

State of Oregon
Department of Environmental Quality

Memorandum

Date: July 14, 2023

To: FILE

Through: Kevin Parrett, Manager
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Northwest Region Cleanup Program

From: Rebecca Digiustino, Project Manager
Northwest Region

Subject: Hunt's Market, LUST # 04-16-0669; Staff Memorandum in support of a No Further Action determination

This document presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended Conditional No Further Action (CNFA) determination for Hunt's Market in Astoria, Oregon. As discussed in this report and conditional upon adherence to a contaminated media management plan (CMMP) and property use restrictions in an Easement and Equitable Servitudes (E&ES), residual contaminant in soil and groundwater do not pose unacceptable risk to human health and the environment.

The proposed NFA determination meets the requirements of Oregon Administrative Rules Chapter 340, Division 122, Sections 0205 to 360 and ORS 465.200 through 465.455.

The proposal is based on information documented in the administrative record for this site. A copy of the administrative record index is presented at the end of this report.

1. BACKGROUND

Site location.

The site's location (Figure 1) can be described as follows:

- Address: 40490 Old Highway 30, Astoria, Oregon 97103.
- Latitude 46.1654° North, longitude -123.6607° West
- Clatsop County Tax Lot 2200, Township 8 North, Range 8 West, Section 22B

Site setting.

The 0.84-acre site property is developed with an approximately 10,545 square foot building originally constructed in 1938 (Figure 2). The site property type is listed as improved commercial by Clatsop County and is currently occupied by a grocery store identified as the Country Market. Asphalt-paved parking areas are located on the north and east portions of the property.

During a Phase I Environmental Site Assessment (ESA), a fill port and vent line for a presumed tank were observed along the south side of the building with an additional vent line observed on the north side. A limited geophysical survey was conducted on June 30, 2015, and an underground storage tank (UST) was identified on the north side of the building. The geophysical survey did not identify any suspected objects in the vicinity of the fill port area located on the south side of the building.

The site property is located to the southwest of the intersection of Old Highway 30 and Svensen Market Road in Astoria, Oregon. According to Clatsop County, the surrounding properties include commercial retail, vacant, and residential uses. Properties adjacent to the site are occupied as follows:

North: Old US Highway 30, followed by vacant commercial land (Tax Lot 2300), followed by a 1.03-acre property with a residential dwelling (Tax Lot 2401)

Northeast: The intersection of Old US Highway 30 and Svensen Market Road, followed by vacant land with the Wickiup Grange Hall beyond

East: Svensen Market Road, followed by vacant commercial land

Southeast: Svensen Market Road, followed by a residential dwelling

South: Wickiup Water District, followed by a residential dwelling

West: Vacant forested land

Physical setting.

According to the United States Geological Survey (USGS) 7.5-minute topographic map for the Cathlamet Bay, Oregon quadrangle, the site is located approximately 95 feet above mean sea level. Topography in the area generally slopes towards Cathlamet Bay and the Columbia River located approximately 0.45 miles to the north-northwest.

The soil on the site property is reported as Walluski silt loam. Walluski soils are described as moderately well drained with a moderately low to moderately high capacity to transmit water through the least transmissive layer. During site investigations, the site stratigraphy was observed to be predominantly brown silty clay with increased gravel with depth.

The primary aquifers in the vicinity of the site are typically located within alluvial deposits of sand, gravel and silt associated with the flood and terrace deposits along the Columbia River. Within these deposits are localized areas or lenses of water-bearing sands and gravels that may result in a shallow, localized, perched water table. Lateral and vertical migration of shallow groundwater may be impeded by the relatively impermeable nature of underlying bedrock and by the discontinuous nature of the perched water-bearing sands and gravel. According to previous site investigations, groundwater has been encountered in the area at depths ranging from 4.5 to 17 feet below ground surface (bgs). Based on the general topography of the site property, the hydraulic gradient is assumed to the north-northwest, towards the Columbia River; however, quarterly groundwater isocontours indicate a hydraulic gradient that flows toward MW1 from across the site (Figure 3).

Site history.

The site property was developed by 1938 with the current building located in the eastern portion of the property. The building was expanded in 1988 and a loading dock and warehouse section was added between 1994 and 2000. Assessor records suggest that the original heat source for the building was an oil burning furnace. The identified UST was presumed to be associated with the former gasoline service station that was located on the property in the 1950s.

2. BENEFICIAL LAND AND WATER USE DETERMINATIONS

Land use.

Based on the information provided as part of the site investigations and groundwater monitoring, a Locality of Facility (LOF) was estimated for this site (Figure 4). The limits of the LOF include areas where site media have been impacted by petroleum hydrocarbons and associated constituents. The LOF encompasses the northern portion of the site, the adjacent Old U.S. Highway 30 right-of-way (ROW), and the two north adjacent properties (Tax Lots 2300 and 2401). In addition, the LOF extends north and east of the site to near the intersection with Svensen Market Road (Figure 4).

According to Clatsop County, the site property is listed for general commercial land use (GC). Based on the current zoning designation, the property is reasonably likely to remain as commercial use in the future. The surrounding properties include commercial retail, vacant, and residential uses. Tax Lot 2300 is vacant but zoned as GC and Tax Lot 2401 is zoned as Knappa-Svensen Rural Community Residential (KS-RCR). Tax Lots 2300 and 2401 are reasonably likely to remain as the current zoning, but additional buildings may be constructed on the properties in the future.

Groundwater use.

A Beneficial Water Use Determination (BWUD) was previously completed for the former Svensen Mobil (LUST No. 04-00-0856) site located adjacent to the east of the site. The BWUD findings were reviewed and updated as appropriate for purposes of preparing this Staff Memo. The shallow groundwater in the area is not used for drinking water purposes and is not a reasonably likely future water supply. A door-to-door survey of water supply wells was conducted on December 6 and 7, 2009, and the survey indicated that there are no groundwater supply wells in the vicinity of the site. Drinking water is supplied to the area by Wickiup Water District. The Wickiup Water District is supplied water by Little Creek, John Day Creek (locally known as Big Fat Buck Creek) and a small tributary to John Day Creek (locally known as Little Fat Buck Creek).

The Oregon Water Resources Department's (WRD) Well Log Query database was reviewed for the area within a 0.5-mile radius of the site. One domestic water well was identified 650 feet south of the site (presumed upgradient). The well was reportedly installed in the deep aquifer (70 feet bgs) in 1980. According to Clatsop County records, the property is currently hooked up to the municipal water supply. No other water wells were identified in the WRD database within the search radius. Based on the lack of water wells, and availability of municipal drinking water

sourced from surface water, groundwater within an approximate 0.5-mile radius of the site does not have a current or reasonably likely beneficial use as drinking water.

Surface water use.

No surface water body is located within the LOF. The closest surface water body is a vegetated swale located about 850 feet east of the site. The swale appears to connect to the Columbia River, located approximately 0.45 miles north of the site. The Columbia River has current and likely future beneficial uses including commercial shipping, fishing, recreation, and habitat for fish and benthic organisms. Additionally, a freshwater emergent wetland connected to Bear Creek was identified approximately 1,000-feet west of the property. The wetland has current and likely future beneficial use as habitat for local wildlife.

3. INVESTIGATION AND CLEANUP WORK

Following the Phase I ESA, a Phase II ESA was conducted on June 30, 2015, which included a geophysical survey and advancing four soil borings near the UST (S1 through S3) and in the vicinity of the fill port on the south side of the building (S4). Soil samples were collected at depths of 10 or 13 feet bgs. Groundwater was encountered in boring S1(2015) at 17 feet bgs and a groundwater sample was collected. Laboratory analysis identified gasoline range organics (GRO) and select volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene, and total xylenes (BTEX) exceeded DEQ Risk-Based Concentrations (RBCs) in soil and/or groundwater samples collected near the UST. Diesel range organics (DRO) and oil range organics (ORO) were reportedly not detected in soil and groundwater.

On April 14, 2016, five soil borings were advanced on the site property (B1 through B5) and two of the borings were converted into permanent monitoring wells (B3 to MW1 and B4 to MW2). One soil sample was collected from each boring at depths ranging from 13.5 to 15 feet bgs and a groundwater sample was collected from each monitoring well. All five soil samples and both groundwater samples contained detectable concentrations of GRO and BTEX. The maximum detected concentration (MDC) of GRO in soil was detected in boring B1 at a concentration of 1,160 milligrams per kilogram (mg/kg) and the MDC of benzene in soil was detected in boring B3 at a concentration of 19.8 mg/kg. The MDC of GRO in groundwater was detected in boring B3 at 17,000 micrograms per liter (µg/L) and the MDC of benzene in groundwater was detected in boring B1 at a concentration of 1,170 µg/L.

On April 13 and 14, 2017, eight soil borings were advanced on the site property (B6 through B13). One soil sample was collected from each boring at depths of 12.5 to 17 feet bgs. Ten groundwater samples were collected from three existing groundwater monitoring wells (MW1, MW2, and SM-MW9). Monitoring well SM-MW9 was associated with the former Svensen Mobil site (LUST No. 04-00-0856) and was installed on June 23, 2011. Six of eight soil samples and all of the groundwater samples contained concentrations of one or more petroleum constituents that exceeded their respective RBC. The MDC of GRO and benzene in soil was detected in boring B7 at concentrations of 6,280 mg/kg and 246 mg/kg, respectively. GRO concentrations in the groundwater samples ranged from 10,700 µg/L to 126,000 µg/L, with the MDC detected in boring B6. Total lead concentrations in groundwater samples ranged from 17 µg/L to 89.6 µg/L,

with the MDC detected in B12. Additionally, the MDCs of benzene, ethylbenzene, and total xylenes were detected in boring B6 at concentrations of 17,300 µg/L, 13,800 µg/L, and 14,881 µg/L, respectively.

On March 29, 2018, the 1,000-gallon, single-wall steel UST was decommissioned and removed from the site property. The tank was approximately 4 feet in diameter by 10 feet in length and located approximately 2 to 3 feet bgs. No staining, sheen, or soil discoloration was observed during the UST closure activities. The limits of the excavation were approximately 8 feet by 12 feet and a total depth of approximately 7 feet bgs. Eight soil samples were collected from the floor and sidewalls of the excavation (S1 through S5) and from the excavated soil stockpile (S6 through S8) following removal of the UST. The excavated soil stockpile samples were composited and analyzed as soil sample S9-Composite. Groundwater was not encountered during the UST decommissioning activities. Soil samples were analyzed for GRO and BTEX. Concentrations of the analyzed constituents in the soil samples were below the laboratory reporting limits, except for the GRO concentrations in three of the soil samples (S1, S3, and S4). GRO concentrations ranged in the three samples from 15.7 to 26.7 mg/kg. The stockpiled soil from the excavation was subsequently used to backfill the excavation.

In January 2019, three groundwater monitoring wells were installed on the site property (MW3 through MW5). One soil sample was collected from each boring during advancement. Soil samples were analyzed for GRO and BTEX analytes. Soil collected from MW3 contained concentrations of GRO, benzene, and ethylbenzene that exceeded the occupational RBC for soil leaching to groundwater at respective concentrations of 170 mg/kg, 0.15 mg/kg, and 1.30 mg/kg. Additionally, two sub-slab samples, one soil vapor sample, two ambient indoor air samples, and one exterior ambient air sample were collected from around and within the Country Market building. Soil gas and ambient air samples were analyzed for GRO and VOCs. GRO was not detected in the ambient air samples but was detected in the sub-slab and soil vapor samples in concentrations ranging from 1,300 to 1,800 micrograms per cubic meter (µg/m³). Naphthalene was detected in five of the six samples ranging in concentration from 0.26 to 0.71 µg/m³. Naphthalene concentrations in the indoor air sample collected near the cashier's area (0.71 µg/m³) and the exterior ambient air sample (0.51 µg/m³) exceeded the occupational RBC for inhalation (0.36 µg/m³).

On March 12, 2019, groundwater samples were collected from monitoring wells MW1 through MW5 and SM-MW9. The six groundwater samples were analyzed for GRO and BTEX analytes. Groundwater collected from MW1 through MW4 contained detectable concentrations of GRO, benzene, ethylbenzene, and/or total xylenes. The MDC of GRO, benzene, ethylbenzene, and total xylenes were detected in MW1 at 5,900 µg/L, 40 µg/L, 530 µg/L, and 250 µg/L, respectively.

On September 24, 2019, groundwater samples were collected from monitoring wells MW1 through MW5 and SM-MW9. The six groundwater samples were analyzed for GRO and BTEX analytes. Groundwater collected from MW1 through MW4 contained one or more detectable concentrations of GRO and/or BTEX constituents. The MDC of GRO, benzene, ethylbenzene, and total xylenes were detected in MW1 at 5,000 µg/L, 16 µg/L, 320 µg/L, and 190 µg/L, respectively.

On February 5, 2020, two groundwater monitoring wells (MW6 and MW7) were installed on the site property. The wells were located near the former UST on the north side of the building. During soil boring advancement, staining was apparent and field screening evidence indicated evidence of contamination from approximately 8 feet to 14 feet bgs in the borings. Sheen was also observed in the groundwater removed from the borings. Two soil samples were collected from each boring at depths of 8 or 10 feet bgs and 14 or 15 feet bgs. On February 6, 2020, groundwater samples were collected from all eight monitoring wells (MW1 through MW7 and SM-MW9). Soil and groundwater samples were analyzed for GRO, DRO, RRO, BTEX, and lead. Elevated concentrations of GRO, benzene, ethylbenzene, and total xylenes were detected in MW6 and MW7, with the MDC for the analytes being detected in MW7 at concentrations of 52,000 µg/L; 2,700 µg/L; 2,700 µg/L; and 5,800 µg/L, respectively.

