

June 17, 2008

Anna Coates, R.G.
Project Manager/Hydrogeologist
Cleanup and Emergency Response
DEQ NWR
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

VIA Hand Delivery

Re: DEQ Review Comments
Draft Remedial Investigation Report
RI/FS and IRAM Development
Astoria Area-Wide Petroleum Site
Astoria, Oregon
DEQ ECSI File #2277

Dear Ms. Coates:

This letter provides responses to comments made by DEQ in its review of the Draft Remedial Investigation Report for the Astoria Area-Wide Petroleum Site in Astoria, Oregon. Often, you will be referred to changes made and reflected in the Final RI Report that is being submitted with this letter. The following presents the DEQ Comment in italics followed by the PRP Group response.

GENERAL COMMENTS

Hydrogeologic Conceptual Site Model

DEQ Comment: A more detailed site-specific hydrogeologic conceptual site model is needed to tie together sections 4.1.1 vadose zone, 4.1.2 shallow water-bearing zone, 4.1.3 groundwater quality parameters, 4.1.4 hydraulic gradient, and 4.1.5 aquifer parameters. The model should include a description of precipitation, infiltration, stormwater runoff, shallow groundwater flow, and groundwater discharge to surface water and sediments.

Figures showing the locations of Light Non-Aqueous Phase Liquid (LNAPL) and the dissolved plumes with the potentiometric surfaces plotted are needed to present the overall picture. An accurate model of the site groundwater, surface water, and tidal influences will be important for preparing the feasibility study (FS).

Response: Text and figures have been revised in the Final RI Report. In particular, additional figures and text are added to Section 4.0. The estimated extent of LNAPL has been included on the potentiometric figures.



Zoning, Land Use, and Conceptual Site Model

DEQ Comment: It appears that the human health risk assessment considered urban residential uses only for the area within 50 feet of the former apartment building. DEQ understands that the site is predominately commercial and industrial. However, residential condominiums are increasingly common in Astoria, and the site zoning does not preclude conditional residential land uses. Please consider a potentially complete urban residential pathway for all areas of the site outside of the Port of Astoria's property boundaries.

DEQ understands that the Port of Astoria's Charter prohibits residential land uses. Please provide a Charter boundary map, summarize the terms of the Charter, and include a copy as an appendix. This information will allow DEQ to effectively respond to long term future public inquiries.

Response: A copy of a portion of the Port of Astoria's Charter was made available and reviewed. This portion of the charter does not address land use. The reported prohibition of residential land use appears to be a Port policy given its mission to be an economic development engine. Although local zoning does not explicitly prohibit residential structures, given current and historical land use and recent developmental trends, it is unlikely that new residences will be developed at the Port of Astoria in the foreseeable future. Several properties at the Astoria Area-Wide site have been redeveloped in the past few years, and all of the new developments support commercial and industrial operations. New large-scale commercial developments include: Englund Marine and Industrial Supply Co (85 Hamburg Ave), Bornstein Seafoods, Inc. (9 Portway St.), Riverland Company LLC Business Park (at former ExxonMobil/Niemi Oil Bulk Plant and extending northeast onto Port property). The Bergeson property has also been completely redeveloped, portions of Portway Street renamed to Gateway Avenue, and Youngs Bay Texaco converted from a service station to a restaurant and seafood market. The Bergeson redevelopment included removal of the old warehouse and office and construction of a 3-story office building, garage, and shop. As noted in the draft report, the apartment complex on West Marine Drive has been demolished. At the time of an April 24, 2008, site visit the former apartment complex property was vacant with no signs of redevelopment underway.

At the request of DEQ, soil and ground-water data are compared to DEQ RBCs for urban residents in Section 5.5 of the HHRA (Appendix G). However, because the urban residential exposure scenario is not considered reasonably likely in the foreseeable future, the text of the HHRA remains focused on evaluating potential risks to various workers. The CSM has been updated to reflect that urban residential structures are no longer present at the Astoria Area-Wide site, and are unlikely to be developed in the foreseeable future.

At the January 10, 2008, meeting, it was agreed that a copy of the Ports charter would be included as an appendix and those lands owned by the Port be specifically noted on a figure. Based on the review of the charter provided to *EnviroLogic Resources* by the Port including a copy of the charter now appears to not be justified. In addition, zoning appears to be the



key indicator of land use rather than ownership therefore, no figures were revised for this issue.

LNAPL

DEQ Comment: The presence of LNAPL has a substantial effect on risk characterization. To best present this information, LNAPL should be discussed before comparing "maximum" contaminant concentrations to DEQ Risk-Based Concentrations. Where LNAPL is present it should be assumed that petroleum is present at limits of saturation, which will vary depending on soil type, as opposed to maximum reported concentrations in soil. The same comment applies to groundwater. The highest concentrations in LNAPL areas should be solubility levels for the product present. Basing the LNAPL risk evaluation on RBC screening alone does not constitute a complete evaluation and may underestimate risk. The CPT/ROST borings shown in cross-section (Figures 6-114 and 6-115) are very useful in understanding the extent of LNAPL at the site. The site stratigraphy should be added to the cross-sections. Include an area-wide base map showing LNAPL and dissolved plumes in relation to surface and historical features and the AOCs.

