

December 23, 2004  
10077.015

Oregon Department of Environmental Quality  
Northwest Region  
2020 SW Fourth Avenue  
Suite 400  
Portland, Oregon 97201-4987

**VIA Email/First Class**

**Attention: Anna Coates**

**Subject: IRAM Work Plan  
Port of Astoria Property Redevelopment  
Former Mobil/Niemi Oil Bulk Plant  
Astoria Area-Wide Petroleum Site  
Astoria, Oregon  
DEQ ECSI File #2277**

Dear Ms. Coates:

This document presents a Work Plan for Interim Remedial Action Measures (IRAMs) related to the redevelopment of the former Mobil/Niemi bulk petroleum storage plant located at 490 Industry Street, Astoria, Oregon. The former Mobil/Niemi bulk plant and adjoining properties owned by the Port of Astoria (the Port) are located within the Astoria Area-Wide Petroleum Site. While the property planned for redevelopment includes the adjoining Port of Astoria property to the east of the former Mobil/Niemi bulk plant, an IRAM is only required where a potential environmental risk is identified. The site location is shown on Figure 1.

The Port has owned the former Mobil/Niemi bulk plant and adjoining properties since the early 1900s. The Port previously leased the property to Mobil Oil Company and its predecessors from approximately the early 1920s through 1976, and to the Ed Niemi Oil Company from 1976 until 1999. The former Mobil/Niemi bulk plant and surrounding Port and other properties within the larger Astoria Area-Wide Petroleum Site are shown on Figure 2. This IRAM Work Plan has been prepared to enable the lease and commercial redevelopment of this property by the Port in the summer of 2005. The layout of the proposed development is shown on Figure 3.

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Investigation and potential cleanup of the various properties at the Astoria Area-Wide site is being conducted under a unilateral order issued by the Oregon Department of Environmental Quality (DEQ) in December 2001. The Order (DEQ Unilateral Order No. ECSR-NWR-01-11) was issued to certain current and former facility operators, property owners, and leaseholders. These owners and operators have formed the Astoria Area-Wide Petroleum Site PRP Group to fund and perform a Remedial Investigation/Feasibility Study (RI/FS) and the other work required by the Order. Thus far, several investigations and interim measures have been completed for the Astoria Area-Wide site as required by the Order, including the removal of an underground heating oil storage tank and an underground storage tank (UST) for secondary containment in connection with the former overhead petroleum truck loading rack at the former Mobil/Niemi bulk plant.

## **PURPOSE**

This IRAM addresses environmental issues associated with the proposed redevelopment of the former Mobil/Niemi bulk plant, as shown on Figure 3. The proposed land use associated with the redevelopment is commercial facilities designed to support marine activities and storage facilities with associated parking and roadways. The planned foundation design is slab-on-grade with, potentially, driven pilings. Subsurface activities are limited to installation of underground utilities. Minimal grading is planned; the proposed redevelopment will be essentially at the existing grade.

Previous investigations have identified the presence of gasoline and diesel-range hydrocarbons at the former Mobil/Niemi bulk plant and surrounding Port properties, including light non-aqueous phase liquids (LNAPL). The LNAPL consists of weathered petroleum products. The nature of the former sources has not been completely defined, other than that releases likely resulted from one or more aboveground storage tanks or petroleum related operations. Based on previous soil and ground-water sampling at the former Mobil/Niemi bulk plant and surrounding Port properties, the extent of hydrocarbon impacted soil, ground water, and LNAPL is known.

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The goals of this IRAM are to:

- Reduce potential human exposure to petroleum hydrocarbons and other contaminants in the environment that could result in an unacceptable risk.
- Reduce potential migration of contaminants through subsurface soil and ground water to the Columbia River.
- Provide specific guidelines and requirements regarding petroleum contamination for preparation of engineering and land use plans associated with the proposed commercial redevelopment of the former Mobil/Niemi bulk plant.
- Utilize remedies that are consistent with the potential final remedial actions for the Astoria Area-Wide site.

The tasks to be performed as part of this proposed IRAM consist of implementing remedies for the identified areas of hydrocarbon impact and where necessary to mitigate risks to human health and the environment. In addition, this IRAM includes decommissioning the two underground storage tanks (USTs), which was completed in November 2004.

The following sections summarize pertinent background information and results of previous investigation results, followed by the preliminary IRAM cleanup goals, and description of the selected IRAM.