On July 12, 2021, three soil borings (S1 through S3) were advanced on the north adjacent property (Tax Lot 2300) and a soil sample was collected at a depth of approximately 15 feet bgs from each boring. Groundwater was encountered in each boring at approximately 17 feet bgs and grab groundwater samples were collected. Soil and groundwater samples were analyzed for GRO, DRO, RRO, and VOCs. The MDC of GRO in soil was detected in S2(2021) and S3(2021) at 1,300 mg/kg. Naphthalene was detected in soil collected from S1(2021) and S2(2021) at 0.8 mg/kg and 10 mg/kg, respectively. GRO concentrations in groundwater ranged from 170,000 to 520,000 µg/L, with the MDC detected in groundwater collected from S1(2021). The MDC of naphthalene in groundwater was detected in groundwater collected from S1(2021) at a concentration of 1,400 µg/L. DRO was detected in soil and groundwater samples; however, the DRO sample chromatographs did not resemble the fuel standard used for quantitation.

On September 30, 2021, three additional soil borings (S4 through S6) were advanced on Tax Lot 2401, approximately 100 feet north-northwest of the July 2021 borings. Soil samples were collected from the three soil borings at depths of 14 to 16 feet bgs or 15 to 17 feet bgs. Groundwater was only encountered in boring S5(2021) at approximately 15 feet bgs and a grab groundwater sample was collected. Soil and groundwater samples were analyzed for GRO, DRO, and RRO, and soil samples were also analyzed for VOCs. No detectable concentrations of the analytes were detected in the soil or groundwater samples, except for a DRO concentration of 580 µg/L detected in the groundwater sample.

On November 15 and 16, 2022, two soil borings (S7 and S8) were advanced at Tax Lot 2401 to a depth of 16 feet bgs. Groundwater was encountered in both borings at approximately 12 feet bgs and a grab groundwater sample was collected from each boring. Additionally, two soil gas samples (SV9 and SV10) were collected along the south side of the residence located on Tax Lot 2401 (92694 Svenson Market Road). The soil gas samples were collected at depths of approximately 5 feet bgs. The soil samples were analyzed for GRO, DRO, RRO, and VOCs. The soil gas samples were analyzed for GRO and VOCs. No detectable concentrations of the analytes were detected in the soil or groundwater samples. The MDC of benzene, m,p-xylene, and o-xylene were detected in SV9 at concentrations of 2.1 µg/m³, 8.5 µg/m³, and 3.9 µg/m³, respectively.

Locations of historical sample locations are shown on Figure 5. Analytical results for soil, groundwater, and soil vapor samples are shown on Tables 1 through 4, 5 through 10, and 11 through 12, respectively.

4. RISK EVALUATION

Conceptual site model.

To evaluate human exposure to residual chemical contamination requires an assessment of the type and extent of that exposure. This is based on current and reasonably likely future site use. DEQ publishes RBCs for contaminants commonly encountered, for different types of exposure scenarios. These RBCs are conservative estimates of protective levels of contaminants in soil, groundwater and air. In-text Table A (below) shows potential exposure pathways and receptors for this site. Based on this, applicable RBCs are identified and used for risk screening.

Table A. Identification of applicable RBCs, based on pertinent pathways and receptors

Pathway	Receptor	Applicable RBC?	Basis for selection/exclusion
SOIL			
Ingestion, dermal contact, and inhalation	Residential	Yes	See Note 1.
	Urban residential	Yes	
	Occupational	Yes	
	Construction worker	Yes	
	Excavation worker	Yes	
Volatilization to outdoor air	Residential	Yes	See Note 1.
	Urban residential	Yes	
	Occupational	Yes	
Vapor intrusion into buildings	Residential	Yes	See Note 1.
	Urban residential	Yes	
	Occupational	Yes	
Leaching to groundwater	Residential	No	See Note 2.
	Urban residential	No	
	Occupational	No	
GROUNDWATER			
Ingestion and inhalation from tap water	Residential	No	See Note 3.
	Urban residential	No	
	Occupational	No	
Volatilization to outdoor air	Residential	Yes	See Note 1.
	Urban residential	Yes	
	Occupational	Yes	
Vapor intrusion into buildings	Residential	Yes	See Note 1.
	Urban residential	Yes	
	Occupational	Yes	
Groundwater in excavation	Construction and excavation worker	Yes	See Note 4.

Notes:

1. Although the site is a non-residential facility, there is a residential building adjacent to the site. Although multi-use residential/commercial properties are allowed based on county zoning, residential exposure RBCs are used for comparison rather than urban residential exposure RBCs because single-family residences are more likely in a rural setting and residential RBCs are more stringent.
2. Groundwater is not used for drinking. This pathway is therefore not considered, in accordance with Section B.3.2.4 of DEQ's RBDM guidance.
3. City water is provided. Local groundwater is not currently used for drinking water and is not likely to be used for this purpose in the future.
4. Construction and excavation work are generally limited to a depth of approximately 15 feet. Groundwater has been encountered at the site as shallow as 4.5 feet bgs; therefore, the groundwater in excavation pathway is considered.

Contaminant concentrations.

Maximum Contaminant Concentrations – Soil

To evaluate human health risks posed by contaminants in soil under various exposure scenarios, the highest detected concentrations of GRO, VOCs, and lead from the on-site investigations were utilized for comparison to occupational RBCs and from the off-site investigations at Tax Lots 2300 and 2401 were utilized for comparison to residential RBCs.

Soil Ingestion, Dermal Contact and Inhalation Pathway

Constituent of Interest	MDC in Soil mg/kg	Residential (RBC _{ss}) mg/kg	Occupational Worker (RBC _{ss}) mg/kg	Construction Worker (RBC _{ss}) mg/kg	COPC? (Yes/No)
GRO	6,280	1,200	20,000	9,700	Y
DRO	780 x	1,100	14,000	4,600	N
benzene	246	8.2	37	380	Y
toluene	253	5,800	88,000	28,000	N
ethylbenzene	138	34	150	1,700	Y
total xylenes	218.8	1,400	25,000	20,000	N
naphthalene	10	5.3	23	580	Y
lead	26.4	400	800	800	N

Yellow highlighted RBCs were exceeded in samples collected from one or more locations.

COPC = constituent of potential concern

x = the sample chromatograph did not resemble the fuel standard used for quantitation

Concentrations of GRO, benzene, ethylbenzene, and naphthalene exceed the residential RBCs for the soil ingestion, dermal contact and inhalation exposure pathway in soil collected from borings located on-site and on Tax Lot 2300. The MDCs of GRO and benzene were detected in boring B7 located along the southern boundary of Tax Lot 2300. Additionally, borings S1(2021), S2(2021), and S3(2021) exhibited exceedances of the RBC and are located along the north and west property boundaries of Tax Lot 2300, suggesting contamination is also present on Tax Lot 2401. Additional borings (S4[2021] through S8[2021]) were advanced on Tax Lot 2401 approximately 50 feet from the property boundary of Tax Lot 2300. Soil collected from these borings did not contain detectable concentrations of GRO, DRO, RRO, BTEX, or naphthalene, indicating soil contamination on Tax Lot 2401 is limited to about 20 feet from the property

boundaries of Tax Lot 2300. The impacted areas of Tax Lot 2401 and Tax Lot 2300 are currently covered only by grass or gravel; however, the soil was collected from approximately 13.5 to 15 feet bgs which is greater than the depth at which DEQ considers residential occupants or occupational workers would likely encounter contamination (3 feet bgs).

Soil Vapor Intrusion into Building

Constituent of Interest	MDC in Soil mg/kg	Residential (RBC _{si}) mg/kg	Occupational Worker (RBC _{si}) mg/kg	COPC? (Yes/No)
GRO	6,280	94	>Max	Y
DRO	780 x	>Max	>Max	N
benzene	246	0.16	2.1	Y
toluene	253	>Csat	>Csat	N
ethylbenzene	138	1.3	17	Y
total xylenes	350	160	>Csat	Y
naphthalene	10	6.4	83	Y

Yellow-shaded RBCs were exceeded in samples collected from one or more locations.

>Csat = Soil concentrations in excess of Csat indicate free product may be present.

>Max = The constituent RBC for this pathway is greater than 1,000,000 mg/kg or 1,000,000 mg/L. Therefore, these substances are not expected to pose risks in the scenario shown.

GRO concentrations exceed the residential RBC for soil vapor intrusion into the building in soil collected from borings B1 through B7, B9 through B11, B13, MW3, MW6, MW7, and S1(2021) through S3(2021). Benzene concentrations exceeded the residential RBCs for soil vapor intrusion into the building in soil collected from borings MW3, MW6, S1(2021), and S2(2021) and exceeded the residential and occupational worker RBCs for soil vapor intrusion into the building in soil collected from borings B1 through B7, B9 through B11, B13, and MW7. Additionally, other petroleum constituents such as ethylbenzene, total xylenes and naphthalene were detected at similar extents to the GRO and benzene exceedances. It should be noted that naphthalene was not analyzed in soil samples collected prior to 2021. Based on the elevated concentrations detected in the soil, potential risks to occupants of nearby residential and commercial buildings within 100 feet of site contamination could not be ruled out.

As discussed in a subsequent section of this Staff Memo, soil gas data were collected from temporary sampling points installed at the site and adjacent to the residential dwelling on Tax Lot 2401 to further evaluate risks from this pathway.

Maximum Contaminant Concentrations – Groundwater

To evaluate human health risks from contamination in groundwater under various exposure scenarios, the highest detected concentrations of GRO, VOCs, and lead from the on-site investigations were utilized for comparison to occupational RBCs and from the off-site investigations at Tax Lots 2300 and 2401 were utilized for comparison to residential RBCs.

Groundwater Vapor Intrusion into Building

Constituent of Interest	MDC in Groundwater	Residential (RBC _{wi})	Occupational Worker (RBC _{wi})	COPC? (Yes/No)
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	$\mu\text{g/l}$	$\mu\text{g/l}$	$\mu\text{g/l}$	
GRO	520,000	22,000	>S	Y
DRO	90,000	>S	>S	N
RRO	560	>S	>S	N
benzene	17,300	210	2,800	Y
toluene	991	>S	>S	N
ethylbenzene	13,800	620	8,200	Y
total xylenes	14,881	86,000	>S	N
naphthalene	1,400	840	11,000	Y

>S = Groundwater RBC exceeds the solubility limit, which indicates light nonaqueous phase liquids (LNAPL) may be present. Based on historical groundwater observations, measurable LNAPL is not present at the site.

GRO concentrations exceed the residential RBC for groundwater vapor intrusion into the building in groundwater collected from borings B6, B9, B11, B12, and S1(2021) through S3(2021). Benzene concentrations exceed the residential RBC for groundwater vapor intrusion into the building in groundwater collected from borings B1, B2, B7, B11, B12 and S1(2021). Ethylbenzene concentrations exceed the residential RBC for groundwater vapor intrusion into the building in groundwater collected from borings B3, B9, B12, S1(2021), and S3(2021). Benzene and ethylbenzene exceeded both the residential and occupational worker RBCs for groundwater vapor intrusion into the building in groundwater collected from boring B6. Naphthalene concentrations exceed the residential RBC for groundwater vapor intrusion into the building in groundwater collected from borings S1(2021) and S3(2021). It should be noted that naphthalene was not analyzed in groundwater samples collected prior to 2021. Additionally, concentrations of GRO, benzene, and ethylbenzene in groundwater collected during the 2019-2020 quarterly monitoring events at monitoring wells MW1 through MW5 were less than the residential RBC for groundwater vapor intrusion into the building. It should also be noted that, based on the high concentrations of petroleum constituents and the lack of measurable LNAPL at the site, the reported concentrations may be biased high due to increased turbidity that can occur in grab groundwater samples collected from temporary wells.

As discussed in a subsequent section of this Staff Memo, soil gas data were collected from temporary sampling points installed at the site and adjacent to the residential dwelling on Tax Lot 2401 to further evaluate risks from this pathway.

Groundwater in Excavation

Constituent of Interest	MDC in Groundwater $\mu\text{g/l}$	Construction/Excavation Worker (RBC_{we}) $\mu\text{g/l}$	COPC? (Yes/No)
GRO	520,000	14,000	Y
DRO	90,000	>S	N
RRO	560	>S	N
benzene	17,300	1,800	Y
toluene	991	220,000	N
ethylbenzene	13,800	4,500	Y
total xylenes	14,881	23,000	N

naphthalene	1,400	500	Y
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Yellow highlighted RBCs were exceeded in samples collected from one or more locations.

GRO concentrations exceed the construction and excavation worker RBC for groundwater in excavations in groundwater collected from borings B3, B6, B7, B9, B11, B12, and S1(2021) through S3(2021). Benzene concentrations exceed the construction and excavation worker RBC for groundwater in excavations in groundwater collected from borings B6, B7, B11, and B12. Ethylbenzene concentrations exceed the construction and excavation worker RBC for groundwater in excavations in groundwater collected from boring B6. Naphthalene concentrations exceed the construction and excavation worker RBC for groundwater in excavations in groundwater collected from boring S1(2021). It should be noted that naphthalene was not analyzed in groundwater samples collected prior to 2021. Additionally, concentrations of GRO, benzene, and ethylbenzene in groundwater collected during the 2019-2020 quarterly monitoring events at monitoring wells MW1 through MW5 were less than the construction and excavation worker RBC for groundwater in excavations. It should also be noted that, based on the high concentrations of petroleum constituents and the lack of measurable LNAPL at the site, the reported concentrations may be biased high due to increased turbidity that can occur in grab groundwater samples collected from temporary wells.

