100	ug/L	-	30	55-120	30	55-120	30	3424-82-6
EPA 8081B	2,4'-DDE [2C]	0.00500	0.0100	ug/L	-	30	55-120	30	55-120	30	3424-82-6
EPA 8081B	2,4'-DDT	0.00500	0.0100	ug/L	-	30	62-127	30	62-127	30	789-02-6
EPA 8081B	2,4'-DDT [2C]	0.00500	0.0100	ug/L	-	30	62-127	30	62-127	30	789-02-6
EPA 8081B	Hexachlorobenzene	0.0150	0.0300	ug/L	-	30	28-136	30	28-136	30	118-74-1
EPA 8081B	Hexachlorobenzene [2C]	0.0150	0.0300	ug/L	-	30	28-136	30	28-136	30	118-74-1
EPA 8081B	Hexachlorobutadiene	0.00500	0.0100	ug/L	-	30	10-120	30	10-120	30	87-68-3
EPA 8081B	Hexachlorobutadiene [2C]	0.00500	0.0100	ug/L	-	30	10-120	30	10-120	30	87-68-3
EPA 8081B	Mirex	0.00500	0.0100	ug/L	-	30	51-127	30	51-127	30	2385-85-5
EPA 8081B	Mirex [2C]	0.00500	0.0100	ug/L	-	30	51-127	30	51-127	30	2385-85-5
EPA 8081B	Oxychlordane	0.00500	0.0100	ug/L	-	30	47-120	30	47-120	30	27304-13-8
EPA 8081B	Oxychlordane [2C]	0.00500	0.0100	ug/L	-	30	47-120	30	47-120	30	27304-13-8
EPA 8081B	2,4,5,6-TCMX (Surr)			Surrogate	25-140	-	-	-	-	-	877-09-8
EPA 8081B	2,4,5,6-TCMX (Surr) [2C]			Surrogate	25-140	-	-	-	-	-	877-09-8
EPA 8081B	Decachlorobiphenyl (Surr)			Surrogate	30-135	-	-	-	-	-	2051-24-3
EPA 8081B	Decachlorobiphenyl (Surr) [2C]			Surrogate	30-135	-	-	-	-	-	2051-24-3
Selected Semivolatile Organic Compounds by EPA 8270E in Soil											
EPA 8270E	Acenaphthene	1.33	2.67	ug/kg dry wt	-	30	40-123	30	40-123	30	83-32-9
EPA 8270E	Acenaphthylene	1.33	2.67	ug/kg dry wt	-	30	32-132	30	32-132	30	208-96-8
EPA 8270E	Anthracene	1.33	2.67	ug/kg dry wt	-	30	47-123	30	47-123	30	120-12-7
EPA 8270E	Benz(a)anthracene	1.33	2.67	ug/kg dry wt	-	30	49-126	30	49-126	30	56-55-3
EPA 8270E	Benzo(a)pyrene	2.00	4.00	ug/kg dry wt	-	30	45-129	30	45-129	30	50-32-8
EPA 8270E	Benzo(b)fluoranthene	2.00	4.00	ug/kg dry wt	-	30	45-132	30	45-132	30	205-99-2
EPA 8270E	Benzo(k)fluoranthene	2.00	4.00	ug/kg dry wt	-	30	47-132	30	47-132	30	207-08-9
EPA 8270E	Benzo(g,h,i)perylene	1.33	2.67	ug/kg dry wt	-	30	43-134	30	43-134	30	191-24-2
EPA 8270E	Chrysene	1.33	2.67	ug/kg dry wt	-	30	50-124	30	50-124	30	218-01-9
EPA 8270E	Dibenz(a,h)anthracene	1.33	2.67	ug/kg dry wt	-	30	45-134	30	45-134	30	53-70-3
EPA 8270E	Fluoranthene	1.33	2.67	ug/kg dry wt	-	30	50-127	30	50-127	30	206-44-0
EPA 8270E	Fluorene	1.33	2.67	ug/kg dry wt	-	30	43-125	30	43-125	30	86-73-7
EPA 8270E	Indeno(1,2,3-cd)pyrene	1.33	2.67	ug/kg dry wt	-	30	45-133	30	45-133	30	193-39-5
EPA 8270E	1-Methylnaphthalene	2.67	5.33	ug/kg dry wt	-	30	40-120	30	40-120	30	90-12-0
EPA 8270E	2-Methylnaphthalene	2.67	5.33	ug/kg dry wt	-	30	38-122	30	38-122	30	91-57-6
EPA 8270E	Naphthalene	2.67	5.33	ug/kg dry wt	-	30	35-123	30	35-123	30	91-20-3
EPA 8270E	Phenanthrene	1.33	2.67	ug/kg dry wt	-	30	50-121	30	50-121	30	85-01-8
EPA 8270E	Pyrene	1.33	2.67	ug/kg dry wt	-	30	47-127	30	47-127	30	129-00-0
EPA 8270E	Carbazole	2.00	4.00	ug/kg dry wt	-	30	50-123	30	50-123	30	86-74-8
EPA 8270E	Dibenzofuran	1.33	2.67	ug/kg dry wt	-	30	44-120	30	44-120	30	132-64-9
EPA 8270E	2-Chlorophenol	6.67	13.3	ug/kg dry wt	-	30	34-121	30	34-121	30	95-57-8
EPA 8270E	4-Chloro-3-methylphenol	13.3	26.7	ug/kg dry wt	-	30	45-122	30	45-122	30	59-50-7
EPA 8270E	2,4-Dichlorophenol	6.67	13.3	ug/kg dry wt	-	30	40-122	30	40-122	30	120-83-2
EPA 8270E	2,4-Dimethylphenol	6.67	13.3	ug/kg dry wt	-	30	30-127	30	30-127	30	105-67-9
EPA 8270E	2,4-Dinitrophenol	33.3	66.7	ug/kg dry wt	-	30	10-137	30	10-137	30	51-28-5
EPA 8270E	4,6-Dinitro-2-methylphenol	33.3	66.7	ug/kg dry wt	-	30	29-132	30	29-132	30	534-52-1
EPA 8270E	2-Methylphenol	3.33	6.67	ug/kg dry wt	-	30	32-122	30	32-122	30	95-48-7
EPA 8270E	3+4-Methylphenol(s)	3.33	6.67	ug/kg dry wt	-	30	34-120	30	34-120	30	NA
EPA 8270E	2-Nitrophenol	13.3	26.7	ug/kg dry wt	-	30	36-123	30	36-123	30	88-75-5
EPA 8270E	4-Nitrophenol	13.3	26.7	ug/kg dry wt	-	30	30-132	30	30-132	30	100-02-7
EPA 8270E	Pentachlorophenol (PCP)	13.3	26.7	ug/kg dry wt	-	30	25-133	30	25-133	30	87-86-5
EPA 8270E	Phenol	2.67	5.33	ug/kg dry wt	-	30	34-121	30	34-121	30	108-95-2
EPA 8270E	2,3,4,6-Tetrachlorophenol	6.67	13.3	ug/kg dry wt	-	30	44-125	30	44-125	30	58-90-2
EPA 8270E	2,3,5,6-Tetrachlorophenol	6.67	13.3	ug/kg dry wt	-	30	40-120	30	40-120	30	935-95-5
EPA 8270E	2,4,5-Trichlorophenol	6.67	13.3	ug/kg dry wt	-	30	41-124	30	41-124	30	95-95-4
EPA 8270E	2,4,6-Trichlorophenol	6.67	13.3	ug/kg dry wt	-	30	39-126	30	39-126	30	88-06-2
EPA 8270E	Bis(2-ethylhexyl)phthalate	20.0	40.0	ug/kg dry wt	-	30	51-133	30	51-133	30	117-81-7

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8270E	Butyl benzyl phthalate	13.3	26.7	ug/kg dry wt	-	30	48-132	30	48-132	30	85-68-7
EPA 8270E	Diethylphthalate	13.3	26.7	ug/kg dry wt	-	30	50-124	30	50-124	30	84-66-2
EPA 8270E	Dimethylphthalate	13.3	26.7	ug/kg dry wt	-	30	48-124	30	48-124	30	131-11-3
EPA 8270E	Di-n-butylphthalate	13.3	26.7	ug/kg dry wt	-	30	51-128	30	51-128	30	84-74-2
EPA 8270E	Di-n-octyl phthalate	13.3	26.7	ug/kg dry wt	-	30	45-140	30	45-140	30	117-84-0
EPA 8270E	Benzo(e)pyrene	1.33	2.67	ug/kg dry wt	-	30	64-120	30	64-120	30	192-97-2
EPA 8270E	Perylene	1.33	2.67	ug/kg dry wt	-	30	72-130	30	72-130	30	198-55-0
EPA 8270E	1,1'-Biphenyl	3.33	6.67	ug/kg dry wt	-	30	40-120	30	40-120	30	92-52-4
EPA 8270E	2,3,5-Trimethylnaphthalene	1.33	2.67	ug/kg dry wt	-	30	62-120	30	62-120	30	2245-38-7
EPA 8270E	2,6-Dimethylnaphthalene	1.33	2.67	ug/kg dry wt	-	30	61-120	30	61-120	30	581-42-0
EPA 8270E	Nitrobenzene-d5 (Surr)			Surrogate	37-122	-	-	-	-	-	4165-60-0
EPA 8270E	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
EPA 8270E	Phenol-d6 (Surr)			Surrogate	33-122	-	-	-	-	-	13127-88-3
EPA 8270E	p-Terphenyl-d14 (Surr)			Surrogate	54-127	-	-	-	-	-	1718-51-0
EPA 8270E	2-Fluorophenol (Surr)			Surrogate	35-120	-	-	-	-	-	367-12-4
EPA 8270E	2,4,6-Tribromophenol (Surr)			Surrogate	39-132	-	-	-	-	-	118-79-6
EPA 8270E	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3855-82-1
EPA 8270E	Naphthalene-d8 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1146-65-2
EPA 8270E	Acenaphthene-d10 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	15067-26-2
EPA 8270E	Phenanthrene-d10 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1517-22-2
EPA 8270E	Chrysene-d12 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1719-03-5
EPA 8270E	Perylene-d12 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1520-96-3
EPA 8270E	Dibenz(a,h)anthracene-d14 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	13250-98-1
Semivolatile Organic Compounds by EPA 8270E in Water											
EPA 8270E	Acenaphthene	0.0100	0.0200	ug/L	-	30	47-122	30	47-122	30	83-32-9
EPA 8270E	Acenaphthylene	0.0100	0.0200	ug/L	-	30	41-130	30	41-130	30	208-96-8
EPA 8270E	Anthracene	0.0100	0.0200	ug/L	-	30	57-123	30	57-123	30	120-12-7
EPA 8270E	Benz(a)anthracene	0.0100	0.0200	ug/L	-	30	58-125	30	58-125	30	56-55-3
EPA 8270E	Benzo(a)pyrene	0.0150	0.0300	ug/L	-	30	54-128	30	54-128	30	50-32-8
EPA 8270E	Benzo(b)fluoranthene	0.0150	0.0300	ug/L	-	30	53-131	30	53-131	30	205-99-2
EPA 8270E	Benzo(b+j)fluoranthene	0.0150	0.0300	ug/L							
EPA 8270E	Benzo(k)fluoranthene	0.0150	0.0300	ug/L	-	30	57-129	30	57-129	30	207-08-9
EPA 8270E	Benzo(g,h,i)perylene	0.0100	0.0200	ug/L	-	30	50-134	30	50-134	30	191-24-2
EPA 8270E	Chrysene	0.0100	0.0200	ug/L	-	30	59-123	30	59-123	30	218-01-9
EPA 8270E	Dibenz(a,h)anthracene	0.0100	0.0200	ug/L	-	30	51-134	30	51-134	30	53-70-3
EPA 8270E	Fluoranthene	0.0100	0.0200	ug/L	-	30	57-128	30	57-128	30	206-44-0
EPA 8270E	Fluorene	0.0100	0.0200	ug/L	-	30	52-124	30	52-124	30	86-73-7
EPA 8270E	Indeno(1,2,3-cd)pyrene	0.0100	0.0200	ug/L	-	30	52-134	30	52-134	30	193-39-5
EPA 8270E	1-Methylnaphthalene	0.0200	0.0400	ug/L	-	30	41-120	30	41-120	30	90-12-0
EPA 8270E	2-Methylnaphthalene	0.0200	0.0400	ug/L	-	30	40-121	30	40-121	30	91-57-6
EPA 8270E	Naphthalene	0.0200	0.0400	ug/L	-	30	40-121	30	40-121	30	91-20-3
EPA 8270E	Phenanthrene	0.0100	0.0200	ug/L	-	30	59-120	30	59-120	30	85-01-8
EPA 8270E	Pyrene	0.0100	0.0200	ug/L	-	30	57-126	30	57-126	30	129-00-0
EPA 8270E	Carbazole	0.0150	0.0300	ug/L	-	30	60-122	30	60-122	30	86-74-8
EPA 8270E	Dibenzofuran	0.0100	0.0200	ug/L	-	30	53-120	30	53-120	30	132-64-9
EPA 8270E	2-Chlorophenol	0.0500	0.100	ug/L	-	30	38-120	30	38-120	30	95-57-8
EPA 8270E	4-Chloro-3-methylphenol	0.100	0.200	ug/L	-	30	52-120	30	52-120	30	59-50-7
EPA 8270E	2,4-Dichlorophenol	0.0500	0.100	ug/L	-	30	47-121	30	47-121	30	120-83-2
EPA 8270E	2,4-Dimethylphenol	0.250	0.500	ug/L	-	30	31-124	30	31-124	30	105-67-9
EPA 8270E	2,4-Dinitrophenol	0.250	0.500	ug/L	-	30	23-143	30	23-143	30	51-28-5
EPA 8270E	4,6-Dinitro-2-methylphenol	0.250	0.500	ug/L	-	30	44-137	30	44-137	30	534-52-1
EPA 8270E	2-Methylphenol	0.0250	0.0500	ug/L	-	30	30-120	30	30-120	30	95-48-7
EPA 8270E	3+4-Methylphenol(s)	0.0250	0.0500	ug/L	-	30	29-120	30	29-120	30	NA
EPA 8270E	2-Nitrophenol	0.100	0.200	ug/L	-	30	47-123	30	47-123	30	88-75-5
EPA 8270E	4-Nitrophenol	0.100	0.200	ug/L	-	30	10-120	30	10-120	30	100-02-7
EPA 8270E	Pentachlorophenol (PCP)	0.100	0.200	ug/L	-	30	35-138	30	35-138	30	87-86-5
EPA 8270E	Phenol	0.200	0.400	ug/L	-	30	10-120	30	10-120	30	108-95-2
EPA 8270E	2,3,4,6-Tetrachlorophenol	0.0500	0.100	ug/L	-	30	50-128	30	50-128	30	58-90-2

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8270E	2,3,5,6-Tetrachlorophenol	0.0500	0.100	ug/L	-	30	50-121	30	50-121	30	935-95-5
EPA 8270E	2,4,5-Trichlorophenol	0.0500	0.100	ug/L	-	30	53-123	30	53-123	30	95-95-4
EPA 8270E	2,4,6-Trichlorophenol	0.0500	0.100	ug/L	-	30	50-125	30	50-125	30	88-06-2
EPA 8270E	Bis(2-ethylhexyl)phthalate	0.200	0.400	ug/L	-	30	55-135	30	55-135	30	117-81-7
EPA 8270E	Butyl benzyl phthalate	0.200	0.400	ug/L	-	30	53-134	30	53-134	30	85-68-7
EPA 8270E	Diethylphthalate	0.200	0.400	ug/L	-	30	56-125	30	56-125	30	84-66-2
EPA 8270E	Dimethylphthalate	0.200	0.400	ug/L	-	30	45-127	30	45-127	30	131-11-3
EPA 8270E	Di-n-butylphthalate	0.200	0.400	ug/L	-	30	59-127	30	59-127	30	84-74-2
EPA 8270E	Di-n-octyl phthalate	0.200	0.400	ug/L	-	30	51-140	30	51-140	30	117-84-0
EPA 8270E	N-Nitrosodimethylamine	0.0250	0.0500	ug/L	-	30	19-120	30	19-120	30	62-75-9
EPA 8270E	N-Nitroso-di-n-propylamine	0.0250	0.0500	ug/L	-	30	49-120	30	49-120	30	621-64-7
EPA 8270E	N-Nitrosodiphenylamine	0.0250	0.0500	ug/L	-	30	51-123	30	51-123	30	86-30-6
EPA 8270E	Bis(2-Chloroethoxy) methane	0.0250	0.0500	ug/L	-	30	48-120	30	48-120	30	111-91-1
EPA 8270E	Bis(2-Chloroethyl) ether	0.0250	0.0500	ug/L	-	30	43-120	30	43-120	30	111-44-4
EPA 8270E	2,2'-Oxybis(1-Chloropropane)	0.0250	0.0500	ug/L	-	30	41-120	30	41-120	30	108-60-1
EPA 8270E	Hexachlorobenzene	0.0100	0.0200	ug/L	-	30	53-125	30	53-125	30	118-74-1
EPA 8270E	Hexachlorobutadiene	0.0250	0.0500	ug/L	-	30	22-124	30	22-124	30	87-68-3
EPA 8270E	Hexachlorocyclopentadiene	0.0500	0.100	ug/L	-	30	10-127	30	10-127	30	77-47-4
EPA 8270E	Hexachloroethane	0.0250	0.0500	ug/L	-	30	21-120	30	21-120	30	67-72-1
EPA 8270E	2-Chloronaphthalene	0.0100	0.0200	ug/L	-	30	40-120	30	40-120	30	91-58-7
EPA 8270E	1,2,4-Trichlorobenzene	0.0250	0.0500	ug/L	-	30	29-120	30	29-120	30	120-82-1
EPA 8270E	4-Bromophenyl phenyl ether	0.0250	0.0500	ug/L	-	30	55-124	30	55-124	30	101-55-3
EPA 8270E	4-Chlorophenyl phenyl ether	0.0250	0.0500	ug/L	-	30	53-121	30	53-121	30	7005-72-3
EPA 8270E	Aniline	0.0500	0.100	ug/L	-	30	10-120	30	10-120	30	62-53-3
EPA 8270E	4-Chloroaniline	0.0250	0.0500	ug/L	-	30	33-120	30	33-120	30	106-47-8
EPA 8270E	2-Nitroaniline	0.200	0.400	ug/L	-	30	55-127	30	55-127	30	88-74-4
EPA 8270E	3-Nitroaniline	0.200	0.400	ug/L	-	30	41-128	30	41-128	30	99-09-2
EPA 8270E	4-Nitroaniline	0.200	0.400	ug/L	-	30	25-120	30	25-120	30	100-01-6
EPA 8270E	Nitrobenzene	0.100	0.200	ug/L	-	30	45-121	30	45-121	30	98-95-3
EPA 8270E	2,4-Dinitrotoluene	0.100	0.200	ug/L	-	30	57-128	30	57-128	30	121-14-2
EPA 8270E	2,6-Dinitrotoluene	0.100	0.200	ug/L	-	30	57-124	30	57-124	30	606-20-2
EPA 8270E	Benzoic acid	1.25	2.50	ug/L	-	30	10-120	30	10-120	30	65-85-0
EPA 8270E	Benzyl alcohol	0.100	0.200	ug/L	-	30	31-120	30	31-120	30	100-51-6
EPA 8270E	Isophorone	0.0250	0.0500	ug/L	-	30	42-124	30	42-124	30	78-59-1
EPA 8270E	Azobenzene (1,2-DPH)	0.0250	0.0500	ug/L	-	30	61-120	30	61-120	30	103-33-3
EPA 8270E	Benzidine	0.500	1.00	ug/L	-	30	10-127	30	10-127	30	92-87-5
EPA 8270E	Bis(2-Ethylhexyl) adipate	0.250	0.500	ug/L	-	30	63-121	30	63-121	30	103-23-1
EPA 8270E	3,3'-Dichlorobenzidine	0.500	1.00	ug/L	-	30	27-129	30	27-129	30	91-94-1
EPA 8270E	1,2-Dinitrobenzene	0.250	0.500	ug/L	-	30	59-120	30	59-120	30	528-29-0
EPA 8270E	1,3-Dinitrobenzene	0.250	0.500	ug/L	-	30	49-128	30	49-128	30	99-65-0
EPA 8270E	1,4-Dinitrobenzene	0.250	0.500	ug/L	-	30	54-120	30	54-120	30	100-25-4
EPA 8270E	Pyridine	0.100	0.200	ug/L	-	30	10-120	30	10-120	30	110-86-1
EPA 8270E	Benzo(e)pyrene	0.0100	0.0200	ug/L	-	30	67-120	30	67-120	30	192-97-2
EPA 8270E	Perylene	0.0100	0.0200	ug/L	-	30	62-130	30	62-130	30	198-55-0
EPA 8270E	2,6-Dichlorophenol	0.0500	0.100	ug/L	-	30	50-120	30	50-120	30	87-65-0
EPA 8270E	2,3,4,5-Tetrachlorophenol	0.0500	0.100	ug/L	-	30	60-140	30	60-140	30	4901-51-3
EPA 8270E	1,2-Dichlorobenzene	0.0250	0.0500	ug/L	-	30	32-120	30	32-120	30	95-50-1
EPA 8270E	1,3-Dichlorobenzene	0.0250	0.0500	ug/L	-	30	28-120	30	28-120	30	541-73-1
EPA 8270E	1,4-Dichlorobenzene	0.0250	0.0500	ug/L	-	30	29-120	30	29-120	30	106-46-7
EPA 8270E	1,1'-Biphenyl	0.0250	0.0500	ug/L	-	30	49-120	30	49-120	30	92-52-4
EPA 8270E	2,3,5-Trimethylnaphthalene	0.0100	0.0200	ug/L	-	30	47-120	30	47-120	30	2245-38-7
EPA 8270E	2,6-Dimethylnaphthalene	0.0100	0.0200	ug/L	-	30	35-120	30	35-120	30	581-42-0
EPA 8270E	Nitrobenzene-d5 (Surr)			Surrogate	44-120	-	-	-	-	-	4165-60-0
EPA 8270E	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
EPA 8270E	Phenol-d6 (Surr)			Surrogate	10-133	-	-	-	-	-	13127-88-3
EPA 8270E	p-Terphenyl-d14 (Surr)			Surrogate	50-134	-	-	-	-	-	1718-51-0
EPA 8270E	2-Fluorophenol (Surr)			Surrogate	19-120	-	-	-	-	-	367-12-4
EPA 8270E	2,4,6-Tribromophenol (Surr)			Surrogate	43-140	-	-	-	-	-	118-79-6
EPA 8270E	1,4-Dichlorobenzene-d4 (ISTD)			ug/L	-	-	-	-	-	-	3855-82-1
EPA 8270E	Naphthalene-d8 (ISTD)			ug/L	-	-	-	-	-	-	1146-65-2

