RI/FS WORK PLAN ADDENDUM
PHASE 2
SOIL CHARACTERIZATION

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon
DEQ ECSI File #2277

July 28, 2003

Prepared for:
Astoria Area-Wide PRP Group

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July 28, 2003
10077.004

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Northwest Region
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VIA Hand Delivery

Attention: Anna Coates

Subject: RI/FS Work Plan Addendum
Phase 2 Soil Characterization
Astoria Area-Wide Petroleum Site
Astoria, Oregon
DEQ ECSI File #2277

Dear Ms. Coates:

Enclosed are three bound and one unbound copies of the above-referenced document. This work plan addendum is being submitted to you on behalf of the Astoria Area-Wide PRP group as described in "Technical Memorandum, Phase 1 Soil Characterization," dated January 31, 2003. This proposed plan is intended to comply with the terms of DEQ Order No. ECSR-NWR-01-11.

Please call me at (503)768-5121 if you have any questions or comments.

Sincerely,
EnviroLogic Resources, Inc.

Thomas J. Calabrese, R.G.
Principal/Hydrogeologist

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Astoria Area-Wide Petroleum Site
Astoria, Oregon

July 28, 2003

This report has been prepared by *EnviroLogic Resources, Inc*., of Portland, Oregon.

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RI/FS WORK PLAN ADDENDUM
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Astoria, Oregon

1.0 INTRODUCTION

This work plan addendum presents the rational, methods and procedures to be used for the second phase of soil characterization at the Astoria Area-Wide Petroleum Site. The proposed soil characterization plan is based on data collected from the Phase 1 Remedial Investigation/Feasibility Study (RI/FS) field activities and historical information documented in the RI/FS and Interim Remedial Action Measures (IRAM) Work Plan, Phase 1 (RI/FS Work Plan)(*EnviroLogic Resources*, July 2002). The Phase 1 field activities were completed at the site in August and September 2002. The soil analytical results for the Phase 1 RI/FS field activities are presented in the Technical Memorandum, Phase 1 Source/Soil Characterization (Phase 1 Soil TM) dated January 30, 2003 (*EnviroLogic Resources*, January 2003a).

The RI/FS is being performed pursuant to a Unilateral Order issued in December 2001 by the Oregon Department of Environmental Quality (DEQ) (No. ECSR-NWR-01-11) to eight entities. The Order requires these current and former facility owners and operators involved in industrial and commercial activities to investigate and potentially cleanup properties within the Astoria Area-Wide site. ChevronTexaco Products Company (ChevronTexaco), Delphia Oil Company (Delphia), McCall Oil and Chemical Company (McCall), Ed Niemi Oil Company (Niemi Oil), Flying Dutchman and Harris Enterprises (Harris/Van West), Port of Astoria (the Port), Qwest Communications International (Qwest), and Shell Oil Company (Shell), collectively potentially responsible parties (PRPs), are identified in the Order and have agreed to comply with its requirements. The following is a list of the consultants representing each PRP:

PRP	**CONSULTANT**
ChevronTexaco	SAIC
Delphia Oil	Maul Foster & Alongi, Inc.
Harris/Van West	Kleinfelder, Inc.
McCall Oil	Anchor Environmental, LLC
Niemi Oil	AMEC, Inc.
Port of Astoria	*EnviroLogic Resources, Inc.*
Qwest	Tetra Tech EM, Inc.
Shell Oil	Hart Crowser, Inc.

The areas within which the investigations are focused are termed the Astoria Area-Wide Petroleum Site (Astoria Area-Wide) and the Regional Study Area (RSA). The boundary of the RSA is shown in Figure 1. Figure 2 shows the locations of each of the properties subject to the Order.

2.0 BACKGROUND

The Astoria Area-Wide site includes facilities and properties located at and near the Port of Astoria in Astoria, Oregon (Figure 1). The RSA includes the Astoria Area-Wide site and the surrounding areas. The RSA is located in Section 7, Township 8 North, Range 9 West, and Section 12, Township 8 North, Range 10 West, Willamette Base and Meridian. The Astoria Area-Wide site includes property bounded by Portway to the northeast, the Columbia River to the northwest, Hamburg Street (including the former McCall Bulk plant) to the southwest, and Marine Drive to the southeast.

The topography of the area consists of a prominent hill overlooking the RSA from the southeast. West Marine Drive (US Highways 26, 30, and 101) is located on a topographic bench, at the base of the prominent hill, approximately 15 feet above the level of the Port facilities. The Columbia River flows to the west on the northwest side of the RSA. Youngs Bay lies to the southwest.

The area around the Port has been used for petroleum storage and distribution since the 1920s. Aboveground storage tanks (ASTs), underground storage tanks (USTs), and pipelines are present on several of the facilities subject to this investigation. Historically, the area was home to at least four bulk petroleum storage facilities and five vehicle fueling or service stations between West Marine Drive and the Columbia River in the RSA. Inactive pipelines associate with several of the former bulk fuel storage facilities extend onto Pier 2. A complete site history and a summary of remedial actions completed at the Astoria Area-Wide site are presented in the RI/FS Work Plan (*EnviroLogic Resources*, July 2002).