## **PREVIOUS INVESTIGATIONS**

The initial Remedial Investigation/Feasibility Study (RI/FS) and IRAM Development Work Plan, Phase 1 (*EnviroLogic Resources*, 2002) was submitted to DEQ on July 15, 2002. In August and September 2002 the Phase 1 source/soil characterization field work (including some ground- water characterization) was completed at the Astoria Area-Wide site. Phase 2 soil characterization was completed in September 2003 and March 2004. Thirty-two soil borings

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were completed in the vicinity of the proposed redevelopment as part of the Phase 1 and Phase 2 soil characterization activities. Phase 1 soil analytical results are presented in the Technical Memorandum, Phase 1 Soil Characterization (*EnviroLogic Resources*, 2003). Phase 2 soil analytical results are presented in the Technical Memorandum, Phase 2 Soil Characterization (*EnviroLogic Resources*, 2004).

The Work Plan Addendum, Phase 1 Ground-Water Assessment, was submitted to DEQ on July 2, 2003 (*EnviroLogic Resources*, 2003). As part of the RI/FS ground-water characterization activities, eight monitoring wells were installed on the property proposed for redevelopment. These wells have been monitored quarterly for one year as part of the Astoria Area-Wide ground-water monitoring program. Ground water analytical results are presented in the Technical Memorandum, Quarterly Ground-Water Monitoring, Third Quarter 2004 – 4th Round (*EnviroLogic Resources*, 2004). LNAPL have been encountered at the former Mobil/Niemi Oil bulk plant and adjacent properties during quarterly ground-water monitoring. The results of these previous investigations, relevant to the proposed redevelopment are discussed in the following section. Analytical tables and reports describing the previous investigations are incorporated by reference.

#### **OCCURRENCE/CONCENTRATION OF COIs**

Documentation of the occurrence and concentration of constituents of interest (COIs) is presented in the reports discussed under the previous investigation section of this document. The COIs are gasoline- and diesel-related petroleum hydrocarbons including volatile organic compounds and polynuclear aromatic hydrocarbons. No new or additional information or COI analysis was performed for this IRAM work plan.

A comparison of soil (Phase 1 and 2) and ground-water (quarterly monitoring) analytical data to the DEQ Generic Risk-Based Concentrations (RBCs) (DEQ, 2003) identified several locations where generic RBCs are exceeded. Based on the past and proposed land use the receptor

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scenarios used were occupational, construction worker, or excavation worker. An analysis of relevant receptors and exposure pathways within the Astoria Area-Wide site were identified in the conceptual site model presented in the Technical Memorandum, Beneficial Land and Water Use Surveys (*EnviroLogic Resources*, 2003b). RBC exceedances are presented on Figure 3. For purposes of this IRAM, detected concentrations were screened against generic RBC values. The default parameters used to develop the generic RBCs are generally similar to conditions encountered beneath the redevelopment area and are considered appropriate for evaluating risk. However, these values will be calculated on a site-specific basis as part of the risk assessment to be conducted for the Astoria Area-Wide site and the generic RBCs may not represent final cleanup targets. Soil analytical results were also compared to the DEQ Pre-Calculated "Highly Concentrated" Hot Spot Levels in soil. The highly concentrated hot spot level concentrations are presented in Table 3-1 of DEQ Guidance For Identification of Hot Spots (DEQ, 1998). The results of these comparisons to regulatory guidance are presented in the following sections.

## **Soil**

A review of Phase 1 and Phase 2 soil analytical results shows that two petroleum constituents have been detected at concentrations greater than the corresponding DEQ generic RBC. The exposure pathways considered include:

- RBC<sub>ss</sub> - surface soil ingestion, dermal contact and inhalation for occupational use, construction worker or an excavation worker;
  - RBC<sub>so</sub> - volatilization to outdoor air for an occupational receptor; and
  - RBC<sub>si</sub> - vapor intrusion into buildings for an occupational receptor.
  - Leaching to ground water was not considered because the beneficial use of ground water does not include drinking water.
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No exceedances were identified for the potential RBCss or the RBCso exposure pathways. For the RBCsi exposure pathway the only exceedances noted were benzene in soil samples analyzed from boring SB-612(N) and boring SB-720(P), and 1,3,5-trimethylbenzene in a soil sample analyzed from soil boring SB-612(N). A summary of these RBC exceedances is presented on Figure 3.

Laboratory analytical results show that soil samples contained concentrations that do not exceed the highly concentrated hot spot levels presented for industrial land use in Table 3-1 (DEQ, 1998).