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8270E	Acenaphthene-d10 (ISTD)			ug/L	-	-	-	-	-	-	15067-26-2
EPA 8270E	Phenanthrene-d10 (ISTD)			ug/L	-	-	-	-	-	-	1517-22-2
EPA 8270E	Chrysene-d12 (ISTD)			ug/L	-	-	-	-	-	-	1719-03-5
EPA 8270E	Perylene-d12 (ISTD)			ug/L	-	-	-	-	-	-	1520-96-3
EPA 8270E	Dibenz(a,h)anthracene-d14 (ISTD)			ug/L	-	-	-	-	-	-	13250-98-1
Semivolatile Organic Compounds by EPA 8270E in Water											
EPA 8270E	Tributyltin Ion	0.00260	0.00520	ug/L	-	30	30-160	30	30-160	30	
EPA 8270E	Dibutyltin Ion	0.00770	0.00770	ug/L	-	30	30-160	30	30-160	30	
EPA 8270E	Butyltin Ion	0.00600	0.00600	ug/L	-	30	30-160	30	30-160	30	
EPA 8270E	Tetrabutyltin	0.0300	0.0300	ug/L	-	30	30-160	30	30-160	30	
EPA 8270E	Tripentyltin (Surr)				30-160						
EPA 8270E	Tripopyltin (Surr)				30-160						
EPA 8270E	Tetrapentyltin			ug/L							
Polyaromatic Hydrocarbons (PAHs) and PAH Homologs by EPA 8270E Modified in Liquid											
EPA 8270m	cis-Decalin	100	200	ug/kg	-	30	40-120	30	40-120	30	493-01-6
EPA 8270m	C1-Decalin	500	500	ug/kg	-	30	-	-	-	-	C1-D
EPA 8270m	C2-Decalin	500	500	ug/kg	-	30	-	-	-	-	C2-D
EPA 8270m	C3-Decalin	1000	1000	ug/kg	-	30	-	-	-	-	C3-D
EPA 8270m	C4-Decalin	1000	1000	ug/kg	-	30	-	-	-	-	C4-D
EPA 8270m	Naphthalene	100	200	ug/kg	-	30	35-123	30	35-123	30	91-20-3
EPA 8270m	1-Methylnaphthalene	100	200	ug/kg	-	30	40-120	30	40-120	30	90-12-0
EPA 8270m	2-Methylnaphthalene	100	200	ug/kg	-	30	38-122	30	38-122	30	91-57-6
EPA 8270m	C1-Naphthalenes	500	500	ug/kg	-	30	-	-	-	-	C1-N
EPA 8270m	C2-Naphthalenes	500	500	ug/kg	-	30	-	-	-	-	C2-N
EPA 8270m	C3-Naphthalenes	500	500	ug/kg	-	30	-	-	-	-	C3-N
EPA 8270m	C4-Naphthalenes	500	500	ug/kg	-	30	-	-	-	-	C4-N
EPA 8270m	Acenaphthene	50.0	100	ug/kg	-	30	40-123	30	40-123	30	83-32-9
EPA 8270m	Acenaphthylene	50.0	100	ug/kg	-	30	32-132	30	32-132	30	208-96-8
EPA 8270m	Dibenzofuran	50.0	100	ug/kg	-	30	44-120	30	44-120	30	132-64-9
EPA 8270m	Fluorene	50.0	100	ug/kg	-	30	43-125	30	43-125	30	86-73-7
EPA 8270m	C1-Fluorenes	500	500	ug/kg	-	30	-	-	-	-	C1-F
EPA 8270m	C2-Fluorenes	500	500	ug/kg	-	30	-	-	-	-	C2-F
EPA 8270m	C3-Fluorenes	500	500	ug/kg	-	30	-	-	-	-	C3-F
EPA 8270m	Dibenzothiophene	50.0	100	ug/kg	-	30	40-120	30	40-120	30	132-65-0
EPA 8270m	C1-Dibenzothiophene	500	500	ug/kg	-	30	-	-	-	-	C1-DBT
EPA 8270m	C2-Dibenzothiophene	500	500	ug/kg	-	30	-	-	-	-	C2-DBT
EPA 8270m	C3-Dibenzothiophene	500	500	ug/kg	-	30	-	-	-	-	C3-DBT
EPA 8270m	C4-Dibenzothiophene	1000	1000	ug/kg	-	30	-	-	-	-	C4-DBT
EPA 8270m	Phenanthrene	50.0	100	ug/kg	-	30	50-121	30	50-121	30	85-01-8
EPA 8270m	Anthracene	50.0	100	ug/kg	-	30	47-123	30	47-123	30	120-12-7
EPA 8270m	1-Methylphenanthrene	50.0	100	ug/kg	-	30	40-120	30	40-120	30	832-69-9
EPA 8270m	C1-Phenanthrenes/Anthracenes	500	500	ug/kg	-	30	-	-	-	-	C1-P/A
EPA 8270m	C2-Phenanthrenes/Anthracenes	500	500	ug/kg	-	30	-	-	-	-	C2-P/A
EPA 8270m	C3-Phenanthrenes/Anthracenes	500	500	ug/kg	-	30	-	-	-	-	C3-P/A
EPA 8270m	C4-Phenanthrenes/Anthracenes	1000	1000	ug/kg	-	30	-	-	-	-	C4-P/A
EPA 8270m	Fluoranthene	500	1000	ug/kg	-	30	50-127	30	50-127	30	206-44-0
EPA 8270m	Pyrene	500	1000	ug/kg	-	30	47-127	30	47-127	30	129-00-0
EPA 8270m	C1-Fluoranthenes/Pyrenes	500	500	ug/kg	-	30	-	-	-	-	C1-F/P
EPA 8270m	C2-Fluoranthenes/Pyrenes	500	500	ug/kg	-	30	-	-	-	-	C2-C/PA
EPA 8270m	C3-Fluoranthenes/Pyrenes	500	500	ug/kg	-	30	-	-	-	-	C3-C/PA
EPA 8270m	C4-Fluoranthenes/Pyrenes	1000	1000	ug/kg	-	30	-	-	-	-	C4-C/PA
EPA 8270m	Chrysene	50.0	100	ug/kg	-	30	50-124	30	50-124	30	218-01-9
EPA 8270m	Benz(a)anthracene	50.0	100	ug/kg	-	30	49-126	30	49-126	30	56-55-3
EPA 8270m	C1-Chrysenes/Benz(a)anthracenes	500	500	ug/kg	-	30	-	-	-	-	C1-C/BA
EPA 8270m	C2-Chrysenes/Benz(a)anthracenes	500	500	ug/kg	-	30	-	-	-	-	C2-C/BA
EPA 8270m	C3-Chrysenes/Benz(a)anthracenes	500	500	ug/kg	-	30	-	-	-	-	C3-C/BA

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8270m	C4-Chrysenes/Benz(a)anthracenes	1000	1000	ug/kg	-	30	-	-	-	-	C4-C/BA
EPA 8270m	Benzo(b)fluoranthene	75.0	150	ug/kg	-	30	45-132	30	45-132	30	205-99-2
EPA 8270m	Benzo(k)fluoranthene	75.0	150	ug/kg	-	30	47-132	30	47-132	30	207-08-9
EPA 8270m	Benzo(a)pyrene	75.0	150	ug/kg	-	30	45-129	30	45-129	30	50-32-8
EPA 8270m	Benzo(e)pyrene	50.0	100	ug/kg	-	30	64-120	30	64-120	30	192-97-2
EPA 8270m	Perylene	50.0	100	ug/kg	-	30	72-130	30	72-130	30	198-55-0
EPA 8270m	Indeno(1,2,3-cd)pyrene	50.0	100	ug/kg	-	30	45-133	30	45-133	30	193-39-5
EPA 8270m	Dibenz(a,h)anthracene	50.0	100	ug/kg	-	30	45-134	30	45-134	30	53-70-3
EPA 8270m	Benzo(g,h,i)perylene	50.0	100	ug/kg	-	30	43-134	30	43-134	30	191-24-2
EPA 8270m	1,1'-Biphenyl	125	250	ug/kg	-	30	40-120	30	40-120	30	92-52-4
EPA 8270m	2,6-Dimethylnaphthalene	50.0	100	ug/kg	-	30	61-120	30	61-120	30	581-42-0
EPA 8270m	1,6,7-Trimethylnaphthalene	50.0	100	ug/kg	-	30	40-120	30	40-120	30	2245-38-7
EPA 8270m	Nitrobenzene-d5 (Surr)			Surrogate	37-122	-	-	-	-	-	4165-60-0
EPA 8270m	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
EPA 8270m	Acenaphthylene-d8 (Surr)			Surrogate	57-120	-	-	-	-	-	93951-97-4
EPA 8270m	p-Terphenyl-d14 (Surr)			Surrogate	54-127	-	-	-	-	-	1718-51-0
EPA 8270m	Benzo(a)pyrene-d12 (Surr)			Surrogate	54-120	-	-	-	-	-	63466-71-7
EPA 8270m	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg	-	-	-	-	-	-	3855-82-1
EPA 8270m	Naphthalene-d8 (ISTD)			ug/kg	-	-	-	-	-	-	1146-65-2
EPA 8270m	Acenaphthene-d10 (ISTD)			ug/kg	-	-	-	-	-	-	15067-26-2
EPA 8270m	Phenanthrene-d10 (ISTD)			ug/kg	-	-	-	-	-	-	1517-22-2
EPA 8270m	Chrysene-d12 (ISTD)			ug/kg	-	-	-	-	-	-	1719-03-5
EPA 8270m	Perylene-d12 (ISTD)			ug/kg	-	-	-	-	-	-	1520-96-3
EPA 8270m	Dibenz(a,h)anthracene-d14 (ISTD)			ug/kg	-	-	-	-	-	-	13250-98-1
Polyaromatic Hydrocarbons (PAHs) and PAH Homologs by EPA 8270E Modified in Soil											
EPA 8270m	cis-Decalin	4.00	8.00	ug/kg dry wt	-	30	40-120	30	40-120	30	493-01-6
EPA 8270m	C1-Decalin	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-D
EPA 8270m	C2-Decalin	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-D
EPA 8270m	C3-Decalin	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C3-D
EPA 8270m	C4-Decalin	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C4-D
EPA 8270m	Naphthalene	4.00	8.00	ug/kg dry wt	-	30	35-123	30	35-123	30	91-20-3
EPA 8270m	1-Methylnaphthalene	4.00	8.00	ug/kg dry wt	-	30	40-120	30	40-120	30	90-12-0
EPA 8270m	2-Methylnaphthalene	4.00	8.00	ug/kg dry wt	-	30	38-122	30	38-122	30	91-57-6
EPA 8270m	C1-Naphthalenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-N
EPA 8270m	C2-Naphthalenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-N
EPA 8270m	C3-Naphthalenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-N
EPA 8270m	C4-Naphthalenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C4-N
EPA 8270m	Acenaphthene	2.00	4.00	ug/kg dry wt	-	30	40-123	30	40-123	30	83-32-9
EPA 8270m	Acenaphthylene	2.00	4.00	ug/kg dry wt	-	30	32-132	30	32-132	30	208-96-8
EPA 8270m	Dibenzofuran	2.00	4.00	ug/kg dry wt	-	30	44-120	30	44-120	30	132-64-9
EPA 8270m	Fluorene	2.00	4.00	ug/kg dry wt	-	30	43-125	30	43-125	30	86-73-7
EPA 8270m	C1-Fluorenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-F
EPA 8270m	C2-Fluorenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-F
EPA 8270m	C3-Fluorenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-F
EPA 8270m	Dibenzothiophene	2.00	4.00	ug/kg dry wt	-	30	40-120	30	40-120	30	132-65-0
EPA 8270m	C1-Dibenzothiophene	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-DBT
EPA 8270m	C2-Dibenzothiophene	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-DBT
EPA 8270m	C3-Dibenzothiophene	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-DBT
EPA 8270m	C4-Dibenzothiophene	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C4-DBT
EPA 8270m	Phenanthrene	2.00	4.00	ug/kg dry wt	-	30	50-121	30	50-121	30	85-01-8
EPA 8270m	Anthracene	2.00	4.00	ug/kg dry wt	-	30	47-123	30	47-123	30	120-12-7
EPA 8270m	1-Methylphenanthrene	2.00	4.00	ug/kg dry wt	-	30	40-120	30	40-120	30	832-69-9
EPA 8270m	C1-Phenanthrenes/Anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-P/A
EPA 8270m	C2-Phenanthrenes/Anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-P/A
EPA 8270m	C3-Phenanthrenes/Anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-P/A
EPA 8270m	C4-Phenanthrenes/Anthracenes	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C4-P/A
EPA 8270m	Fluoranthene	2.00	4.00	ug/kg dry wt	-	30	50-127	30	50-127	30	206-44-0
EPA 8270m	Pyrene	2.00	4.00	ug/kg dry wt	-	30	47-127	30	47-127	30	129-00-0

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
EPA 8270m	C1-Fluoranthenes/Pyrenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-F/P
EPA 8270m	C2-Fluoranthenes/Pyrenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-C/PA
EPA 8270m	C3-Fluoranthenes/Pyrenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-C/PA
EPA 8270m	C4-Fluoranthenes/Pyrenes	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C4-C/PA
EPA 8270m	Chrysene	2.00	4.00	ug/kg dry wt	-	30	50-124	30	50-124	30	218-01-9
EPA 8270m	Benz(a)anthracene	2.00	4.00	ug/kg dry wt	-	30	49-126	30	49-126	30	56-55-3
EPA 8270m	C1-Chrysenes/Benz(a)anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C1-C/BA
EPA 8270m	C2-Chrysenes/Benz(a)anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C2-C/BA
EPA 8270m	C3-Chrysenes/Benz(a)anthracenes	20.0	20.0	ug/kg dry wt	-	30	-	-	-	-	C3-C/BA
EPA 8270m	C4-Chrysenes/Benz(a)anthracenes	40.0	40.0	ug/kg dry wt	-	30	-	-	-	-	C4-C/BA
EPA 8270m	Benzo(b)fluoranthene	3.00	6.00	ug/kg dry wt	-	30	45-132	30	45-132	30	205-99-2
EPA 8270m	Benzo(k)fluoranthene	3.00	6.00	ug/kg dry wt	-	30	47-132	30	47-132	30	207-08-9
EPA 8270m	Benzo(a)pyrene	3.00	6.00	ug/kg dry wt	-	30	45-129	30	45-129	30	50-32-8
EPA 8270m	Benzo(e)pyrene	2.00	4.00	ug/kg dry wt	-	30	64-120	30	64-120	30	192-97-2
EPA 8270m	Perylene	2.00	4.00	ug/kg dry wt	-	30	72-130	30	72-130	30	198-55-0
EPA 8270m	Indeno(1,2,3-cd)pyrene	2.00	4.00	ug/kg dry wt	-	30	45-133	30	45-133	30	193-39-5
EPA 8270m	Dibenz(a,h)anthracene	2.00	4.00	ug/kg dry wt	-	30	45-134	30	45-134	30	53-70-3
EPA 8270m	Benzo(g,h,i)perylene	2.00	4.00	ug/kg dry wt	-	30	43-134	30	43-134	30	191-24-2
EPA 8270m	1,1'-Biphenyl	5.00	10.0	ug/kg dry wt	-	30	40-120	30	40-120	30	92-52-4
EPA 8270m	2,6-Dimethylnaphthalene	2.00	4.00	ug/kg dry wt	-	30	61-120	30	61-120	30	581-42-0
EPA 8270m	1,6,7-Trimethylnaphthalene	2.00	4.00	ug/kg dry wt	-	30	40-120	30	40-120	30	2245-38-7
EPA 8270m	Nitrobenzene-d5 (Surr)			Surrogate	37-122	-	-	-	-	-	4165-60-0
EPA 8270m	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
EPA 8270m	Acenaphthylene-d8 (Surr)			Surrogate	57-120	-	-	-	-	-	93951-97-4
EPA 8270m	p-Terphenyl-d14 (Surr)			Surrogate	54-127	-	-	-	-	-	1718-51-0
EPA 8270m	Benzo(a)pyrene-d12 (Surr)			Surrogate	54-120	-	-	-	-	-	63466-71-7
EPA 8270m	1,4-Dichlorobenzene-d4 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	3855-82-1
EPA 8270m	Naphthalene-d8 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1146-65-2
EPA 8270m	Acenaphthene-d10 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	15067-26-2
EPA 8270m	Phenanthrene-d10 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1517-22-2
EPA 8270m	Chrysene-d12 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1719-03-5
EPA 8270m	Perylene-d12 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	1520-96-3
EPA 8270m	Dibenz(a,h)anthracene-d14 (ISTD)			ug/kg dry wt	-	-	-	-	-	-	13250-98-1
Polyaromatic Hydrocarbons (PAHs) and PAH Homologs by EPA 8270E Modified in Water											
EPA 8270m	cis-Decalin	0.0200	0.0400	ug/L	-	30	40-120	30	40-120	30	493-01-6
EPA 8270m	C1-Decalin	0.100	0.100	ug/L	-	30	-	-	-	-	C1-D
EPA 8270m	C2-Decalin	0.100	0.100	ug/L	-	30	-	-	-	-	C2-D
EPA 8270m	C3-Decalin	0.200	0.200	ug/L	-	30	-	-	-	-	C3-D
EPA 8270m	C4-Decalin	0.200	0.200	ug/L	-	30	-	-	-	-	C4-D
EPA 8270m	Naphthalene	0.0200	0.0400	ug/L	-	30	40-121	30	40-121	30	91-20-3
EPA 8270m	1-Methylnaphthalene	0.0200	0.0400	ug/L	-	30	41-120	30	41-120	30	90-12-0
EPA 8270m	2-Methylnaphthalene	0.0200	0.0400	ug/L	-	30	40-121	30	40-121	30	91-57-6
EPA 8270m	C1-Naphthalenes	0.100	0.100	ug/L	-	30	-	-	-	-	C1-N
EPA 8270m	C2-Naphthalenes	0.100	0.100	ug/L	-	30	-	-	-	-	C2-N
EPA 8270m	C3-Naphthalenes	0.100	0.100	ug/L	-	30	-	-	-	-	C3-N
EPA 8270m	C4-Naphthalenes	0.100	0.100	ug/L	-	30	-	-	-	-	C4-N
EPA 8270m	Acenaphthene	0.0100	0.0200	ug/L	-	30	47-122	30	47-122	30	83-32-9
EPA 8270m	Acenaphthylene	0.0100	0.0200	ug/L	-	30	41-130	30	41-130	30	208-96-8
EPA 8270m	Dibenzofuran	0.0100	0.0200	ug/L	-	30	53-120	30	53-120	30	132-64-9
EPA 8270m	Fluorene	0.0100	0.0200	ug/L	-	30	52-124	30	52-124	30	86-73-7
EPA 8270m	C1-Fluorenes	0.100	0.100	ug/L	-	30	-	-	-	-	C1-F
EPA 8270m	C2-Fluorenes	0.100	0.100	ug/L	-	30	-	-	-	-	C2-F
EPA 8270m	C3-Fluorenes	0.100	0.100	ug/L	-	30	-	-	-	-	C3-F
EPA 8270m	Dibenzothiophene	0.0100	0.0200	ug/L	-	30	40-120	30	40-120	30	132-65-0
EPA 8270m	C1-Dibenzothiophene	0.100	0.100	ug/L	-	30	-	-	-	-	C1-DBT
EPA 8270m	C2-Dibenzothiophene	0.100	0.100	ug/L	-	30	-	-	-	-	C2-DBT
EPA 8270m	C3-Dibenzothiophene	0.100	0.100	ug/L	-	30	-	-	-	-	C3-DBT
EPA 8270m	C4-Dibenzothiophene	0.200	0.200	ug/L	-	30	-	-	-	-	C4-DBT