Response: Text in Section 6.0 has been revised to discuss LNAPL before presenting the soil and/or ground-water concentrations. Section 6.0 discussions now identify if maximum concentrations are within an LNAPL area.

No concentrations were compared to DEQ Risk Based Concentrations in Section 6.0. The comment "Where LNAPL is present it should be assumed that petroleum is present at limits of saturation...." will be taken into consideration but has no impact on this presentation of the work. The locations where LNAPL is present are considered preliminary "hot spots".

Site stratigraphy has been added to the CPT/ROST[®] cross sections. Figure 6-1 has been revised to show LNAPL, dissolved plumes, and the four main AOCs. The addition of historical features to these figures makes them difficult to read so they were not added. Sections 1.0 and 5.0 figures can be referred to for historical features.

Preferential Flow Paths

DEQ Comment: Preferential contaminant migration pathways are organized by potential source areas in Section 5.0. Please provide a figure that summarizes all of the preferential flow paths identified for the site.

Response:

As agreed in the January 10, 2008, meeting Figure 2-4 has been revised to include petroleum distribution pipelines and underground utility water lines.



Absorbent Boom

DEQ Comment: DEQ wishes to clarify that the Slip 2 IRAM is not an acceptable final remedy. Although it appears to contain the visible sheen, the majority of the contamination likely evaporates and dissipates into the river. This release has been ongoing for many years and will not improve without more active control measures within the bank. An aggressive Interim Remedial Action Measure (IRAM) is needed concurrent with the feasibility study to understand and control the release of LNAPL and dissolved contamination directly to the river.

Response: The PRP group understands that the Slip 2 IRAM is not an acceptable final remedy and as agreed, a more aggressive interim remedial action (enhanced absorbent boom) has already been installed.

Human Health Risk Assessment

DEQ Comments: A single conclusion should be presented for the human health risk assessment. There are inconsistencies in the MFA and Geosyntec reports. One example is the attenuation factor calculation methods (see Section comment for section 6.5.1.3, Soil Gas RBCs). It is unclear what baseline risk assumptions are used, i.e., no additional occupied buildings constructed on the site, no excavation in areas with NAPL, etc.

The assessment of potential vapor intrusion risks for the Port of Astoria office building was performed in a tiered manner. To evaluate potential vapor intrusion risks for the office building, soil gas samples were initially collected just outside of the building. Based on the initial results from soil gas samples collected outside of the building, another investigation was performed to better characterize potential vapor intrusion risks by sampling soil gas beneath the office building. Risk estimates based on both of these soil gas investigations are now collectively summarized in Section 5.4 of the HHRA (Appendix G).

Several relatively minor differences in the inputs used to estimate soil gas RBCs for samples collected outside of the building, and sub-slab vapor RBCs, have been standardized. For example, the RBCs for samples collected outside of the building were initially calculated using USEPA default assumptions regarding soil properties, while the sub-slab soil vapor RBCs were calculated using DEQ default assumptions. DEQ default assumptions regarding soil properties are now used in calculation of RBCs for both samples outside of the building and those collected beneath the building. Also, the dimensions of the Port of Astoria office building have been standardized as follows: length is 100 feet, width is 53 feet, and height of first floor ceiling is 10.5 feet. These refinements do not significantly change risk estimates.

The vapor intrusion risk conclusions for the area near the Port of Astoria office building has been clarified in Section 5.7 of the HHRA (Appendix G). It is assumed that petroleum-



related volatile chemicals in the portion of AOC 4 with LNAPL in the subsurface could pose unacceptable vapor intrusion risks for a future building. As a result, the Feasibility Study (FS) for this portion of the Site will evaluate risk management options for potential future buildings. The only building now present in this area is the Port of Astoria office building. Based on the sub-slab soil vapor results (Appendix H), the concentrations of volatile petroleum-related chemicals in soil vapor beneath the building are unlikely to pose unacceptable vapor intrusion risks to workers in this building. The Port office building HVAC system was upgraded in 2005 to maintain a positive pressure inside the building during work hours. The purpose of maintaining a positive pressure is to limit the potential for soil vapors to migrate through the foundation and enter the breathing zone of the workers inside the building. With the upgrade, 500 cubic feet per minute (cfm) of air now flows through the HVAC system inside the Port office. Five new programmable thermostats were installed during this upgrade. During non-working hours the system is off. The implementation of this IRAM is documented in an October 25, 2005, letter to DEQ.

SECTION COMMENTS

Section 1.4 Site Background

DEQ Comment: The Locality of Facility is identified in this section, but is not clearly annotated as such on Figure 1-2, Regional Study Area and Astoria Area-Wide Site.

Response: Locality of Facility is now identified on Figure 1-2.

Section 1.5.1 General Astoria Area-Wide Site History

DEQ Comment: A more detailed description of recent development and current land use is needed. Include a figure of the new buildings in relation to the NAPL plume.

Response: Some text was added to Section 1.5.1 and a new figure (1-6) has been added to present recent land development changes. A more detailed discussion of current land use is included in Section 9.1. Also added to Section 9.0 is Figure 9-2, which shows recent development changes in relation to the LNAPL.

Section 1.6.1 Previous Investigations

DEQ Comment: There has been additional site investigation and UST work conducted at the former Val's Texaco as documented in the August 2006 underground storage tank (UST) Closure Report. Please include a paragraph summarizing this work.