### **Ground Water**

A review of quarterly ground-water monitoring analytical results revealed three petroleum constituents have been detected at concentrations greater than the corresponding DEQ generic RBC. The exposure pathways considered include:

- RBCwo - volatilization to outdoor air for an occupational receptor;
- RBCwi - vapor intrusion into buildings for an occupational receptor; and
- RBCwe - ground water in an excavation for a construction worker or an excavation worker.
- Because the beneficial use of ground water does not include drinking water, the exposure pathways for ground-water ingestion and ingestion and inhalation from tapwater were not considered (*EnviroLogic Resources, 2003b*)

The results of this comparison identified three monitoring wells [MW-44(A), MW-30(A) and MW-40(A)] with exceedances of one or more of the applicable RBCs. The ground-water exceedances were observed in samples from all three monitoring wells for either generic gasoline hydrocarbons, naphthalene, and/or 1,2,4-trimethylbenzene for the RBCwe exposure

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pathway (construction worker/excavation worker pathway). The exceedances are shown on Figure 3. Monitoring well MW-40(A) and MW-44(A) also contain LNAPL.

The relevant DEQ guidance does not present pre-calculated hot spot levels for ground water. The evaluation of hot spots in ground water requires an evaluation of significant adverse effects on the current and reasonably likely future beneficial use of the water and water to which the hazardous substances is likely to migrate. There is no specific beneficial use of water in the area of the proposed redevelopment. Ground water in the vicinity of the proposed redevelopment is likely to migrate to nearby surface water, however the analytical results from monitoring wells in the area of the proposed redevelopment are not representative of ground water discharges to surface water. The evaluation of ground-water hot spots will be completed as part of the RI/FS for the entire Astoria Area-Wide site.

#### **LNAPL**

The determination of LNAPL as a hot spot is based on exceeding the “acceptable risk level.” The acceptable risk level will be determined in the risk assessment, to be completed as part of the RI/FS for the Astoria Area-Wide site. Pending determination of the acceptable risk level, LNAPL will be considered a potential hot spot.

LNAPL has been identified in three monitoring wells in the area of the proposed redevelopment. The three monitoring wells, MW-37(A), MW-40(A), and MW-44(A), the outline of the extent of LNAPL as determined by cone penetrometer/rapid oscillation screening tool work conducted in September 2004, and the thickness of free product measured during quarterly monitoring are shown on Figure 4.

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## **PROPOSED PATHWAY MITIGATION PLANS**

This IRAM includes removal of the two USTs, one of which was used for storing heating oil used as fuel for an office building and the other as a secondary containment for the truck loading rack. As noted above, the two USTs were removed in November 2004. The following sections discuss the mitigation plans for each medium based on the RBC and hot spot evaluation presented in the previous section.

**Soil.** Generic RBC exceedances were identified for the vapor intrusion into buildings pathway (RBCsi). No hot spots were identified based on the Phase 1 and 2 soil analytical results. To mitigate the potential vapor intrusion into buildings pathway the following actions are planned:

- Incorporate vapor barriers into the proposed building design. A sub-slab vent system (screened sections of horizontal piping with manifolds to solid pipe vertical risers) will be incorporated in the vapor barrier design. The vapor barrier system will be installed as part of building construction.
  - Develop and implement a soil management plan for use during site development.
  - Remove soil vapor from beneath foundations via passive wind-driven ventilation equipment. The passive vapor mitigation system will be designed to allow VOC vapors to be removed from the building prior to penetrating the building pad. Discharge of vapors from the system above the roofline of new buildings is considered to be acceptable, because concentrations of VOCs and TPH detected in soil at this area do not exceed the DEQ volatilization to outdoor air RBC (DEQ, 2003).
  - Install a demarcation layer beneath newly paved areas to limit the potential for excavations to be advanced into potentially hydrocarbon-impacted soil.
  - Develop a program for operation and maintenance of the vapor barrier/venting system following redevelopment.
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**Ground Water.** RBC exceedances were identified for a construction worker or an excavation worker exposed to ground water in an excavation. Currently, it is our understanding the proposed redevelopment activities, including utility trenching will not extend to a depth where ground water is present, approximately 7 feet below ground surface. However, a specific evaluation of the proposed utility depths relative to ground-water levels will be performed when final building plans are available. Engineering controls can be utilized if ground water is encountered in an excavation. This may include ventilation or appropriate personal protective equipment identified in the site-specific health and safety plan.

**LNAPL.** The estimated areal extent of LNAPL in the vicinity of the proposed redevelopment is shown on Figure 4. The LNAPL present in this area is relatively thin, weathered, and has a larger gasoline component than LNAPL occurring further north. The planned IRAM will address the potential migration of vapors from the LNAPL plume into the proposed buildings and will consist of placement of vapor barriers under all proposed building slabs and installation of a passive vapor collection and venting system. The determination of LNAPL hot spots will be completed as part of the risk assessment for the Astoria Area-Wide site. Remedial alternatives to address identified LNAPL hot spots will be evaluated as part of the Astoria Area-Wide Feasibility Study.