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
EPA 8270m	Phenanthrene	0.0100	0.0200	ug/L	-	30	59-120	30	59-120	30	85-01-8
EPA 8270m	Anthracene	0.0100	0.0200	ug/L	-	30	57-123	30	57-123	30	120-12-7
EPA 8270m	1-Methylphenanthrene	0.0100	0.0200	ug/L	-	30	40-120	30	40-120	30	832-69-9
EPA 8270m	C1-Phenanthrenes/Anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C1-P/A
EPA 8270m	C2-Phenanthrenes/Anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C2-P/A
EPA 8270m	C3-Phenanthrenes/Anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C3-P/A
EPA 8270m	C4-Phenanthrenes/Anthracenes	0.200	0.200	ug/L	-	30	-	-	-	-	C4-P/A
EPA 8270m	Fluoranthene	0.0100	0.0200	ug/L	-	30	57-128	30	57-128	30	206-44-0
EPA 8270m	Pyrene	0.0100	0.0200	ug/L	-	30	57-126	30	57-126	30	129-00-0
EPA 8270m	C1-Fluoranthenes/Pyrenes	0.100	0.100	ug/L	-	30	-	-	-	-	C1-F/P
EPA 8270m	C2-Fluoranthenes/Pyrenes	0.100	0.100	ug/L	-	30	-	-	-	-	C2-C/PA
EPA 8270m	C3-Fluoranthenes/Pyrenes	0.100	0.100	ug/L	-	30	-	-	-	-	C3-C/PA
EPA 8270m	C4-Fluoranthenes/Pyrenes	0.200	0.200	ug/L	-	30	-	-	-	-	C4-C/PA
EPA 8270m	Chrysene	0.0100	0.0200	ug/L	-	30	59-123	30	59-123	30	218-01-9
EPA 8270m	Benz(a)anthracene	0.0100	0.0200	ug/L	-	30	58-125	30	58-125	30	56-55-3
EPA 8270m	C1-Chrysenes/Benz(a)anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C1-C/BA
EPA 8270m	C2-Chrysenes/Benz(a)anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C2-C/BA
EPA 8270m	C3-Chrysenes/Benz(a)anthracenes	0.100	0.100	ug/L	-	30	-	-	-	-	C3-C/BA
EPA 8270m	C4-Chrysenes/Benz(a)anthracenes	0.200	0.200	ug/L	-	30	-	-	-	-	C4-C/BA
EPA 8270m	Benzo(b)fluoranthene	0.0150	0.0300	ug/L	-	30	53-131	30	53-131	30	205-99-2
EPA 8270m	Benzo(k)fluoranthene	0.0150	0.0300	ug/L	-	30	57-129	30	57-129	30	207-08-9
EPA 8270m	Benzo(a)pyrene	0.0150	0.0300	ug/L	-	30	54-128	30	54-128	30	50-32-8
EPA 8270m	Benzo(e)pyrene	0.0100	0.0200	ug/L	-	30	67-120	30	67-120	30	192-97-2
EPA 8270m	Perylene	0.0100	0.0200	ug/L	-	30	62-130	30	62-130	30	198-55-0
EPA 8270m	Indeno(1,2,3-cd)pyrene	0.0100	0.0200	ug/L	-	30	52-134	30	52-134	30	193-39-5
EPA 8270m	Dibenz(a,h)anthracene	0.0100	0.0200	ug/L	-	30	51-134	30	51-134	30	53-70-3
EPA 8270m	Benzo(g,h,i)perylene	0.0100	0.0200	ug/L	-	30	50-134	30	50-134	30	191-24-2
EPA 8270m	1,1'-Biphenyl	0.0500	0.100	ug/L	-	30	49-120	30	49-120	30	92-52-4
EPA 8270m	2,6-Dimethylnaphthalene	0.0200	0.0400	ug/L	-	30	35-120	30	35-120	30	581-42-0
EPA 8270m	1,6,7-Trimethylnaphthalene	0.0200	0.0400	ug/L	-	30	40-120	30	40-120	30	2245-38-7
EPA 8270m	Nitrobenzene-d5 (Surr)			Surrogate	44-120	-	-	-	-	-	4165-60-0
EPA 8270m	2-Fluorobiphenyl (Surr)			Surrogate	44-120	-	-	-	-	-	321-60-8
EPA 8270m	Acenaphthylene-d8 (Surr)			Surrogate	45-120	-	-	-	-	-	93951-97-4
EPA 8270m	p-Terphenyl-d14 (Surr)			Surrogate	50-134	-	-	-	-	-	1718-51-0
EPA 8270m	Benzo(a)pyrene-d12 (Surr)			Surrogate	63-120	-	-	-	-	-	63466-71-7
EPA 8270m	1,4-Dichlorobenzene-d4 (ISTD)			ug/L	-	-	-	-	-	-	3855-82-1
EPA 8270m	Naphthalene-d8 (ISTD)			ug/L	-	-	-	-	-	-	1146-65-2
EPA 8270m	Acenaphthene-d10 (ISTD)			ug/L	-	-	-	-	-	-	15067-26-2
EPA 8270m	Phenanthrene-d10 (ISTD)			ug/L	-	-	-	-	-	-	1517-22-2
EPA 8270m	Chrysene-d12 (ISTD)			ug/L	-	-	-	-	-	-	1719-03-5
EPA 8270m	Perylene-d12 (ISTD)			ug/L	-	-	-	-	-	-	1520-96-3
EPA 8270m	Dibenz(a,h)anthracene-d14 (ISTD)			ug/L	-	-	-	-	-	-	13250-98-1
Total Metals by EPA 6020B (ICPMS) in Soil											
EPA 6020B	Arsenic	0.500	1.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-38-2
EPA 6020B	Barium	0.500	1.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-39-3
EPA 6020B	Cadmium	0.100	0.200	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-43-9
EPA 6020B	Chromium	0.500	1.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-47-3
EPA 6020B	Copper	1.00	2.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-50-8
EPA 6020B	Lead	0.100	0.200	mg/kg dry wt	-	20	75-125	20	80-120	20	7439-92-1
EPA 6020B	Mercury	0.0400	0.0800	mg/kg dry wt	-	20	75-125	20	80-120	20	7439-97-6
EPA 6020B	Nickel	1.00	2.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-02-0
EPA 6020B	Selenium	0.500	1.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7782-49-2
EPA 6020B	Silver	0.100	0.200	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-22-4
EPA 6020B	Zinc	2.00	4.00	mg/kg dry wt	-	20	75-125	20	80-120	20	7440-66-6

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
Dissolved Metals by EPA 6020B (ICPMS)											
in Water											
EPA 6020B (Diss)	Arsenic	0.500	1.00	ug/L	-	20	75-125	20	80-120	20	7440-38-2
EPA 6020B (Diss)	Barium	0.500	1.00	ug/L	-	20	75-125	20	80-120	20	7440-39-3
EPA 6020B (Diss)	Cadmium	0.100	0.200	ug/L	-	20	75-125	20	80-120	20	7440-43-9
EPA 6020B (Diss)	Chromium	1.00	2.00	ug/L	-	20	75-125	20	80-120	20	7440-47-3
EPA 6020B (Diss)	Copper	1.00	2.00	ug/L	-	20	75-125	20	80-120	20	7440-50-8
EPA 6020B (Diss)	Lead	0.100	0.200	ug/L	-	20	75-125	20	80-120	20	7439-92-1
EPA 6020B (Diss)	Mercury	0.0400	0.0800	ug/L	-	20	75-125	20	80-120	20	7439-97-6
EPA 6020B (Diss)	Nickel	1.00	2.00	ug/L	-	20	75-125	20	80-120	20	7440-02-0
EPA 6020B (Diss)	Selenium	0.500	1.00	ug/L	-	20	75-125	20	80-120	20	7782-49-2
EPA 6020B (Diss)	Silver	0.100	0.200	ug/L	-	20	75-125	20	80-120	20	7440-22-4
EPA 6020B (Diss)	Zinc	2.00	4.00	ug/L	-	20	75-125	20	80-120	20	7440-66-6
Ammonia by Gas Diffusion and Colorimetric Detection											
in Water											
SM 4500-NH3 G	Ammonia as N	0.0100	0.0200	mg/L	-	13	90-111	13	90-111	13	NH4
Sulfide by Methylene Blue											
in Water											
SM 4500-S2-D	total Sulfides	0.01	0.0010	mg/L							
Free Cyanide Analysis Utilizing Gas Diffusion and Amperometric Detection											
in Water											
D7237-15A	Free Cyanide	0.00250	0.00500	mg/L	-	13	79-121	13	90-118	13	CN-Free
Weak Acid Dissociable Cyanide											
in Water											
SM 4500-CN I	WAD Cyanide	0.00500	0.00500	mg/L	-	20		20	77-114	20	CN-WAD
Demand Parameters											
in Soil											
EPA 9060A mod	Total Organic Carbon	200	200	mg/kg	-	30	-	-	86-110	30	TOC
Solid and Moisture Determinations											
in Soil											
SM 2540 G	Total Solids	1.00	1.00	%	-	10	-	-	-	-	TS
Grain Size by ASTM D6913 and D7928											
in Soil											
D6913+D7928	Gravel (>2.00mm)	0.0100	0.0100	%	-	-	-	-	-	-	GS-Gravel
D6913+D7928	% Retained 4.75 mm sieve (#4)	0.0100	0.0100	%	-	-	-	-	-	-	GS-4.75
D6913+D7928	% Retained 2.00 mm sieve (#10)	0.0100	0.0100	%	-	-	-	-	-	-	GS-2.00
D6913+D7928	Sand (0.075mm - 2.00mm)	0.0100	0.0100	%	-	-	-	-	-	-	GS_Sand
D6913+D7928	% Retained 0.85 mm sieve (#20)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.850
D6913+D7928	% Retained 0.425 mm sieve (#40)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.425
D6913+D7928	% Retained 0.250 mm sieve (#60)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.250
D6913+D7928	% Retained 0.150 mm sieve (#100)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.150
D6913+D7928	% Retained 0.106 mm sieve (#140)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.106
D6913+D7928	% Retained 0.075 mm sieve (#200)	0.0100	0.0100	%	-	-	-	-	-	-	GS-0.075
D6913+D7928	Silt (> 0.005 mm < 0.075 mm)	0.0100	0.0100	%	-	-	-	-	-	-	GS-SILT
D6913+D7928	Clay (< 0.005 mm)	0.0100	0.0100	%	-	-	-	-	-	-	GS-Clay
Forensics by ASTM D-2887-14											
in Liquid											
D2887-14	Analyzed			%m/m	-	30	-	-	-	-	NA
Forensics by ASTM D-2887-14											
in Soil											
D2887-14	Analyzed			%m/m	-	30	-	-	-	-	NA

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	%R	Matrix Spike RPD	%R	Blank Spike RPD	CAS No.
Water Soluble Volatile Organic Compounds by EPA 8260D in Water											
EPA 8260D	Acetone	10.0	20.0	ug/L	-	30	39-160	30	80-120	30	67-64-1
EPA 8260D	Acrylonitrile	1.00	2.00	ug/L	-	30	63-135	30	80-120	30	107-13-1
EPA 8260D	Benzene	0.125	0.250	ug/L	-	30	79-120	30	80-120	30	71-43-2
EPA 8260D	Bromobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	108-86-1
EPA 8260D	Bromochloromethane	0.500	1.00	ug/L	-	30	78-123	30	80-120	30	74-97-5
EPA 8260D	Bromodichloromethane	0.500	1.00	ug/L	-	30	79-125	30	80-120	30	75-27-4
EPA 8260D	Bromoform	0.500	1.00	ug/L	-	30	66-130	30	80-120	30	75-25-2
EPA 8260D	Bromomethane	5.00	5.00	ug/L	-	30	53-141	30	80-120	30	74-83-9
EPA 8260D	2-Butanone (MEK)	5.00	10.0	ug/L	-	30	56-143	30	80-120	30	78-93-3
EPA 8260D	n-Butylbenzene	0.500	1.00	ug/L	-	30	75-128	30	80-120	30	104-51-8
EPA 8260D	sec-Butylbenzene	0.500	1.00	ug/L	-	30	77-126	30	80-120	30	135-98-8
EPA 8260D	tert-Butylbenzene	0.500	1.00	ug/L	-	30	78-124	30	80-120	30	98-06-6
EPA 8260D	Carbon disulfide	5.00	10.0	ug/L	-	30	64-133	30	80-120	30	75-15-0
EPA 8260D	Carbon tetrachloride	0.500	1.00	ug/L	-	30	72-136	30	80-120	30	56-23-5
EPA 8260D	Chlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	108-90-7
EPA 8260D	Chloroethane	5.00	5.00	ug/L	-	30	60-138	30	80-120	30	75-00-3
EPA 8260D	Chloroform	0.500	1.00	ug/L	-	30	79-124	30	80-120	30	67-66-3
EPA 8260D	Chloromethane	2.50	5.00	ug/L	-	30	50-139	30	80-120	30	74-87-3
EPA 8260D	2-Chlorotoluene	0.500	1.00	ug/L	-	30	79-122	30	80-120	30	95-49-8
EPA 8260D	4-Chlorotoluene	0.500	1.00	ug/L	-	30	78-122	30	80-120	30	106-43-4
EPA 8260D	Dibromochloromethane	0.500	1.00	ug/L	-	30	74-126	30	80-120	30	124-48-1
EPA 8260D	1,2-Dibromo-3-chloropropane	2.50	5.00	ug/L	-	30	62-128	30	80-120	30	96-12-8
EPA 8260D	1,2-Dibromoethane (EDB)	0.250	0.500	ug/L	-	30	77-121	30	80-120	30	106-93-4
EPA 8260D	Dibromomethane	0.500	1.00	ug/L	-	30	79-123	30	80-120	30	74-95-3
EPA 8260D	1,2-Dichlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	95-50-1
EPA 8260D	1,3-Dichlorobenzene	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	541-73-1
EPA 8260D	1,4-Dichlorobenzene	0.250	0.500	ug/L	-	30	79-120	30	80-120	30	106-46-7
EPA 8260D	Dichlorodifluoromethane	0.500	1.00	ug/L	-	30	32-152	30	80-120	30	75-71-8
EPA 8260D	1,1-Dichloroethane	0.250	0.500	ug/L	-	30	77-125	30	80-120	30	75-34-3
EPA 8260D	1,2-Dichloroethane (EDC)	0.250	0.500	ug/L	-	30	73-128	30	80-120	30	107-06-2
EPA 8260D	1,1-Dichloroethene	0.250	0.500	ug/L	-	30	71-131	30	80-120	30	75-35-4
EPA 8260D	cis-1,2-Dichloroethene	0.250	0.500	ug/L	-	30	78-123	30	80-120	30	156-59-2
EPA 8260D	trans-1,2-Dichloroethene	0.250	0.500	ug/L	-	30	75-124	30	80-120	30	156-60-5
EPA 8260D	1,2-Dichloropropane	0.250	0.500	ug/L	-	30	78-122	30	80-120	30	78-87-5
EPA 8260D	1,3-Dichloropropane	0.500	1.00	ug/L	-	30	80-120	30	80-120	30	142-28-9
EPA 8260D	2,2-Dichloropropane	0.500	1.00	ug/L	-	30	60-139	30	80-120	30	594-20-7
EPA 8260D	1,1-Dichloropropene	0.500	1.00	ug/L	-	30	79-125	30	80-120	30	563-58-6
EPA 8260D	cis-1,3-Dichloropropene	0.500	1.00	ug/L	-	30	75-124	30	80-120	30	10061-01-5
EPA 8260D	trans-1,3-Dichloropropene	0.500	1.00	ug/L	-	30	73-127	30	80-120	30	10061-02-6
EPA 8260D	Ethylbenzene	0.250	0.500	ug/L	-	30	79-121	30	80-120	30	100-41-4
EPA 8260D	Hexachlorobutadiene	2.50	5.00	ug/L	-	30	66-134	30	80-120	30	87-68-3
EPA 8260D	n-Hexane	5.00	10.0	ug/L	-	30	48-143	30	80-120	30	110-54-3
EPA 8260D	2-Hexanone	5.00	10.0	ug/L	-	30	57-139	30	80-120	30	591-78-6
EPA 8260D	Isopropylbenzene	0.500	1.00	ug/L	-	30	72-131	30	80-120	30	98-82-8
EPA 8260D	4-Isopropyltoluene	0.500	1.00	ug/L	-	30	77-127	30	80-120	30	99-87-6
EPA 8260D	Methylene chloride	5.00	10.0	ug/L	-	30	74-124	30	80-120	30	75-09-2
EPA 8260D	4-Methyl-2-pentanone (MiBK)	5.00	10.0	ug/L	-	30	67-130	30	80-120	30	108-10-1
EPA 8260D	Methyl tert-butyl ether (MTBE)	0.500	1.00	ug/L	-	30	71-124	30	80-120	30	1634-04-4
EPA 8260D	Naphthalene	2.00	4.00	ug/L	-	30	61-128	30	80-120	30	91-20-3
EPA 8260D	n-Propylbenzene	0.250	0.500	ug/L	-	30	76-126	30	80-120	30	103-65-1
EPA 8260D	Styrene	0.500	1.00	ug/L	-	30	78-123	30	80-120	30	100-42-5
EPA 8260D	1,1,1,2-Tetrachloroethane	0.250	0.500	ug/L	-	30	78-124	30	80-120	30	630-20-6
EPA 8260D	1,1,2,2-Tetrachloroethane	0.250	0.500	ug/L	-	30	71-121	30	80-120	30	79-34-5
EPA 8260D	Tetrachloroethene (PCE)	0.250	0.500	ug/L	-	30	74-129	30	80-120	30	127-18-4
EPA 8260D	Tetrahydrofuran	5.00	10.0	ug/L	-	30	57-133	30	80-120	30	109-99-9
EPA 8260D	Toluene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	108-88-3
EPA 8260D	1,2,3-Trichlorobenzene	1.00	2.00	ug/L	-	30	69-129	30	80-120	30	87-61-6
EPA 8260D	1,2,4-Trichlorobenzene	1.00	2.00	ug/L	-	30	69-130	30	80-120	30	120-82-1