Response: The August 2006 UST work is not considered a “previous investigation” and is discussed in section 7.1.10. We have added a sentence to 1.6.1 to refer to that section. Text in section 7.1.10 has been revised to include more details.

Section 2.3.1 Phase 1 Ground-Water Investigation

DEQ Comment: Add a figure that shows the locations of the three primary areas of impacted groundwater referenced. Show the LNAPL and the dissolved plumes.

Response: The three primary areas of impacted ground water were based on one-time reconnaissance samples. Quarterly ground-water monitoring data and CPT-ROST[®] data are considered a better indicator of water quality and LNAPL presence therefore, we would prefer to not include a figure that presents “preliminary” information when better information is available. Additional text has been added to Section 2.3.1 to reflect this. The LNAPL and dissolved plumes based on quarterly monitoring data are included on Figure 6-1.

Section 3.0 Physical Characteristics of the Study Area

DEQ Comment: The reference to “EnviroLogic Resources” at the bottom of the page 3-1 should be “2003d”. The same comment applies to the reference at the top of page 3-4. A citation for “2003c” is not included in the reference section.

Response: The references have been corrected. The correct reference is “2003b”

Section 3.5 Regional Hydrogeology

DEQ Comment: Regional horizontal and vertical gradients should be described in this section.

Response: Section 3.5 has been revised to clarify that no regional horizontal or vertical gradient information was developed during the RI process.

Section 4.1 Site Hydrostratigraphy

DEQ Comments: A site-specific cross-section that incorporates the soil and groundwater investigation data and the CPT/ROST data should be included. Site-specific stratigraphy, NAPL smear zones, tidal fluctuations, groundwater/surface water interactions, and impacted sediments should be portrayed in cross-section. At least one cross-section should extend through Slip 2 and into the Columbia River (similar to Figure 4-1 but based on site-specific data).



Response: Several additional cross sections have been included in Section 4 and Section 6. The nature and extent of petroleum hydrocarbons are discussed in Section 6.0.

Section 4.1.2 Shallow Water-Bearing Zone

DEQ Comments:

1. *The vertical extent of site impacts should be described in terms of the Locality of Facility.*

Response: Additional text was added to Section 4.1.2 to describe the vertical extent of site impacts in terms of the Locality of Facility.

2. *Provide site-specific geologic cross-section depicting the dredge sand fill and the silt and clay lenses that reportedly have an important role on contaminant and LNAPL distribution in the shallow aquifer zone.*

Response: An additional cross section depicting specific site lithology has been added as Figure 4-4. LNAPL distribution is presented in Section 6.

3. *Describe the size of the lenses. Describe the vertical distribution of the LNAPL and the smear zone in the shallow aquifer.*

Response: Additional text was added to Section 4.1.2.

4. *Provide site-specific cross-sections with chemistry data to support the statement that the native alluvial deposits and the Astoria Formation have not been affected by petroleum hydrocarbons.*

Response: Site specific cross-sections have been added in Section 6.0, with CPT-ROST[®] data to support that the alluvial deposits and Astoria Formation have not been impacted. There are no specific analytical data from the alluvial deposits or Astoria Formation since these formations are deeper than the zone of petroleum hydrocarbon impacts, the top of the ground-water table lies above these formations, and the site is impacted by LNAPL which by definition is lighter than water.

Section 4.1.3 Ground-water Quality Parameters

DEQ Comment: Add a paragraph explaining that site groundwater is predominately fresh water and that salt water intrusion is not a significant factor at the site.



Response: Additional text has been added to 4.1.3 to discuss salt-water intrusion. The text is limited to saying that currently salt water intrusion has not been identified as a significant factor. Review of additional information about salt water intrusion into the Columbia River estuary indicates that if ground-water pumping was to occur at the Astoria Area-Wide site, salt water intrusion may become a factor.

Section 4.1.4 Hydraulic Gradient

DEQ Comments: Please explain the significance of the April and July 2004 groundwater contours presented on Figures 4-7 and 4-8. Are they typical of spring season and summer season? Do they represent typical recharge conditions and discharge conditions? Depictions of fall and winter groundwater contours should be included and described in the report.

Response: Fall and winter ground-water contours have been included. There was no particular significance to the April and July data. In general, the data from all four events are consistent in terms of ground-water flow direction.

DEQ Comments: Figures 4-7 and 4-8 indicate a northwest to northeast shallow groundwater flow direction rather than a north to northwest gradient as reported. Vertical gradients should also be presented using site-specific data.

Response: The gradient is north to northwest, the north arrow on the figure is not oriented toward the top of the page. There is no specific vertical gradient information available.

DEQ Comments: The tidal influence on water levels warrants a separate section in the report and a more detailed explanation of Figures 4-9 and 4-10, Tidal Dampening Graphs. The units for the vertical axes on the right side of the figures need to be included. Describe the baseline water level fluctuations.

Response: The tidal influence on water levels appears to not be as significant in magnitude as prior work indicates. Exploration attempts in the very near shore area have been unsuccessful. Hypothetical low and high tide scenarios, based on visual observations and local hydraulic gradients, for the influence of tidal stage on water levels and LNAPL are presented on Figure 4-14.

Additional text has been added to explain Figures 4-15 and 4-16.



DEQ Comment: The characteristics of the plume/river interface are not adequately described.