Recoverability of LNAPL present beneath the Astoria Area-Wide site has not been conclusively determined. Areas where LNAPL thickness in monitoring wells is less than 0.25 feet are not likely amenable to pumping technologies. These thin LNAPL areas will be treated using passive soil vapor ventilation where gasoline is a significant component and the occurrence is under a building foundation. Outside building foundations, absorbent “socks” will be used to collect product that enters monitoring wells. We will continue to consider other free-product recovery options as data from the Astoria Area-Wide site are developed and potential remedies are evaluated.

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## **SUMMARY**

This IRAM consists of decommissioning USTs and placing vapor barriers beneath the proposed buildings to mitigate vapor intrusion into buildings. Passive vapor extraction will also be incorporated into the vapor barrier design. A specific evaluation of proposed utility excavations and depth will also be performed. Demarcation layers beneath paved areas will help to limit the potential for excavations to be advanced into potentially hydrocarbon-impacted soil. If ground water is likely to be encountered in the utility excavations appropriate planning and mitigation will be incorporated into site construction activities. A soil management plan will be developed to guide handling of soil containing hydrocarbons during site preparation and grading. Based on our evaluation, this IRAM will be protective of workers constructing and occupying the new development. This IRAM is intended to be consistent with the final remedy for the entire Astoria Area-Wide site.

Based on DEQ guidance, treatment of soil and LNAPL hot spots is required. A hot spot evaluation and determination will be performed as part of the Astoria Area-Wide risk assessment and remedial alternatives for identified hot spots will be evaluated as part of the Feasibility Study. Accessibility to LNAPL will be maintained to the extent practical during the property redevelopment prior to the completion of the Feasibility Study to facilitate source or hot spot remedial actions, if warranted.

To assist and facilitate the Port's proposed redevelopment, *EnviroLogic Resources* requests that DEQ provide its concurrence and approval of this IRAM Work Plan. We understand that the development plans are draft in nature and revision of the development plans may result in different IRAM requirements. Should any modifications that affect the effectiveness of the measures proposed herein be identified, we will provide DEQ with any new information and seek approval of any amendments to this IRAM.

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If upon your review there are issues that need further clarification please call me at (503)768-5121.

Sincerely,  
*EnviroLogic Resources, Inc.*

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

Attachments:	Figure 1	Site Location
	Figure 2	Site Plan
	Figure 3	Site Development Layout and RBC Exceedance
	Figure 4	Extent and Thickness of Free Product

cc: Distribution list attached

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**ASTORIA AREA-WIDE PETROLEUM SITE  
Distribution List**

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-

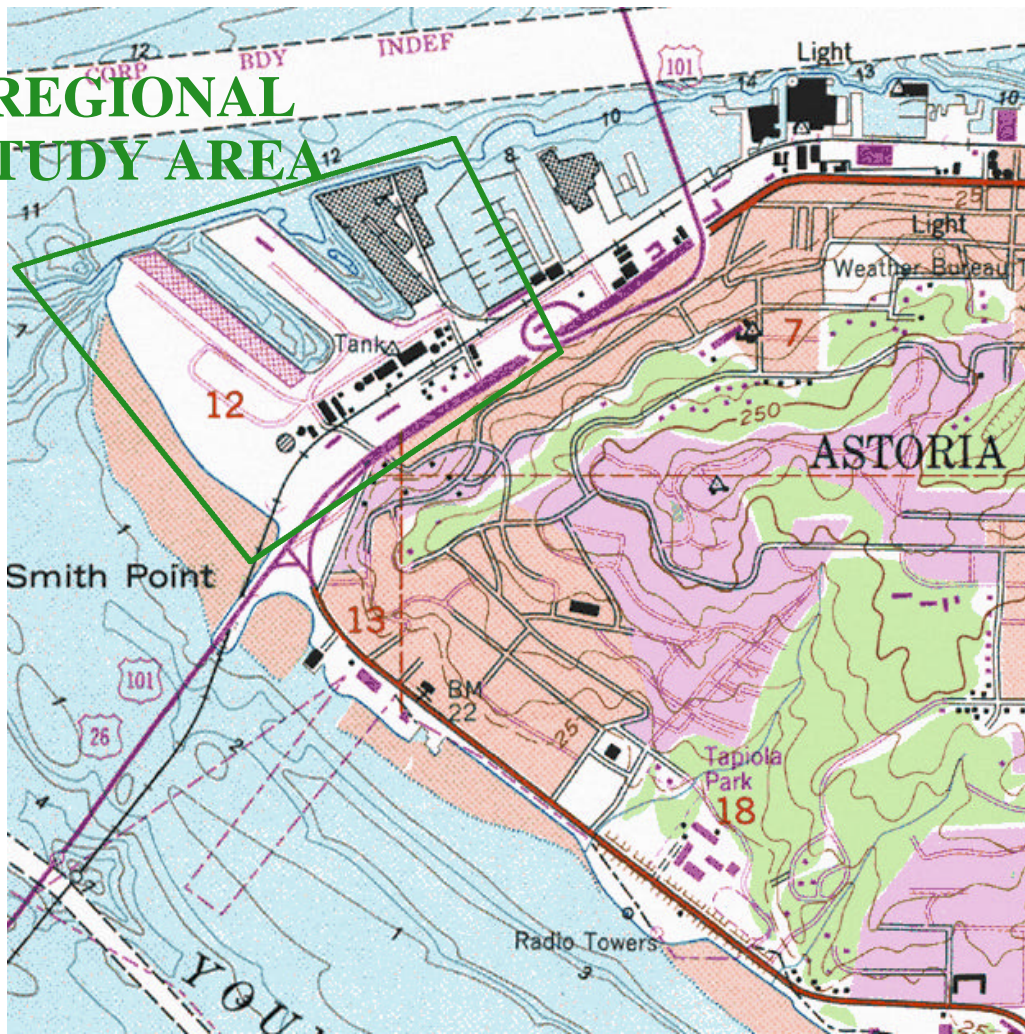
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## **REFERENCES**