Borings with elevated concentrations of petroleum constituents that exceed the construction and excavation worker RBC for groundwater in excavations are located on the site or on Tax Lot 2300 near the intersection of Old US Highway 30 and Svensen Market Road. Although future development is not anticipated at this time, any potentially impacted groundwater encountered during future redevelopment would be managed through implementation of a DEQ-approved CMMP.

Additional Evaluation of Soil Gas.

Two soil gas investigations were conducted to evaluate possible vapor intrusion risks to the onsite building and the residential dwelling located on Tax Lot 2401. It should be noted that soil gas data were not collected from Tax Lot 2300. This property is currently vacant but based on known petroleum hydrocarbon contamination concentrations in soil and groundwater on the Tax Lot 2300, DEQ presumes that contamination poses unacceptable vapor intrusion risks to occupants of *future* buildings constructed at that property.

In 2019, two sub-slab vapor samples, one soil vapor sample, two indoor air samples, and one exterior ambient air sample were collected from inside Hunt's Market. The sub-slab vapor samples and soil vapor sample results were compared to the occupational worker RBCs for soil gas inhalation and the indoor air and exterior ambient air sample were compared to the occupational worker RBCs for air inhalation. All analyzed petroleum constituents in the samples were below the applicable RBCs with the exception of naphthalene in one indoor air sample ($0.71 \mu\text{g}/\text{m}^3$) and the exterior ambient air sample ($0.52 \mu\text{g}/\text{m}^3$) which exceeded the respective occupational worker RBC for air inhalation ($0.36 \mu\text{g}/\text{m}^3$). The indoor air sample was collected near the cashier area located in the northeastern portion of the building and the exterior air sample was collected along the north exterior side of the northeast corner of the building (Figure

6). Based on the exterior ambient air data, sample Indoor Air 1 may have been influenced by other sources.

In 2022, two soil gas samples were collected along the south side of the residential dwelling on Tax Lot 2401. The samples were compared to the residential RBCs for soil gas inhalation. All detected concentrations were below respective RBCs.

Human health risk.

GRO and VOCs including benzene, ethylbenzene, total xylenes, and naphthalene were detected in soil and groundwater at concentrations exceeding generic RBCs for one or more exposure pathways and exposure scenarios and therefore screened in as COPCs. However, based on the following, risks to human receptors are limited (i.e., or nonexistent) for selected exposure pathways and these COPCs were not carried forward as COCs:

- Soil contamination at the site, Tax Lot 2300, Tax Lot 2401, and in the ROW of Old US Highway 30 and Svensen Market Road exceeding generic RBCs for the soil ingestion, dermal contact, and inhalation exposure pathway for residential or occupational worker scenarios is present at depths of at least 13 feet bgs. Based on the depth of the detections, the contamination does not pose unacceptable risks under residential or occupational worker exposure scenarios.
- Soil and groundwater contamination exceeding generic RBCs for the vapor intrusion into building exposure pathways under residential and/or occupational worker scenarios is present at the site, Tax Lot 2300, and the southeastern (unoccupied) portion of Tax Lot 2401. However, soil gas data collected from the site and near the residence at Tax Lot 2401 in 2019 and 2022, respectively, indicate that *as currently developed*, soil and groundwater contamination does not appear to pose unacceptable vapor intrusion risks to building occupants. Likewise, Tax Lot 2300 is currently vacant and, *as it is currently utilized*, soil and groundwater contamination at that property does not pose unacceptable vapor intrusion risks.

Exposure pathways and scenarios carried forward as COCs due to unacceptable human health risks include:

- Excavation workers contacting contaminated groundwater in sufficiently deep excavations at the site, in the ROW of Old US Highway 30 or Svensen Road north and east of the site, and at Tax Lot 2300; and
- Soil and groundwater contamination exceeding generic RBCs for the vapor intrusion into building exposure pathways under residential and/or occupational worker scenarios is present at the site, Tax Lot 2300, and the southeastern portion of Tax Lot 2401. Soil gas data have not been collected from Tax 2300 to date and based on known petroleum hydrocarbon contamination concentrations in soil and groundwater on the Tax Lot 2300, DEQ presumes that contamination poses unacceptable vapor intrusion risks to occupants of *future* buildings constructed at that property. Additionally, the vapor intrusion data collected at the current buildings located at the site and Tax Lot 2401 does not rule out risks to occupants of future buildings constructed at those properties. As a result, a

remedy is necessary to mitigate vapor intrusion risks to occupants of future buildings constructed at those properties.

The general extent of the area with concentrations of GRO and VOCs exceeding RBCs protective of excavation workers in deep excavations is shown in Figure 4.

Ecological risk.

The site and north adjacent properties are devoid of habitat. The closest surface water body is a vegetated swale located about 850 feet east of the site. The swale appears to connect to the Columbia River, located approximately 0.45 miles north of the site. Analytical data from former on-site and off-site monitoring wells and grab samples from borings advanced on Tax Lots 2300 and 2401 indicate that the plume is largely restricted to the right-of-way for Old US Highway 30 and Tax Lot 2300. Based on the known extent of the groundwater contamination, groundwater flow and distance, ecological receptors are unlikely to be impacted.

5. RECOMMENDATION

Unacceptable risks to construction and excavation workers from contact with groundwater in deep excavations should be mitigated through implementation of the DEQ-approved CMMP. The CMMP establishes procedures for evacuation, characterization, and management of groundwater in excavations exhibiting characteristics of impact by petroleum hydrocarbons which is exposed during future construction and/or utility work. The CMMP should be maintained at the site and all off-site properties impacted by petroleum hydrocarbons for future implementation as needed.

Barring further cleanup, an E&ES that prohibits the construction of any new buildings for human occupation without DEQ's prior written approval would be needed to mitigate unacceptable vapor intrusion risks to the occupants of future buildings constructed at the site, Tax Lot 2300, and Tax Lot 2401. Prior to such construction, development plans would have to be submitted to DEQ for approval. If further cleanup and/or soil gas sampling is not performed, the development plans would have to include engineering controls incorporated into the design of future buildings constructed for human occupation to mitigate unacceptable vapor intrusion risks to occupants. Proposed property use restrictions described above would be memorialized in E&ES documents executed for the site, Tax Lot 2300, and Tax Lot 2401 and recorded on the corresponding property deeds on file with Clatsop County. DEQ is currently in discussions with the impacted properties regarding the implications of this closure approach.

Provided that future deep excavations in the ROW of Old US Highway 30 or Svensen Road north and east of the site and Tax Lot 2300 incorporate the above-described protocols and the site, Tax Lot 2300, and Tax Lot 2401 agree to the terms outlined in the proposed E&ES, a conditional No Further Action determination is possible for this site. The No Further Action determination should be recorded in DEQ's LUST database (LUST No. 04-16-0669).

6. ADMINISTRATIVE RECORD

Phase II Environmental Site Assessment: Country Market, 40490 Old Hwy 30, Astoria, OR 97103. Envitech. July 20, 2015.

Focused Subsurface Investigation: 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Services. September 12, 2016.

Supplemental Focused Subsurface Investigation: 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Services. May 22, 2017.

Underground Storage Tank Closure & Site Assessment Report: 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Services. May 17, 2018.

Soil Vapor Investigation – Hunt's Market: 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Services. June 12, 2019.

Groundwater Monitoring Well Installation & Sampling Report: Hunt's Market, 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Consulting. May 23, 2019.

Groundwater Monitoring Report – Second Quarter: Hunt's Market, 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Consulting. August 27, 2019.

Groundwater Monitoring Report – Third Quarter: Hunt's Market, 40490 Old Hwy 30, Astoria, OR 97103. DEQ Site ID 04-16-0669. ECI Environmental Consulting. October 17, 2019.

Groundwater Monitoring Well Installation & Sampling Report: Country Market, 40490 Old Hwy 30, Astoria, OR 97103. ECI Environmental Consulting. April 17, 2020.

Re: Environmental Investigation Work Plan 40490 Old Highway 30, Astoria, Oregon 97103, DEQ File #04-16-0669. Soil Solutions Environmental Services. August 6, 2021.

Re: Environmental Investigation Work Plan 40490 Old Highway 30, Astoria, Oregon 97103, DEQ File #04-16-0669. Soil Solutions Environmental Services. November 11, 2021.

Additional Environmental Investigation: 40490 Old Highway 30, Astoria, Oregon 97103, DEQ File #04-16-0669. Soil Solutions Environmental Services. December 15, 2022.

7. ATTACHMENTS

- Figure 1. Vicinity Map
- Figure 2. Site Plan
- Figure 3. Groundwater Contour Map
- Figure 4. Site Map with Estimated Extent of Contamination
- Figure 5. Sample Locations

Figure 6. Air Sample Location Map

Table 1. Summary of Soil Analytical Results (2015)
Table 2. Summary of Soil Analytical Results (2016-2020)
Table 3. Summary of Soil Analytical Results (2021-2022) – Petroleum Hydrocarbons
Table 4. Summary of Soil Analytical Results (2021-2022) – VOCs
Table 5. Summary of Groundwater Analytical Results (2015)
Table 6. Summary of Groundwater Analytical Results (2016-2020)
Table 7. Summary of Groundwater Analytical Results (2021-2022) – Petroleum Hydrocarbons
Table 8. Summary of Groundwater Analytical Results (2021-2022) – VOCs
Table 9. Summary of Monitoring Well Groundwater Analytical Results
Table 10. Summary of Groundwater Elevations
Table 11. Summary Soil Vapor and Ambient Air Analytical Results (2019)
Table 12. Soil Gas Sample Analytical Results (2022)



Figure 1: Vicinity Map
 40490 Old HWY 30
 Astoria, Oregon 97103
 DEQ File #04-16-0669