Attachment C-2
Laboratory Limits
Worthen Substation Site – Wenatchee, Washington

Method	Analyte	MDL	MRL	Units	Surr. %R	DUP RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike %R	Blank Spike RPD	CAS No.
EPA 8260D	1,1,1-Trichloroethane	0.250	0.500	ug/L	-	30	74-131	30	80-120	30	71-55-6
EPA 8260D	1,1,2-Trichloroethane	0.250	0.500	ug/L	-	30	80-120	30	80-120	30	79-00-5
EPA 8260D	Trichloroethene (TCE)	0.250	0.500	ug/L	-	30	79-123	30	80-120	30	79-01-6
EPA 8260D	Trichlorofluoromethane	1.00	2.00	ug/L	-	30	65-141	30	80-120	30	75-69-4
EPA 8260D	1,2,3-Trichloropropane	0.500	1.00	ug/L	-	30	73-122	30	80-120	30	96-18-4
EPA 8260D	1,1,2-Trichloro-1,2,2-trifluoroethane	1.00	2.00	ug/L	-	30	70-136	30	80-120	30	76-13-1
EPA 8260D	1,2,4-Trimethylbenzene	0.500	1.00	ug/L	-	30	76-124	30	80-120	30	95-63-6
EPA 8260D	1,3,5-Trimethylbenzene	0.500	1.00	ug/L	-	30	75-124	30	80-120	30	108-67-8
EPA 8260D	Isobutyl alcohol	250	250	ug/L	-	30	63-133	30	80-120	30	78-83-1
EPA 8260D	Vinyl chloride	0.100	0.200	ug/L	-	30	58-137	30	80-120	30	75-01-4
EPA 8260D	m,p-Xylene	0.500	1.00	ug/L	-	30	80-121	30	80-120	30	179601-23-1
EPA 8260D	o-Xylene	0.250	0.500	ug/L	-	30	78-122	30	80-120	30	95-47-6
EPA 8260D	Xylenes, total	0.750	1.50	ug/L	-	30	79-121	30	80-120	30	1330-20-7
EPA 8260D	trans-1,4-Dichloro-2-butene	5.00	10.0	ug/L	-	30	43-140	30	80-120	30	110-57-6
EPA 8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
EPA 8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
EPA 8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
EPA 8260D	Pentafluorobenzene (ISTD)			ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)			ug/L	-	-	-	-	-	-	3114-55-4
EPA 8260D	1,4-Dichlorobenzene-d4 (ISTD)			ug/L	-	-	-	-	-	-	3855-82-1
Water Soluble Gasoline Range Hydrocarbons by NWTPH-Gx in Water											
NWTPH-Gx (MS)	Gasoline Range Organics	0.0500	0.100	mg/L	-	30	78-122	30	80-120	30	8006-61-9
NWTPH-Gx (MS)	4-Bromofluorobenzene (Sur)	0.000500	0.000500	Surrogate	50-150	-	-	-	-	-	460-00-4
NWTPH-Gx (MS)	1,4-Difluorobenzene (Sur)	0.000500	0.000500	Surrogate	50-150	-	-	-	-	-	540-36-3
NWTPH-Gx (MS)	Pentafluorobenzene (IS)			mg/L	-	-	-	-	-	-	363-72-4
Water Soluble Oxygenates by EPA 8260D in Water											
EPA 8260D	Ethanol	62.5	125	ug/L	-	30	48-151	30	80-120	30	64-17-5
EPA 8260D	tert-Butanol (TBA)	50.0	100	ug/L	-	30	68-129	30	80-120	30	75-65-0
EPA 8260D	tert-Amyl ethyl ether (TAEE)	0.250	0.500	ug/L	-	30	62-126	30	80-120	30	919-94-8
EPA 8260D	Diisopropyl ether (DIPE)	0.250	0.500	ug/L	-	30	67-128	30	80-120	30	108-20-3
EPA 8260D	Ethyl-tert-butyl ether (ETBE)	0.250	0.500	ug/L	-	30	70-127	30	80-120	30	637-92-3
EPA 8260D	tert-Amyl methyl ether (TAME)	0.250	0.500	ug/L	-	30	68-128	30	80-120	30	994-05-8
EPA 8260D	Methyl tert-butyl ether (MTBE)	0.500	1.00	ug/L	-	30	71-124	30	80-120	30	1634-04-4
EPA 8260D	1,2-Dibromoethane (EDB)	0.250	0.500	ug/L	-	30	77-121	30	80-120	30	106-93-4
EPA 8260D	1,2-Dichloroethane (EDC)	0.200	0.400	ug/L	-	30	73-128	30	80-120	30	107-06-2
EPA 8260D	1,4-Difluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	540-36-3
EPA 8260D	Toluene-d8 (Surr)			Surrogate	80-120	-	-	-	-	-	2037-26-5
EPA 8260D	4-Bromofluorobenzene (Surr)			Surrogate	80-120	-	-	-	-	-	460-00-4
EPA 8260D	Pentafluorobenzene (ISTD)		0.500	ug/L	-	-	-	-	-	-	363-72-4
EPA 8260D	Chlorobenzene-d5 (ISTD)		0.500	ug/L	-	-	-	-	-	-	3114-55-4
EPA 8260D	1,4-Dichlorobenzene-d4 (ISTD)		0.500	ug/L	-	-	-	-	-	-	3855-82-1
SPLP Extraction by EPA 1312 (ZHE) in Soil											
EPA 1312 ZHE	TCLP ZHE Extraction			N/A	-	-	-	-	-	-	NA

APPENDIX D

Health and Safety Plan

Health and Safety Plan
Chelan PUD Worthen Substation Site
500 South Worthen Street
Wenatchee, Washington

Attach Pertinent Documents/Data

Fill in Blanks <u>As Appropriate</u>

Project Number:	0130037.010	Reviewed by:	Christine Kimmel
Prepared by:	Weston Boardman, Carolyn Carlstrom, and Thai Do	Date:	June 2023, December 5, 2023, June 15, 2024
Date:	June 2023 Revised: December 2023 and June 2024		

Health and Safety Plan

A. Work Location Description
B. Hazard Description
C. Personal Protective Equipment
D. Decontamination
E. Activities Covered Under This Plan
F. Subcontractor's Health and Safety Program Evaluation
G. Emergency Facilities Numbers
H. Emergency Spill Response Contacts and Numbers

Attachments:

Health and Safety Plan Approval/Sign Off Form
Attachment A: Action Levels for Respiratory Protection
Attachment B: Mapped Route to Hospital
Attachment C: Contingency and Emergencies Plan
Personnel Training Certifications

A. Work Location Description

1.	**Project Name:**	Chelan PUD 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, groundwater sampling, and collecting and processing surface and subsurface sediment samples
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 a steep 25- to 30-foot slope down to the Columbia River to the east.
8.	**Anticipated Weather:**	-10 to 110 degrees F, sun/snow and ice/rain/wind/potential smoke from wildfires
9.	**Unusual Features:**	Site is an active Chelan County PUD substation and switchyard, 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 underground storage tank 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 MW-22 in Worthen Street right-of-way (ROW) east of property. 2022, 2023 – 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?

2. Hazardous Level: ☐ B ☐ C ☒ D ☐ Unknown

Justification: Sampling techniques will be implemented to minimize contact with potentially impacted media. Sampling is for the potential presence of gasoline-, diesel-, and heavy oil-range total petroleum hydrocarbons (TPH); volatile organic compounds (VOCs), which include benzene, ethylbenzene, and xylenes; metals, which include arsenic, barium, total chromium, copper, lead, selenium, and zinc; and polycyclic aromatic hydrocarbons (PAHs). Cyanide may also be present at the Site. Coal tar or coal tar-like material dense non-aqueous phase liquid (DNAPL) will be sampled if present. The overall hazard level associated with the sediment sampling activities described is low to moderate for the processing area and moderate for the overwater activities. Activities will be conducted in Modified Level D PPE (See Section C).

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. Sediment samples will be collected from a vessel in open water with risks of drowning and hypothermia. Sampling equipment will be on a small vessel with limited space so identification of potential pinch points and use of equipment is required. Physical fatigue from using equipment will be monitored. Use proper lifting techniques and engineered devices to minimize muscle strain.

C. ☐ Radiation

Describe:

4. Nature of Hazards:

☒ Air Describe: Vapor from subsurface sources of TPH and 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:

☒ 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. Sediment in the river adjacent to the Site has been uncharacterized, but potential contaminants include metals, PAHS, and PCBs (from offsite sources), which may pose a risk to human health primarily via ingestion, and/or dermal 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	Present in soil with maximum benzene concentrations at 58.9 ppm, in free product, and in groundwater at 0.333 ppm.	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	Present in soil at maximum concentrations at 2,150 ppm and groundwater at 0.90 ppm.	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

Contaminant	PEL/TWA (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
RCRA Metals (protective to arsenic)	0.002 mg/m^3	5 mg/m^3	Present in soil with maximum concentration at 26.4 ppm and in groundwater at 0.00797 ppm.	Inhalation, skin absorption, dermal contact, ingestion.	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin [potential occupational carcinogen]	Dust Control
Total petroleum hydrocarbons	100 ppm	400 ppm	Present in soil at concentrations up to 30,400 ppm (sum of gasoline-range, diesel-range, and residual-range organics [GRO, DRO, and RRO, respectively]) and in groundwater at concentrations up to 42.83 ppm (sum of GRO, DRO, and RRO).	Dermal contact, ingestion, inhalation	Irritation of eyes, nose, and throat; nausea; dizziness; headache; dry, cracked skin	PID meter
Polycyclic aromatic hydrocarbons (PAHs)	0.2 mg/m^3	80 mg/m^3	Present in soil with benzo(a)pyrene concentrations up to 40.7 ppm and	Inhalation, ingestion, percutaneous absorption, skin	Nervous system depression, liver and kidney damage.	Dust Control

Contaminant	PEL/TWA (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
(protective to benzo(a)pyrene)			in groundwater at 0.00074 ppm.	and/or eye contact.		
Arsenic	0.01 mg/m^3	5 mg/ m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Vomiting, abdominal pain, encephalopathy, diarrhea (occupational carcinogen)	Dust control
Cadmium	0.005 mg/m^3	9 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Chills, fevers, muscle pains (occupational carcinogen)	Dust control
Copper	1 mg/m^3	100 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Headaches, abdominal pain, diarrhea, vomiting, jaundice	Dust control
Lead	0.05 mg/m^3	100 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Headaches, stomach cramps, constipation, muscle/joint pain, trouble sleeping, fatigue, irritability	Dust control
Mercury	0.05 mg/m^3	10 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Rashes/dermatitis, breathing problems, mood changes, memory problems, reduced muscle strength	Dust control
Silver	0.01 mg/m^3	10 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	irritation of the eyes, skin, respiratory, and intestinal tract	Dust control

Contaminant	PEL/TWA (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Zinc	5 mg/m^3	500 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Considered non-toxic, but in rare cases may cause abdominal distress and vomiting	Dust control
PCBs (polychlorinated biphenyls)	0.001 mg/m^3	5 mg/m^3	Potential sediment contamination	Dermal and/or eye contact, ingestion, inhalation	Headache, nausea, respiratory and dermal irritation (occupational carcinogen)	Dust control

Note: See Sampling and Analysis Plan for detailed work activities.

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 Street 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 Aboveground Utilities	Damage to utilities through advancement of borings	Project location	Public and private utility locating services will be performed prior to drilling and boring locations will be air-knifed to a depth of at least 5 ft below ground surface. 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.

Hazard	Description	Location	Procedures Used to Monitor Hazard
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).
Working Around Temporary Encampments	Transient encampments will be encountered when working near the Columbia River shoreline	Columbia River shoreline	Watch footing and be aware of needles, waste, or other hazards. Wear PPE to identify self and use caution. Do not enter encampments. Seek medical care if skin is penetrated by sharp objects.
Dust/Particulate Control	Dust generated from subsurface soil disruption	Drill or excavation area	Establish exclusion work zone with cones/tape to eliminate public access and potential exposure to dust. If dust is observed at the edge of the exclusion zone, then adjust the zone boundaries. Apply moisture to work area if visible dust is generated.
Sediment Sampling and Processing Activities	Collect sediment samples; perform sampling support as part of the project	Project location	Wear PPE such as high-visibility clothing, safety glasses, steel-toed boots, gloves, and hard hats.
Cold Stress/Inclement Weather	Sampling activities taking place during cold weather and/or rainy and stormy conditions	Project location	Wear weather-appropriate clothing such as jackets, gloves, and face coverings; drink water; take breaks as needed, avoid caffeine.
Operating and Sampling from a Boat, Dock, or Otherwise Near Water	Sampling from a boat, dock, shoreline, or near waterway	On-water area adjacent to project Site	Wear US Coast Guard-approved non-altered life jackets, have additional flotation device available with sampling team, equip whistles, use the buddy system.
Slips, Trips, and Falls	Uneven ground, steps, slopes, and slippery areas	Project location and Columbia River shoreline	Be aware of surroundings, use caution when stepping on surfaces with these conditions, wear shoes with tread. For work on or near waterway: wear US Coast Guard-approved life jackets, have additional flotation device available, equip whistles, be familiar with the Man Overboard response plan.

Operating Power and Hand Tools	Power and/or hand tools for sediment collection and/or processing	Project location	Only personnel trained and familiar with tools/equipment should use it. Use appropriate power source, wear appropriate PPE such as safety glasses, face shields, and gloves.
Lifting	Lifting heavy items	Project location	Use proper lifting techniques to avoid back strain (e.g., lift with knees, not the back); lift heavy items with assistance from additional personnel.

7. Work Location Instrument Readings ☒ N/A

Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:
Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:
Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:
Location:	
Percent O_2:	Percent LEL:
Radioactivity:	PID:
FID:	Other:
Other:	Other:
Other:	Other:

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

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, and personal flotation device (PFD) (for on-water work).

☐ 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-visibility safety vest, PFD (for on-water work)

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: Grip gloves when working with equipment, as needed
☐ None
☐ Other:

Foot Protection ☐ N/A

☐ Neoprene Safety Boots with Steel Toe/Shank
☐ Disposable Overboots
☒ Other: Steel-toed boots (waterproof, if on-water)

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 investigation-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 non-dedicated equipment with Alconox solution
- Rinse with tap water (or river water if working on a boat)
- Rinse with distilled water to remove tap- or river-water impurities
- Repeat entire procedure or any parts of the procedure as necessary.

Decontamination of the reusable sampling devices will occur between the collection of each sample.

E. Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
013	Utility locates including GPR	January-February 2025
013	Air knifing, drilling, well installation	January-February 2025
013	Well Development	January-February 2025
013	Quarterly Groundwater Monitoring	2025- 4 quarters
TBD	Surface sediment sampling and processing	TBD
TBD	Sediment core sampling and processing	TBD

F. Subcontractor's Health and Safety Program Evaluation ☐ N/A

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

Gravity Marine, 32617 SE 44th Street, Fall City, WA 98024

Evaluation Criteria

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

General Health and Safety Program Evaluation: ☒ Adequate ☐ Inadequate

Additional Comments:

Evaluation Conducted by: Weston Boardman and Thai Do Date: 05/09/2023 and 06/15/2024

G. 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 mile, 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 B)

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.

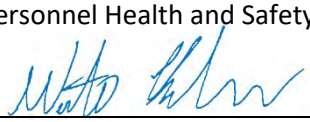
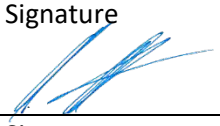
H. Emergency Spill Response Contacts and Phone Numbers

A contact list for emergency and spill situations is provided in the table below.

Contact Person/ Agency	Contact Role	Phone number
500 South Worthen Street Site Contacts		
Suzanne Dolberg	Site Manager	425-229-0172
Piper Roelen	Operations Supervisor/ Landau Project Manager	425-503-6784
Emergency Services		
Fire-Medical-Police- Sheriff	All Emergencies	911
Non-Emergency Services		
Central Washington Hospital		509-662-1511
Fire-Police-Sheriff		509-667-6851
Washington State Patrol		509-682-8090
Chelan-Douglas Health District Environmental Health Division 200 Valley Mall Parkway East Wenatchee, WA 98802	Onsite & Water Program Solid Waste After hours – to report an urgent health concern Public Health Emergency Preparedness & Response (PHEPR)	509-886-6484 509-886-6404 509-886-6499 509-886-6412
Washington Spill Reporting	Washington State Department of Ecology Emergency Management	206-407-6300 800-258-5990

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.

Weston Boardman		05/09/2023
Name	Signature	Date
Dan Gray		05/09/2023
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Shane Kostka		5/31/2023
Landau Site Safety Coordinator	Signature	Date
Christine Kimmel		07/30/2024
Landau Health and Safety Manager	Signature	Date
Piper Roelen		06/08/2023
Landau Project Manager	Signature	Date

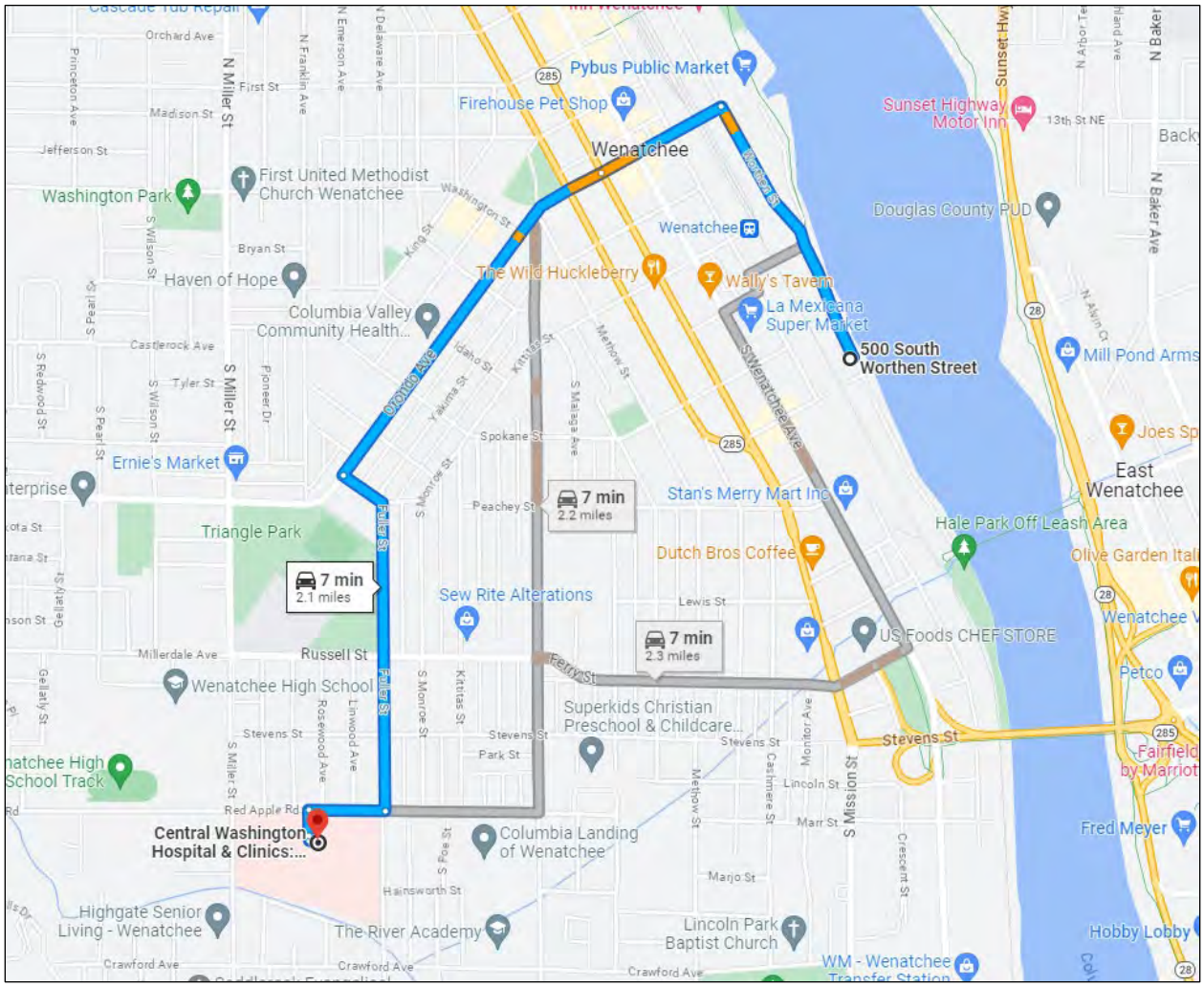
Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date

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 Health & Safety Manager
Explosivity	LEL >10% Or <19.5% Oxygen>23%	Stop work, verify proper grounding of equipment prior to contacting Health & Safety Manager.
Dust/Particulate	Visual signs of dust that may be environmentally impacted	Apply moisture to work area and upgrade to Level C – half-face respirator with organic vapor/HEPA cartridge

Attachment B
Mapped Route to Hospital



Attachment C
Contingency and Emergencies Plan

Subsurface contamination delineation at the Site is complex due to a variety of factors. It is expected that during Site characterization, field conditions may differ from the assumptions made during the Site characterization planning phase of the project. Contingency planning is necessary for management of contaminated material generated during investigation activities.