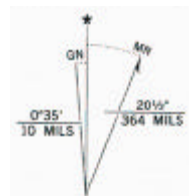
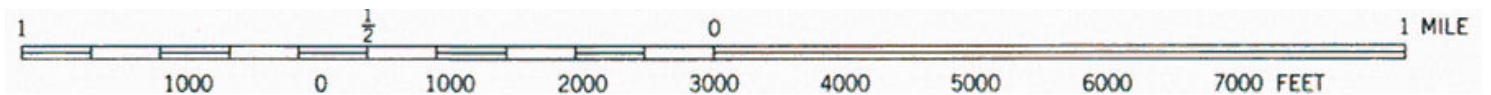
- EnviroLogic Resources, Inc.*, 2002a, RI/FS and IRAM Development Proposal, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon: consultant report dated January 21, 2002.
- EnviroLogic Resources, Inc.*, 2002b, RI/FS and IRAM Development Work Plan, Phase 1, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon: consultant report dated July 15, 2002.
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- EnviroLogic Resources, Inc.*, 2003c, Technical Memorandum, Phase 1, Monitoring Well Installation, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon: consultant report dated April 30 2004.
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- EnviroLogic Resources, Inc.*, 2004a, RI/FS Work Plan Addendum, Slip 2 Hydrocarbon Seep Interim Removal Action Measures, Upland Data Collection Work Plan, Astoria Area-Wide Petroleum Site, Astoria, Oregon: consultant report dated August 5, 2004.
- EnviroLogic Resources, Inc.*, 2004b, Technical Memorandum, Quarterly Ground-Water Monitoring, Third Quarter 2004 – 4th Round, Remedial Investigation/Feasibility Study, Astoria Area-Wide Petroleum Site, Astoria, Oregon: draft consultant report.
- Oregon Department of Environmental Quality, 1998a, Final Guidance for Identification of Hot Spots, Oregon Department of Environmental Quality, Waste Management and Cleanup Division, April 23, 1998
- Oregon Department of Environmental Quality, 1998b, UST cleanup manual, cleanup rules for leaking petroleum UST systems: Oregon Department of Environmental Quality, October 1998.
- Oregon Department of Environmental Quality, 1999a, Risk-based decision making [RBDM] for the remediation of petroleum-contaminated sites: Oregon Department of Environmental Quality, September 1999.
-