Response: Additional text has been added to Section 4.1.4. Mostly, this text describes visual observations. No quantitative information about the seep/river interface was developed during the remedial investigation process.

Section 4.1.5 Aquifer Parameters and Table 4-3

DEQ Comments: The transmissivity values derived by Hahn and Associates in February 1995 should be in the same units as those used to describe the more recent tests. The transmissivity value of 3000 gpd/ft should be converted to 400 ft²/day for comparison to values in Table 4-3, which range from 450 to 14,000 ft²/day.

Explain the implications of the aquifer parameters. An aquifer thickness of 45 feet was assumed for the area. Explain the basis for the thickness (lithology, the depth of tidal influence, or the depth of contamination). What effect do tides have on the fate and transport of the NAPL or of the dissolved plume? Use the data collected to estimate the rate of LNAPL flux and the rate of contaminated groundwater flux into the river.

Response: Text in Section 4.1.5 has been revised and transmissivity values in Table 4-3 have been converted. The transmissivity values are now in consistent units. The implication of the measured aquifer parameters is that there is significant local variability. Any remedial design should include determining specific aquifer parameters in the area of interest. The basis for the aquifer thickness is the depth to the bottom of the alluvium/top of the Astoria Formation, which is based on site-specific drilling information.

Section 5.1.4 Former Chevron/McCall Petroleum Distribution and Figure 5-4, Potential Sources, Petroleum Distribution Pipelines.

DEQ Comment: All the site pipelines should be discussed rather than just the Chevron/McCall pipelines.

Response: Other petroleum distribution pipelines are discussed under each associated facility in Section 5. Chevron/McCall pipelines were called out individually since they are a documented source. No text or figures were modified in response to this comment.

DEQ Comment: Explain that all fuel lines were evaluated as part of the RI and Explain how the pipelines to the west of the Port Maintenance building were evaluated.

Response: Not all pipelines were evaluated as part of this RI as some evaluation was conducted historically and pipelines extending out Pier 2 were not evaluated as photos show



these pipelines are suspended from the pier framework (not located in subsurface soils). In any case, the extent of evaluation and how the pipelines were evaluated was presented in one or more work plans (see Section 1.6.2) that DEQ approved. Results of RI characterization (including locations of relevant borings) are presented in Section 6. No text or figures were modified in response to this comment.

DEQ Comment: Include figures showing the relevant borings.

Response: Relevant borings and/or test pits are included in Section 6 that is organized by AOC, not by potential source. Figure 1-8 identifies Petroleum Distribution Lines, Figure 2-1, 2-2, and 2-3 show all RI explorations. Historical relevant borings are included in Figure 1-7. In response to this comment, Figures 1-7, 2-1, 2-2, and 2-3 were revised to show petroleum distribution lines in the background so relevant explorations in relationship to petroleum distribution lines are more easily identified.

Section 5.1.5 Niemi Oil Cardlock

DEQ Comment:

1. *At the time of the Harris/VanWest release and investigation, DEQ observed some petroleum staining in the bermed areas around the above ground storage tanks (ASTs) at the Niemi Cardlock site.*

Response: So noted. Thank you for the information. No text or figures were modified in response to this comment.

DEQ Comment:

2. *This area was reportedly a former junk yard. Please add a paragraph describing the results of test for junk yard constituents other than petroleum hydrocarbons constituents (PCBs, metals, phthalates).*

Response: DEQ approved a work plan that did not specifically include analysis for junk yard constituents, therefore junk yard constituent analyses are not available. All analyses are discussed in Section 6. No text was revised for this comment. A brief review of available analytical data is summarized below.

Lead analysis was conducted on select soil samples from the Niemi Oil Cardlock site. No PCB or phthalates analyses were conducted on soils from the Niemi Oil Carlock site. No elevated lead was detected such that it was identified as a concern in soil. The results of those analyses are included in Phase I Soil Technical Memorandum and the Phase II Soil Technical Memorandum.



Select ground-water samples from the Niemi Oil Cardlock site were analyzed for total metals and dissolved metals. Although elevated total chromium was detected in ground water sampled from MW-28(A) (12.8 µg/L), dissolved chromium was not detected (1U). Similarly elevated total chromium was identified in ground water from two other monitoring wells on the Astoria Area-Wide site (MW-1(F) and MW-10(M)) while dissolved chromium was not detected. Total chromium in ground-water samples collected from monitoring wells at the Niemi Oil Cardlock site was not identified as a constituent of potential concern in ground water. No specific source for the elevated total chromium in MW-28(A), MW-1(F), and MW-10(M) was identified.

Section 5.2 Areas of Concern

DEQ Comment:

Figures 5-11 and 6-1 are identical and are directly adjacent to each other in the report. Please delete one figure.

Response: Figure 6-1 has been changed to provide an overview of the Areas of Concern, where LNAPL is located, and the main areas of impacted ground water.

Section 6.1.1 Soil TPH

DEQ Comment:

- 1. The lack of elevated detections of gasoline in surface soil at the Niemi Oil Cardlock, where significant subsurface gasoline contamination was noted, does not necessarily mean there is not a surface source. Historic surface gasoline releases may be masked due to degradation/volatilization of volatile fractions through e.g., photolysis (see section 8.1.1.6, Photolysis) and/or fill placement following a release.*

Response: The report is not trying to imply there is no source, just that the characterization performed did not specifically identify it or it is not well defined. No text or figures were revised in response to this comment.