PROJECT: LUST

DATE: 12/15/22

500 feet

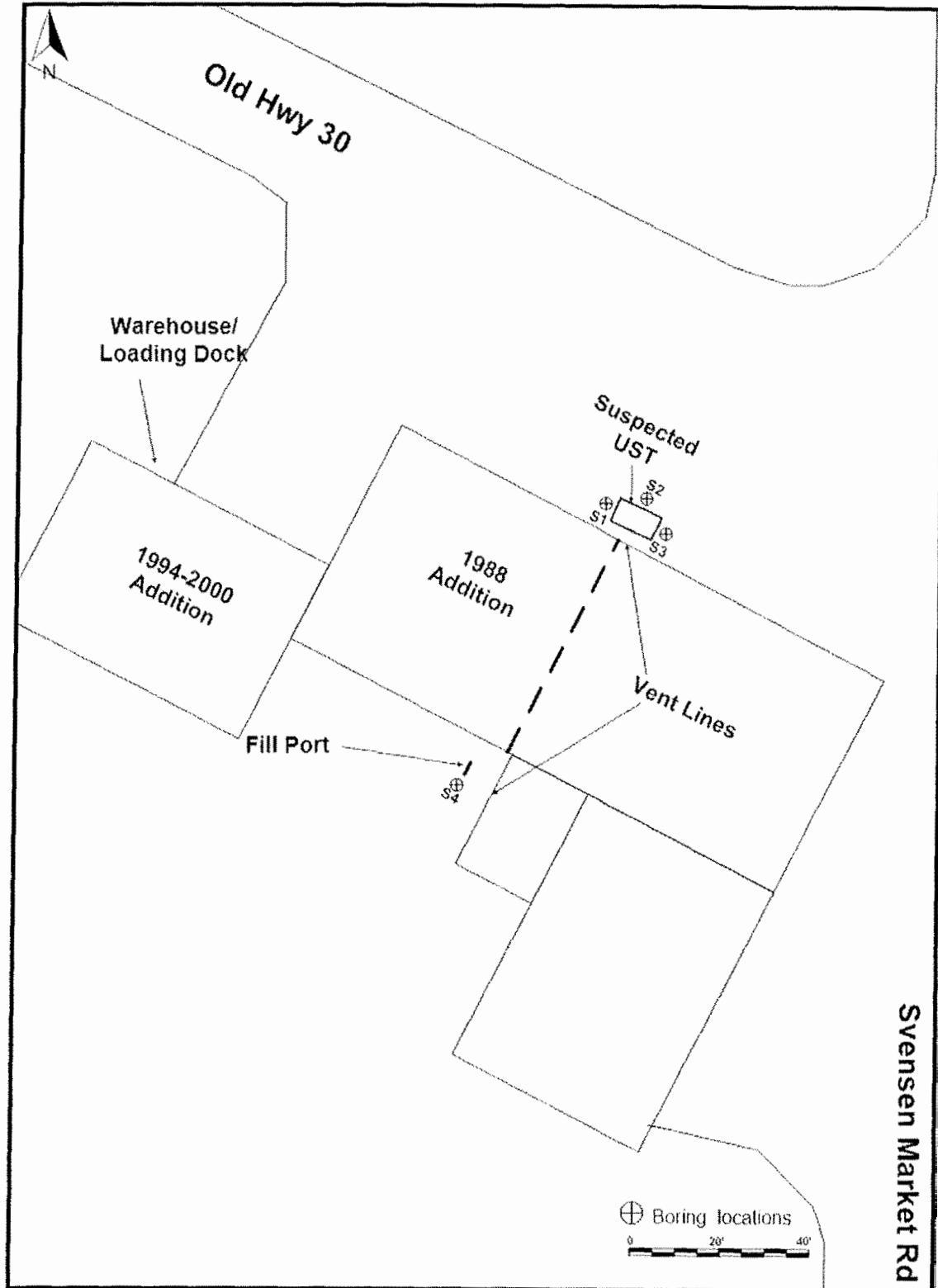
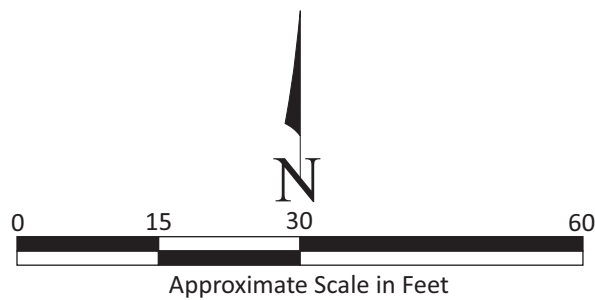
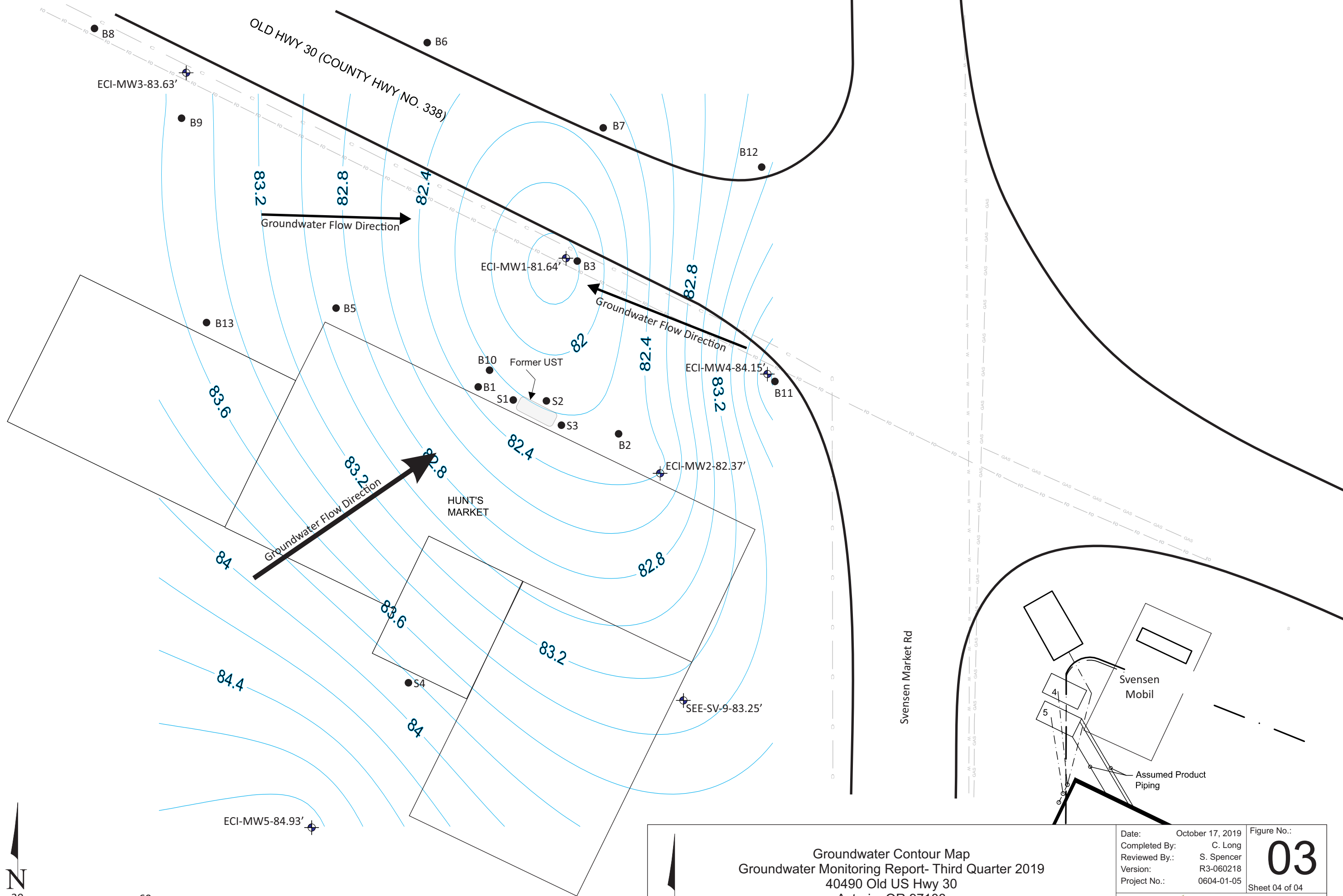


Figure 2. Site Plan



Groundwater Contour Map
Groundwater Monitoring Report- Third Quarter 2019
40490 Old US Hwy 30
Astoria, OR 97103

Date: October 17, 2019
Completed By: C. Long
Reviewed By.: S. Spencer
Version: R3-060218
Project No.: 0604-01-05

Figure No.:
03
Sheet 04 of 04



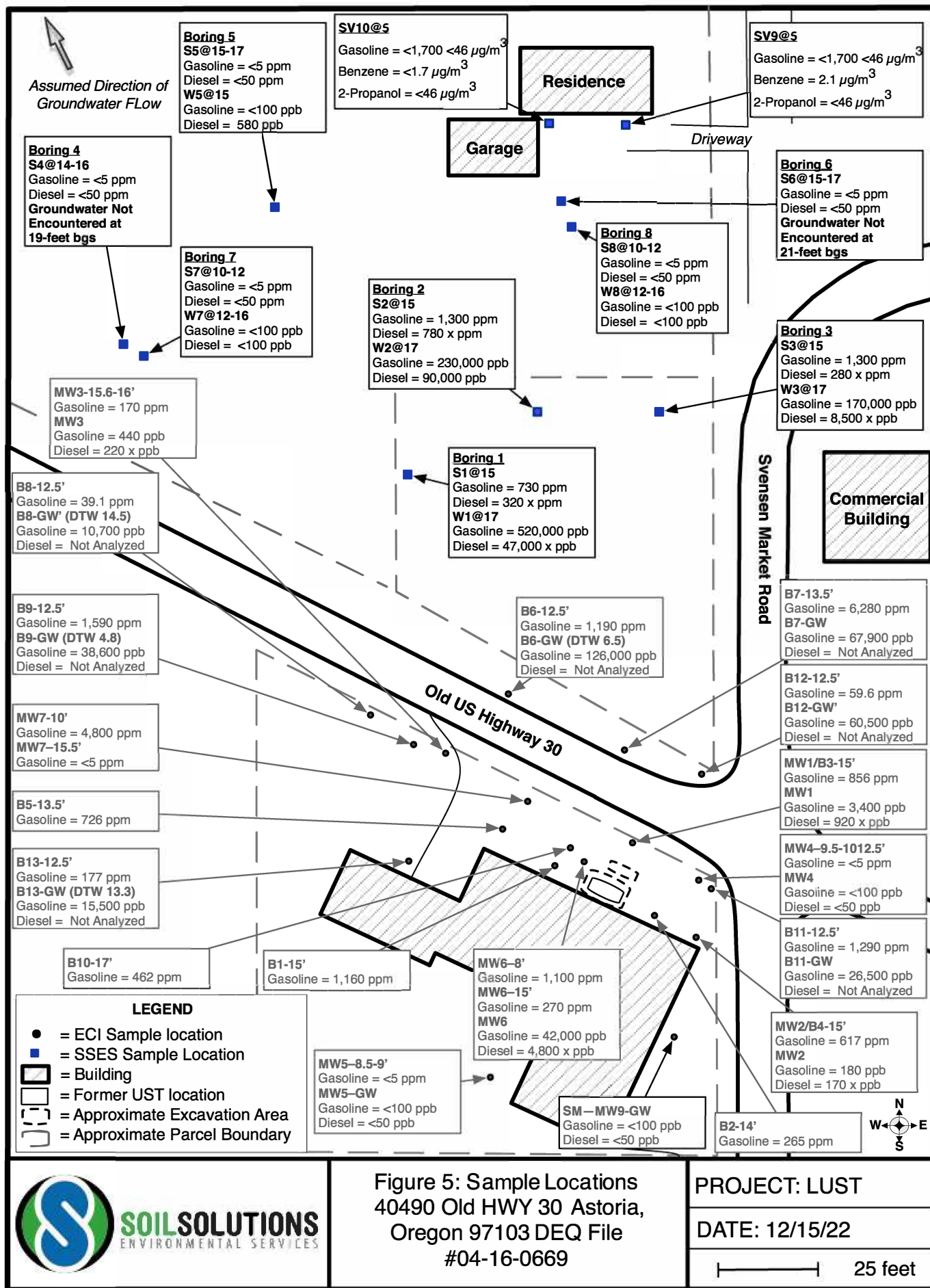
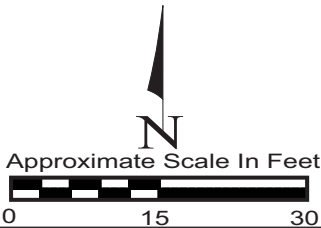
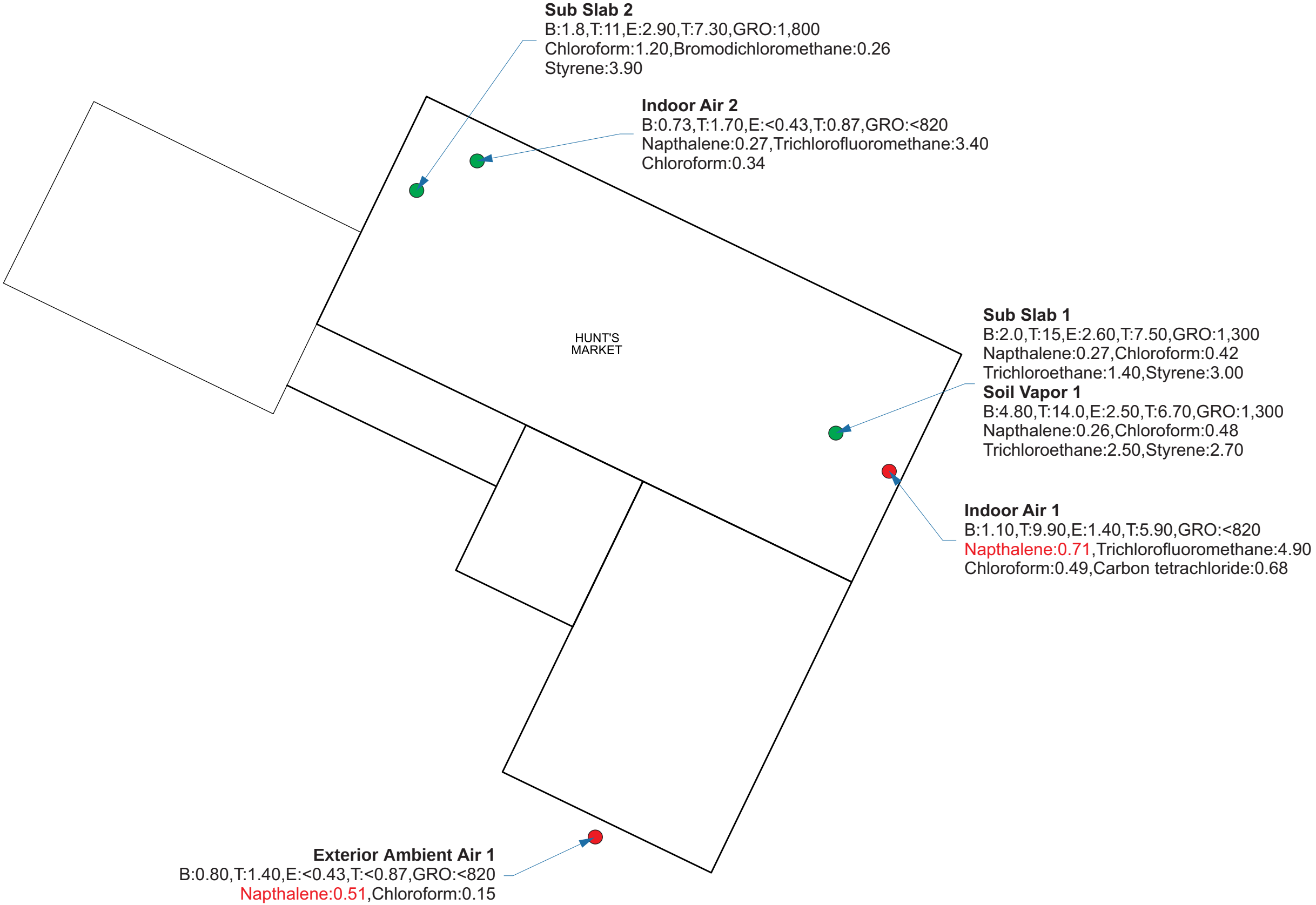


Figure 5: Sample Locations
40490 Old HWY 30 Astoria,
Oregon 97103 DEQ File
#04-16-0669



- Explanation**
- Air Sample Locations <ODEQ Risk-Based Concentrations
 - Air Sample Locations >ODEQ Risk-Based Concentrations
 - * Oregon DEQ RBC for Air Inhalation for Napthalene: 0.36

Air Sample Location Map
Soil Vapor Intrusion and Air Investigation
40490 Old US Hwy 30
Astoria, OR 97103

Date:	May 15, 2019	Figure No.:
Completed By:	K. Spencer	06
Reviewed By.:	S. Spencer	
Version:	R4-051019	
Project No.:	0604-01-05	
		Sheet 03 of 03
eci Environmental Services Providing Practical Environmental Compliance Solutions Offices in Anchorage Tacoma Portland		

Table 1: Summary of Soil Analytical Results (2015) (mg/kg)

Samples	Dates	B	T	E	X	Tph-Gas	Tph-Diesel	Tph-Oil	VOCs	Semi-VOCs	PCBs
S1-10	6/30/2015	ND	11	57	240	3,300	ND	ND	S	ND	ND
S2-10	6/30/2015	ND	ND	5.9	8.2	2,100	ND	ND	-	-	-
S3-13	6/30/2015	ND	ND	7.4	11	3,700	ND	ND	-	-	-
S4-10	6/30/2015	-	-	-	-	-	ND	ND	-	-	-
STD		0.0093	140	0.16	25	31	9,500	N/A	V	V	V

ND: Not detected at PQL (Practical Quantitation Limit)

STD: DEQ Risk-based screening level (Soil leaching to groundwater)

B: benzene

T: toluene

E: ethylbenzene

X: xylene

-: not tested

V: Cleanup levels are various.