The occurrence of free product or light non-aqueous phase liquids (LNAPL) has been documented at several locations within the Astoria Area-Wide site. Currently LNAPL is only known to be present in monitoring wells located near the Ports office in the vicinity of a 1993 diesel release from the McCall Oil pipeline. Historically LNAPL was also present in two monitoring wells situated between the Niemi Cardlock and the Harris/Van West properties in the

vicinity of a 1990 release from Harris/VanWest and in a trench between the Youngs Bay Texaco and Qwest properties in the vicinity of a 1997 gasoline release at Youngs Bay Texaco.

3.0 LOCAL HYDROGEOLOGY

Based on a review of all the boring logs completed as part of the Phase 1 soil characterization activities most of the Astoria Area-Wide site is underlain by grey and light brown sand fill. Lenses of silt and clay are present in the fill as well as gravel, wood and other organics. In addition, two native materials were encountered beneath the site: native river deposits and the Astoria Formation. The native materials were encountered at depth, consistent with the conceptual hydrogeologic model presented in the RI/FS Work Plan.

Native river deposits consisting of dark greenish-grey silty sandy clay with cobbles were encountered beneath the Qwest site at a depth of 9 feet below ground surface (bgs). Mudstone and yellowish-red and yellowish-brown silts were encountered in soil borings located at the Harris/Van West site and the Youngs Bay Texaco site. The mudstone and silts were encountered near the base of the borings from depths of 14 to 18 feet bgs. The mudstone and silt is interpreted to be part of the Astoria Formation.

The depth to ground water during Phase 1 exploration acitivites was generally between 7 and 11 feet bgs at the site, except along West Marine Drive. The three sites along West Marine Drive have a ground surface elevation approximately 15 feet above the remainder of the site and the depth to ground water was generally 22 feet bgs. Boring logs and a summary of physical and engineering parameters of selected soil samples is presented in the Phase 1 Soil TM.

4.0 DISCUSSION OF PHASE 1 SOIL ANALYTICAL RESULTS

In August and September 2002 the Phase 1 source/soil characterization field work was completed at the site in accordance with the RI/FS Work Plan. The Phase 1 investigation included the advancement of 139 direct-push soil borings. Soil and analytical procedures were performed as outlined in the Field Sampling Plan (Appendix A of the RI/FS Work Plan) and the Quality Assurance Project Plan (Appendix B of the RI/FS Work Plan). Appendices D through K of the Phase 1 Soil TM contain the laboratory analytical reports. The analytical results are also summarized in table format in the Phase 1 Soil TM.

The PRPs current understanding of subsurface soil conditions and the extent of petroleum hydrocarbons based on field observations and laboratory data is presented on three cross-sections. The cross section locations are shown on Figure 3. The cross sections are shown on Figures 4, 5, and 6. Also, included on the cross sections are former known facilities, underground utilities, and depth to ground water. The utilities included on Figure 3 and the cross-sections are located based on information the PRP group has obtained during the project. The utility information in these figures represents our best understanding of site conditions but not all utility locations and depths have been field verified.

All soil samples submitted for analysis were analyzed for petroleum hydrocarbons although not all petroleum hydrocarbons were quantified. Select soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and lead. Additional analyses for polychlorinated biphenols (PCBs), formaldehyde, and metals were conducted on select soil samples depending on the nature of the source being investigated.

The chromatograms attached to analytical laboratory reports show evidence that petroleum hydrocarbons at the Astoria Area-Wide site, in general, exhibit weathered characteristics. The effect of weathering on fuels in the subsurface is to cause distinctions between different fuel types

(e.g., gasoline and diesel) to be less clear. The resulting quantification of one fuel may include consitituents typically quantified as another fuel in an unweathered state.

Phase 1 analytical results are discussed in the following sections by constituent group (by gasoline, diesel, heavy oil, VOCs, SVOCs, metals, PCBs and formaldehyde). Discussion within each constituent group is by depth interval. First, the surface soil samples (0 to 3 feet bgs) are discussed then the subsurface soil samples (from 3 feet bgs to the total depth explored). Analytical data are presented on Figures 7 through 28 for selected analytes. The figures provide an overview of analytical data for the two depth intervals. If more than one sample was analyzed within one depth zone the sample with the highest concentration is presented on the figure.

4.1 GASOLINE RANGE HYDROCARBONS

Gasoline range hydrocarbons were detected at all the PRP sites. TPH-Gx analytical results are presented on Figures 7 and 8. The maximum concentration of gasoline range hydrocarbons detected in surface soil samples was 15.8 mg/kg (SB-703(P)). The maximum concentration of gasoline range hydrocarbons detected in the subsurface soils was 7,620 mg/kg (SB-822(Q)).

4.2 DIESEL RANGE HYDROCARBONS

Diesel-range hydrocarbons were detected at all the PRP sites except Harris/Van West. The TPH-Dx analytical results are presented on Figures 9 and 10. The maximum concentration detected in the surface soil zone was 6,030 mg/kg at the former McCall Bulk Plant (SB-202(C)). The soil in the vicinity of this sample was subsequently removed by excavation. The maximum concentration detected in the subsurface soil zone was 35,000 mg/kg in the vicinity of the McCall pipeline release (SB-510(P)).