A Landau field staff member with training in this type of work is scheduled to be on Site to monitor the appropriate use and implementation of the Contingency Plan during Site activities. Landau is familiar with standard protocols for working on contaminated sites including but not limited to worker safety; field identification of potentially contaminated soil, vapor, and groundwater; confirmation and waste characterization sampling and analysis; and proper handling and management of known and potentially contaminated media. Refer to the Sampling and Analysis Plan for a description of waste storage and characterization procedures.

- Field personnel assigned to the Site must have successfully completed 40 hours of training for hazardous (Hazwoper) Site work in accordance with US Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(e)(3) and be current with their 8-hour annual Hazwoper refresher training in accordance with OSHA 29 CFR 1910.120(e)(8). Documentation of OSHA training is required prior to personnel being permitted to work on Site.
- Transporters hauling hazardous waste must have current Hazardous Materials Certificates of Registration, per 49 CFR Part 107(G) with the US Department of Transportation.
- Emergency spill kits will be kept at the Site when investigation-derived waste (IDW) is stored at the Site. Emergency spill kits will be stored near the IDW storage area.

In accordance with WAC 173-303-360, an emergency coordinator will be available at all times, either on the project Site or on call. Whenever there is an imminent or actual emergency situation, the emergency coordinator (or their designee when the emergency coordinator is on call) will immediately:

- Notify all Site personnel; and
- Notify appropriate state or local agencies with designated response roles if their help is needed.

Whenever there is a release, fire, or explosion, the emergency coordinator will immediately identify the character, exact source, amount, and areal extent of any released materials. The emergency coordinator will assess possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that may result from the release, fire, or explosion. If the emergency coordinator determines that the facility has had a release, fire, or explosion that could threaten human health or the environment, they will report their findings as follows:

- If their assessment indicates that evacuation of local areas may be advisable, they will immediately notify appropriate local authorities. They will be available to help appropriate officials decide whether local areas should be evacuated; and
- They will immediately notify the Washington State Department of Ecology (Ecology) and either the government official designated as the on-scene coordinator, or the National Response Center (using its 24-hour toll-free phone number: 800-424-8802).

The emergency coordinator's report will include:

- Name and telephone number of reporter;
- Name and address of facility;
- Time and type of incident (e.g., release, fire);
- Name and quantity of material(s) involved, to the extent known;
- The extent of injuries, if any; and
- The possible hazards to human health or the environment outside the facility.

During an emergency, the emergency coordinator will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste that may be at the facility. These measures must include, where applicable, stopping processes and operations, collecting and containing released waste, and removing or isolating containers. Immediately after an emergency, the emergency coordinator will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility. The emergency coordinator will ensure that, in the affected area(s) of the facility:

- No waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and
- The Site manager will note the time, date, and details of any incident that requires implementing the contingency plan. Within 15 days after the incident, they will submit a written report on the incident to Ecology. The report will include:
  - Name, address, and telephone number of the Site manager;
  - Name, address, and telephone number of the facility;
  - Date, time, and type of incident (e.g., fire, explosion);
  - Name and quantity of material(s) involved;
  - The extent of injuries, if any;
  - An assessment of actual or potential hazards to human health or the environment, where this is applicable;
  - Estimated quantity and disposition of recovered material that resulted from the incident;
  - Cause of incident; and

– Description of corrective action taken to prevent reoccurrence of the incident.

Emergency coordinators' contact information and project role are listed below in order of priority:

Name	Role	Phone Number
Shane Kostka	Field Manager (Landau)	208-819-1965
Suzanne Dolberg	Site Manager (Puget Sound Energy)	425-229-0172
Piper Roelen	Project Manager (Landau)	425-503-6784
Jason Moline	General Contractor Safety Lead (Nwestco)	509-991-9422
Ron Rider	Drilling Contractor Lead (Anderson Drilling)	253-293-1910
Chris Kimmel	Health and Safety Manager (Landau)	425-329-0254

All personnel working on the Site will be appropriately trained in management, characterization, and handling of hazardous and non-hazardous waste. Personnel transporting investigation-derived waste will be trained and certified to transport hazardous and non-hazardous waste. The job title, role, and qualifications and ongoing training requirements for each Site staff member managing, characterizing, handling, and transporting hazardous and non-hazardous waste are listed below. Training and transportation certifications are included as attachments to this document.

Name	Role	Qualifications	Ongoing Training Requirements
Piper Roelen	Operations Supervisor/ Landau Project Manager	Certified Hazardous Material Manager (CHMM)	CHMMs must earn at least 200 Certification Maintenance Points (CMPs) during a 5-year period
Shane Kostka	Landau Field Manager	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course
Dan Gray	Landau Field personnel	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course
Weston Boardman	Landau Field personnel	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course
Thai Do	Landau Field personnel	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course
Joshua King	Waste Transportation (Nwestco)	Hazwoper (40 hr + annual refreshers)	Retraining is required every 3 years
John Wright and Cole Pickering	Drilling Lead(s) (Anderson Environmental Contracting)	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course
Ed Sloan	Boat captain (Gravity Marine)	Hazwoper (40 hr + annual refreshers), boat captain's license	Annual 8 hour refresher course
Kyle Sanders	Deck hand (Gravity Marine)	Hazwoper (40 hr + annual refreshers)	Annual 8 hour refresher course

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:	Project Location:

As the on-site supervisor, 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 of On-Site Supervisor 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, Ecology, Chelan PUD, and Project Leads**

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

Ecology Contacts:

John Mefford; Project Manager
Email: jmef461@ecy.wa.gov

Tavi Wise; Cultural Resources
Email: twis461@ecy.wa.gov

Chelan PUD Contact:

Jennifer Burns
Environmental/Cultural Program Manager
Phone: 509-661-4474
Email: Jennifer.burns@chelanpud.org

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 Phone: 303-815-9967 Email: wboardman@landauinc.com	Name: Dan Gray, L.G., Sr. Staff Geologist Phone: 206-513-1285 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

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:
Jennifer Spence, Ph.D.
Email: Jennifer.Spence@dahp.wa.gov
Phone: 360.890.0174
PO Box 48343
Olympia, WA 98504-8343

6. Tribal Information

In the case of an inadvertent discovery, PSE or DAHP will contact the Tribes listed below. The information below is for informational purposes only and on-site personnel are advised not to contact Tribes directly regarding inadvertent discoveries.

Yakama Nation:
- THPO: THPO@yakama.com or Corrine Camusa ccamuso@Yakama.com (THPO)
- Jessica Lally jessica_lally@yakama.com
- Casey Barney: Casey_Barney@yakama.com
- Jerry Meninick: Jerry_meninick@yakama.com

Colville Tribe:

- Guy Moura guy.moura@colvilletribes.com
- Crystal Miller crystal.miller@colvilletribes.com

Sauk-Suittle:

- Nino Maltos: nmaltos@sauk-suiattle.com
- Kevin Joseph: kjoseph@sauk-suiattle.com
- THPO: THPO@sauk-suiattle.com

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





CMT in Gifford Pinchot National Forest (USFS).



CMT on Makah Indian Reservation (NativePlantsPNW.com)



CMT in Puget Sound (inspiremore.com).

Culturally Modified Trees

- Trees with stripped or peeled bark, carvings, axe cuts, or limb manipulation.
- Bent limbs with nodes and scaring at manipulation sites.

ATTACHMENT 1

GeoEngineers' Soil and Groundwater Analytical Results

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	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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 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

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 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
	4/19/2023	7:28	26.11		616.48
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
	4/19/2023	7:32	22.57		616.37
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
	4/19/2023	7:44	22.58		616.06
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
	4/19/2023	7:39	22.37		617.10

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					WMW-1					WMW-2				
Sample ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-1-W-20220420	WMW-1-W-20220720	WMW-1-W-20221019	WMW-1-W-20230104	WMW-1-W-041923	WMW-2-W-20220420	WMW-2-W-20220720	WMW-2-W-20221019	WMW-2-W-20230104	WMW-2-W-041923
Sample Date					4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023	4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023
Total Petroleum Hydrocarbons[1,2] (mg/L)														
Gasoline-range hydrocarbons	0.8/1.0	NE	NE	0.8	**0.199**	**0.101**	0.100 U	**0.117**	0.100 U	0.100 U	0.100 U	**0.486 J**	0.100 U	0.100 U
Diesel-range hydrocarbons	0.5	NE	NE	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	0.100 U	0.100 U
Lube oil-range hydrocarbons	0.5	NE	NE	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
Sum diesel+oil-range hydrocarbons[3]	NE	NE	NE	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	0.200 U	0.200 U
BTEX[4] (µg/L)														
Benzene	5	32	0.8	0.44	**3.24**	**2.85**	**1.69**	**10.7**	**0.41**	**2.59**	**2.13**	**25.2 J**	**0.06 J**	0.20 U
Ethylbenzene	700	800	NE	12	**3.87**	**1.09**	**1.03**	**1.90**	**0.05 J**	**1.01**	**2.16**	**17.7 J**	0.20 U	0.20 U
Toluene	1,000	640	NE	53	**5.18**	**1.96**	**0.79**	**0.85**	**0.65**	**2.02**	**1.41**	**7.43 J**	0.20 U	0.20 U
Total Xylenes	1,000	1,600	NE	57	**7.63**	**3.47**	**2.20**	**4.64**	**0.90**	**2.65**	**3.62**	**23.3 J**	0.60 U	0.60 U
SVOCs[5] (µg/L)														
2,4-Dimethylphenol	NE	320	NE	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	3.0 U	3.0 U
2-methylphenol	NE	800	NE	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	1.0 U	1.0 U
4-methylphenol	NE	1,600	NE	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	2.0 U	2.0 U
Carbazole	NE	NE	NE	5.2	1.0 U	0.10 UJ	0.10 U	0.10 U	0.10 U	1.0 U	0.10 UJ	**0.07 J**	0.10 U	0.10 U
Phenol	NE	4,800	NE	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	1.0 U	1.0 U
PAHs[6] (µg/L)														
1-Methylnaphthalene	NE	560	1.5	1.5	**1.38**	0.10 U	**0.08 J**	0.10 U	**0.39**	0.10 U	0.10 U	**2.80**	0.10 U	**0.20**
2-Methylnaphthalene	NE	32	NE	32	**1.39**	0.10 U	**0.06 J**	0.10 U	**0.12**	0.10 U	0.10 U	**3.26**	0.10 U	**0.13**
Acenaphthene	NE	480	NE	30	**0.27**	0.10 U	**0.03 J**	**0.06 J**	**0.08 J**	0.10 U	0.10 U	**0.64**	0.10 U	**0.05 J**
Acenaphthylene	NE	NE	NE	NE	**1.43**	**0.03 J**	**0.04 J**	**0.03 J**	**0.21**	**0.08 J**	**0.03 J**	**0.17 J**	0.10 U	0.10 U
Anthracene	NE	2,400	NE	100	**0.50**	0.10 U	**0.05 J**	0.10 U	0.10 U	**0.13**	0.10 U	**0.05 J**	0.10 U	0.10 U
Benzo(a)anthracene	NE	NE	NE	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	0.10 U	0.10 U
Benzo(a)pyrene	0.1	4.8	0.023	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	0.10 U	0.10 U
Benzo(b)fluoranthene	NE	NE	NE	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	0.10 U	0.10 U
Benzo(g,h,i)perylene	NE	NE	NE	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	0.10 U	0.10 U
Benzo(j)fluoranthene	NE	NE	NE	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	0.10 U	0.10 U
Benzo(k)fluoranthene	NE	NE	NE	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	0.10 U	0.10 U
Benzofluoranthenes (Total)	NE	NE	NE	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	0.20 U	0.20 U
Chrysene	NE	NE	NE	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	0.10 U	0.10 U
Dibenzo(a,h)anthracene	NE	NE	NE	0.1	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 U
Dibenzofuran	NE	8	NE	1.15	**0.25**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	**0.07 J**	0.10 U	0.10 U
Fluoranthene	NE	640	NE	6	**0.81**	**0.02 J**	**0.12**	**0.16**	**0.04 J**	0.10 U	0.10 U	**0.02 J**	0.10 U	0.10 U
Fluorene	NE	320	NE	10	**1.09**	0.10 U	**0.03 J**	**0.02 J**	**0.11**	0.10 U	0.10 U	**0.37**	0.10 U	**0.02 J**
Indeno(1,2,3-c,d)pyrene	NE	NE	NE	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	0.10 U	0.10 U
Naphthalene	160	160	NE	8.9	**1.25**	0.10 U	**0.18**	0.10 U	**0.52**	0.10 U	0.10 U	**17.8 J**	0.10 U	**0.50**
Phenanthrene	NE	NE	NE	NE	**0.18**	0.10 U	**0.06 J**	0.10 U	**0.03 J**	0.10 U	0.10 U	**0.30**	0.10 UJ	0.10 U
Pyrene	NE	NE	NE	8	**1.03**	**0.31**	**0.60**	**0.38**	**0.08 J**	0.10 U	0.10 U	**0.03 J**	0.10 UJ	0.10 U
cPAH TTEC (ND=0.5RL)	0.1	4.8	0.023	0.2	**0.12**	0.0855 U	**0.1092 J**	**0.0867 J**	0.0755 U	**0.15**	0.0855 U	0.0855 U	0.0855 U	0.0755 U
Cyanide (µg/L)														
Free Cyanide	NE	NE	NE	--	--	5.0 U	5.0 U	5.0 U	**9.0**	--	5.0 U	5.0 U	5.0 U	**7.0**
Total Cyanide	NE	NE	NE	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
Weak Acid Dissociable Cyanide	NE	NE	NE	--	--	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					WMW-1					WMW-2				
Sample ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-1-W-20220420	WMW-1-W-20220720	WMW-1-W-20221019	WMW-1-W-20230104	WMW-1-W-041923	WMW-2-W-20220420	WMW-2-W-20220720	WMW-2-W-20221019	WMW-2-W-20230104	WMW-2-W-041923
Sample Date					4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023	4/20/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023
Field Parameter														
pH (S.U.)	NA	NA	NA	NA	7.66	7.58	7.82	8.15	7.32	6.71	6.36	6.73	6.80	6.62
Specific Conductance (µs/cm)	NA	NA	NA	NA	623	583	335.8	428.4	1,470	234.0	316.2	310.6	255.2	369.1
Turbidity (NTU)	NA	NA	NA	NA	1.53	4.78	12.36	17.46	4.16	8.61	3.02	8.76	2.86	3.31
Dissolved Oxygen (mg/L)	NA	NA	NA	NA	0.21	0.1	0.11	0.32	0.15	3.76	0.88	1.36	4.36	5.32
Temperate (degrees Celsius)	NA	NA	NA	NA	14.2	16.2	14.5	9.8	13.3	12.4	14	14.3	12.5	11.3
ORP (millivolts)	NA	NA	NA	NA	-173.6	-119.8	-193.3	-152.3	89.1	134.4	121.1	9.1	82.2	142.3

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.

Table 5

Groundwater Analytical Data

Worthen Substation Site

Wenatchee, Washington

Location ID					WMW-3									
Sample ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-3-W-20220421	WMW-53-W-20220421	WMW-3-W-20220720	WMW-53-W-20220720	WMW-3-W-20221019	WMW-53-W-20221019	WMW-3-W-20230104	WMW-53-W-20230104	WMW-3-W-041923	WMW-53-W-041923
Sample Date					4/21/2022	4/21/2022	7/20/2022	7/20/2022	10/19/2022	10/19/2022	1/4/2023	1/4/2023	4/19/2023	4/19/2023
Total Petroleum Hydrocarbons[1,2] (mg/L)														
Gasoline-range hydrocarbons	0.8/1.0	NE	NE	0.8	**8.22**	**8.28**	**1.22**	**1.23**	**1.180**	**1.190**	**1.480**	**1.360**	**0.934**	**1.1**
Diesel-range hydrocarbons	0.5	NE	NE	0.5	**1.61**	**1.81**	**0.685**	**0.715**	**0.544**	**0.446**	**0.545**	**0.498**	**0.733**	**0.694**
Lube oil-range hydrocarbons	0.5	NE	NE	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	**0.349**	**0.297**
Sum diesel+oil-range hydrocarbons[3]	NE	NE	NE	0.5	**1.61**	**1.81**	**0.685**	**0.715**	**0.544**	**0.446**	**0.545**	**0.498**	**1.082**	**0.991**
BTEX[4] (µg/L)														
Benzene	5	32	0.8	0.44	**333**	**304**	**35.8**	**35.4**	**72.2**	**65.1**	**66.9**	**57.6**	**30.2**	**30.4**
Ethylbenzene	700	800	NE	12	**157**	**153**	**19.6**	**20.1**	**17.0**	**14.4**	**14.8**	**12.2**	**7.73**	**7.04**
Toluene	1,000	640	NE	53	**2.60**	**2.78**	**0.46**	**0.45**	**0.68**	**0.60**	**0.69**	**0.69**	**0.36**	**0.41**
Total Xylenes	1,000	1,600	NE	57	**117**	**140**	**22.3**	**22.4**	**25.2**	**21.4**	**17.9**	**16.2**	**10.7**	**10.4**
SVOCs[5] (µg/L)														
2,4-Dimethylphenol	NE	320	NE	85	9.0 U	9.0 U	9.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
2-methylphenol	NE	800	NE	800	3.0 U	3.0 U	3.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-methylphenol	NE	1,600	NE	41.3	6.0 U	6.0 U	6.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Carbazole	NE	NE	NE	5.2	**5.0**	**5.0**	0.10 UJ	0.10 UJ	**0.39**	**0.47**	**0.43**	**0.49**	**0.71**	**0.64**
Phenol	NE	4,800	NE	28.9	**7.4**	**6.8**	**1.3 J**	**1.0**	**2.0**	1.0 U	**1.7**	**1.9**	**1.0**	**1.0 J**
PAHs[6] (µg/L)														
1-Methylnaphthalene	NE	560	1.5	1.5	**117**	**101**	**25.1**	**21.6**	**14.1**	**20.4**	**16.1**	**22.3**	**22.8**	**23.9**
2-Methylnaphthalene	NE	32	NE	32	**126**	**107**	**25.6**	**21.6**	**10.2**	**13.6**	**12.3**	**16.9**	**16.9**	**17.3**
Acenaphthene	NE	480	NE	30	**37.8**	**31.7**	**8.82**	**8.07**	**5.01**	**5.95**	**4.78**	**5.93**	**9.03**	**7.69**
Acenaphthylene	NE	NE	NE	NE	**2.00 J**	**0.94 J**	**0.34**	**0.31**	**0.13 J**	**0.14 J**	**0.17**	**0.19**	**0.50**	**0.32**
Anthracene	NE	2,400	NE	100	**4.71**	**3.49**	**1.90**	**1.76**	**0.63**	**0.81**	**0.72**	**0.85**	**1.75**	**1.24**
Benzo(a)anthracene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.44**	**0.39**	**0.06 J**	**0.09 J**	**0.09 J**	**0.09 J**	**0.91**	**0.47**
Benzo(a)pyrene	0.1	4.8	0.023	0.1	3.00 U	3.00 U	**0.29**	**0.24**	0.10 U	0.10 U	0.10 U	0.10 U	**0.74**	**0.34**
Benzo(b)fluoranthene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.12**	**0.12**	0.10 U	0.10 U	0.10 U	0.10 U	**0.42**	**0.20**
Benzo(g,h,i)perylene	NE	NE	NE	NE	3.00 U	3.00 U	**0.15**	**0.12**	0.10 U	0.10 U	0.10 U	0.10 U	**0.40**	**0.17**
Benzo(j)fluoranthene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.13**	**0.10**	0.10 U	0.10 U	0.10 U	0.10 U	**0.36**	**0.17**
Benzo(k)fluoranthene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.09 J**	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	**0.29**	**0.14**
Benzofluoranthenes (Total)	NE	NE	NE	NE	6.00 U	6.00 U	**0.36**	**0.31**	0.20 U	0.20 U	0.20 U	0.20 U	**1.08**	**0.51**
Chrysene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.50**	**0.43**	**0.08 J**	**0.11**	**0.11**	**0.11**	**1.04**	**0.55**
Dibenzo(a,h)anthracene	NE	NE	NE	0.1	3.00 U	3.00 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 U	0.10 U	**0.10**	0.10 U
Dibenzofuran	NE	8	NE	1.15	**4.26**	**3.00**	**0.76**	**0.69**	**0.39**	**0.44**	**0.31 J**	**0.43 J**	**0.58**	**0.48**
Fluoranthene	NE	640	NE	6	**2.89 J**	**2.05 J**	**2.16**	**1.96**	**0.65**	**0.88**	**0.70**	**0.83**	**1.93**	**1.35**
Fluorene	NE	320	NE	10	**22.4**	**17.6**	**5.88**	**5.38**	**2.61**	**3.11**	**2.39**	**3.02**	**4.12**	**3.50**
Indeno(1,2,3-c,d)pyrene	NE	NE	NE	0.1	3.00 U	3.00 U	**0.11**	**0.10 J**	0.10 U	0.10 U	0.10 U	0.10 U	**0.27**	**0.12**
Naphthalene	160	160	NE	8.9	**319**	**265**	**52.1**	**44.8**	**24.8**	**37.1**	**30.0**	**42.3**	**36.7**	**37.9**
Phenanthrene	NE	NE	NE	NE	**24.0**	**18.6**	**9.38**	**8.39**	**3.25**	**4.24**	**3.62**	**4.37**	**7.50**	**5.83**
Pyrene	NE	NE	NE	8	**3.94**	**2.28 J**	**2.65**	**2.36**	**0.81**	**1.05**	**0.88**	**1.01**	**3.44**	**2.21**
cPAH TTEC (ND=0.5RL)	0.1	4.8	0.023	0.2	4.5 U	4.5 U	**0.412 J**	**0.0989**	**0.0868 J**	**0.0901 J**	**0.0901 J**	**0.0901 J**	**0.9494**	**0.4435**
Cyanide (µg/L)														
Free Cyanide	NE	NE	NE	--	--	--	**9.0**	5.0 U	5.0 U	5.0 U	**5.0**	5.0 U	5.0 U	5.0 U
Total Cyanide	NE	NE	NE	5	--	--	**8.0**	**7.0**	**7.0**	**7.0**	**9.0**	**11.0**	**9.0**	**9.0**
Weak Acid Dissociable Cyanide	NE	NE	NE	--	--	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**6.0**	5.0 U