S: Several VOCs were detected at various concentrations

Numbers in bold red indicate concentrations above the screening levels.

Table 2: Summary of Soil Analytical Results (2016-2020)

Hunt's Market

40490 Old US Highway 30, Astoria, Oregon 97103

Sample ID	Sample Depth (ft)	Date Sampled	Total Petroleum Hydrocarbons (mg/kg)			Select Volatile Organic Constituents ³ (mg/kg)						Metals (mg/kg)
			Diesel	Oil	Gasoline (mg/kg)	Benzene	Toluene	Ethylbenzene	M&p Xylene	o-Xylene	Total Xylenes	Lead
2016 FSI (ECI)												
B1-15	15	4/14/2016	--	--	1,160	16.8	38.3	30.7	48.9	44.9	93.8	--
B2-14	14	4/14/2016	--	--	265	2.1	2.1	3.7	6.0	5.2	11.2	--
B3-15	15	4/14/2016	--	--	856	19.8	14.6	16.7	19.2	7.9	27.1	--
B4-15	15	4/14/2016	--	--	617	7.0	14.3	9.9	12.9	10.8	23.7	--
B5-13.5	13.5	4/14/2016	--	--	726	19.1	16.9	10.3	9.9	0.88	10.78	--
2017 SFSI (ECI)												
B6-12.5'	12.5	4/14/2017	--	--	1,190	33.1	31.1	44.4	19.3	36.8	56.1	11.5
B7-13.5'	13.5	4/14/2017	--	--	6,280	246	253	138	136	82.8	218.8	26.4
B8-12.5'	12.5	4/14/2017	--	--	39.1	<2.2	4.7	<1.5	<3.9	<2.5	<3.9	15.9
B9-12.5'	12.5	4/14/2017	--	--	1,590	79.5	46.9	4.1	15.2	9.2	24.4	12.2
B10-17'	17.0	4/14/2017	--	--	462	11.2	4.2	15.1	12.4	6.3	18.7	16.4
B11-12.5'	12.5	4/14/2017	--	--	1,290	11	25.2	20.3	53	48.2	101.2	25.9
B12-12.5'	12.5	4/14/2017	--	--	59.6	<2.2	3.8	<1.5	1.6	1.9	3.5	10.8
B13-12.5'	12.5	4/14/2017	--	--	177	4.9	3.4	0.65	4.3	1.3	5.6	11.4
2018 UST Closure & Site Assessment (ECI)												
S1-NSW-5'	5.0	3/29/2018	--	--	15.7	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
S2-ESW-5'	5.0	3/29/2018	--	--	<5.0	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
S3-SSW-5'	5.0	3/29/2018	--	--	24.3	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
S4-WSW-5'	5.0	3/29/2018	--	--	26.7	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
S5-ExF-7'	7.0	3/29/2018	--	--	<5.0	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
S9-Composite	--	3/29/2018	--	--	<5.0	<0.010	<0.10	<0.10	<0.10	<0.10	<0.10	--
2019 Well Installation (ECI)												
MW3-15.5-16	15.5-16	1/31/2019	--	--	170	0.15	0.61	1.3	--	--	2.1	--
MW4-9.5-10	9.5-10	1/31/2019	--	--	<5	<0.02	<0.02	<0.02	--	--	<0.06	--
MW5-8.5-9	8.5-9	1/31/2019	--	--	<5	<0.02	<0.02	<0.02	--	--	<0.06	--
2020 Well Installation (ECI)												
MW6-8	8	2/7/2020	570x	<250	1100	0.34	2.50	25	--	--	52	7.39
MW6-15	15	2/7/2020	<50	<250	270	<0.02	0.10	<0.02	--	--	0.85	26.6
MW7-10	10	2/7/2020	400x	<250	4,800	4.80	10	98	--	--	350	10.3
MW7-15	15	2/7/2020	<50	<250	<5	<0.02	<0.2	<0.02	--	--	<0.06	9.56
Laboratory Reporting Limit			50	250	5.0	0.02	0.02	0.02	0.10	0.10	0.06	0.05
ODEQ RBC Soil Leaching to Groundwater (Occupational)			>Max	>Max	130	0.10	490	0.90	100	100	100	30

Notes:
³Select Volatile Organic Compounds. Analyzed by EPA Method 8021B.

mg/kg = Milligrams per kilogram

RBC = Risk-Based Concentrations

< = not detected above laboratory detection limits

Bold indicates a detected concentration that is below ODEQ Risk-Based Concentrations

Bold and Shaded indicates the detected concentration exceeds ODEQ Risk-Based Concentrations

>Max=The constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg or 1,000,000 mg/L. Therefore, this substance is deemed bot to psoe risks in this scenario

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

Table 3
Summary of Soil Analytical Results (2021-2022) - Petroleum Hydrocarbons

Sample Identification	Depth ¹	Date Collected	Analytical Results (mg/kg)							
			Total Petroleum Hydrocarbons (TPH)			Volatile Organic Carbons (VOCs) by EPA Method 8260C or 8021B				
			Gasoline Range (C ₄ -C ₅) by NMTPH-Gx	Diesel Range (C ₁₀ -C ₂₅) by NMTPH-Dx	Residual Range (C ₂₅ -C ₄₀) by NMTPH-Dx	Benzene	Toluene	Ethyl-benzene	m,p-Xylene	o-Xylene
S1@15	15	7/12/21	730	320 x	<250	0.18 j	<0.5	21	5.2	<0.5
S2@15	15	7/12/21	1,300	780 x	<250	0.21 j	<0.5	21	4.4	<0.5
S3@15	15	7/12/21	1,300	280 x	<250	<0.03 j	<0.25	0.48	<0.5	<0.25
S4@14-16	14-16	9/30/21	<5	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
S5@15-17	15-17	9/30/21	<5	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
S6@15-17	15-17	9/30/21	<5	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
S7@10-12	10-12	11/15/22	<5	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
S8@10-12	10-12	11/15/22	<5	<50	<250	<0.03	<0.05	<0.05	<0.1	<0.05
DEQ Risk-Based Concentrations										
Pathway			Receptor							
Soil Ingestion, Dermal Contact, and Inhalation (RBC _{sl})	Residential		1,200	1,100	8.2	5,800	34	1,400	1,400	5.3
	Urban Residential		2,500	2,200	24	12,000	110	2,900	2,900	25
	Occupational		20,000	1,400	37	88,000	150	25,000	25,000	23
	Construction Worker		9700	4,600	380	28,000	1,700	20,000	20,000	580
	Excavation Worker		>Max	>Max	11,000	770,000	49,000	560,000	560,000	16,000
Volatilization to Outdoor Air (RBC _{vo})	Residential		5,900	>Max	11	>Csat	36	>Csat	>Csat	6.4
	Urban Residential		5,900	>Max	27	>Csat	85	>Csat	>Csat	15
	Occupational		69,000	>Max	50	>Csat	160	>Csat	>Csat	83
Vapor Intrusion into Buildings (RBC _{vi})	Residential		94	>Max	0.16	>Csat	1.3	160	160	6.4
	Urban Residential		94	>Max	0.38	>Csat	3.0	160	160	15
	Occupational		>Max	>Max	2.1	>Csat	17	>Csat	>Csat	83
Leaching to Groundwater (RBC _{gw})	Residential		31	9,500	0.023	83	0.22	23	23	0.077
	Urban Residential		31	9,500	0.10	340	0.94	87	87	0.37
	Occupational		130	>Max	0.10	490	0.90	100	100	0.34

Notes: Highlighted cells indicate that detected value remaining on site exceeds one or more of the referenced RBCs.

Gray Italics Indicate Sample Location has been Removed

Bold indicates a detection

RBCs for Diesel Range and Residual Range Organics are given as Generic Diesel/Heating Oil.

1 - Depth in feet below ground surface

-- - Not analyzed

>Max - The constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg.

>Csat - The soil RBC exceeds the three-phase equilibrium partitioning for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

NA - Not Applicable

x - Sample chromatograph does not resemble fuel standard used for quantitation

Table4
Summary of Soil Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date Collected	Laboratory Analytical Results (mg/kg)																											
			Volatile Organic Carbons (VOCs) by EPA Method 8260C or 8021B																											
			Dichlorodifluoromethane	Chloromethane	Vinyl chloride	Bromomethane	Chloroethane (ethyl chloride)	Trichlorofluoromethane (Freon 11)	Acetone	1,1-Dichloroethene (DCE, 1,1-Dichloroethylene)	Hexane (n-hexane)	Methylene chloride (Dichloromethane)	Methyl t-butyl ether (MTBE)	trans-1,2-Dichloroethene (trans-1,2-Dichloroethylene)	1,1-Dichloroethane	2,2-Dichloropropane	cis-1,2-Dichloroethene (cis-1,2-Dichloroethylene)	Chloroform	2-Butanone (MEK, methyl ethyl ketone)	1,2-Dichloroethane (EDC)	1,1,1-Trichloroethane	1,1-Dichloropropene	Carbon tetrachloride	Benzene	Trichloroethene (TCE, Trichloroethylene)	1,2-Dichloropropane	Bromodichloromethane	Dibromomethane (methylene bromide)	4-Methyl-2-pentanone (Methyl isobutyl ketone)	cis-1,3-Dichloropropene
S1@15	15	7/12/21	<5	<5	<0.5	<5	<5	<5	<50	<0.5	6.8	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	0.18 j	<0.2	<0.5	<0.5	<0.5	<10	<0.5	
S2@15	15	7/12/21	<5	<5	<0.5	<5	<5	<5	<50	<0.5	14	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<0.5	<0.5	<0.5	<0.5	0.21 j	<0.2	<0.5	<0.5	<0.5	<10	<0.5	
S3@15	15	7/12/21	<2.5	<2.5	<0.25	<2.5	<2.5	<2.5	<25	<0.25	3.9	<2.5	<0.25	<0.25	<0.25	<0.25	<0.25	<5	<0.25	<0.25	<0.25	<0.25	<0.03 j	<0.1	<0.25	<0.25	<0.25	<5	<0.25	
S4@14-16	14-16	9/30/21	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.05	<0.25	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.05	<0.05	<0.05	<0.5	<0.05	
S5@15-17	15-17	9/30/21	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.05	<0.25	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.05	<0.05	<0.05	<0.5	<0.05	
S6@15-17	15-17	9/30/21	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<0.5	<0.05	<0.25	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.05	<0.05	<0.05	<0.5	<0.05	
S7@10-12	10-12	11/15/22	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<5	<0.05	<0.25	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.05	<0.05	<0.05	<1	<0.05	
S8@10-12	10-12	11/15/22	<0.5	<0.5	<0.05	<0.5	<0.5	<0.5	<5	<0.05	<0.25	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.05	<0.05	<0.05	<1	<0.05	
DEQ Risk-Based Concentrations																														
Pathway		Receptor	RBCs																											
Soil Ingestion, Dermal Contact, and Inhalation (RBC _{so})	Residential		NE	1,400	0.36	3.7	160000	7,600	NE	1,800	NE	76	250	1,600	58	NE	160	5.8	NE	3.6	53,000	NE	7.5	8.2	6.7	NE	3.4	3.7	NE	NE
	Urban Residential		NE	2,900	0.80	12	320000	15,000	NE	3,500	NE	170	730	3,100	190	NE	310	22	NE	12	110000	NE	21	24	17	NE	12	12	NE	NE
	Occupational		NE	25,000	4.4	17	>Max	130000	NE	29000	NE	1,600	1,100	23,000	260	NE	2,300	26	NE	16	870000	NE	34	37	51	NE	15	17	NE	NE
	Excavation Worker		NE	25,000	34	210	>Max	69,000	NE	13,000	NE	12,000	12,000	7,100	3,200	NE	710	410	NE	200	470000	NE	320	380	470	NE	230	210	NE	NE
Volatilization to Outdoor Air (RBC _o)	Residential		NE	700000	950	5,800	>Max	>Max	NE	370000	NE	340000	320000	200000	89,000	NE	20,000	11,000	NE	5,600	>Max	NE	8,900	11,000	13,000	NE	6,300	5,800	NE	NE
	Urban Residential		NE	>Csat	5.3	3.3	>Max	>Csat	NE	>Csat	NE	>Csat	340	>Max	56	NE	>Max	3.9	NE	3.4	>Csat	NE	15	11	15	NE	2.4	3.3	NE	NE
	Occupational		NE	>Csat	89	14	>Max	>Csat	NE	>Csat	NE	>Csat	1,500	>Max	240	NE	>Max	17	NE	15	>Csat	NE	65	50	96	NE	11	14	NE	NE
Vapor Intrusion into Buildings (RBC _i)	Residential		NE	24	0.043	0.22	>Csat	190	NE	54	NE	26	8.5	>Max	0.45	NE	>Max	0.031	NE	0.077	>Csat	NE	0.12	0.16	0.12	NE	0.041	0.22	NE	NE
	Urban Residential		NE	24	0.053	0.53	>Csat	190	NE	54	NE	51	20	>Max	1.1	NE	>Max	0.074	NE	0.18	>Csat	NE	0.28	0.38	0.26	NE	0.096	0.53	NE	NE
	Occupational		NE	300	2.2	2.9	>Csat	>Csat	NE	680	NE	950	110	>Max	5.9	NE	>Max	0.41	NE	1.0	>Csat	NE	1.6	2.1	2.3	NE	0.53	2.9	NE	NE
Leaching to Groundwater (RBC _w)	Residential		NE	2.2	0.00057	0.0024	310	61	NE	6.7	NE	0.14	0.11	7.0	0.044	NE	0.63	0.0034	NE	0.0028	190	NE	0.013	0.023	0.013	NE	0.0020	0.0024	NE	NE
	Urban Residential		NE	7.9	0.0014	0.011	1,100	230	NE	25	NE	0.44	0.50	27	0.20	NE	2.4	0.016	NE	0.013	710	NE	0.055	0.10	0.053	NE	0.0091	0.011	NE	NE
	Occupational		NE	9.1	0.010	0.011	1,300	280	NE	32	NE	2.4	0.54	51	0.20	NE	4.5	0.015	NE	0.013	880	NE	0.058	0.10	0.087	NE	0.0088	0.011	NE	NE