DEQ Comment:

- 2. The storm line that conveyed contamination from the vicinity of the Harris/VanWest property is identified as a source area for gasoline contamination observed at the Niemi Oil Cardlock facility. However, it should be noted that similarly elevated gasoline concentrations are not observed along other portions of the storm drain line between the two facilities.*

Response: The text in section 6.1.1 has been revised to help clarify the distinction between the north-south trending storm sewer line (this line was a lateral at the time of the 1990



release and now there is a main line in this location) and the storm sewer main line (now abandoned in the area between these two facilities) that was located between the northern former Harris/VanWest property line and the Niemi Oil Cardlock property. The text was trying to say that elevated gasoline concentrations were observed along other portions of the north-south trending sewer line.

Section 6.1.2 Ground Water

DEQ Comment: At the top of page 6-6 it should state "...similar in magnitude to October 2003 concentrations..." instead of 2004.

Response: The text has been corrected.

Section 6.1.3 LNAPL

DEQ Comment: This section should reference Figure 1-6 (not 1-5). Test pit locations should be shown on Figure 1-6, Historical Soil Boring Locations.

Response: The text has been revised to refer to Figure 1-9. Figure 1-9 shows the test pits referred to in this section. Test pit locations were not added to Figure 1-6 because this figure already contains a significant amount of information. In addition, explorations included on Figure 1-7 were limited to those with verifiable analytical results.

Section 6.2.3 LNAPL

DEQ Comments:

- 1. The inferred extent of LNAPL in the vicinity of Delphia Oil (AOC 2) is smaller than might be expected based on the data.*

Response: As agreed in the January 10, 2008, meeting with DEQ, the extent of LNAPL at the former Delphia bulk plant property has been revised.

DEQ Comments:

- 2. The horizontal and vertical extent of the NAPL smear zone in AOC2 should be described. One or more site-specific hydrogeologic cross-sections are needed to set the stage for the feasibility study.*

Response: Data comparable to the CPT/ROST® data were not developed in AOC 2. However, we would expect the smear zone thickness to be similar to other areas where more detailed information was developed because the change in water table elevation over the



seasons is of the same magnitude in AOC 2 as in AOC 4. A cross section is now included on Figure 4-5.

Section 6.2.6 Air

DEQ Comments: Subsurface NAPL could have vapor intrusion implications that should be discussed. As discussed in the general comments, it should be assumed that petroleum concentrations in soil equal the saturation limit, and equal the solubility limit for groundwater concentrations.

Response: Text in section 6.2.6 has been revised to address this concern.

Section 6.4.1 Soil

DEQ Comments: The text refers to the former Exxon Mobil/Niemi Oil bulk plant and Portway on Figure 6-81. Please reference the figure and label those features on the figure to assist the reader.

Response: The text has been revised to be consistent with the AOC concept and now refers to an area of the AOC, not a specific facility. In addition some facility names were added to figures.

Section 6.4.2 Ground Water

DEQ Comments: Add a discussion of the discharge of contaminated groundwater and free product to the river. This is a significant Hot Spot that will need to be addressed in the FS.

Response: Discussion of ground-water discharge to surface water was added to Section 4.0. This included some discussion of LNAPL discharge to surface water. LNAPL discharge is discussed in Section 6.4.3. The PRP group acknowledges this is a preliminary hot spot that will need to be addressed in the feasibility study.

Section 6.4.2 Ground Water

DEQ Comments: Little quantitative groundwater data were collected in the central portion of AOC 4. Samples were not collected and tested due to the presence of free product. The LNAPL evaluation only addresses types of TPH ascertained through product analysis (i.e., no BTEX, PAHs, etc.). Describe how constituents in the LNAPL are going to be addressed in the feasibility study.



Response: A discussion of how LNAPL constituents are to be addressed will be presented in the feasibility study in the context of individual remedial alternatives.

Section 6.4.3 LNAPL

DEQ Comment: The first paragraph says that the product at wells 37(A) and 40(A) are similar. The last sentence says that free product at 37(A) is markedly different than other wells in AOC4. Please clarify.

Response: Text in Section 6.4.3 has been revised to clarify that the nature of the LNAPL in MW-37(A) is different from the LNAPL in MW-40(A).

Section 6.4.5 Sediment June 2003 Sampling

DEQ Comments: Conclusions regarding contaminant distribution and the effectiveness of the containment boom are based on limited 2003 sampling data (i.e., concentrations inside the boom verses outside the boom). The data collected in January 2006 do not show such a clear distinction. The discussion of the distribution of contamination with respect to the containment boom should be based on all sediment data, not just the 2003 data.

Response: The text in this section has been revised to exclude discussion of effectiveness of IRAMs. The text has also been revised to discuss results of all sampling together and to clarify analytical results.

DEQ Comment: Since sediment sampling was not conducted prior to placement of the boom, the distribution of contaminants cannot be conclusively attributed to the effectiveness of the boom, but rather may be a result of distance from the petroleum seep.

Response: The PRP group acknowledges that sediment sampling does not evaluate post and pre-boom contaminant distribution.

Section 6.4.7 Soil Vapor

DEQ Comment:

- 1. This section should reference Tables D-34 to D-37 (not D-33 to D-37).*

Response: The text has been corrected.