Location ID					WMW-3									
Sample ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-3-W-20220421	WMW-53-W-20220421	WMW-3-W-20220720	WMW-53-W-20220720	WMW-3-W-20221019	WMW-53-W-20221019	WMW-3-W-20230104	WMW-53-W-20230104	WMW-3-W-041923	WMW-53-W-041923
Sample Date					4/21/2022	4/21/2022	7/20/2022	7/20/2022	10/19/2022	10/19/2022	1/4/2023	1/4/2023	4/19/2023	4/19/2023
Field Parameter														
pH (S.U.)	NA	NA	NA	NA	6.97	6.97	6.64	6.64	6.81	6.81	7.03	7.03	6.86	6.86
Specific Conductance (µs/cm)	NA	NA	NA	NA	981	981	1181	1181	831	831	919	919	1,302	1,302
Turbidity (NTU)	NA	NA	NA	NA	4.91	4.91	2.88	2.88	9.76	9.76	4.54	4.54	69.36	69.36
Dissolved Oxygen (mg/L)	NA	NA	NA	NA	0.15	0.15	0.00	0.00	0.02	0.02	0.19	0.19	0.05	0.05
Temperate (degrees Celsius)	NA	NA	NA	NA	15.2	15.2	18.0	18.0	16.7	16.7	14.8	14.8	15.7	15.7
ORP (millivolts)	NA	NA	NA	NA	-144.0	-144.0	-124.7	-124.7	-158.1	-158.1	-164.6	-164.6	-182.5	-182.5

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.

Table 5

Groundwater Analytical Data

Worthen Substation Site

Wenatchee, Washington

Location ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-4				
Sample ID					WMW-4-W-20220421	WMW-4-W-20220720	WMW-4-W-20221019	WMW-4-W-20230104	WMW-4-W-041923
Sample Date					4/21/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023
Total Petroleum Hydrocarbons[1,2] (mg/L)									
Gasoline-range hydrocarbons	0.8/1.0	NE	NE	0.8	**7.35**	**2.78**	**3.660**	**4.760**	**3.76**
Diesel-range hydrocarbons	0.5	NE	NE	0.5	**1.45**	**1.00**	**1.16**	**1.05**	**1.04**
Lube oil-range hydrocarbons	0.5	NE	NE	0.5	0.200 U	0.200 U	0.200 U	0.200 U	0.200 U
Sum diesel+oil-range hydrocarbons[3]	NE	NE	NE	0.5	**1.45**	**1.00**	**1.16**	**1.05**	**1.04**
BTEX[4] (µg/L)									
Benzene	5	32	0.8	0.44	**274**	**120**	**141**	**171**	**162**
Ethylbenzene	700	800	NE	12	**124**	**57.3**	**50.4**	**57.5**	**37.8**
Toluene	1,000	640	NE	53	**3.13**	**1.41**	**1.67**	**2.22**	**1.64**
Total Xylenes	1,000	1,600	NE	57	**108**	**43.6**	**48.3**	**62.1**	**49.8**
SVOCs[5] (µg/L)									
2,4-Dimethylphenol	NE	320	NE	85	9.0 U	9.0 U	3.0 U	3.0 U	3.0 U
2-methylphenol	NE	800	NE	800	3.0 U	3.0 U	1.0 U	1.0 U	1.0 U
4-methylphenol	NE	1,600	NE	41.3	6.0 U	6.0 U	2.0 U	2.0 U	2.0 U
Carbazole	NE	NE	NE	5.2	**5.1**	0.10 UJ	**1.73**	**1.88**	**3.26**
Phenol	NE	4,800	NE	28.9	**7.3**	**3.6**	**4.9**	**4.0**	**2.9**
PAHs[6] (µg/L)									
1-Methylnaphthalene	NE	560	1.5	1.5	**87.3**	**53.2**	**62.1**	**47.3**	**106**
2-Methylnaphthalene	NE	32	NE	32	**73.6**	**38.0**	**27.7**	**31.9**	**61.5**
Acenaphthene	NE	480	NE	30	**29.9**	**19.8**	**14.6**	**15.6**	**36.5**
Acenaphthylene	NE	NE	NE	NE	**0.95 J**	**0.52**	**0.66 J**	**0.66**	**1.00**
Anthracene	NE	2,400	NE	100	**4.05**	**2.02**	**1.79**	**1.54**	**2.83**
Benzo(a)anthracene	NE	NE	NE	0.1	3.00 U	**0.17**	**0.69**	**0.27**	**0.18**
Benzo(a)pyrene	0.1	4.8	0.023	0.1	3.00 U	0.10 U	**0.49**	**0.17**	0.10 U
Benzo(b)fluoranthene	NE	NE	NE	0.1	3.00 U	0.10 U	0.30 U	0.10 U	0.10 U
Benzo(g,h,i)perylene	NE	NE	NE	NE	3.00 U	0.10 U	**0.27 J**	**0.08 J**	0.10 U
Benzo(j)fluoranthene	NE	NE	NE	0.1	3.00 U	0.10 U	**0.22 J**	**0.07 J**	0.10 U
Benzo(k)fluoranthene	NE	NE	NE	0.1	3.00 U	0.10 U	0.30 U	0.10 U	0.10 U
Benzofluoranthenes (Total)	NE	NE	NE	NE	6.00 U	0.20 U	**0.62**	**0.20**	0.20 U
Chrysene	NE	NE	NE	0.1	3.00 U	**0.19**	**0.76**	**0.27**	**0.21**
Dibenzo(a,h)anthracene	NE	NE	NE	0.1	3.00 U	0.1 U	0.30 UJ	0.10 U	0.10 U
Dibenzofuran	NE	8	NE	1.15	**2.62 J**	**1.20**	**1.11**	**1.11**	**2.01**
Fluoranthene	NE	640	NE	6	**2.26 J**	**1.73**	**2.25**	**1.24**	**1.58**
Fluorene	NE	320	NE	10	**16.3**	**9.12**	**7.51**	**7.83**	**17.4**
Indeno(1,2,3-c,d)pyrene	NE	NE	NE	0.1	3.00 U	0.10 U	0.30 U	0.10 U	0.10 U
Naphthalene	160	160	NE	8.9	**210**	**114**	**141**	**102**	**213**
Phenanthrene	NE	NE	NE	NE	**19.8**	**12.6**	**9.41**	**7.74**	**19.7**
Pyrene	NE	NE	NE	8	**2.56 J**	**2.04**	**2.96**	**1.58**	**2.24**
cPAH TTEC (ND=0.5RL)	0.1	4.8	0.023	0.2	4.5 U	**0.3463 J**	**0.6886 J**	**0.2397**	**0.0901**
Cyanide (µg/L)									
Free Cyanide	NE	NE	NE	--	--	**5.0**	5.0 U	**6.0**	**5.0**
Total Cyanide	NE	NE	NE	5	--	**10.0**	**9.0**	**6.0**	**20**
Weak Acid Dissociable Cyanide	NE	NE	NE	--	--	5.0 U	5.0 U	5.0 U	**7.0**

Location ID					WMW-4				
Sample ID	MTCA Method A	MTCA Method B Non-cancer	MTCA Method B Cancer	Preliminary Groundwater Screening Level (Table 4)	WMW-4-W-20220421	WMW-4-W-20220720	WMW-4-W-20221019	WMW-4-W-20230104	WMW-4-W-041923
Sample Date					4/21/2022	7/20/2022	10/19/2022	1/4/2023	4/19/2023
Field Parameter									
pH (S.U.)	NA	NA	NA	NA	6.96	6.70	6.89	6.97	6.79
Specific Conductance (µs/cm)	NA	NA	NA	NA	1120	1159	860	994	1,336
Turbidity (NTU)	NA	NA	NA	NA	1.42	0.02	8.54	14.81	32.91
Dissolved Oxygen (mg/L)	NA	NA	NA	NA	0.14	0.01	0.08	0.14	0.08
Temperate (degrees Celsius)	NA	NA	NA	NA	14.7	17.5	15.8	14.5	14.7
ORP (millivolts)	NA	NA	NA	NA	-150.5	-135.7	-182.9	-176.6	-190

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.

ATTACHMENT 2

Soil and Groundwater Grouping Letter

August 5, 2024

Shane Kostka
Landau Associates (Spokane)
421 W. Riverside Avenue, Suite 256
Spokane, WA 99201

Dear Mr. Kostka:

As requested, we have reviewed the reports issued by Apex Forensics between July 10, 2023 and February 14, 2024 for the PSE-Worthen Sub 0130037.010 project. These reports included results from the testing of soil, water, and product samples collected from various locations at the Site. The purpose of this review was to further characterize the contaminants present at the Site.

1.0 EXECUTIVE SUMMARY

Based on the data generated, the following contaminants have impacted one or more soil, water, and/or product samples collected from the Site:

- naphthalenes-dominant coal tar, MGP waste, or similar material
- medium boiling petroleum distillate product such as diesel #2, diesel #4, fuel oil, or similar petroleum product or mixture of petroleum products
- biologically degraded residual fuel, bunker C, diesel #6 or similar petroleum product
- R-99 (biodiesel) or similar product
- middle distillate such as kerosene, Jet A, or similar petroleum products

2.0 SAMPLE ANALYSIS SUMMARY

The analytical work completed at Apex Forensics included testing of soil and water samples for diesel/oil range organics (DRO/ORO) using a gas chromatograph fitted with a flame ionization detector (GC/FID) following WDOE Method NWTPH-Dx.

The product samples and select soil samples were also analyzed using GC/FID following the American Society for Testing and Materials (ASTM) Method D2887-14. The ASTM Method D2887-14 was completed in order to determine the boiling range and general chemical composition of the contamination present in these samples. It should be noted that because the ASTM D2887-14 analysis is not applicable to water matrices, water samples were not analyzed by this method.

It was requested that we review this data in order to identify contaminants that have impacted one or more samples collected to date. A summary of each contaminant type is provided below. The GC/FID traces for each contaminant group are provided in Appendices A through I. It should be noted that this evaluation was limited to soil samples with greater than approximately 300 mg/kg DRO/ORO, and water samples with approximately greater than 50 ug/L DRO/ORO, except where noted.

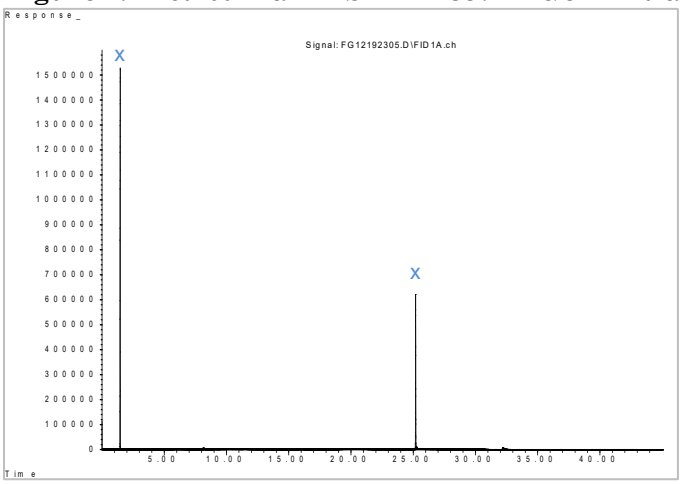
3.0 SOIL AND PRODUCT CONTAMINANT GROUPS

3.1 Group A – Naphthalenes-Dominant Coal Tar, MGP Waste, or Similar Material

Based on the GC/FID traces generated, the material present in the Group A samples is indicative of a naphthalenes-dominant coal tar, materials derived from coal tar, and/or MGP waste products.

The ASTM D2887-14 GC/FID trace of an example method blank is provided as Figure 1. The large peak seen near 1.6 minutes corresponds to the extraction solvent, carbon disulfide. The peak seen near 25.2 minutes corresponds to pentacosane, a compound which was added as a retention time (RT) marker and quality assurance check for this analysis. The peaks corresponding to the extraction solvent and RT marker are labeled in Figure 1 with a blue "x".

Figure 1. Method Blank ASTM D2887-14 GC/FID trace



The ASTM D2887-14 GC/FID traces of the product samples WB13-(FP)-231212 and WB-8-230621 are provided as Figures 2 and 3, respectively, as examples of the material found in this group of samples. For reference, the ASTM D2887-14 GC/FID trace of coal tar is

provided as Figure 4. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue "x" in these figures.

Figure 2. WB13-(FP)- 231212 (A3L1298-02) ASTM D2887-14 GC/FID trace

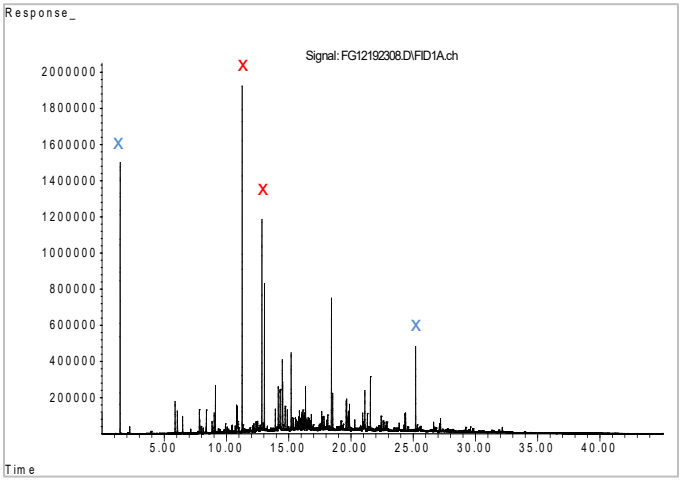


Figure 3. WB-8-230621 (A3F1466-09) ASTM D2887-14 GC/FID trace

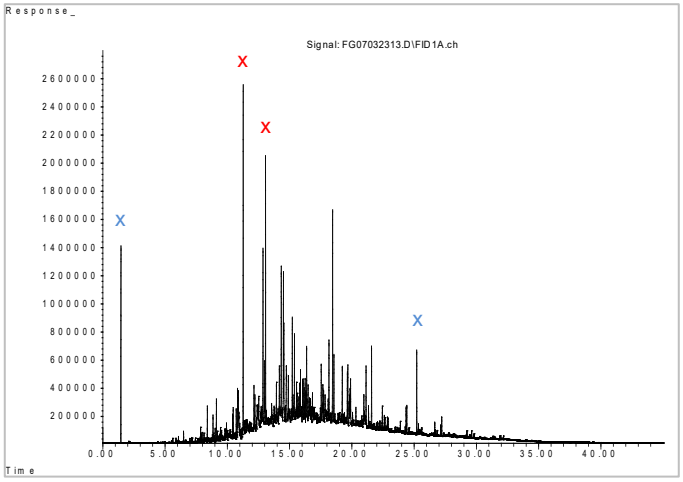
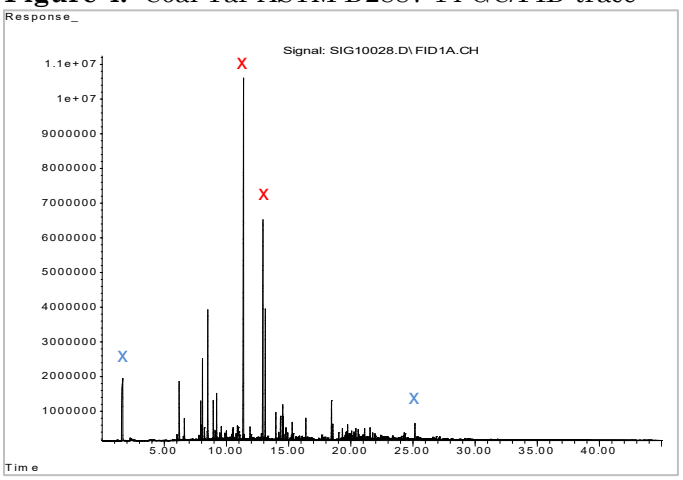


Figure 4. Coal Tar ASTM D2887-14 GC/FID trace



The GC/FID traces of the samples WB13-(FP)-231212 and WB-8-230621 show the presence of low to high boiling compounds. These compounds appear as a ragged pattern of peaks on top of a broad hump or unresolved complex mixture (UCM). The dominant peaks present on the GC/FID traces are indicative of the PAHs naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.[1] The peaks corresponding to these compounds are labeled with a red "x" in Figures 2 through 4.

[1] The presence of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene was confirmed in many samples in this group using a gas chromatograph fitted with a mass spectrometer (GC/MS) following EPA Method 8270E.

Based on the GC/FID traces generated, the following soil and product samples have been impacted by and/or consist of a naphthalenes-dominant coal tar, materials derived from coal tar, and/or MGP waste products:

Sample Identifier	Laboratory Identifier	DRO / ORO Concentration (mg/kg)	Sample Matrix
AB01-(15-16)-230825	A3H1440-02	12,000 / ND	Soil
AB01-(25-25.5)-230825	A3H1440-03	960 / ND	Soil
WB5-(15-16)-230619	A3F1369-01	1,900 / 300	Soil
WB6-(11-11.5)-230622	A3F1506-01	13,000 / ND	Soil
WB-8-230621	A3F1466-09	-	Product
WB8-(27-28)-230620	A3F1369-06	2,200 / 390	Soil
WB10-(11.5-12)-230626	A3F1639-02	1,900 / ND	Soil
WB-11-(26-26.5)-231219	A3L1589-09	1,400 / ND	Soil
WB12-(22.5-23)-231215	A3L1381-06	3,100 / ND	Soil
WB13-(FP)-231212	A3L1298-02	-	Product
WB13-(25.5-26)-231212	A3L1298-04	3,700 / ND	Soil
WB13-(30.5-31)-231212	A3L1298-05	400 / 150	Soil
WB13-(37.5-38.5)-231212	A3L1298-07	750 / ND	Soil
WB13-(40-41)-231213	A3L1381-02	570 / ND	Soil
WMW5-(45-46)-230623	A3F1506-03	350 / ND	Soil
WMW6-(6.5-7)-230615	A3F1267-03	13,000 / 2,800	Soil
WMW8-(17.5-18)-230629	A3G0729-06	5,900 / ND	Soil

As requested, we have also evaluated the soil sample WB-9(14-15)-230619 (A3F1369-04). The level of DRO and ORO quantified in this sample was approximately 22 mg/kg and <22 mg/kg, respectively. Review of the data generated indicates the minimum PAH content of this sample is 27%. This indicates that the source of the contamination present in this sample is likely pyrogenic in origin (i.e. is unlikely to be petroleum in nature). Further sampling and testing for parent and alkylated PAHs at this location would be useful in further characterizing the material present, if warranted.