Notes:

Highlighted cells indicate that detected value remaining on site exceeds one or more of the referenced RBCs.

Bold Indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 - Depth in feet below ground surface

>Csat - The soil RBC exceeds the three-phase equilibrium partitioning for this compound

>Max - The constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg.

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

Table4
Summary of Soil Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date Collected	Laboratory Analytical Results (mg/kg)																													
			Volatile Organic Carbons (VOCs) by EPA Method 8260C																													
			Toluene	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	2-Hexanone	1,3-Dichloropropene	Tetrachloroethene (PCE, perchloroethylene, tetrachloroethylene)	Dibromochloromethane	1,2-Dibromoethane (EDB, ethylene dibromide)	Chlorobenzene	Ethylbenzene	1,1,1,2-Tetrachloroethane	m,p-Xylene	o-Xylene	Styrene	Isopropylbenzene (Cumene)	Bromodorm	n-Propylbenzene	Bromobenzene	1,3,5-Trimethylbenzene	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane	2-Chlorotoluene (o-Chlorotoluene)	4-Chlorotoluene (p,p',4,4'-tetrachlorotoluene)	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	p-Isopropyltoluene (p-cymene)	1,3-Dichlorobenzene	1,4-Dichlorobenzene	
S1@15	15	7/12/21	<0.5	<0.5	<0.5	<5	<0.5	<0.25	<0.5	<0.5	<0.5	21	<0.5	5.2	<0.5	<0.5	3.5	<0.5	13	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	16	1.5	0.82	<0.5	<0.5		
S2@15	15	7/12/21	<0.5	<0.5	<0.5	<5	<0.5	<0.25	<0.5	<0.5	<0.5	21	<0.5	4.4	<0.5	<0.5	3.9	<0.5	15	<0.5	1.5	<0.5	<0.5	<0.5	0.59	13	2.0	0.92	<0.5	<0.5		
S3@15	15	7/12/21	<0.25	<0.25	<0.25	<2.5	<0.25	<0.12	<0.25	<0.25	<0.25	0.48	<0.25	<0.5	<0.25	<0.5	2.0	<0.25	5.1	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	0.31	<0.25	1.3	0.27	<0.25	
S4@14-16	14-16	9/30/21	<0.05	<0.05	<0.05	<0.5	<0.05	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
S5@15-17	15-17	9/30/21	<0.05	<0.05	<0.05	<0.5	<0.05	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
S6@15-17	15-17	9/30/21	<0.05	<0.05	<0.05	<0.5	<0.05	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
S7@10-12	10-12	11/15/22	<0.05	<0.05	<0.05	<0.5	<0.05	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
S8@10-12	10-12	11/15/22	<0.05	<0.05	<0.05	<0.5	<0.05	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
DEQ Risk-Based Concentrations																																
Pathway	Receptor	RBCs																														
Soil Ingestion, Dermal Contact, and Inhalation (RBC _{so})	Residential	5,800	NE	5.8	NE	NE	220	3.7	0.16	530	34	NE	1,400	7,900	NE	57	NE	NE	780	NE	NE	NE	NE	NE	NE	NE	110	NE	NE	NE	NE	14
	Urban Residential	12,000	NE	19	NE	NE	650	12	0.53	1,100	110	NE	2,900	16,000	NE	170	NE	NE	1,600	NE	NE	NE	NE	NE	NE	NE	220	NE	NE	NE	NE	62
	Occupational	88,000	NE	26	NE	NE	1,000	17	0.73	8,700	150	NE	25,000	130,000	NE	260	NE	NE	12,000	NE	NE	NE	NE	NE	NE	NE	2,000	NE	NE	NE	NE	64
	Construction Worker	28,000	NE	320	NE	NE	10,000	210	9.0	4,700	1,700	NE	20,000	56,000	NE	2,700	NE	NE	3,500	NE	NE	NE	NE	NE	NE	NE	2,000	NE	NE	NE	NE	1,300
Volatilization to Outdoor Air (RBC _{vo})	Excavation Worker	770,000	NE	8,900	NE	NE	280,000	5,800	250	130,000	49,000	NE	560,000	>Max	NE	74,000	NE	NE	98,000	NE	NE	NE	NE	NE	NE	NE	54,000	NE	NE	NE	NE	36,000
	Residential	>Csat	NE	5.6	NE	NE	>Csat	3.3	0.15	>Csat	36	NE	>Csat	>Csat	NE	81	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	230	NE	NE	NE	NE	8.1
	Urban Residential	>Csat	NE	13	NE	NE	>Csat	7.8	0.35	>Csat	85	NE	>Csat	>Csat	NE	190	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	230	NE	NE	NE	NE	19
	Occupational	>Csat	NE	24	NE	NE	>Csat	14	0.65	>Csat	160	NE	>Csat	>Csat	NE	360	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	980	NE	NE	NE	NE	36
Vapor Intrusion into Buildings (RBC _{vi})	Residential	>Csat	NE	0.32	NE	NE	2.8	0.22	0.012	77	1.3	NE	160	>Csat	NE	8.2	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	16	NE	NE	NE	NE	0.99
	Urban Residential	>Csat	NE	0.75	NE	NE	6.6	0.53	0.028	77	3.0	NE	160	>Csat	NE	19	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	16	NE	NE	NE	NE	2.3
	Occupational	>Csat	NE	4.2	NE	NE	36	2.9	0.16	>Csat	17	NE	>Csat	>Csat	NE	110	NE	NE	>Max	NE	NE	NE	NE	NE	NE	NE	210	NE	NE	NE	NE	13
	Residential	83	NE	0.0063	NE	NE	0.46	0.0024	0.00012	5.8	0.22	NE	23	170	NE	0.046	NE	NE	21	NE	NE	NE	NE	NE	NE	NE	2.8	NE	NE	NE	NE	0.057
Leaching to Groundwater (RBC _{gw})	Urban Residential	340	NE	0.029	NE	NE	1.9	0.011	0.00056	22	0.94	NE	87	640	NE	0.20	NE	NE	94	NE	NE	NE	NE	NE	NE	NE	10	NE	NE	NE	NE	0.27
	Occupational	490	NE	0.029	NE	NE	1.9	0.011	0.00056	27	0.90	NE	100	800	NE	0.22	NE	NE	110	NE	NE	NE	NE	NE	NE	NE	12	NE	NE	NE	NE	0.25

Notes:

Highlighted cells indicate that detected value remaining on site exceeds one or more of the referenced RBCs.

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 - Depth in feet below ground surface

>Csat - The soil RBC exceeds the three-phase equilibrium partitioning for this compound

>Max - The constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg.

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

Table4
Summary of Soil Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date Collected	Laboratory Analytical Results (mg/kg)						
			Volatile Organic Carbons (VOCs) by EPA Method 8260C						
			1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane (DBCP, dibromochloropropane)	1,2,4-Trichlorobenzene	Hexachlorobutadiene	Naphthalene	1,2,3-Trichlorobenzene	
S1@15	15	7/12/21	<0.5	<5	<2.5	<2.5	9.8	<2.5	
S2@15	15	7/12/21	<0.5	<5	<2.5	<2.5	10	<2.5	
S3@15	15	7/12/21	<0.25	<0.25	<1.2	<1.2	<0.25	<1.2	
S4@14-16	14-16	9/30/21	<0.05	<0.5	<0.25	<0.25	<0.05	<0.25	
S5@15-17	15-17	9/30/21	<0.05	<0.5	<0.25	<0.25	<0.05	<0.25	
S6@15-17	15-17	9/30/21	<0.05	<0.5	<0.25	<0.25	<0.05	<0.25	
S7@10-12	10-12	11/15/22	<0.05	<0.5	<0.25	<0.25	<0.05	<0.25	
S8@10-12	10-12	11/15/22	<0.05	<0.5	<0.25	<0.25	<0.05	<0.25	
DEQ Risk-Based Concentrations									
Pathway		Receptor	RBCs						
Soil Ingestion, Dermal Contact, and Inhalation (RBC _{so})		Residential	2,200	NE	NE	NE	5.3	NE	
		Urban Residential	4,400	NE	NE	NE	25	NE	
		Occupational	36,000	NE	NE	NE	23	NE	
		Construction Worker	20,000	NE	NE	NE	580	NE	
		Excavation Worker	560,000	NE	NE	NE	16,000	NE	
Volatilization to Outdoor Air (RBC _o)		Residential	>Csat	NE	NE	NE	6.4	NE	
		Urban Residential	>Csat	NE	NE	NE	15	NE	
		Occupational	>Csat	NE	NE	NE	83	NE	
Vapor Intrusion into Buildings (RBC _i)		Residential	>Csat	NE	NE	NE	6.4	NE	
		Urban Residential	>Csat	NE	NE	NE	15	NE	
		Occupational	>Csat	NE	NE	NE	83	NE	
Leaching to Groundwater (RBC _w)		Residential	36	NE	NE	NE	0.077	NE	
		Urban Residential	140	NE	NE	NE	0.37	NE	
		Occupational	160	NE	NE	NE	0.34	NE	

Notes:

Highlighted cells indicate that detected value remaining on site exceeds one or more of the referenced RBCs.

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 - Depth in feet below ground surface

>Csat- The soil RBC exceeds the three-phase equilibrium partitioning for this compound

>Max- The constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg.

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

Table 5: Summary of Groundwater Analytical Results (2015) (µg/L)

Samples	Dates	B	T	E	X	Tph-Gas	Tph-Diesel	Tph-Oil
W-1	6/30/2015	870	3,500	500	2,600	12,000	ND	ND
STD1		2.2	92,000	7.8	850	450	430	430

ND: Not detected at PQL (Practical Quantitation Limit)

STD1: DEQ Risk-based screening level (Ingestion/inhalation from tap water)

B: benzene

T: toluene

E: ethylbenzene

X: xylene

Numbers in bold red indicate concentrations above the screening levels.