# REGIONAL STUDY AREA



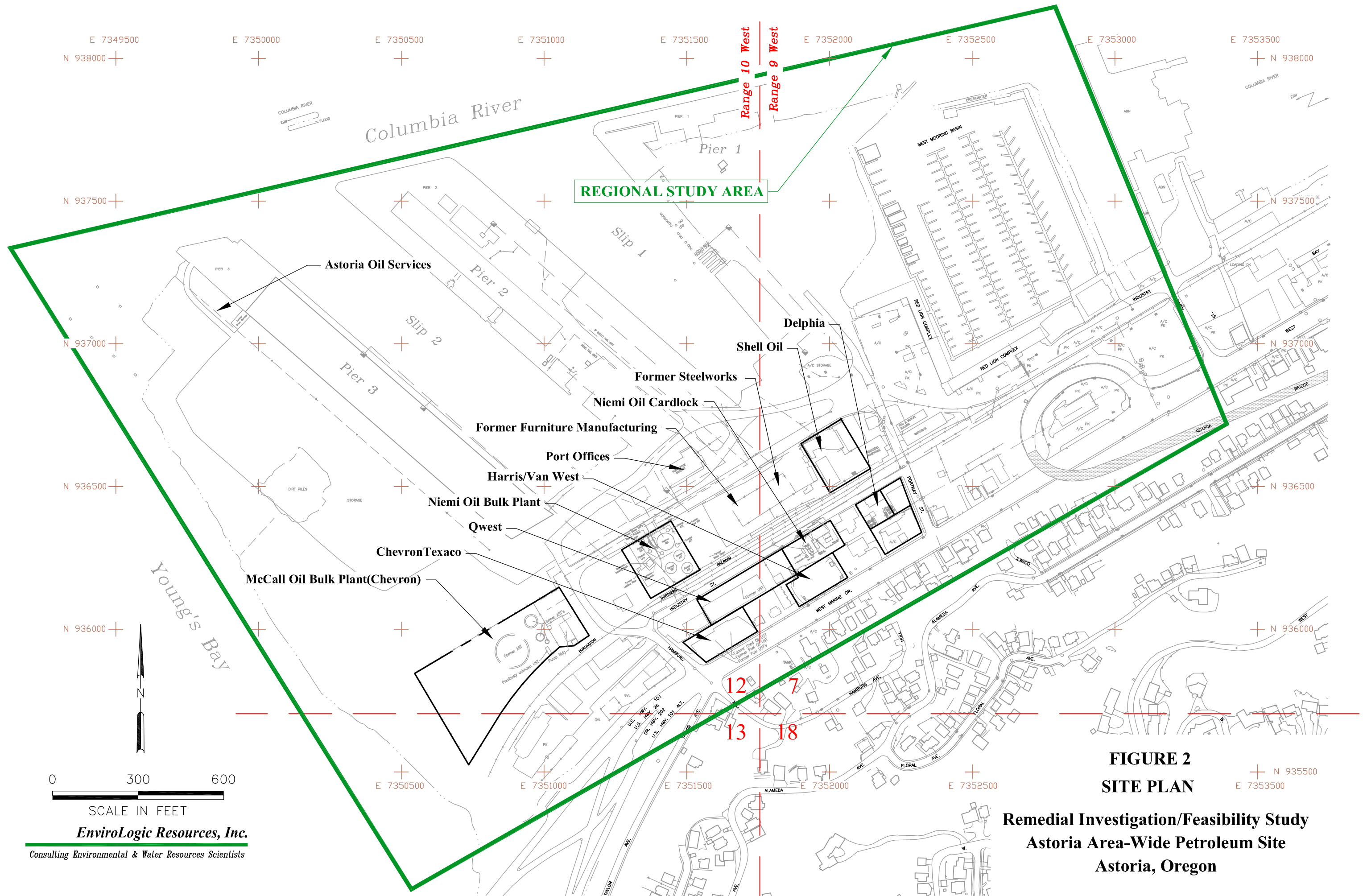
(from USGS, Astoria [1984], OR 7.5' Quadrangles)