4.3 OIL RANGE HYDROCARBONS

Heavy oil or lube oil hydrocarbons were detected at all the PRP sites except Val's Texaco. The maximum concentration detected in the surface soil zone was 7,700 mg/kg (SB-202 (C)) at the former McCall bulk plant. The soil in the vicinity of SB-202(C) was subsequently excavated. Oil

range hydrocarbon (by TPH-Dx) analytical results are presented on Figures 11 and 12 for the two soil zones.

4.4 VOCs

VOCs consisting of BTEX, other gasoline constituents, and chlorinated compounds were analyzed for in various samples collected from the Astoria Area-Wide site. Petroleum hydrocarbon related VOCs were detected at each PRP site. Analytical results for BTEX, 1,2,4-trimethylbenzene, and 1,3,5 trimethylbenzene are presented on Figures 13 to 24 for the two soil zones. The maximum detected concentration of each risk based decision making (RBDM) VOC is presented below.

RBDM VOCs		
Analyte	Maximum Concentration in Surface Soil Zone (mg/kg)	Maximum Concentration in Subsurface Soil Zone (mg/kg)
1,2,4-Trimethylbenzene	34.9 SB-306(D)	689 SB-602(N)
1,2-Dibromoethane	ND	0.00105 SB-309(D)
1,2-Dichloroethance	0.000304J SB-315(D)	0.000315J SB-314(D)
1,3,5-Trimethylbenzene	17 SB-306(D)	189 SB602(N)
Benzene	0.157 SB-605(N)	17.2 SB-612(N)
Ethylbenzene	4.3 SB-605(N)	204 SB-602(N)
Isopropylbenzene	2.72 SB-306(D)	22.6 SB-602(N)
Methyl-t-butyl ether	ND	ND
n-Propylbenzene	11.6 SB-306(D)	91.3 SB-602(N)
Toluene	0.234 SB-309(D)	169 SB-602(N)
Xylenes	14.3 SB-605(N)	1,160 SB-602(N)

4.5 SVOCs

SVOCs, including RBDM SVOCs, were analyzed for in various samples collected from the Astoria Area-Wide site. Naphthalene is the SVOC most frequently detected. Concentrations of naphthalene in the two soil zones are shown on Figure 25 and 26. The maximum detected concentration of each RBDM SVOCs is presented below.

RBDM SVOCs		
Analyte	Maximum Concentration in Surface Soil Zone (mg/kg)	Maximum Concentration in Subsurface Soil Zone (mg/kg)
Acenaphthene	0.494 SB-306(D)	1.49 SB-904(S)
Anthracene	0.0877J SB306(D)	0.62 SB-712(P)
Benzo(a)anthracene	0.225 SB-720(P)	0.326 SB-712(P)
Benzo(a)pyrene	0.238 SB-720(P)	0.405 SB-311(D)
Benzo(b)fluoranthene	0.233 SB-720(P)	0.447 SB-311(D)
Benzo(k)fluoranthene	0.187 SB-720(P)	0.384 SB-311(D)
Chrysene	1.51J SB-202(C)	0.698 SB-712(P)
Dibenz(a,h)anthracene	0.052 SB-720(P)	0.112 SB-311(D)
Fluoranthene	0.331 SB-720(P)	1.02 SB-712(P)
Fluorene	1.03 SB-306(D)	2.55 SB-618(N)
Indeno(1,2,3-cd)pyrene	0.143 SB-720(P)	0.45 SB-311(D)
Naphthalene	1.35 SB-306(D)	141 SB-602(N)
Pyrene	2.88 SB-202(C)	0.753 SB-712(P)

4.6 METALS

Total metals (RCRA 8 metals) analysis was performed on soil samples collected from the Youngs Bay Texaco, former McCall Bulk Plant, and Port properties . Soil samples collected from the former Shell bulk plant facility were analyzed for cadmium, chromium, and lead. No metals analysis was performed on soil samples collected from the Harris/Van West site (SB-400 series samples) or on the soil samples collected from along the McCall product conveyance piping (SB-500(M) series samples).

Lead concentrations are shown on Figures 27 and 28. Lead detections in the surface soils generally ranged from 1.54 mg/kg to 9.9 mg/kg, with six higher detections ranging from 19.6 mg/kg to 53.2 mg/kg (SB-700(P), SB-702(P), SB-703(P), SB-704(P), SB-304(D), SB-202 (C). Lead in subsurface soil ranged from 0.773 mg/kg to 18.9 mg/kg with higher detections up to to 144 mg/kg (SB-310(D)).

4.7 FORMALDEHYDE AND PCBS

Formaldehyde analysis was performed on five soil samples collected from two soil borings (SB-704(P) and SB-705(P)). These two soil borings are located in the vicinity of the boiler room and glue room at the former furniture manufacturing facility. Formaldehyde was detected in one soil sample SB-705(P)-2.5 (former glue room) at a concentration of 2.8 mg/kg

PCB analyses were conducted on 81 soil samples. The only PCB detected was Arcolor 1254 in soil sample SB-228(C)-4. Soil sample location SB-228(C) is located in the northern corner of the former McCall Bulk Plant

5.0 PHASE 2 SOIL CHARACTERIZATION PLAN

The basic objective of the Phase 2 soil characterization plan is to collect soil samples from locations designed to enhance the understanding of the nature and extent of COIs. Field methods and procedures are presented in the RI/FS Work Plan (Appendix A and Appendix E). Table 1 lists the proposed borings and the analytical program planned for each. The locations of the proposed borings are presented on Figure 29.