3.2 Group B - Medium Boiling Petroleum Distillate Product such as Diesel #2, Diesel #4, Fuel Oil, or Similar Petroleum Product or Mixture of Petroleum Products

Based on the GC/FID traces generated, the material present in the Group B samples is indicative of a petroleum product such as diesel fuel #2, diesel fuel #4, fuel oil, or a similar petroleum product or mixture of petroleum products.

The ASTM D2887-14 GC/FID traces of the samples AB03-(7.5-9.0)-230824 and WB7-(6-7)-230620 are provided as Figures 5 and 6, respectively, as examples of the material found in this group of samples. For reference, the ASTM D2887-14 GC/FID traces of an undegraded diesel fuel #2 and a biologically degraded diesel fuel #2 are provided as Figures 7 and 8, respectively. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue "x" in these figures.

Figure 5. AB03-(7.5-9.0)-230824 (A3H1440-01)
ASTM D2887-14 GC/FID trace

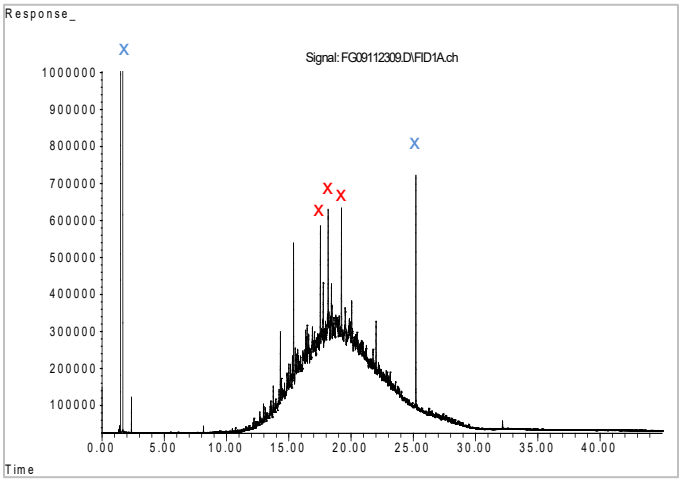


Figure 6. WB-7-(6-7)-230620 (A3F1466-01)
ASTM D2887-14 GC/FID trace

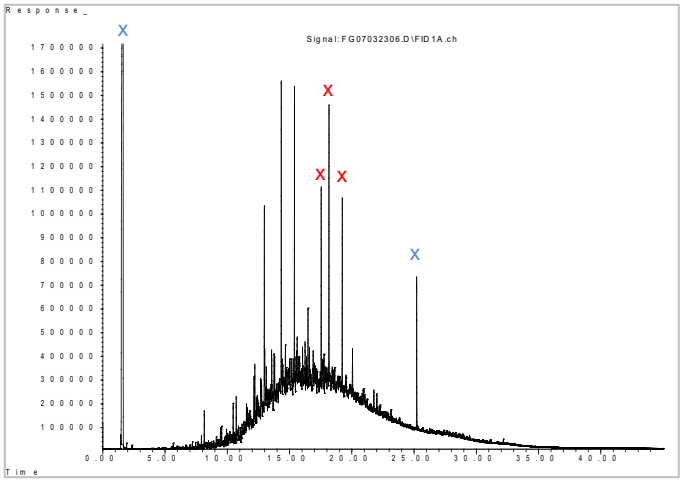


Figure 7. Undegraded Diesel Fuel #2
ASTM D2887-14 GC/FID trace

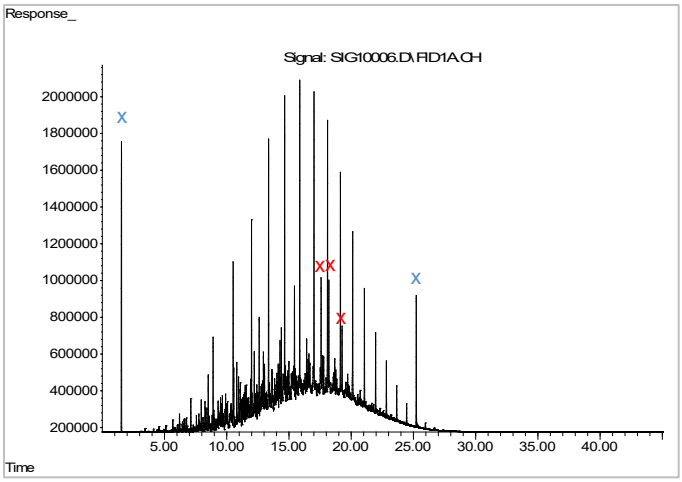
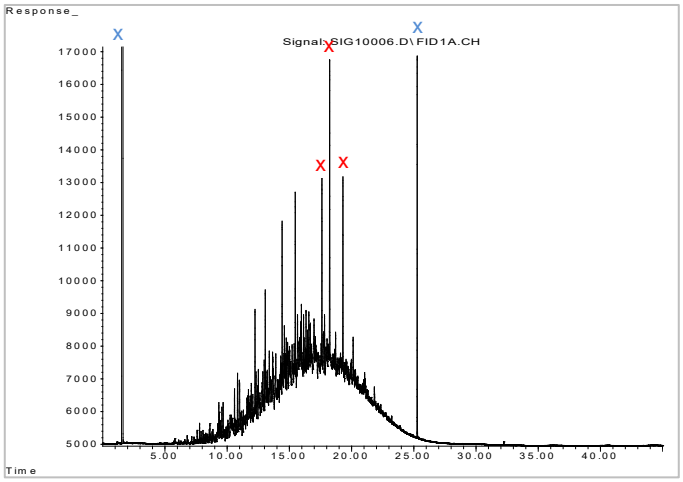


Figure 8. Biologically Degraded Diesel Fuel #2
ASTM D2887-14 GC/FID trace



The GC/FID traces of the samples AB03-(7.5-9.0)-230824 and WB7-(6-7)-230620 showed the presence of primarily medium compounds. These compounds appear as a ragged pattern of peaks on top of a broad hump or UCM. Within this range, peaks are present which are consistent with isoprenoids such as norpristane, pristane, and phytane. The peaks corresponding to these compounds are labeled with a red "x" in Figures 5 through 8. An identifiable pattern of peaks characteristic of the normal alkanes was not present. The abundance of isoprenoids in conjunction with the apparent absence of normal alkanes indicates that the fuel present has undergone substantial biological degradation. Dominant peaks characteristic of the PAHs naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were not identified.

Based on the GC/FID traces generated, the following samples have been impacted by a medium boiling petroleum distillate product such as diesel fuel #2, diesel fuel #4, fuel oil, or a similar petroleum product or mixture of petroleum products:

Sample Identifier	Laboratory Identifier	DRO / ORO Concentration (mg/kg)	Sample Matrix
AB03-(7.5-9.0)-230824	A3H1440-01	2,600 / ND	Soil
WB7-(6-7)-230620	A3F1466-01	4,500 / ND	Soil
WMW18-(22-23)-231215	A3L1381-09	200 / ND	Soil
WMW18-(14-14.5)-231215	A3L1381-08	1,900 / ND	Soil

It should be noted that based on the boiling range and UCM present in the sample AB02-(12.5-13.7)-230823, a similar material also appears to have impacted this location. However, the presence or absence of isoprenoids in this sample could not be readily determined based on the ASTM D2887-14 testing.

3.3 Group C – Majority Biologically Degraded Residual Fuel, Bunker C, Diesel #6 or Similar Petroleum Product

Based on the GC/FID traces generated, the majority of material present in the Group C samples is indicative of a biologically degraded residual fuel such as Bunker C, diesel fuel #6 or similar materials.

The ASTM D2887-14 GC/FID trace of the sample AB04-(7.5-7.9)-230823 is provided as Figure 9, as an example of the material found in this group of samples. For reference, the ASTM D2887-14 GC/FID trace of an undegraded residual fuel is provided as Figure 10. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue "x" in these figures.

Figure 9. AB04-(7.5-7.9)-230823 (A3H1389-02) ASTM D2887-14 GC/FID trace

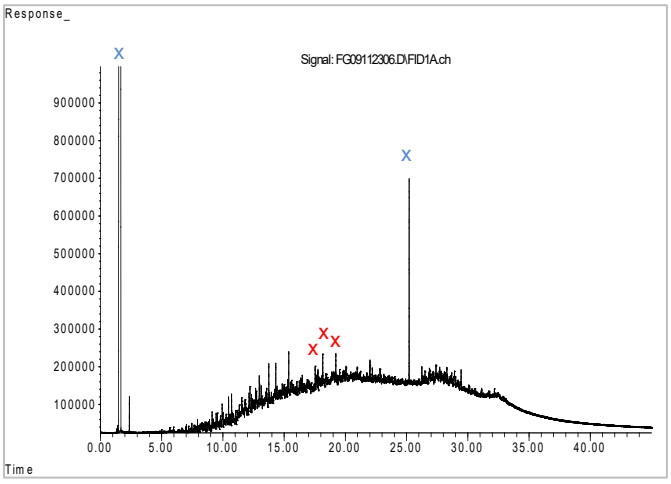
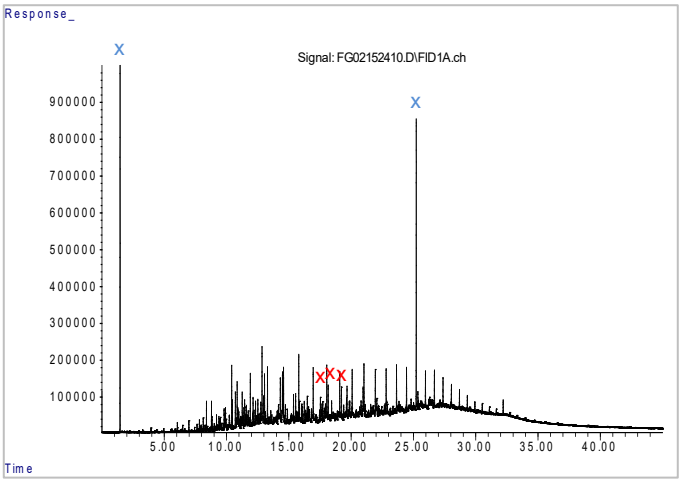


Figure 10. Undegraded Residual Fuel ASTM D2887-14 GC/FID trace



The GC/FID trace generated for the sample AB04-(7.5-7.9)-230823 showed the presence of medium to high boiling compounds. These compounds appear as a ragged pattern of peaks on top of a broad hump or UCM. Peaks are present which are indicative of isoprenoids such as norpristane, pristane, and phytane. The peaks corresponding to these compounds are labeled with a red "x" in Figures 9 and 10. An identifiable pattern of peaks characteristic of the normal alkanes was not present in this sample. The abundance of isoprenoids in conjunction

with the apparent absence of normal alkanes indicates that the fuel present has undergone substantial biological degradation. It should be noted that dominant peaks characteristic of the PAHs naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were not identified in this sample.

Based on the GC/FID traces generated, the following samples have been impacted by a biologically degraded residual fuel such as Bunker C, diesel fuel #6 or similar materials:

Sample Identifier	Laboratory Identifier	DRO / ORO Concentration (mg/kg)	Sample Matrix
AB04-(7.5-7.9)-230823	A3H1389-02	6,100 / ND	Soil
WB-11-(8-9)-231219	A3L1589-06	3,100 / ND	Soil
WMW-17-(10-10.5)-231218	A3L1589-01	4,400 / ND	Soil

It was also requested that we evaluate the sample WB-11(15.5-16)-231219 (A3L1589-07). The level of DRO and ORO present in this sample was approximately 120 mg/kg and <24 mg/kg, respectively. Review of the NWTPH-Dx GC/FID traces generated shows that the boiling range of the UCM present in this sample is similar to that present in the shallower sample WB-11-(8-9)-231219 (A3L1589-06) at this location. This indicates that at least a portion of the material present in these samples is consistent with a similar source or sources. It should be noted that additional peaks are present in the sample WB-11(15.5-16)-231219 which were not present in the sample WB-11-(8-9)-231219 with some of these peaks likely being due to the presence of PAHs. Further sampling and testing for parent and alkylated PAHs at this location would be useful in further characterizing the material present, if warranted.

3.4 Group D – R-99 (Biodiesel) or Similar Product

Based on the GC/FID trace generated, the material present in the sample WMW-14-(15.5-16)-231221 is indicative of R-99 (biodiesel).

The ASTM D2887-14 GC/FID trace of this sample is provided as Figure 11. For reference, the ASTM D2887-14 GC/FID trace of an undegraded R-99 sample is provided as Figure 12. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue “x” in these figures.

Figure 11. WMW-14-(15.5-16)-231221 (A3L1627-03) ASTM D2887-14 GC/FID trace

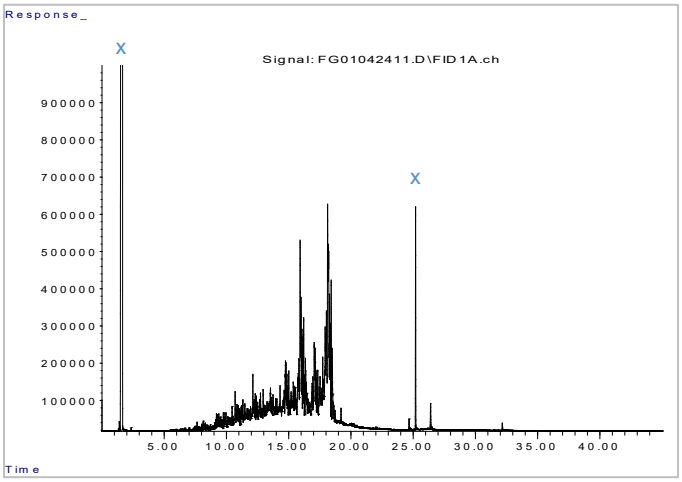
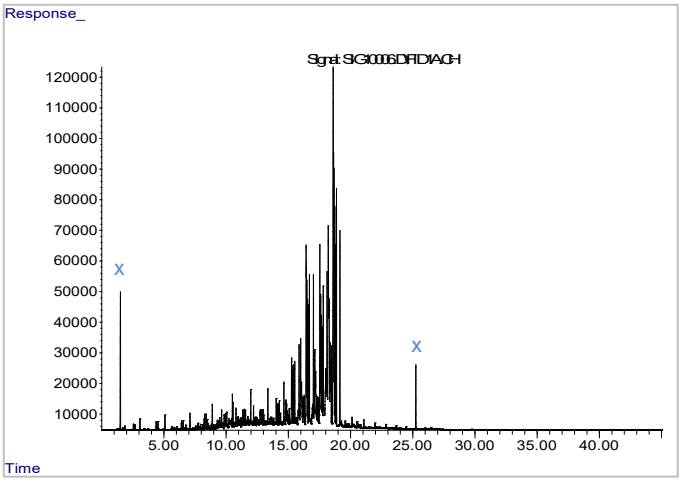


Figure 12. Undegraded R-99 (Biodiesel) ASTM D2887-14 GC/FID trace



The GC/FID trace generated for the sample WMW-14-(15.5-16)-231221 showed the presence of medium boiling compounds. These compounds appear as an irregular pattern of peaks on top of a broad hump or UCM. A dominant pattern of peaks indicative of the normal alkanes was not identified. The low level or apparent absence of normal alkanes indicates that the R-99 (biodiesel) present in this sample has undergone some degree of biological degradation. It should be noted that dominant peaks characteristic of the PAHs naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were not identified in this sample.

3.5 Group E – Middle Distillate such as Kerosene, Jet A, or Similar Petroleum Products

Based on the GC/FID traces generated, the majority of material present in the sample WMW-15-(16-16.5)-231220 is indicative of a middle distillate such as kerosene or Jet A.

The ASTM D2887-14 GC/FID trace of this sample is provided as Figure 13. For reference, the ASTM D2887-14 GC/FID trace of an undegraded Jet A is provided as Figure 14. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue "x" in these figures.

Figure 13. WMW-15-(16-16.5)-231220 (A3L1589-13) ASTM D2887-14 GC/FID trace

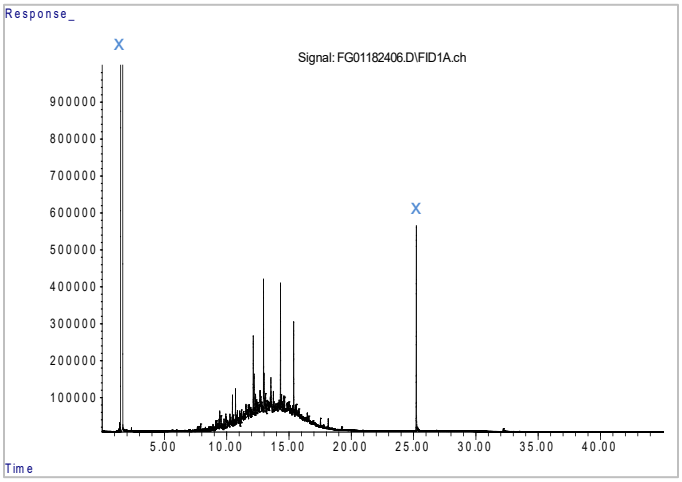
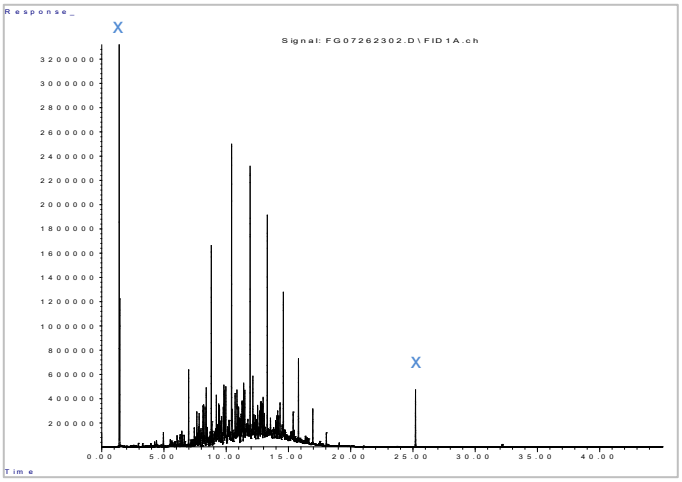


Figure 14. Undegraded Jet A ASTM D2887-14 GC/FID trace



The GC/FID trace for the sample WMW-15-(16-16.5)-231220 showed the presence of medium boiling compounds. These compounds appear as an irregular pattern of peaks on top of a broad hump or UCM. The dominant peaks present are indicative of isoprenoids. An identifiable pattern of peaks characteristic of the normal alkanes was not present. The abundance of isoprenoids in conjunction with the apparent absence of normal alkanes indicates that the fuel present has undergone substantial biological degradation. It should be noted that dominant peaks characteristic of the PAHs naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were not identified in this sample.

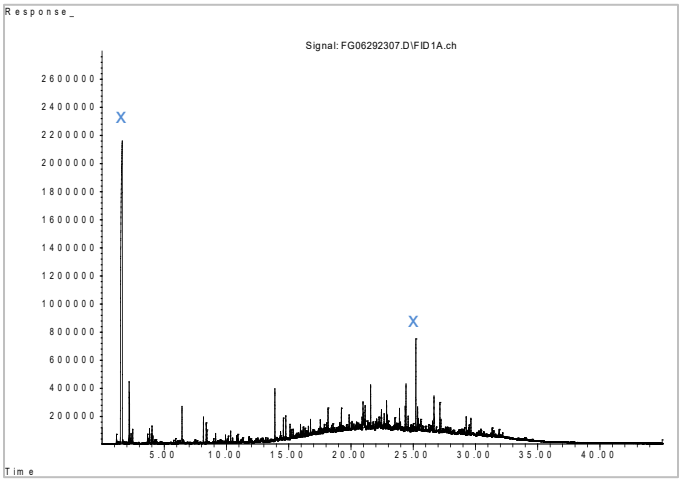
It should be noted that a low level of kerosene or Jet A may also be present in the sample WMW-15(12-12.5) (A3L1589-11).