### FIGURE 1

## SITE LOCATION

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



**REGIONAL STUDY AREA**

Range 10 West

Range 9 West

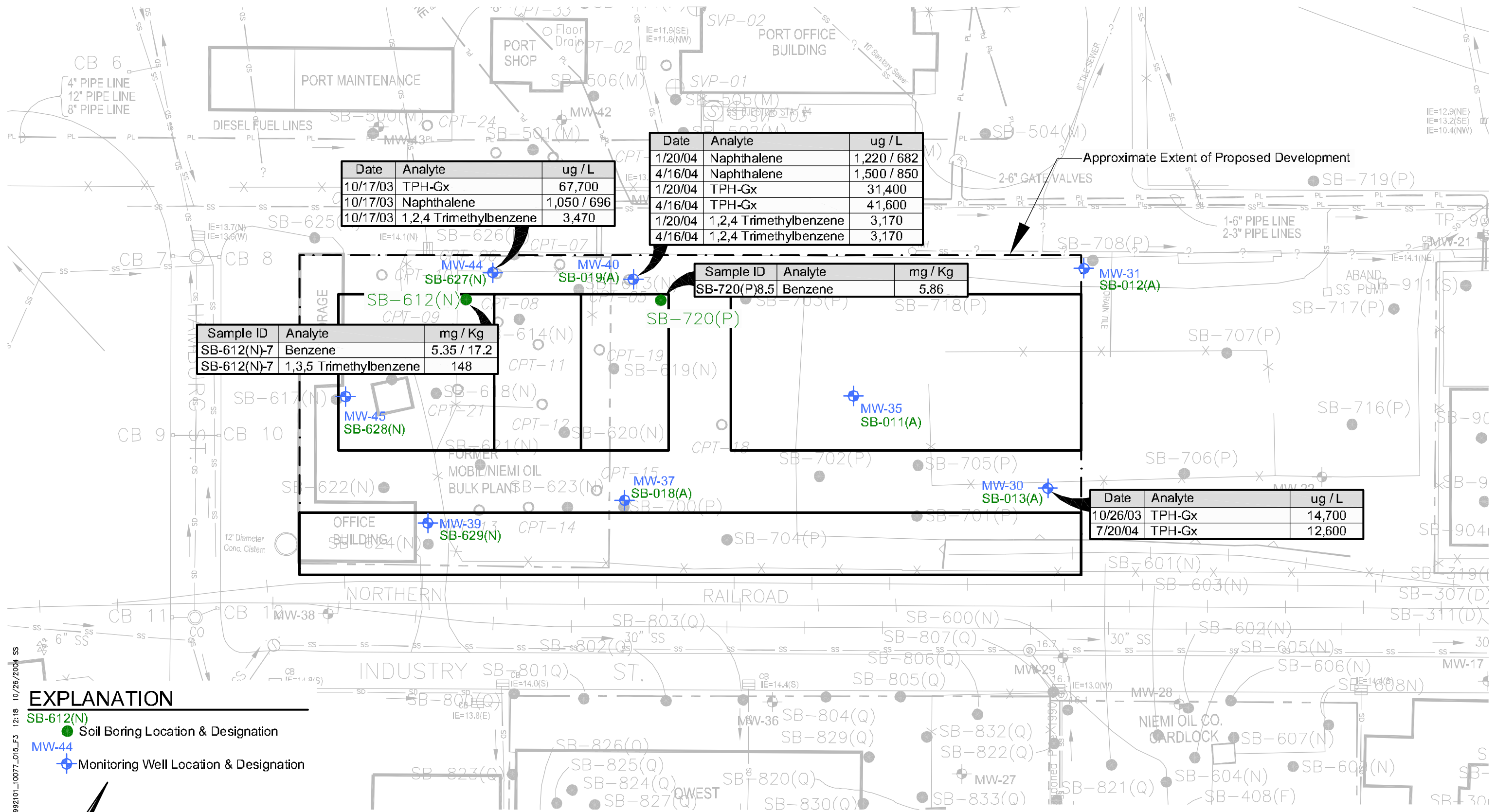
**FIGURE 2  
SITE PLAN**

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

0 300 600  
SCALE IN FEET

**EnviroLogic Resources, Inc.**  
Consulting Environmental & Water Resources Scientists





Date	Analyte	ug / L
10/17/03	TPH-Gx	67,700
10/17/03	Naphthalene	1,050 / 696
10/17/03	1,2,4 Trimethylbenzene	3,470

Date	Analyte	ug / L
1/20/04	Naphthalene	1,220 / 682
4/16/04	Naphthalene	1,500 / 850
1/20/04	TPH-Gx	31,400
4/16/04	TPH-Gx	41,600
1/20/04	1,2,4 Trimethylbenzene	3,170
4/16/04	1,2,4 Trimethylbenzene	3,170

Sample ID	Analyte	mg / Kg
SB-612(N)-7	Benzene	5.35 / 17.2
SB-612(N)-7	1,3,5 Trimethylbenzene	148

Sample ID	Analyte	mg / Kg
SB-720(P)8.5	Benzene	5.86

Date	Analyte	ug / L
10/26/03	TPH-Gx	14,700
7/20/04	TPH-Gx	12,600

**EXPLANATION**

- SB-612(N) Soil Boring Location & Designation
- ⊕ MW-44 Monitoring Well Location & Designation