Table 6: Summary of Groundwater Analytical Results (2016-2020)

Hunt's Market

40490 Old US Highway 30, Astoria, Oregon 97103

Sample ID	Date Sampled	Total Petroleum Hydrocarbons (mg/kg)	Select Volatile Organic Constituents (mg/kg)						Metals (mg/kg)
		Gasoline	Benzene	Toluene	Ethyl benzene	m&p Xylene	o-Xylene	Total Xylenes	Lead (Total)
2016 FSI (ECI)									
B1-GW-19'	4/14/2016	10,100	1,170	597	531	1,300	469	1,769	--
B3-GW-10'	4/14/2016	17,000	631	65.6	788	822	68.3	890	--
2017 SFSI (ECI)									
B6-GW	4/14/2017	126,000	17,300	<1.4	13,800	14,600	281	14,881	47.4
B7-GW	4/14/2017	67,900	2,050	991	<1.5	<3.9	<2.5	--	39.8
B8-GW	4/14/2017	10,700	<2.2	<1.4	466	143	<2.5	143	17.4
B9-GW	4/14/2017	38,600	<2.2	<1.4	2,980	1,860	<2.5	1,860	65
B11-GW	4/14/2017	26,500	2,640	724	482	415	<2.5	415	43.9
B12-GW	4/14/2017	30,500	2,730	584	801	176	<2.5	176	89.6
B13-GW	4/14/2017	12,500	389	<1.4	275	157	<2.5	157	17
Method Reporting Limit		5.0	0.01	0.10	0.10	0.10	0.10	--	0.050
ODEQ RBC (Occupational)		450	2.1	6,300	6.4	830	830	830	15.0

Notes:

(µg/l) = micrograms per liter

RBC = Risk-Based Concentrations

< Not detected above the laboratory reporting limit

Bold indicates a detected concentration that is below ODEQ Risk-Based Concentrations

Bold and Shaded indicates the detected concentration exceeds ODEQ Risk-Based Concentrations

Table 7
Summary of Groundwater Analytical Results (2021-2022) - Petroleum Hydrocarbons

Sample Identification	Depth ¹	Date	Analytical Results (ug/l) ²							
			Total Petroleum Hydrocarbons (TPH)			Volatile Organic Carbons (VOCs) by EPA Method 8260C, 8260D, or 8021B				
			Gasoline Range (C2-C5) by NWTPH-Gx	Diesel Range (C10-C25) by NWTPH-Dx	Residual Range (C25-C36) by NWTPH-Dx	Benzene ^(S)	Toluene ^(S)	Ethyl-benzene ^(S)	Total Xylenes ^(S)	Naphthalene
W1@17	17	7/12/21	520,000	47,000 x	<250	430	<200	3,700	2,000	1,400
W2@17	17	7/12/21	230,000	90,000	560	<0.35	<10	45	<30	<10
W3@17	17	7/12/21	170,000	8,500 x	<500	13	<200	1,100	<600	400
W5@15	15	10/6/21	<100	580	<750	--	--	--	--	--
W7@12-16	12-16	11/15/22	<100	<100	<250	<0.35	<1	<1	<3	<1
W8@12-16	12-16	11/15/22	<100	<100	<250	<0.35	<1	<1	<3	<1
DEQ Risk-Based Concentrations										
Pathway			Receptor							
Ingestion & Inhalation from Tapwater (RBC _{tw})	Residential		110	100	100	0.46	1,100	1.5	190	0.17
	Urban		110	100	100	2.0	4,400	6.7	710	0.78
	Occupational		450	430	430	2.1	6,300	6.4	830	0.72
Volatilization to Outdoor Air (RBC _{wo})	Residential		>S	>S	>S	3,100	>S	9,900	>S	3,600
	Urban		>S	>S	>S	7400	>S	2,300	>S	8,500
	Occupational		>S	>S	>S	1400	>S	4300	>S	16000
Vapor Intrusion into Buildings (RBC _{wi})	Residential		22000	>S	>S	210	>S	620	86,000	840
	Urban		22000	>S	>S	510	>S	1,500.00	8600	2,000
	Occupational		>S	>S	>S	2800	>S	8200	>S	11000
Groundwater in Excavation (RBC _{we})	Construction & Excavation		14,000	>S	>S	1,800	220,000	4,500	23000	500

Notes:

Grey highlighted cells indicate that detected value exceeds one or more of the referenced RBCs.

Gray Italics Indicate Sample Location has been Removed

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 – Depth in feet below ground surface

-- - Not analyzed

* sample passed through silica gel cleanup

>S - The groundwater RBC exceeds the solubility limit for this compound

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

x - Sample chromatograph does not resemble fuel standard used for quantitation

ve - Estimated concentration calculated for an analyte response is outside of instrument calibration range

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

Table 8
Summary of Groundwater Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date	Laboratory Analytical Results (ug/L)																											
			Volatile Organic Carbons (VOCs) by EPA Method 8260C or EPA Method 8021B																											
			Dichlorodifluoromethane	Chloromethane	Vinyl chloride	Bromomethane	Chloroethane (ethyl chloride)	Trichlorofluoromethane (Freon 11)	Acetone	1,1-Dichloroethene (DCE, 1,1-Dichloroethylene)	Hexane (n-hexane)	Methylene chloride (Dichloromethane)	Methyl t-butyl ether (MTBE)	trans-1,2-Dichloroethene (trans-1,2-Dichloroethylene)	1,1-Dichloroethane	2,2-Dichloropropane	cis-1,2-Dichloroethene (cis-1,2-Dichloroethylene)	Chloroform	2-Butanone (MEK, methyl ethyl ketone)	1,2-Dichloroethane (EDC)	1,1,1-Trichloroethane	1,1-Dichloropropane	Carbon tetrachloride	Benzene	Trichloroethene (TCE, Trichloroethylene)	1,2-Dichloropropane	Bromodichloromethane	Dibromomethane (methylene bromide)	4-Methyl-2-pentanone (Methyl isobutyl ketone)	cis-1,3-Dichloropropene
W1@17	17	7/12/21	<200	<2,000	<40	<1,000	<200	<200	<10,000	<200	3,100	<1,000	<200	<200	<200	<200	<200	<4,000	<200	<200	<200	<200	<200	430	<200	<200	<200	<200	<2,000	<2,000
W2@17	17	7/12/21	<10	<100	<2	<50	<10	<10	<500	<10	180	<50	<10	<10	<10	<10	<10	<200	<10	<10	<10	<10	<10	<0.35	<10	<10	<10	<10	<100	<10
W3@17	17	7/12/21	<200	<2,000	<40	<1,000	<200	<200	<10,000	<200	7,300	<1,000	<200	<200	<200	<200	<200	<4,000	<200	<200	<200	<200	<200	13	<200	<200	<200	<200	<2,000	<2,000
W7@12-16	12-16	11/15/22	<1	<10	<0.02	<5	<1	<1	<50	<1	<5	<5	<1	<1	<1	<1	<1	<20	<0.2	<1	<1	<0.5	<0.35	<0.5	<1	<0.5	<1	<10	<0.4	
W8@12-16	12-16	11/15/22	<1	<10	<0.02	<5	<1	<1	<50	<1	<5	<5	<1	<1	<1	<1	<1	<20	<0.2	<1	<1	<0.5	<0.35	<0.5	<1	<0.5	<1	<10	<0.4	
DEQ Risk-Based Concentrations																														
Pathway	Receptor		RBCs																											
Ingestion & Inhalation from Tapwater (RBCtw)	Residential		NE	190	0.027	0.17	21,000	1,100	NE	280	NE	11	14	360	2.8	NE	36	0.22	NE	0.17	8,000	NE	0.46	0.46	0.49	NE	0.13	0.17	NE	NE
	Urban Residential		NE	690	0.066	0.77	76,000	4,200	NE	1,100	NE	37	64	1,400	13	NE	140	1.0	NE	0.78	30,000	NE	2.0	2.0	2.0	NE	0.62	0.77	NE	NE
	Occupational		NE	790	0.49	0.77	88,000	5,200	NE	1,400	NE	200	68	2,600	13	NE	260	0.98	NE	0.78	37,000	NE	2.1	2.1	3.3	NE	0.60	0.77	NE	NE
Volatilization to Outdoor Air (RBCwo)	Residential		NE	440,000	350	3,900	>S	780,000	NE	570,000	NE	1,000,000	350,000	>S	16,000	NE	>S	1,400	NE	2,100	>S	NE	1,800	3,100	3,300	NE	1,400	3,900	NE	NE
	Urban Residential		NE	440,000	430	9,300	>S	780,000	NE	570,000	NE	2,000,000	830,000	>S	37,000	NE	>S	3,400	NE	4,900	>S	NE	4,200	7,400	6,900	NE	3,200	9,300	NE	NE
	Occupational		NE	1,800,000	5,900	17,000	>S	>S	NE	2,400,000	NE	12,581,128	1,500,000	>S	68,000	NE	>S	6,300	NE	9,000	>S	NE	7,700	14,000	20,000	NE	6,000	17,000	NE	NE
Vapor Intrusion into Buildings (RBCwi)	Residential		NE	26,000	17	980	2,800,000	36,000	NE	29,000	NE	90,000	67,000	>S	1,100	NE	>S	120	NE	300	>S	NE	92	210	200	NE	180	980	NE	NE
	Urban Residential		NE	26,000	21	2,300	2,800,000	36,000	NE	29,000	NE	170,000	160,000	>S	2,600	NE	>S	290	NE	700	>S	NE	220	510	430	NE	420	2,300	NE	NE
	Occupational		NE	330,000	880	13,000	>S	460,000	NE	360,000	NE	3,300,000	870,000	>S	14,000	NE	>S	1,600	NE	3,900	>S	NE	1,200	2,800	3,700	NE	2,300	13,000	NE	NE
Groundwater in Excavation (RBCwe)	Construction and Excavation Worker	NE	22,000	960	610	2,400,000	160,000	NE	44,000	NE	640,000	63,000	180,000	10,000	NE	18,000	720	NE	630	1,100,000	NE	1,800	1,800	3,000	NE	450	610	NE	NE	

Notes:

Grey highlighted cells indicate that detected value exceeds one or more of the referenced RBCs.

Gray Italics Indicate Sample Location has been Removed

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 – Depth in feet below ground surface

-- Not analyzed

* sample passed through silica gel cleanup

>S - The groundwater RBC exceeds the solubility limit for

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

x - Sample chromatograph does not resemble fuel standard used for quantitation

ve - Estimated concentration calculated for an analyte

response is outside of instrument calibration range

jl - The laboratory control sample(s) percent recovery

and/or RPD were out of control limits. The reported concentration should be considered an estimate.

Table 8
Summary of Groundwater Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date	Laboratory Analytical Results (mg/kg)																														
			Volatile Organic Carbons (VOCs) by EPA Method 8260C or EPA Method 8021B																														
			Toluene	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	2-Hexanone	1,3-Dichloropropane	Tetrachloroethene (PCE, perchloroethylene, tetrachloroethylene)	Dibromochloromethane	1,2-Dibromoethane (EDB, ethylene dibromide)	Chlorobenzene	Ethylbenzene	1,1,1,2-Tetrachloroethane	m,p-Xylene	o-Xylene	Styrene	Isopropylbenzene (Cumene)	Bromoforn	n-Propylbenzene	Bromobenzene	1,3,5-Trimethylbenzene	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane	2-Chlorotoluene (o-Chlorotoluene)	4-Chlorotoluene (p,a,a,-tetrachlorotoluene)	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	p-Isopropyltoluene (p-cymene)	1,3-Dichlorobenzene	1,4-Dichlorobenzene		
W1@17	17	7/12/21	<200	<200	<200	<2,000	<200	<200	<200	<200	<200	3,700	<200	2,000	<200	<200	<200	260	<1,000	900	<200	290	<200	<200	<200	<200	<200	2,400	<200	<200	<200	<200	
W2@17	17	7/12/21	<10	<10	<10	<100	<10	<10	<10	<10	<10	45	<10	<20	<10	<10	<10	73	<50	140	<10	<10	<10	<10	<10	<10	<10	<10	18	<10	<10	<10	<10
W3@17	17	7/12/21	<200	<200	<200	<2,000	<200	<200	<200	<200	<200	<200	1,100	<200	<400	<200	<200	<200	540	<1,000	1,000	<200	<200	<200	<200	<200	<200	<200	300	<200	<200	<200	<200
W7@12-16	12-16	11/15/22	<1	<0.4	<0.5	<10	<1	<1	<0.5	<1	<1	<1	<1	<2	<1	<1	<1	<5	<1	<1	<0.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
W8@12-16	12-16	11/15/22	<1	<0.4	<0.5	<10	<1	<1	<0.5	<1	<1	<1	<1	<2	<1	<1	<1	<5	<1	<1	<0.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DEQ Risk-Based Concentrations																																	
Pathway	Receptor	RBCs																															
Ingestion & Inhalation from Tapwater (RBCtw)	Residential	1,100	NE	0.28	NE	NE	12	0.17	0.0075	77	1.5	NE	190	1,200	NE	3.3	110	NE	110	NE	NE	NE	NE	NE	NE	NE	15	NE	NE	NE	NE	0.48	
	Urban Residential	4,400	NE	1.3	NE	NE	49	0.77	0.034	290	6.7	NE	710	4,600	NE	15	500	NE	500	NE	NE	NE	NE	NE	NE	NE	54	NE	NE	NE	NE	2.3	
	Occupational	6,300	NE	1.3	NE	NE	48	0.77	0.034	350	6.4	NE	830	5,700	NE	16	600	NE	600	NE	NE	NE	NE	NE	NE	NE	61	NE	NE	NE	NE	2.1	
Volatilization to Outdoor Air (RBCwo)	Residential	>S	NE	4,700	NE	NE	64,000	3,900	180	>S	9,900	NE	>S	>S	NE	130,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	>S	NE	NE	NE	NE	4,900	
	Urban Residential	>S	NE	11,000	NE	NE	150,000	9,300	430	>S	23,000	NE	>S	>S	NE	300,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	>S	NE	NE	NE	NE	12,000	
	Occupational	>S	NE	21,000	NE	NE	>S	17,000	790	>S	43,000	NE	>S	>S	NE	550,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	>S	NE	NE	NE	NE	21,000	
Vapor Intrusion into Buildings (RBCwi)	Residential	>S	NE	870	NE	NE	3,700	980	45	67,000	620	NE	86,000	>S	NE	36,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	5,800	NE	NE	NE	NE	540	
	Urban Residential	>S	NE	2,100	NE	NE	8,700	2,300	110	67,000	1,500	NE	86,000	>S	NE	85,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	5,800	NE	NE	NE	NE	1,300	
	Occupational	>S	NE	11,000	NE	NE	48,000	13,000	590	>S	8,200	NE	>S	>S	NE	470,000	>S	NE	>S	NE	NE	NE	NE	NE	NE	NE	>S	NE	NE	NE	NE	7,100	
Groundwater in Excavation (RBCwe)	Construction and Excavation Worker	#####	NE	1,000	NE	NE	34,000	610	27	10,000	4,500	NE	23,000	170,000	NE	14,000	15,000	NE	15,000	NE	NE	NE	NE	NE	NE	NE	1,700	NE	NE	NE	NE	1,500	

Notes:

Grey highlighted cells indicate that detected value exceeds one or more of the referenced RBCs.