DEQ Comment:



2. *The statement that “none of the monitoring locations contained methane at elevated concentrations” is incorrect. Readings listed for CH4-07 and CH4-15 on Table D-38 are above the 1.25% methane by volume action limit for methane.*

Response: The text has been corrected.

Section 7.0 IRAMS Undertaken as Part of the RI

DEQ Comments: By definition, an evaluation of the five balancing factors listed in DEQ rules for selecting a remedy is not required for approval of an IRAM. This section implies that DEQ selected the IRAMs based on a formal evaluation of these factors, and that is not the case.

Response: It was not the intent to imply that DEQ selected IRAMs based on a formal evaluation of the five balancing factors. However, the PRP Group did consider these factors in making recommendations for IRAMs that have been implemented since 2002 under the PRP Group direction.

Section 7.1.3 Storm Sewer Reroute-AOC 4

DEQ Comment: The section should reference Figure 2-4, not Figure 2-3.

Response: The text has been corrected.

Section 7.1.6 UST Removal - AOC 4

DEQ Comments: The regulatory status of (non-heating oil) USTs is determined based on the age of the tank. USTs in use prior to 1974 are exempt from registration unless they contain pumpable fluids. Tanks installed after 1974 and/or containing pumpable fluids should be registered. Please describe the results of the confirmation samples taken beneath the tanks.

Response: The discussion in Section 7.1.6 has been revised. Sample locations are now included in Section 6 – AOC4 figures.

Section 7.1.8 Soil and Pipeline Removal - AOC 2

DEQ Comment: The report documenting the work described should be referenced.

Response: There was no separate work documenting this work. The sampling results are included in this report.



Section 8.3.2 Polycyclic Aromatic Hydrocarbons

DEQ Comments: While it is true that PAHs adsorb to organic carbon and have limited migration in soil and groundwater matrices through advection or diffusion, physical mass transport of PAH-impacted soil particulates is possible for surface soil and sediment through storm water runoff and fluvial transport.

Response: The text has been revised to note this.

Section 9.1 Land Use Determination

DEQ Comments: A number of properties are zoned C-3, which does not preclude residential use, including child day care. The conclusion in this section implies residential use is not reasonably likely. Please clarify.

Response: Additional text has been added to Section 9.1. Recent development trends are toward commercial/industrial development. It is not reasonably likely that residential development will occur in the commercial/industrial area. Urban residential or mixed use development is potentially reasonably likely along West Marine Drive.

Section 10.3.3 Surface Sediment and Surface Water

DEQ Comment: Sample results show that several PAHs with relatively high molecular weights are present in impacted sediments. Remove the word "likely" in the last paragraph of page 10-7.

Response: The text has been changed.

Section 11.2.1 AOC2

DEQ Comment: Benzene impacted soil within 10 feet of the drain line, and not just directly on the line, is of concern during building construction per RBDM guidance.

Response: (Section 11.2.1 is for AOC 1 not AOC 2) The PRP group acknowledges that soil within 10 feet of the drain line could be of concern. The report notes that development is unlikely to occur over the combined storm sewer line. If redevelopment were to occur more site specific information would be required to identify the relationship of the proposed building location to benzene-impacted soils.

Section 11.3 Hot Spots

DEQ Comments: All areas with NAPL are likely soil and groundwater Hot Spots. Evaluate saturation concentrations, not just measured concentrations from samples. Add a Section 11.3.4, Surface Water Hot Spots, and describe the active release of free product to the river.

Response: The PRP group acknowledges that all NAPL areas are likely Hot Spots no matter the measured concentration in nearby media. The use of saturation concentrations versus measured concentrations will be addressed in the Feasibility Study. A description of the active release of LNAPL to the river is now discussed in Section 4. Concentrations in surface water samples were reviewed and a surface water hot spot was not identified. The release to surface water is a LNAPL hot spot. Some text was revised under 11.3 but a Section 11.3.4 was not added.

Section 12.2 Preliminary Level II Screening Ecological Risk Assessment

DEQ Comment: The conclusion regarding the extent of contamination is based on the 2003 data, which is not necessarily supported by the 2006 data.

Response: The 2003 and 2006 data do support each other. Text in Section 6.4.5 and Section 12.3.2.2 has been revised so the data summary is clarified.

Section 13 Conclusions

DEQ Comment: The report conclusions should include the next steps and the proposed approach, i.e. the feasibility study, individual site cleanups, an IRAM to stop the petroleum seep, etc. Please add this information.

Response: As agreed in the January 10, 2008, meeting this issue will be addressed in other correspondence with DEQ.

Section 13.4 Effectiveness of IRAMs

DEQ Comment: The absorbent boom at Slip 2 is unlikely to be very effective at removing petroleum hydrocarbons. Most of the oil released evaporates or dissipates into the river. Adding pom poms or a more aggressive collection system at the seepage face would help in the short term.

Response: As agreed in the January 10, 2008, meeting an enhanced absorbent boom has been installed to more aggressively collect LNAPL.



DEQ Comments: Until the FS is complete and a final remedy selected, a more aggressive IRAM that will intercept the fuel before it discharges to the river is needed. The lack of sheen on the off-shore side of the boom is a poor measure of effectiveness for the Slip 2 area.

Response: As noted above, a more aggressive LNAPL collection system has been installed.