5.1 MONITORING WELL SOIL BORINGS

The work plan for the first phase of ground water characterization is presented in the RI/FS Work Plan Addendum, Phase 1 Ground Water Assessment, Remedial Investigation/Feasibility Study Astoria Area-Wide Petroleum Site Astoria, Oregon prepared by *EnviroLogic Resources, Inc*. This work plan was submitted draft to DEQ in July 2003. This work consists of installing 36 monitoring wells. The monitoring well soil borings are also intended to be utilized to fill data gaps in the soil characterization. .

5.2 DELPHIA OIL SITE

Soil samples will be collected from one monitoring well on the Delphia Oil Bulk Plant site, from two monitoring wells in Industry Street north of the Delphia site, and from one monitoring well east of the Delphia site. In addition to the monitoring well borings planned, two Geoprobe borings will be completed at the Delphia Oil site to fill data gaps including quantification of petroleum hydrocarbons, delineation of the lateral extent of VOCs in the central part of the site and delineation of the lateral extent of benzo(a)pyrene in the northwest corner of the site (Figure 29). At each boring location, discrete soil samples will be collected from the unsaturated zone at depths of 2 feet and 5 feet bgs. Sampling depths may be adjusted in the field based on field observations. All samples will be analyzed for RBDM VOCs by Method 8260B. Selected samples will be analyzed for gasoline-range TPH by Method NWTPH-Gx, and for diesel- and heavy-oil-range TPH by Method NWTPH-Dx. Samples collected from Industry Street will be

analyzed for SVOCs. A silica gel cleanup will be completed on the samples prior to analyzing for diesel and oil.

5.3 VAL'S TEXACO

Soil samples will be collected from one monitoring well south of the Val's Texaco building. In addition to the monitoring well borings, up to four additional Geoprobe borings will be completed at the Val's Texaco site to gather enough analytical data to fill data gaps including quantification of petroleum hydrocarbons and delineation of the lateral extent of VOCs (Figure 29). At each boring location, discrete soil samples will be collected from the unsaturated zone at depths of 2, 5, 10, and 15 feet bgs. Sampling depths may be adjusted in the field based on visual observations. Selected samples will be analyzed for RBDM VOCs by Method 8021/8260, for gasoline-range TPH by Method NWTPH-Gx, and for diesel-range TPH by Method NWTPH-Dx. A silica gel cleanup will be completed on the samples prior to analyzing for diesel. Delphia's summary of the analyses to be completed at each boring is included as Appendix A.

5.4 PORT OF ASTORIA

One soil boring will be completed at Astoria Oil Services to fill data gaps for VOCs, SVOCs, petroleum hydrocarbon identification/quantification and metals analysis from the subsurface soil zone. A near surface and interface soil sample will also be analyzed for metals.

5.5 SHELL

To further assess soil conditions beneath the former Shell bulk facility, Shell Oil Company will collect one surface (i.e., <3 feet bgs) and one subsurface (8-9 feet bgs) soil sample from each of the three planned monitoring well borings (SB-912(S), SB-913(S), and SB-914(S)) located on the former bulk facility site. The soil samples will be analyzed for the presence of diesel and gasoline range petroleum hydrocarbons, RDBM VOCs, and PAHs. .

5.6 HARRIS/VAN WEST

Harris/Van West will be collecting two soil samples for SVOC and metals analysis from the monitoring well that will be installed immediately northwest of the Harris/Van West site. In addition, one boring will be drilled along the southwest property line to characterize COIs in the direction of the residential property located adjacent to the site.

5.7 QWEST

Qwest will collect soil samples for MTBE, PAHs, iso-propylbenzene, n-propylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,2-dibromoethane, 1,2-dicholorethane, and lead analysis. The soil samples will be collected from three monitoring wells, SB-632(N), SB-834(Q), SB-835(Q), being installed either on or near the Qwest property. At SB-632(N), Qwest will collect one soil sample at depth (greater than 3 feet bgs). At SB-834(Q), Qwest will collect two soil samples: one surface sample (0 to 3 feet bgs) and one sample at depth (greater than 3 feet bgs). At SB-835(Q), Qwest will collect two soil samples: one surface sample (0 to 3 feet bgs) and one sample at depth (greater than 3 feet bgs).

5.8 NIEMI OIL CARDLOCK AND FORMER MOBIL/NIEMI OIL BULK PLANT

Niemi Oil completed and sampled 10 direct-push explorations at the cardlock facility and 15 direct-push explorations at the former Mobil/Niemi Oil bulk plant as part of the Phase 1 Soil Investigation. The explorations were located in areas that were historically occupied by storage tanks and loading facilities, and at other accessible locations to provide a range of coverage over each facility. Ground-water monitoring wells will be installed on or near both properties as part of the Astoria Area-Wide ground-water monitoring program. To address limited data gaps in analytical data at each property, soil samples will be collected from select monitoring well borings and analyzed for COIs. These data, coupled with existing data collected during the Phase 1 soil investigation, will be incorporated into the risk assessment.