3.6 Group F – Mixture of Petroleum and Non-Petroleum Material

Based on the GC/FID trace generated, at least a portion of the material present in the sample WB6-(4-4.5)-230615 is due to a mixture of petroleum and non-petroleum material.

The ASTM D2887-14 GC/FID trace of this sample is provided as Figure 15. Peaks corresponding to the extraction solvent and RT marker are labeled with a blue "x" in this figure.

Figure 15. WB6-(4-4.5)-230615 (A3F1267-02)
ASTM D2887-14 GC/FID trace



The GC/FID trace for the sample WB6-(4-4.5)-230615 showed the presence of low, medium, and high boiling compounds. These compounds appear as an irregular pattern of peaks on top of a broad hump or UCM. Identifiable peaks are present which are indicative of isoprenoids such as norpristane, pristane, and phytane. The abundance of isoprenoids and apparent absence of normal alkanes indicates that any petroleum distillate present has undergone substantial biological degradation.

In addition, identifiable peaks are present which are indicative of PAHs. The abundance of PAHs indicates a non-petroleum material potentially including coal tar or a MGP waste product may also have impacted the sample.

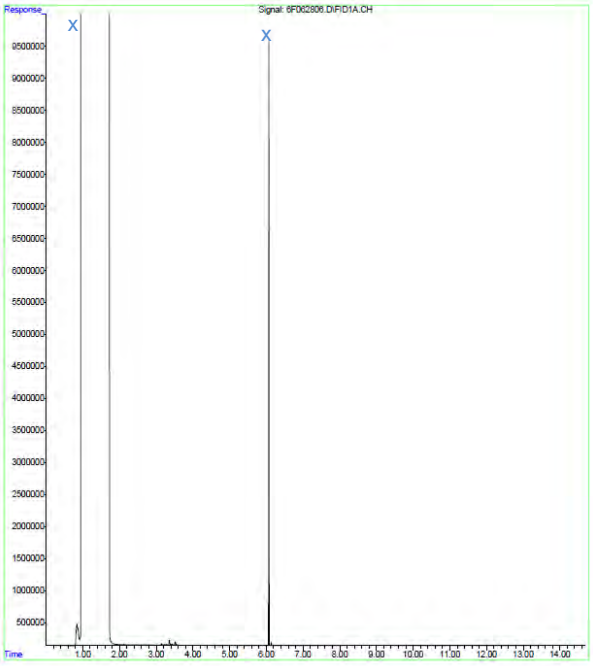
4.0 WATER CONTAMINANT GROUPS

4.1 Group G - Naphthalenes-Dominant Dissolved Phase Material

Based on the NWTPH-Dx GC/FID traces generated, the material present in the Group G samples is indicative of a naphthalenes-dominant dissolved phase material. The primary contamination in this group of samples is consistent with impact by a material such as that identified in Group A.

The NWTPH-Dx GC/FID trace for an example method blank is provided as Figure 16. The extraction solvent, methylene chloride, is seen eluting between 0.8 and 1.8 minutes. The large peak seen near 6.1 minutes is *o*-terphenyl, which is a surrogate compound added as a quality assurance check for this analysis. The peaks corresponding to the extraction solvent and surrogate are labeled in Figure 16 with a blue "x".

Figure 16. Method Blank NWTPH-Dx GC/FID trace



The NWTPH-Dx GC/FID traces for the samples WMW-8-231012 and WB-11-231219 are provided as Figures 17 and 18, respectively, as examples of the material present in this group of samples. Peaks corresponding to the extraction solvent and surrogate are labeled with a blue "x" in these figures.

Figure 17. WMW-8-231012 (A3J1320-11) NWTPH-Dx GC/FID trace

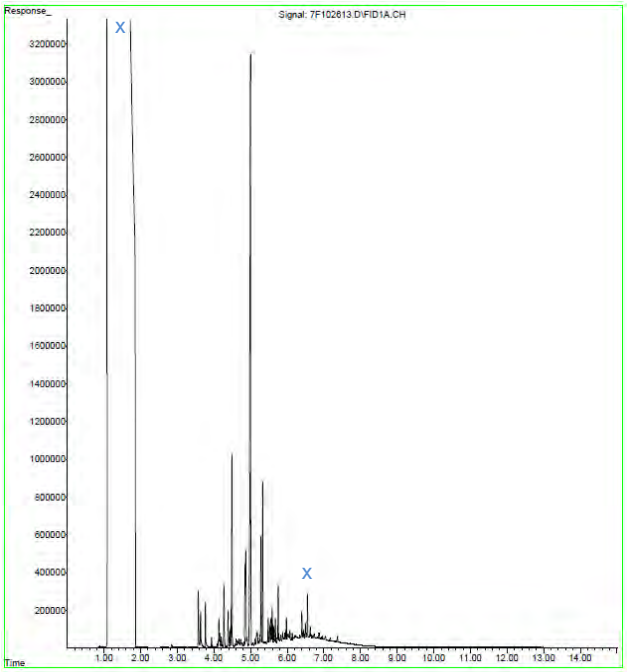
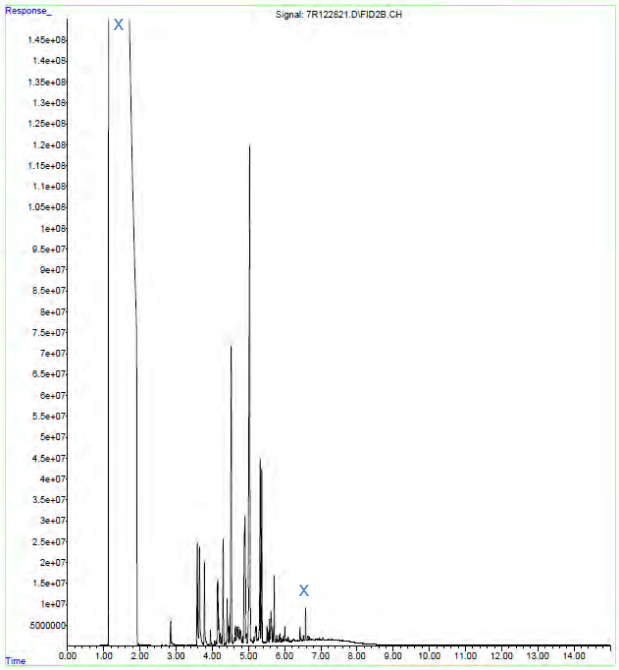


Figure 18. WB-11-231219 (A3L1589-05) NWTPH-Dx GC/FID trace



The NWTPH-Dx GC/FID traces of the samples WMW-8-231012 and WB-11-231219 showed the presence of low to medium boiling compounds. These compounds appear as an irregular pattern of peaks on top of a broad hump or UCM. Within this range, the dominant peaks present are indicative of PAHs.

Based on the GC/FID traces generated, the following samples contain a naphthalenes-dominant dissolved phase material.

Sample Identifier	Laboratory Identifier	DRO / ORO Concentration (ug/L)	Sample Matrix
WB8-230621	A3F1466-07	482,000 / ND	Water
WB-11-231219	A3L1589-05	10,000 / ND	Water
WMW3-230718	A3G1203-11	390 / ND	Water
WMW-3-231011	A3J1320-03	650 / ND	Water
WMW-3-240109	A4A1106-08	510 / ND	Water
WMW4-230718	A3G1203-13	690 / ND	Water
WMW-4-231011	A3J1320-04	1,700 / ND	Water
WMW-4-240109	A4A1106-09	1,400 / ND	Water
WMW6-230718	A3G1203-15	300 / ND	Water
WMW8-230718	A3G1203-14	6,300 / ND	Water
WMW-8-231012	A3J1320-11	9,200 / ND	Water
WMW-8-240110	A4A1185-04	7,400 / ND	Water
WMW-17-240111	A4A1185-10	3,500 / ND	Water

It should be noted that a UCM consistent with polar/semi-polar organics was also identified in the samples WB8-230621, WMW3-230718, and WMW6-230718.

4.2 Group H – Polar/Semi-polar Unresolved Complex Mixture (UCM) Dominant Dissolved Phase Material

Based on the GC/FID traces generated, the Group H samples contain a material characteristic of a polar/semi-polar UCM. The vast majority of samples in this group have a UCM with a boiling point maximum near or above 300°C. This includes WMW5-230717, WMW-5-231011, WMW-5-240110, WMW-6-231012, WMW-6-240110, WMW10-230718, WMW-10-231012, WMW-10-240109, WMW-12-231012, and WMW-15-240108. However, it should be noted that during three sampling events, samples were encountered that contained a UCM with a significantly lower boiling point maximum. These samples include WMW-12-240111, WMW-16-240108, and WMW-18-240110. Further testing of the Group H samples using silica gel column cleanup may be completed to confirm the presence of polar/semi-polar material, if warranted.

The NWTPH-Dx GC/FID traces generated for the samples WMW-12-240111, WMW-18-240110, and WMW-5-231011 are provided as Figures 19, 20, and 21, respectively, as examples of the material found in this group of samples. Peaks corresponding to the extraction solvent and surrogate are labeled with a blue "x" in these figures. The pattern of peaks eluting between 3.6 and 4.2 minutes (labeled with a blue bracket in the figures) is indicative of laboratory contamination.

Figure 19. WMW-12-240111 (A4A1185-09)
NWTPH-Dx GC/FID trace

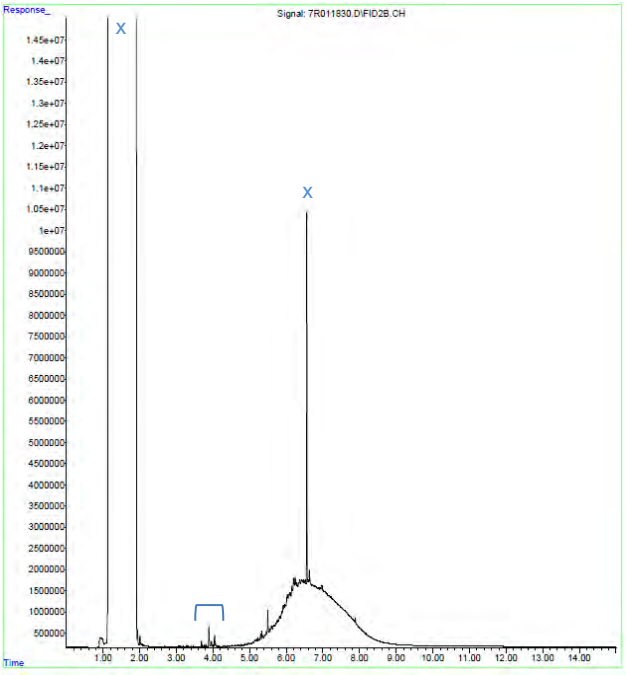


Figure 20. WMW-18-240110 (A4A1185-02)
NWTPH-Dx GC/FID trace

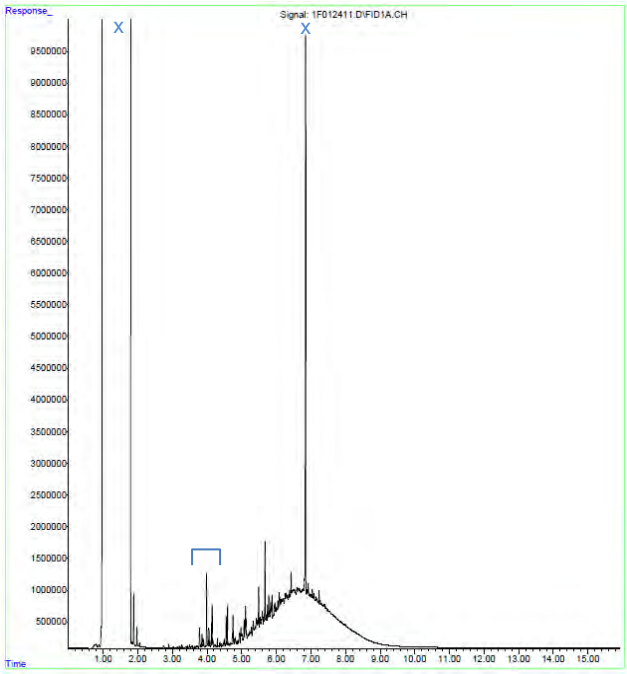
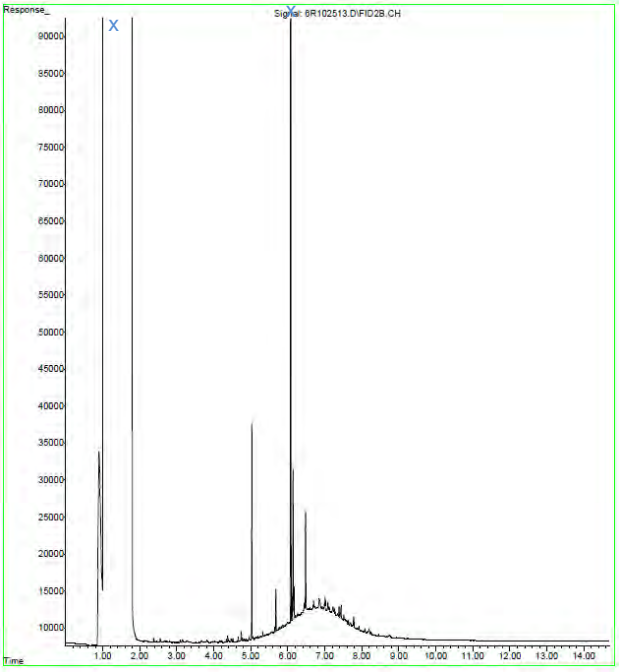


Figure 21. WMW-5-231011 (A3J1320-06)
NWTPH-Dx GC/FID trace



Based on the GC/FID traces generated, the following samples contain polar/semi-polar UCM dominant dissolved phase material:

Sample Identifier	Laboratory Identifier	DRO / ORO Concentration (ug/L)	Sample Matrix
WMW5-230717	A3G1203-05	130 / ND	Water
WMW-5-231011	A3J1320-06	360 / ND	Water
WMW-5-240110	A4A1185-06	200 / ND	Water
WMW-6-231012	A3J1320-10	340 / ND	Water
WMW-6-240110	A4A1185-05	220 / ND	Water
WMW10-230718	A3G1203-10	170 / ND	Water
WMW-10-231012	A3J1320-09	200 / ND	Water
WMW-10-240109	A4A1106-04	140 / ND	Water
WMW-12-231012	A3J1320-12	1,400 / ND	Water
WMW-12-240111	A4A1185-09	2,500 / ND	Water
WMW-15-240108	A4A1106-02	130 / ND	Water
WMW-16-240108	A4A1106-01	1,200 / ND	Water
WMW-18-240110	A4A1185-02	1,700 / ND	Water

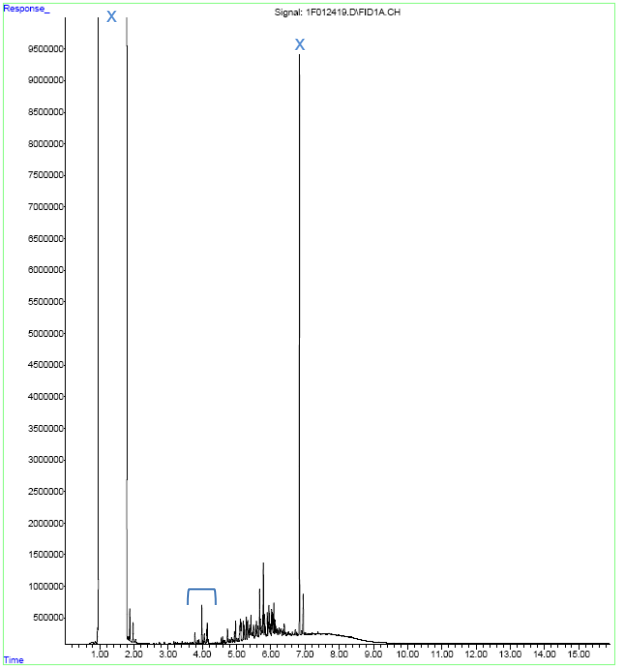
It should also be noted that some of the samples in this group, including MW6-231012, showed a significant level of naphthalene. This indicates that select samples in this group may also have been impacted by the material identified in Group A.

4.3 Group I - Water Soluble Fraction of R-99 (Biodiesel)

Based on the GC/FID trace generated, the majority of material present in the sample WMW-14-240111 is indicative of the water soluble fraction of R-99 (biodiesel).

The NWTPH-Dx GC/FID trace of this sample is provided as Figure 22. Peaks corresponding to the extraction solvent and surrogate are labeled with a blue “x”, and peaks indicative of laboratory contamination are labeled with a blue bracket.

Figure 22. WMW-14-240111 (A4A1185-07)
NWTPH-Dx GC/FID trace



The NWTPH-Dx GC/FID trace of the sample WMW-14-240111 shows the presence of low to medium boiling compounds. These compounds appear as an irregular pattern of peaks on top of a broad hump or UCM. This material is consistent with that found in the soil sample collected from this location (WMW-14-(15.5-16)-231221), which is characteristic of R-99 (biodiesel).

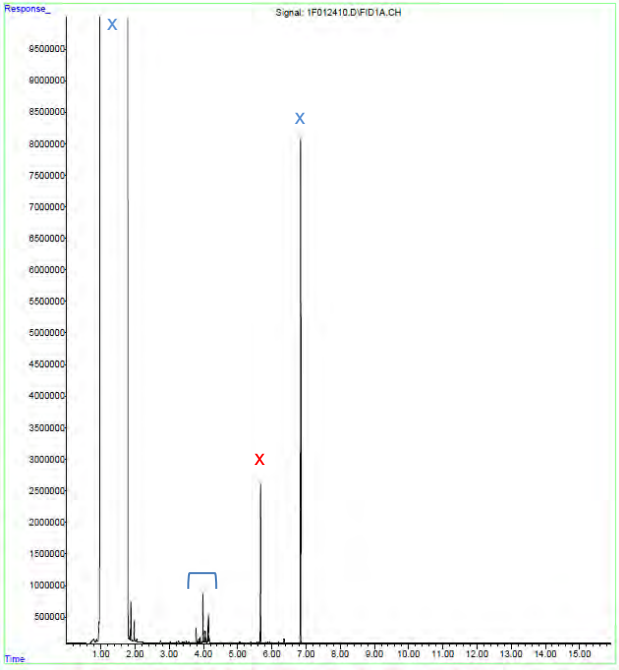
4.4 Additional Comments on Dissolved Phase Contaminant Evaluation

It should also be noted that during the evaluation of the NWTPH-Dx GC/FID traces generated for the water samples, a relatively low level peak was seen in numerous samples at the Site. This peak elutes near 250°C and was quantified within the NWTPH-Dx boiling range. This peak was not readily identified. A cursory evaluation of the diesel extract at the WMW-7 location using a mass spectrometer tentatively identified this peak as 4-(1,1-dimethylpropyl)-phenol.[2] This compound may be present in samples collected from numerous locations at the Site including, but not limited to, WMW-1, WMW-2, WMW-6, WMW-7, WMW-8, WMW-9, WMW-10, WMW-11, and WMW-18. Further evaluation of phenols at the Site may be completed using GC/MS, if warranted.

For example, the NWTPH-Dx GC/FID trace of the sample WMW-7-240110 is provided as Figure 23. Peaks corresponding to the extraction solvent and surrogate are labeled with a blue "x", and peaks indicative of laboratory contamination are labeled with a blue bracket in the figure below. The unidentified peak is labeled with a red "x."

[2] This tentatively identified compound had a spectral qualifier of 95 and a CAS number of 80-46-6.

Figure 23. WMW-7-240110 (A4A1185-01)
NWTPH-Dx GC/FID trace



4.5 Additional Comments on Soil, Water and Product Contaminant Evaluation

In addition, it was requested that we evaluate whether automotive gasoline has impacted any of the soil, water or product samples included in this evaluation. Based on this review, the data does not clearly indicate the presence of automotive gasoline in any samples. Testing of additional samples collected at the site for Forensic VOCs at a Gasoline Site may be useful in further characterizing any gasoline range material in the samples, if warranted.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Respectfully,

Kurt Johnson, Senior Chemist
Director of Forensic Services
Apex Laboratories, LLC

Enclosures