Tables

DEQ Comment: Table 7-1, LNAPL Recovered, is missing from the report.

Response: Table 7-1 is now included.

Site Figures

DEQ Comments:

- 1. Because of their scale, some of the site figures are difficult to interpret without close reference to the text. The figures should contain additional details and descriptions of what they represent, or they should be referenced back to the text.*

Response: An effort was made to improve the presentation of figures. Note that all figures are referenced to the text. The first digit of each figure number refers to the section of the text in which the figure was introduced (Figure 1-2 would refer to Section 1 and be the second figure introduced in this section).

DEQ Comments:

- 2. Many of the site figures focus in on one of the five AOCs. It would be helpful to include an overview map of the site and provide select overview maps of the AOCs. Perhaps a number of the figures for Section 5, AOC1, and Section 6, AOC2, could be eliminated by limiting the detailed figures to areas with exceedances of the applicable criteria.*

Response: Figures 5-11 and 6-1 are overview figures. The PRP group chooses to not eliminate figures because sample locations without exceedances are an important part of site characterization. In addition all Section 6 figures include a key plan that indicates the location of the figure on the site (where appropriate).



DEQ Comments:

3. *There are various designations for monitoring wells and soil borings that correspond to site names, (A) for Port of Astoria, etc. The designations should be defined on the site figures to avoid confusion.*

Response: The designations were for internal tracking purposes, no special significance should be attached to them. The designation (A) does not refer to Port of Astoria.

Figure 2-4, Stormwater Sampling Locations and Storm Piping Systems

DEQ Comment: The explanation does not describe several of the symbols used on the figure.

Response: This figure is a compilation from a variety of sources and the related symbology used in conjunction with this piping is an illustration by the original designers and its purpose or functionality was not verified and is not referenced. The exception to this was catch basins, in general catch basins were field verified. A note has been added to the figure to reflect this.

Figure 4-7 Potentiometric Surface – April 12, 2004

DEQ Comment: The designation for MW-23 is obscured by the potentiometric surface elevation.

Response: This has been corrected.

Figure 6-22 Potentiometric Surface, AOC-1 – July 19, 2004

DEQ Comments: There are water level data along the western edge, apparently collected on different dates, which are not explained (i.e., MW-36, MW-34a, and MW-32a). If the July 2004 water levels were shown, would the contours be consistent? This comment applies to other AOCs as well.

Response: The ground-water elevations have been corrected. Inadvertently, December 2006 data was mixed with July 2004 data. On the revised figure, the elevations reflect data collected on July 19, 2004, and the contours are consistent. Figure 6-101 was also corrected.

Figures 6-36, 6-38, and 6-40

DEQ Comment: Describe the composition of the NAPL on the Figures. This comment also applies to the other AOCs.



Response: As agreed in the January 10, 2008, meeting Figure 6-113 presents the composition of the LNAPL. No figures were revised.

Figure 6-101 Potentiometric Surface AOC4 – December 7, 2006

DEQ Comment: There are several water table elevation “outliers” in the southeast site area that are not incorporated into the groundwater elevation contours and that are not discussed.

Response: The figure has been revised. No ground-water elevations are shown for these wells because data were not collected on December 7, 2006, from these wells.

Figure 6-113 Estimated Lateral Extent of NAPL – Fall 2004

DEQ Comments: Add one or more cross-sections through the plume in AOC 4 and through the seep into Slip 2. Show a cross-section through the river edge, the elevations of the bank and primary seep zone, river level in relation to groundwater levels, tidal ranges in the river and influence on groundwater, presence and thickness of free product, implied gradient toward the river, surface structures, and underground utilities.

Response: These changes have been incorporated into Section 4 figures.

Appendix G Human Health Risk Assessment

Section G2.3 Local Geology and Hydrogeology

DEQ Comment: Shallow groundwater contour maps in the RI, Figures 4-7 and 4-8 show a northwest to northeast gradient rather than a north to northwest gradient.

Response: The gradient is generally north/northwest. Note the orientation of the north arrow on the potentiometric surface figures. These are now figure numbers 4-8, 4-9, 4-10, and 4-11.

Section G2.5 Beneficial Uses of Land and Water

DEQ Comments:

- 1. Industrial uses of groundwater are consistent with the predominately commercial and industrial zoning. The section should include a discussion of the suitability of shallow groundwater for industrial uses and whether such future uses are reasonably likely given aquifer yield and the cost of municipal water.*



Response: Additional discussion has been added. Local shallow ground water is unlikely to be used for industrial purposes, particularly due to salt water intrusion concerns.

DEQ Comments

2. *Waterfront residential developments are a growing trend in Astoria and site zoning allows for residential land use, such as waterfront condominiums. The section explains that the Port of Astoria's Charter prohibits such developments on Port property. However, as indicated, not all of the properties within the site are owned by the Port. Please provide a figure showing the Port property boundaries and include the relevant sections of Port's charter as an appendix.*

Response: This has been addressed under "General Comments." The human health risk assessment was revised and text in the RI report was revised.

DEQ Comment:

3. *The City of Astoria's Walking/Jogging trail should be shown on a figure of land use and the trail should be discussed in the risk assessment.*

Response: Based on conversations with Port of Astoria personnel the proposed walking/jogging trail (referred to as Riverwalk) alignment has not been finalized. The current proposed alignment, provided to us by the Port of Astoria, is included on Figure 9-1. The duration of exposure for users of the walking/jogging trail is too small for site contaminants to pose an unacceptable risk.