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TABLES

TABLE 1

PROPOSED ANALYTICAL PROGRAM
Phase 2 Soil Characterization

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Boring Number	Sample Depths (ft.)	Analyses for Soil Samples
SB-001(A)	3, 7[a]	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-002(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-003(A)	5	PAHs
SB-004(A)	None	None
SB-005(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-006(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-007(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-008(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-009(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-010(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-011(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-012(A)	None	None
SB-013(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-014(A)	None	None
SB-015(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-016(A)	7	PAHs
SB-017(A)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-018(A)	None	None
SB-019(A)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-105(C)	3, 10	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-253(C)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-254(C)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-255(C)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-256(C)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb, PCBs, RCRA-8
SB-320(D)	2, 5	TPH-Gx, TPH-Dx, RBDMVOCs
SB-321(D)	2, 5	TPH-Gx, TPH-Dx, RBDMVOCs
SB-322(D)	2, 5	TPH-Gx, TPH-Dx, RBDMVOCs
SB-323(D)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-324(D)	2, 5, 10, 15	TPH-Gx, TPH-Dx, RBDMVOCs
SB-325(D)	2, 5, 10, 15	TPH-Gx, TPH-Dx, RBDMVOCs
SB-326(D)	2, 5, 10, 15	TPH-Gx, TPH-Dx, RBDMVOCs
SB-327(D)	2, 5, 10, 15	TPH-Gx, TPH-Dx, RBDMVOCs
SB-328(D)	2, 5, 10, 15	TPH-Gx, TPH-Dx, RBDMVOCs
SB-329(D)	None	None
SB-330(D)	None	None

TABLE 1

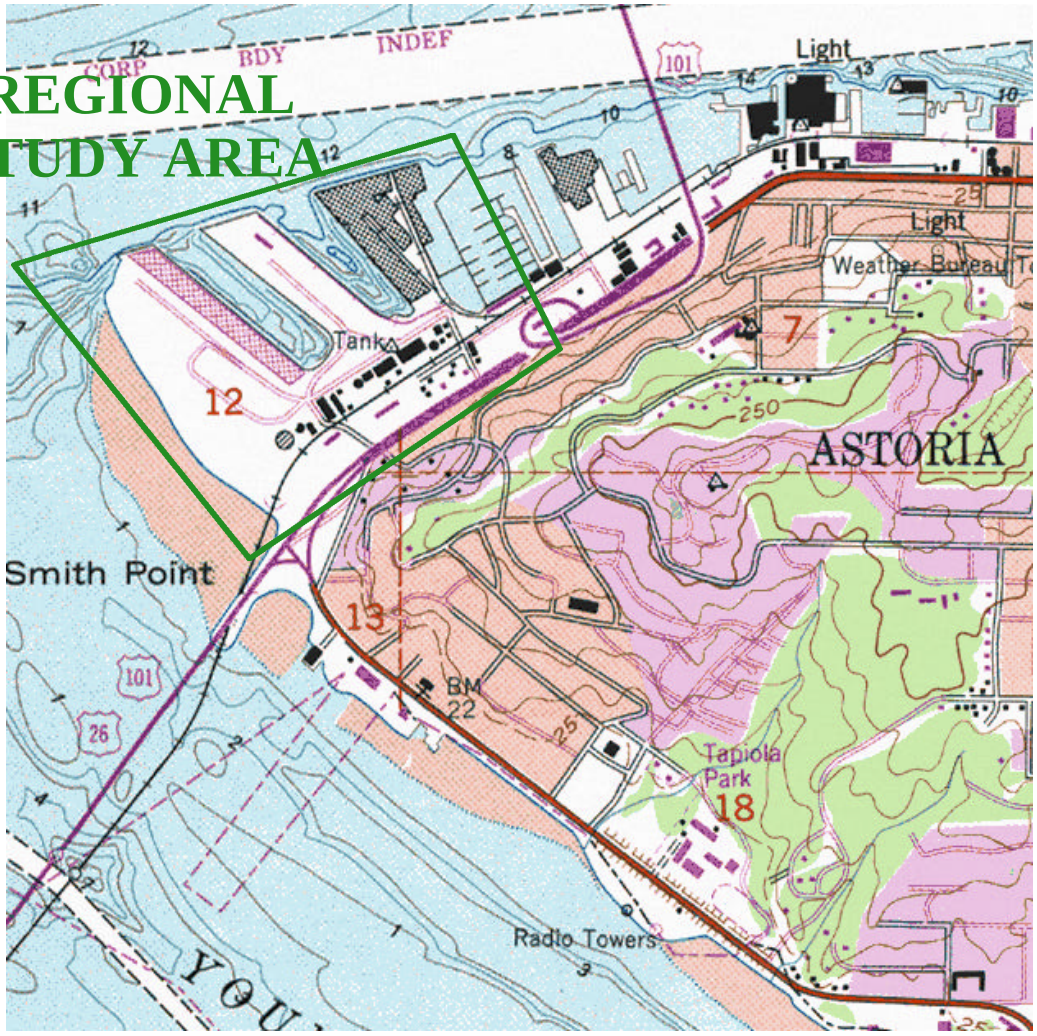
PROPOSED ANALYTICAL PROGRAM
Phase 2 Soil Characterization