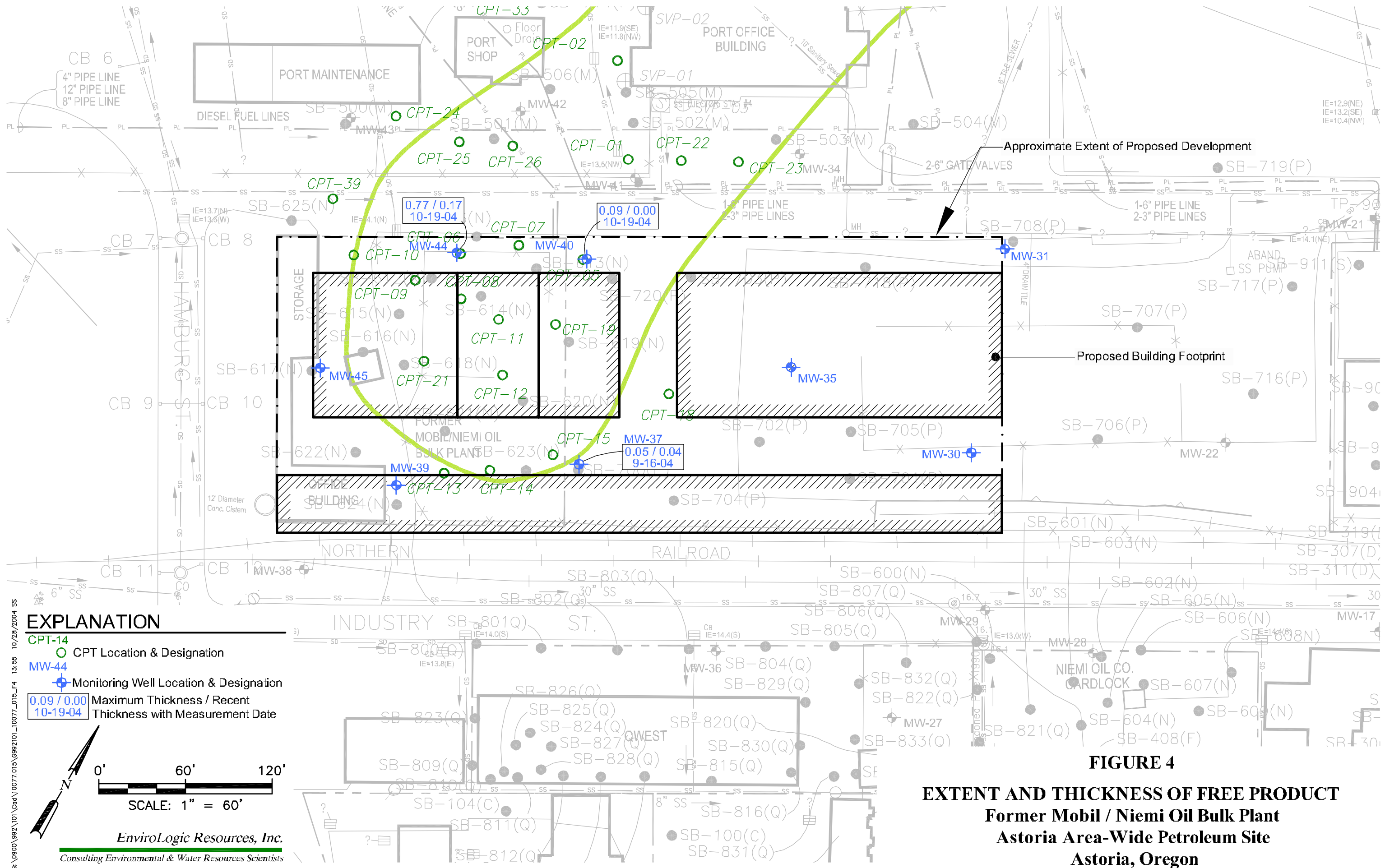
RBC Si	
Analyte	RBC Value
Benzene	1.2 mg / Kg
1,3,5 Trimethylbenzene	140 mg / Kg

RBC We	
Analyte	RBC Value
Generic Gasoline\	12,000 ug / L
Naphthalene	680 ug / L
1,2,4 Trimethylbenzene	1,300 ug / L

**FIGURE 3**  
**SITE DEVELOPMENT LAYOUT & RBC EXCEEDENCE**  
**Former Mobil / Niemi Oil Bulk Plant**  
**Astoria Area-Wide Petroleum Site**  
**Astoria, Oregon**

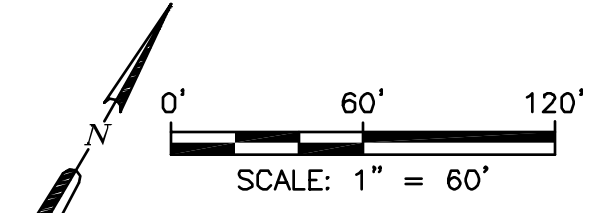
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**EXPLANATION**

- CPT-14 CPT Location & Designation
- ⊕ MW-44 Monitoring Well Location & Designation
- 0.09 / 0.00  
10-19-04 Maximum Thickness / Recent Thickness with Measurement Date



**EnviroLogic Resources, Inc.**  
 Consulting Environmental & Water Resources Scientists

**FIGURE 4**

**EXTENT AND THICKNESS OF FREE PRODUCT  
 Former Mobil / Niemi Oil Bulk Plant  
 Astoria Area-Wide Petroleum Site  
 Astoria, Oregon**

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