Gray Italics Indicate Sample Location has been Removed

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 – Depth in feet below ground surface

-- - Not analyzed

* sample passed through silica gel cleanup

>S - The groundwater RBC exceeds the solubility limit for

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

x - Sample chromatograph does not resemble fuel standard used for quantitation

ve - Estimated concentration calculated for an analyte

response is outside of instrument calibration range

jl - The laboratory control sample(s) percent recovery

and/or RPD were out of control limits. The reported concentration should be considered an estimate.

Table 8
Summary of Groundwater Analytical Results (2021-2022) - VOCs

Sample Identification	Depth ¹	Date	Laboratory Analytical Results (mg/kg)					
			Volatile Organic Carbons (VOCs) by EPA Method 8260C					
			1,2-Dichlorobenzene	1,2-Dibromo-3-chloropropane (DBCP, dibromochloropropane)	1,2,4-Trichlorobenzene	Hexachlorobutadiene	Naphthalene	1,2,3-Trichlorobenzene
W1@17	17	7/12/21	<200	<2,000	<200	<200	1,400	<200
W2@17	17	7/12/21	<10	<100	<10	<10	<10	<10
W3@17	17	7/12/21	<200	<2,000	<200	<200	400	<200
W7@12-16	12-16	11/15/22	<1	<10	<1	<0.5	<1	<1
W8@12-16	12-16	11/15/22	<1	<10	<1	<0.5	<1	<1
DEQ Risk-Based Concentrations								
Pathway	Receptor		RBCs					
Ingestion & Inhalation from Tapwater (RBCtw)	Residential		300	NE	NE	NE	0.17	NE
	Urban Residential		1,200	NE	NE	NE	0.78	NE
	Occupational		1,400	NE	NE	NE	0.72	NE
Volatilization to Outdoor Air (RBCwo)	Residential		>S	NE	NE	NE	3,600	NE
	Urban Residential		>S	NE	NE	NE	8,500	NE
	Occupational		>S	NE	NE	NE	16,000	NE
Vapor Intrusion into Buildings (RBCwi)	Residential		>S	NE	NE	NE	840	NE
	Urban Residential		>S	NE	NE	NE	2,000	NE
	Occupational		>S	NE	NE	NE	11,000	NE
Groundwater in Excavation (RBCwe)	Construction and Excavation Worker		37,000	NE	NE	NE	500	NE

Notes:

Grey highlighted cells indicate that detected value exceeds one or more of the referenced RBCs.

Gray Italics Indicate Sample Location has been Removed

Bold indicates a detection

RBCs for m,p-Xylenes and o-Xylenes are given as a total of all Xylenes.

1 – Depth in feet below ground surface

-- - Not analyzed

* sample passed through silica gel cleanup

>S - The groundwater RBC exceeds the solubility limit

NE - An RBC has not been established for this compound

NV - Compound is considered non-volatile for purposes of exposure calculations

x - Sample chromatograph does not resemble fuel standard used for quantitation

ve - Estimated concentration calculated for an analyte

response is outside of instrument calibration range

jl - The laboratory control sample(s) percent recovery

and/or RPD were out of control limits. The reported concentration should be considered an estimate.

Table 9: Summary of Monitoring Well Analytical Results

40490 Old US Highway 30, Astoria, Oregon 97103

5/23/2019

Sample ID	Date Sampled	Total Petroleum Hydrocarbons (µg/l)	Select Volatile Organic Constituents (µg/l)						Metals
		Gasoline	Benzene	Toluene	Ethylbenzene	m&p Xylene	o-Xylene	Total Xylenes	Lead (Total)
Monitoring Well 1 (MW1)									
MW1	4/13/2017	36,500	1,290	<1.4	6,620	4,870	<2.5	4,870	0.93
	3/12/19	5,900	40	<1.0	530	250		250	
Monitoring Well 2 (MW2)									
MW2	4/13/17	12,700	695	<1.4	268	232	<2.5	232	0.19
	3/12/19	1,900	<1.0	<1.0	9.6	--	--	14	--
Monitoring Well 3 (MW3)									
MW3	3/12/19	2,200	6.7	<1.0	69	--	--	73	--
Monitoring Well 4 (MW4)									
MW4	3/12/19	400	<1.0	<1.0	3.0	--	--	5.8	--
Monitoring Well 5 (MW5)									
MW5	3/12/19	<100	<1.0	<1.0	<1.0	--	--	<3.0	--
Monitoring Well 9 (MW9/SV9)									
	6/23/2011*	<100	<0.25	<1.0	<0.5	--	--	<1.5	--
	10/27/2011*	<100	<0.25	<1.0	<0.5	--	--	<1.5	--
	2/8/2012*	<100	<0.25	<1.0	<0.5	--	--	<1.5	--
	5/30/2013*	<100	<0.25	<1.0	<0.5	--	--	<1.5	--
	4/13/17	9,230	<2.2	<1.4	<1.5	<3.9	<2.5	<3.9	2.6
	3/12/19	<100	<1.0	<1.0	<1.0	--	--	<3.0	--
ODEQ RBC (Occupational)		450	2.1	6,300	6.4	--	--	830	15

Notes:

(µg/l) = micrograms per liter

* = sampled by Saga Environmental & Engineering, Inc. as part of the investigation of the Svensen Mobil site

RBC = Risk-Based Concentrations

< Not detected above the laboratory reporting limit

Bold indicates a detected concentration that is below ODEQ Risk-Based Concentrations

Bold and Shaded indicates the detected concentration exceeds ODEQ Risk-Based Concentrations



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Table 10: Summary of Groundwater Elevations

Hunt's Market

40490 Old US Highway 30, Astoria, Oregon 97103

Well Number	Latitude	Longitude	Elevation Top of Casing (feet)	Date of Measurement	Depth to Water (feet)	Depth to Free Product (feet)	Free Product Thickness (feet)	Groundwater Elevation (feet)	Change in Elevation (feet)
MW1	46.165458	-123.660614	92.96	4/13/2017	5.60	--	--	87.36	--
				3/12/2019	8.45	--	--	84.51	-2.85
				7/10/2019	11.33	--	--	81.63	-2.88
				9/24/2019	11.32	--	--	81.64	0.01
				2/6/2020	2.31	--	--	90.65	9.01
MW2	46.165331	-123.660525	93.75	4/13/2017	6.72	--	--	87.03	--
				3/12/2019	7.35	--	--	86.40	-0.63
				7/10/2019	12.10	--	--	81.65	-4.75
				9/24/2019	11.38	--	--	82.37	0.72
				2/6/2020	4.24	--	--	89.51	7.14
MW3	46.165572	-123.660950	90.40	3/12/2019	8.90	--	--	81.50	--
				7/10/2019	7.33	--	--	83.07	1.57
				9/24/2019	6.77	--	--	83.63	0.56
				2/6/2020	4.22	--	--	86.18	2.55
MW4	46.165386	-123.660433	94.36	3/12/2019	8.69	--	--	85.67	--
				7/10/2019	13.38	--	--	80.98	-4.69
				9/24/2019	10.21	--	--	84.15	3.17
				2/6/2020	5.24	--	--	89.12	4.97
MW5	46.165094	-123.660831	92.85	7/10/2019	8.99	--	--	83.86	--
				9/24/2019	7.92	--	--	84.93	1.07
				2/6/2020	4.82	--	--	88.03	3.10
MW6				2/6/2020	4.26	--	--		--
MW7				2/6/2020	4.13	--	--		--
Svensen Wells									
MW9 (SV9)	46.165186	-123.660503	94.74	4/13/2017	6.62	--	--	88.12	--
				3/12/2019	7.50	--	--	87.24	-0.88
				7/10/2019	11.68	--	--	83.06	-4.18
				9/24/2019	11.49	--	--	83.25	0.19
				2/6/2020	4.11	--	--	90.63	7.38

Notes:

Location and top of casing surveyed by Parametrix 3/11/2019

-- = Not measured, not available, or not applicable

Blue cells indicate quarter 3 results

Table 11: Summary Soil Vapor and Ambient Air Analytical Results (2019)

Hunt's Market

Astoria, Oregon

Sample ID	Date Sampled	Volatile Organic Compounds in Air by Method TO-15																														
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Gasoline Range Organics	Naphthalene	1,4-Dioxane	Chloromethane	Vinyl chloride	Trichloroethene	Bromomethane	Chloroethane	1,1,2-Trichloroethane	Trichlorofluoromethane (CFC-11)	Tetrachloroethene (PCE)	Dibromochloromethane	1,2-Dibromoethane (EDB)	Chlorobenzene	Isopropylbenzene (Cumene)	CFC-113	Methyl t-butyl ether (MTBE)	Styrene	Bromoform	Chloroform	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	1,2-Dichloroethane (EDC)	1,4-Dichlorobenzene	1,1,1-Trichloroethane	1,2-Dichlorobenzene	Carbon tetrachloride
Soil Gas Samples (µg/m³)																																
Sub Slab 1	1/30/2019	2.0	15	2.6	9.8	1,300	0.27	<0.54	<3.1	<0.38	6.4	<2.3	<4	<0.16	<3.4	<10	<13 ca	<0.12	<0.69	<3.7	<1.1	<2.7	3.0	<3.1 ca	0.42	<3.7	<3.7	0.12	<0.36	1.4	<0.9	<0.94
Soil Vapor 1	1/30/2019	4.8	14	2.5	9.2	1,300	0.26	<0.54	<3.1	<0.38	2.2	<2.3	<4	<0.16	<3.4	<10	<13 ca	<0.12	<0.69	<3.7	<1.1	<2.7	2.7	<3.1 ca	0.48	<3.7	<3.7	0.073	<0.36	2.5	<0.9	<0.94
Sub Slab 2	1/30/2019	1.8	11	2.9	9.8	1,800	<0.79	<0.54	<3.1	<0.38	0.52	<2.3	<4	<0.16	<3.4	88	<13 ca	<0.12	<0.69	<3.7	<1.1	<2.7	3.9	<3.1 ca	1.2	<3.7	<3.7	<0.061	<0.36	<0.82	<0.9	<0.94
ODEQ RBC Vapor Intrusion (Occupational)		1,600	21,900,000	4,900	440,000	1,700,000	360	2,500	390,000	2,800	2,900	22,000	43,800,000	770	3,100,000	47,000	450	20	220,000	1,800,000	131,400,000	47,000	4,400,000	11,000	530	260,000	260,000	470	1,100	21,900,000	880,000	2,000
Ambient Air Samples (µg/m³)																																
Indoor Air 1	1/30/2019	1.1	9.9	1.4	8.1	<820	0.71	<0.36	<2.1	<0.26	<0.27	<1.6	<2.6	<0.11	4.9	<6.8	<8.5	<0.077	<0.46	<2.5	<0.77	<1.8	<0.85	<2.1	0.49	<2.5	<2.5	0.19	<0.24	<0.55	<0.6	0.68
Indoor Air 2	1/30/2019	0.73	1.7	<0.43	0.87	<820	0.27	<0.36	<2.1	<0.26	<0.27	<1.6	<2.6	<0.11	3.4	<6.8	<8.5	<0.077	<0.46	<2.5	<0.77	<1.8	<0.85	<2.1	0.34	<2.5	<2.5	0.13	<0.24	<0.55	<0.6	<0.63
Exterior Ambient Air 1	1/30/2019	0.8	1.4	<0.43	<0.87	<820	0.51	<0.36	<2.1	<0.26	<0.27	<1.6	<2.6	<0.11	<2.2	<6.8	<8.5	<0.077	<0.46	<2.5	<0.77	<1.8	<0.85	<2.1	0.15	<2.5	<2.5	0.12	<0.24	<0.55	<0.6	<0.63
ODEQ RBC Air Inhalation (Occupational)		1.6	22,000	4.9	440	1,700	0.36	2.5	390	2.8	2.9	22	44,000	0.77	3,100	47	0.45	0.02	220	1,800	130,000	47	4,400	11	0.53	260	260	0.47	1.1	22,000	880	2

Notes:

µg/m³ = microgram per cubic meter

-- Not a regulated substance

Bold indicates a detected concentration that is below ODEQ Risk-Based Concentrations

Bold and Shaded indicates the detected concentration exceeds ODEQ Risk-Based Concentrations

Table 12
Soil Gas Sample Analytical Results (2022)

Sample Identification	Depth ¹	Date	Analytical Results (ug/m ³) ⁽²⁾							
			Analyzed by EPA Method TO-17							
			Gasoline	Benzene	Ethylbenzene	Touene	m,p-Xylene	o-Xylene	Naphthalene	2-Propanol
SV9@5	5	11/16/22	<1,700	2.1	<2.3	<100	8.5	3.9	<1.4	<46
SV10@5	5	11/16/22	<1,700	<1.7	<2.3	<100	4.6	<2.3	<1.4	<46
DEQ Risk-Based Concentrations										
Pathway	Receptor		RBCs							
Vapor Intrusion into Buildings (RBC _{sv})	Residential		79,000	72	220	1,000,000	21,000	17	NE	
	Occupational		1,700,000	1,600	4,900	21,900,000	440,000	360	NE	

Notes:

Highlighted cells indicate that detected value remaining on site exceeds one or more of the referenced RBCs.

Bold indicates a detection

RBCs for Diesel Range and Residual Range Organics are given as Generic Diesel/Heating Oil.

1 - depth in feet below ground surface

2 – Results reported in micrograms per cubic meter (ug/m³)

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.