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

Boring Number	Sample Depths (ft.)	Analyses for Soil Samples
SB-410(F)	2	TPH-Gx, TPH-Dx, RBDMVOCs
	4	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
	9	TPH-Gx, TPH-Dx, RBDMVOCs, Pb
SB-627(N)	3	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-628(N)	None	None
SB-629(N)	None	None
SB-630(N)	None	None
SB-631(N)	None	None
SB-632(N)	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-721(P)	3	Pb
	7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-834(Q)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-835(Q)	3, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs, Pb
SB-912(S)	2, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-913(S)	2, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs
SB-914(S)	2, 7	TPH-Gx, TPH-Dx, RBDMVOCs, PAHs

Notes:
a – Sample Depth of 7 feet is intended to be at the interface and may vary from boring to boring based upon field observations Additional samples may be collected on the basis of field screening..
TPH-Gx – Total Petroleum Hydrocarbons by NWTPH-Gx
TPH-Dx – Total Petroleum Hydrocarbons by NWTPH-Dx
RBDMVOCs – Risk-Based Decision Making Volatile Organic Compounds by EPA 8260B
PAHs – Polynuclear Aromatic Hydrocarbons by EPA 8270SIM
Pb – Lead by EPA 6010

FIGURES



(from USGS, Astoria {1984}, OR 7.5' Quadrangles)

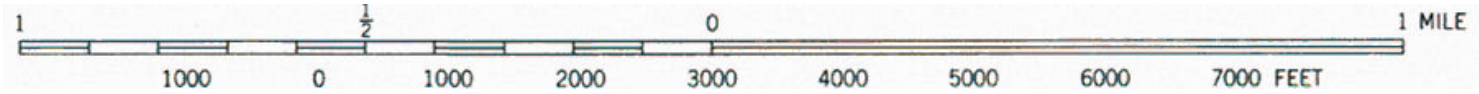


FIGURE 1

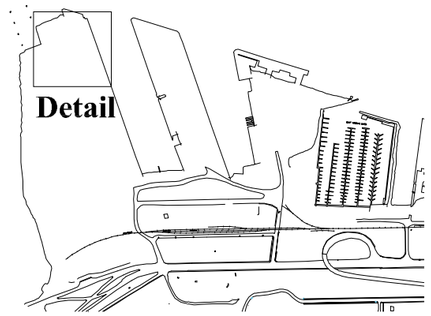
SITE LOCATION

Remedial Investigation/Feasibilty Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

EnviroLogic Resources, Inc.

Consulting Environmental & Water Resources Scientists

Detail



KEY PLAN

SB-509(M) SB-510(M) SB-715(P) SB-508(M) SB-507(M) SB-714(P) PORT OFFICE BUILDING FORMER WATER TANK SB-506(M) SB-505(M) SB-500(M) SB-501(M) SB-502(M) SB-503(M) SB-504(M) SB-719(P)

SB-625(N) SB-626(N) SB-612(N) SB-613(N) SB-720(P) SB-703(P) SB-718(P) SB-708(P) TP-901(S) SB-911(S) TP-900(S) SB-717(P) SB-910(S) SB-615(N) SB-614(N) SB-707(P) SB-907(S) SB-616(N) SB-619(N) SB-908(S) SB-617(N) SB-618(N) SB-716(P) SB-906(S) SB-905(S) SB-621(N) SB-620(N) SB-909(S) SB-702(P) SB-705(P) SB-706(P) SB-903(S) SB-901(S) SB-622(N) SB-623(N) SB-700(P) SB-902(S) SB-904(S) SB-624(N) SB-704(P) SB-701(P) SB-900(S) FISH & W BUILDING SERGESONS WAREHOUSE

SB-236(C) SB-251(C) SB-252(C) SB-237(C) SB-228(C) SB-250(C) SB-202(C) SB-206(C) SB-233(C) SB-238(C) SB-203(C) SB-207(C) SB-232(C) SB-235(C) SB-239(C) SB-244(C) SB-234(C) SB-241(C) SB-245(C) SB-222(C) SB-200(C) SB-224(C) SB-208(C) SB-221(C) SB-246(C) SB-201(C) SB-231(C) SB-225(C) SB-240(C) SB-204(C) SB-218(C) SB-220(C) SB-242(C) SB-216(C) SB-227(C) SB-247(C) SB-213(C) SB-226(C) SB-223(C) SB-214(C) SB-217(C) SB-230(C) SB-243(C) SB-229(C) SB-205(C) TP-202(C) SB-219(C) SB-210(C) TP-201(C) SB-215(C)

NORTHERN RAILROAD

SB-601(N) SB-600(N) SB-603(N) SB-807(Q) SB-602(N) SB-802(Q) SB-605(N) INDUSTRY ST. SB-801(Q) SB-806(Q) SB-606(N) SB-803(Q) SB-805(Q) SB-608N) SB-311(D) SB-312(D) SB-800(Q) SB-804(Q) SB-319(D) SB-307(D) SB-829(Q) SB-832(Q) SB-607(N) SB-826(Q) SB-822(Q) SB-308(D) SB-825(Q) SB-609(N) SB-304(D) SB-823(Q) SB-824(Q) SB-309(D) SB-827(Q) SB-830(Q) SB-833(Q) SB-821(Q) SB-604(N) SB-310(D) SB-300(D) SB-809(Q) SB-828(Q) SB-815(Q) SB-820(Q) SB-408(F) SB-305(D) SB-810(Q) SB-817(Q) SB-407(F) SB-409(F) SB-301(D) SB-306(D) SB-104(C) SB-816(Q) SB-405(F) SB-811(Q) SB-818(Q) SB-406(F) SB-314(D) SB-100(C) SB-819(Q) SB-404(F) SB-831(Q) SB-400(F) SB-812(Q) SB-102(C) SB-318(D) SB-316(D) SB-813(Q) SB-317(D) SB-313(D) SB-814(Q) SB-402(F) SB-401(F) SB-103(C) SB-101(C) SB-315(D)

PORTWAY ST.