Section G3.1 Data Evaluation

DEQ Comments: Please provide a copy of the Access database on CD. The text should reflect that the sub-slab vapor investigation is complete and is included as Appendix H. The Risk Assessment tables (Appendix A, Summary of Analytical Results) do not include urban residential RBCs, although urban residents are identified as potential receptors in the site conceptual model. Please revise the tables to include DEQ RBCs for Urban Residents.

Response: As agreed in the January 10, 2008, meeting the Access database is now included on a CD. The text has been revised to note that the sub-slab vapor investigation is complete. Urban residential DEQ RBCs have been added to the tables.

Section G4.0 Conceptual Site Model



DEQ Comment: Figure 4-2, Exposure Zone Map, is missing from the report.

Response: Figure 4-2 is now included.

Section G4.2 Fate and Transport

DEQ Comment:

- 1. A description of the groundwater to surface water pathway should be included in this section.*

Response: The text has been revised to describe this pathway.

DEQ Comment:

- 2. The horizontal and vertical extent of NAPL, including the NAPL smear zone in soil, is significant at the site and should be described as more than "an intermittent seep ... near the shoreline".*

Response: The text was revised to omit the word intermittent. The seep is more thoroughly described in Section 4 of the RI report.

DEQ Comment:

- 3. The NAPL seep in slip 2 is essentially continuous, but is less visible when the tide is high. An estimate of the rate of NAPL discharge to the river should be included in this section.*

Response: As discussed in the RI report and a previous DEQ comment no data are available to estimate the rate of LNAPL discharge.

Section G5.1.3 Soil Gas RBCs

Different attenuation factors are used in Appendix G, Maul Foster Alongi's (MFA's) Human Health Risk Assessment and Appendix H, Geosyntec's report:

DEQ Comments:

- 1. In MFA's Human Health Risk Assessment, attenuation factors were estimated using USEPA's implementation of the Johnson and Ettinger Model as presented in Appendix C, Table C-1. Three locations, VCP-1, 2, 3, are identified where soil gas exceeds the soil vapor RBCs. The locations are shown in Figure 5-3 Soil Vapor Sample Locations and RBC Exceedences in Soil Vapor.*



2. *In the Appendix H Geosyntec report, spatial averaging is used to determine that, on average, concentrations are not expected to exceed the site-specific soil gas RBCs. Attenuation factors are calculated via the Johnson and Ettinger model as described in Section H5.0, Data Evaluation.*
3. *The differences in MFA's and Geosyntec's interpretations should be noted and a single conclusion on the significance of the vapor intrusion pathway should be presented. The different presentations make it unclear if there is unacceptable risk.*

Response: The MFA and GeoSyntec attenuation factors are now uniform and the presentations have been aligned. Although the presentations were different the conclusion was the same, and text has been revised to clarify this.

Section G6.5 Combinations of Sources of Uncertainty

DEQ Comment: DEQ expects that MFA intended to say that the risk estimates are likely to be over estimates not underestimates.

Response: The text has been clarified.

Appendix H – Sub-Slab Soil Gas Intrusion Assessment

DEQ Comments:

1. *Gasoline-range TPH (TPH-G) Some substantial hits of TPH-G were obtained in the sub-slab soil gas samples (up to 7,800,000 ug/m3). A round of indoor sampling is needed to validate the sub-slab analysis. Please submit a work plan for indoor air sampling.*

Response: The PRP Group is considering alternative approaches to address DEQ's concerns.

DEQ Comments:

2. *Diesel -range TPH (TPH-D) Diesel-range TPH in air was not evaluated. Analytical methods are available to evaluate the diesel-range contaminants in soil gas. This work is necessary since diesel is a significant component of TPH impacts beneath the building.*

Response: Our understanding from Air Toxics, Inc., of Folsom, California, is that there is no TPH-D analysis that can be run from a Summa Canister sample. The PRP Group is considering alternative approaches to address DEQ's concerns.



Appendix J – Well Log Inventory

DEQ Comment:

1. *Table J-1 needs a legend that defines the well log type.*

Response: A legend has been added.

DEQ Comment:

2. *Water rights, both groundwater and surface water, should be included in the inventory.*

Response: A water rights search conducted using WRD WRIS system is now included as Table J-5. The only water rights identified are the municipal right for the City of Astoria because the Astoria Area-Wide site is located within the service boundary.

CLOSING REMARKS

The Final Remedial Investigation Report for the Astoria Area-Wide Petroleum Site has been revised to reflect DEQ comments and information collected since submittal of the Draft RI Report. We believe this Final RI Report document satisfies DEQ's questions and provides a data set for moving to the Feasibility Study. IRAMs completed during the RI process have effectively stabilized conditions or provide protections to human health and the environment.

If you have further questions about the Final RI Report, please do not hesitate to call me at (503) 768-5121. Thank you for your help in completing this portion of a challenging project.

Sincerely,
EnviroLogic Resources, Inc.

Nancy East-Smith, RG, CEG, CWRE
Senior Project Geologist

Thomas J. Calabrese, RG, CWRE
Principal Hydrogeologist
Project Manager