HAMBURG

GVL GVL

U.S. HWY. 101
U.S. HWY. 26
OR. HWY. 202
U.S. HWY. 101 ALT.

TAYLOR AVE.

AVE.

WEST MARINE DR.

SB-211(C) SB-209(C) SB-212(C)

TANK

0 120 240

SCALE IN FEET

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FIGURE 2

SITE PLAN AND SOIL BORING LOCATIONS

Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon

EXPLANATION

- *PETROLEUM RELATED*
- *STORM CONVEYANCE*
- *SANITARY CONVEYANCE*

Former Chevron/McCall Oil Bulk Plant

Former Mobil/Niemi Oil Bulk Plant

Former Shell Oil Bulk Plant

Port Offices

PORT OFFICE BUILDING

Port Offices

Qwest

Niemi Oil Cardlock

ChevronTexaco

Harris/Van West

Delphia Oil

Bergesons Warehouse

A/C STORAGE

FORMER WATER TANK

PORTWAY

INDUSTRY ST.

NORTHERN RAILROAD

BURLINGTON

HAMBURG

WEST MARINE DR.

U.S. HWY. 101

U.S. HWY. 26

OR. HWY. 202

U.S. HWY. 101 ALT.

TAYLOR AVE.

ABANDONED SS IN 1990

0 120 240

SCALE IN FEET

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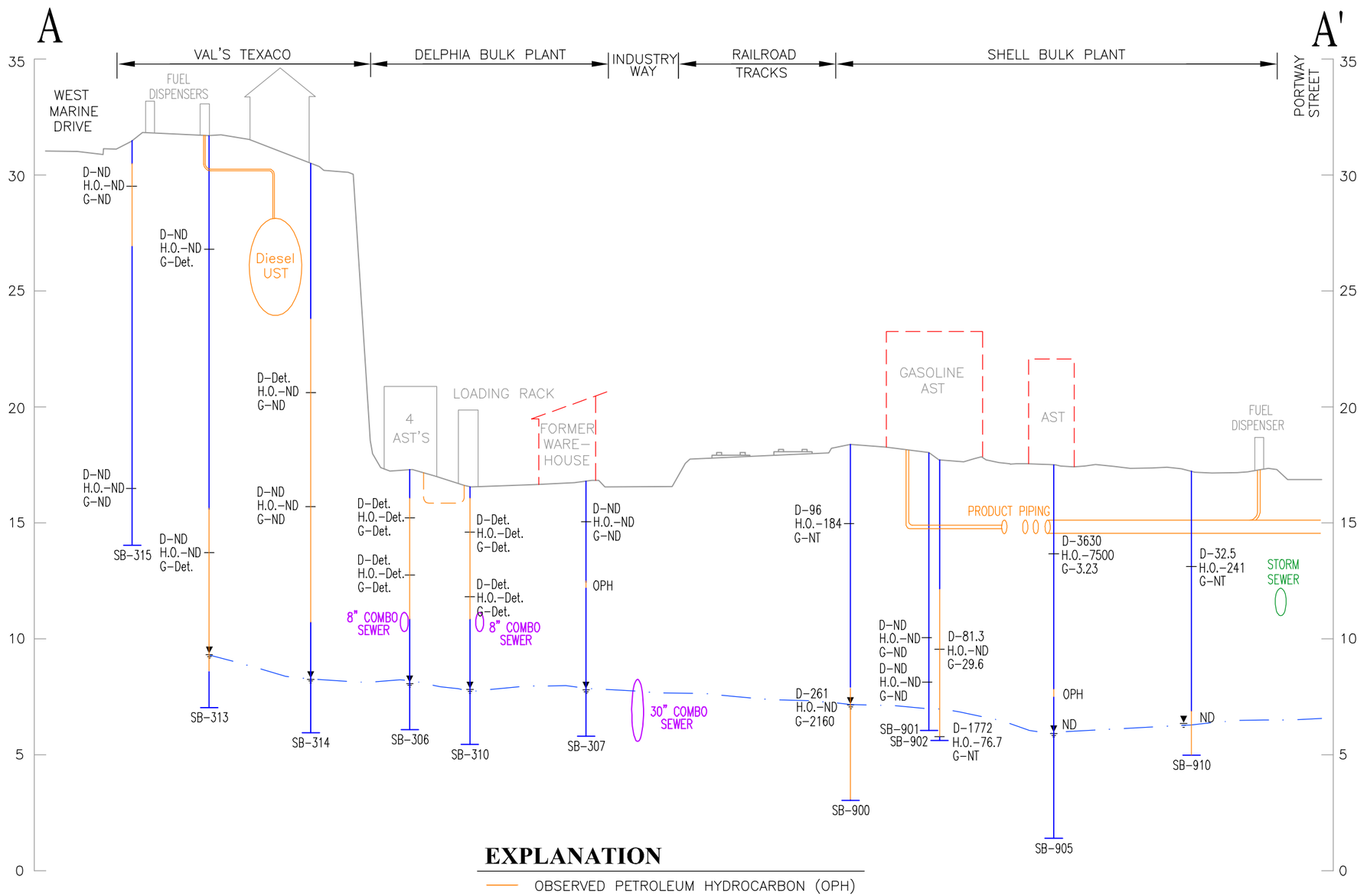
FIGURE 3
CROSS SECTION LOCATIONS
Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon



EXPLANATION

———	OBSERVED PETROLEUM HYDROCARBON (OPH)
D	DIESEL
H.O.	HEAVY OIL
G	GASOLINE
Det.	DETECTED
ND	NOT DETECTED
NT	NOT TESTED

0 50 100

SCALE IN FEET

EnviroLogic Resources, Inc.

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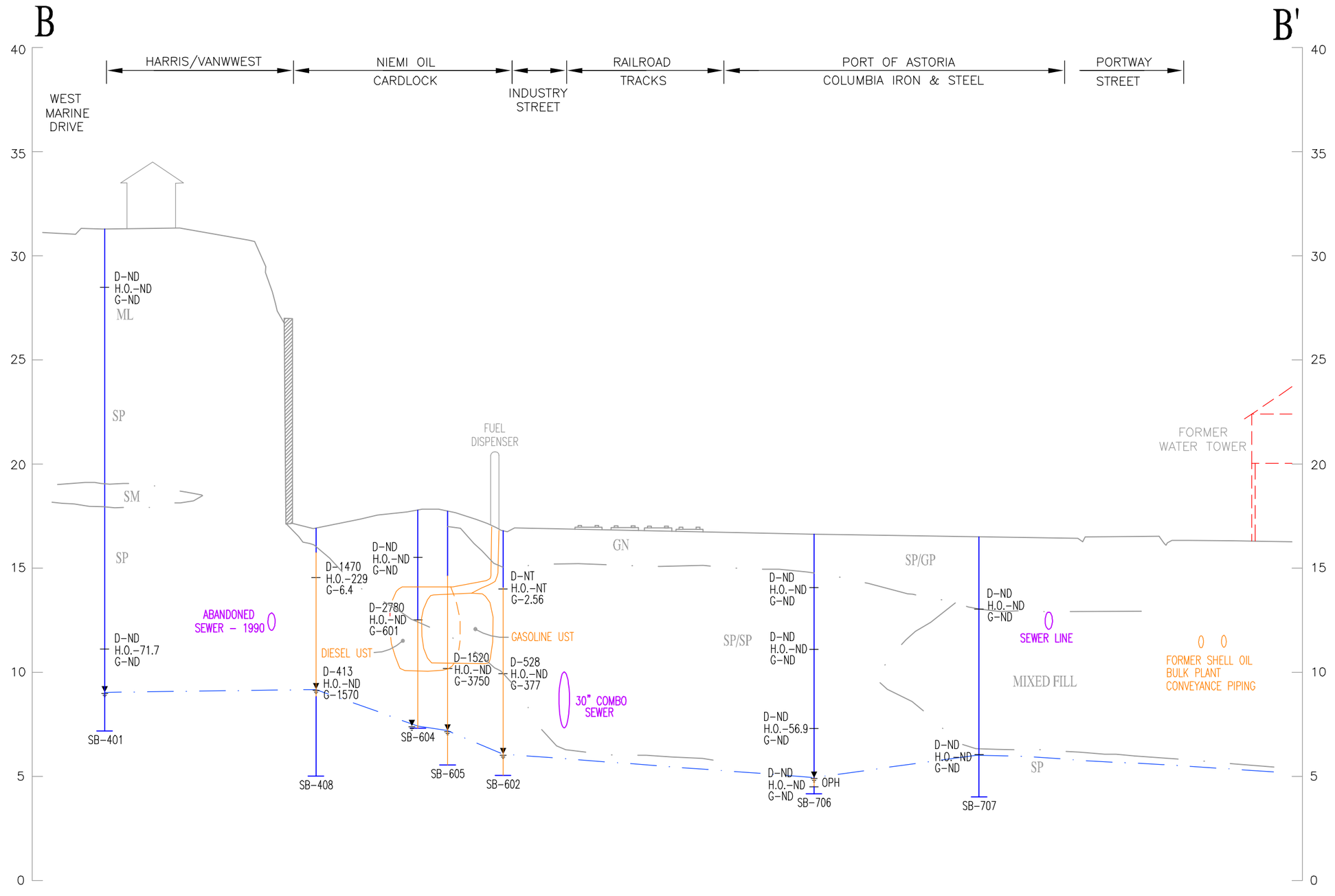
FIGURE 4
SECTION A-A'
Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon



0 50 100

SCALE IN FEET

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FIGURE 5
SECTION B-B'
Remedial Investigation/Feasibility Study
Astoria Area-Wide Petroleum Site
Astoria, Oregon