



July 11, 2013

**948.007.04(006)**

Port of Seattle  
Pier 69  
P.O. Box 1209  
Seattle, Washington 98111-1209

Attention: Mr. Fred Chou

**RESPONSIVENESS SUMMARY  
FINAL ENGINEERING DESIGN SUBMITTAL  
PORT OF SEATTLE TERMINAL 91 TANK FARM CLEANUP  
SEATTLE, WASHINGTON**

Dear Mr. Chou:

PES Environmental, Inc. (PES) and Vista Consultants, LLC (Vista), are submitting this letter to respond to written comments from the Washington State Department of Ecology (Ecology) following its review of the following documents associated with the Terminal 91 Tank Farm and Tank Farm Affected Area (TFAA) cleanup:

- **Draft Engineering Design Report**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 4, 2013, and associated **Construction Drawings, Technical Specifications, and Construction Schedule**;
- **Operation and Maintenance Plan**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 4, 2013;
- **Compliance Monitoring Plan**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 4, 2013;
- **Draft Construction Quality Assurance (CQA) Manual**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 15, 2013
- **Elements of Restrictive Covenant**, Terminal 91 Cleanup Prepared by PES and Vista, March 15, 2013
- **Implementation Schedule**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 15, 2013; and
- **Technical Specifications (Waste Collection, Storage Profiling and Disposal)**, Terminal 91 Tank Farm Cleanup Prepared by PES and Vista, March 22, 2013.

The written comments were sent to Susan Roth in an e-mail dated May 2, 2013<sup>1</sup>. Electronic comments of select documents were sent via email on May 1, 2013; to be used in conjunction with these written comments. Per the Agreed Order, the Final Engineering Design Report (EDR) and 100 percent Construction Plans and Specifications (CPS) are due to Ecology 70 days after receipt of comments (July 11, 2013).

Representatives from the Port, Ecology, PES, Roth Consulting, and Aspect Consulting met at the Port's office on May 16, 2013 to discuss Ecology's comments. The purpose of this letter is to provide the Port's responses to the comments, and reflect the discussions held at the May 16<sup>th</sup> meeting. For ease of use, this responsiveness summary repeats each of the comments provided in italicized text, followed by the Port's response. The responses to comments are organized by document.

Note that there were no comments made on the Draft CQA Manual, Implementation Schedule, or the Elements of Restrictive Covenant documents. The CQA Manual and Implementation Schedule will be modified only as necessary to reflect the changes made in other documents, if necessary, and finalized. The Elements of Restrictive Covenant information have been used to prepare a draft of the Restrictive Covenant document.

## **RESPONSE TO ECOLOGY COMMENTS (MAY 2, 2013)**

### **Comments on Engineering Design Report**

**Ecology Electronic Comments on EDR:** *I placed minor comments and highlighted questionable text within the electronic copy of the report at the following points: Pages vii, 2 (2), 11, 13, 17, 20, 22 (2), 24, 25, 28, 30, 31, 32, 33, 35, 36, 38, 39, 40(2), 41(2), 45, 54(2), 55, 61, 64(2), 66(3), 68, 71, 75. Figures 5, 6, 7, 8.*

**Port Response to Ecology Electronic Comments:** Unless otherwise noted below, the editorial comments or request for clarifications in the above list have been incorporated or addressed. Some of the more significant comments on the pages listed above were repeated in the written comments, and these are addressed below.

- **Comment on Page 17.** The backfill and asphalt repair are now included in the contractor work referenced in Section 4.5; they are also addressed by the specifications referred to in Section 4.3.9.
- **Comment on Page 35.** Figure 5 has been modified to include the previously abandoned monitoring wells referenced in Table 8-1.

**Ecology EDR Comment #1:** *Section 5.6: What are the contingencies for excavating additional highly contaminated soil at SWMU 30, if present?*

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<sup>1</sup> Washington State Department of Ecology. 2013. *POST-91 draft EDR - Ecology Written Comments*. May 2.

**Port Response to Ecology EDR Comment #1:** As discussed in the May 16 meeting, the size of the SMWU 30 excavations are limited on the east and west sides by the existing bulkheads and major utilities, respectively, and it will be very difficult to expand the excavations in these directions. Depending on the shoring approach developed by the contractor, it may be possible to extend the excavations to the north and/or south if highly contaminated soil is observed at the edge of the initial excavation. The southern excavation has a manhole and sewer line immediate south of the current excavation limits, which would prevent extending this excavation further south. The potential for additional excavation will be evaluated during construction in consultation with Ecology.

**Ecology EDR Comment #2:** *Section 8.2.2. King County Sanitary Sewer: Please explain why the cutoff wall is placed 20 ft. from the centerline of the sewer. If the easement is only 5 ft. can the cutoff wall be placed closer to the sewer? Isn't the depth of the sewer great enough to allow installing the cutoff wall closer than 20 ft as well?*

**Port Response to Ecology EDR Comment #2:** The text in Section 8.2.2 has been modified to explain that the 20 ft buffer is required due the County easement (5 ft), new storm drainage improvements (5 ft), and the need to have the stormwater improvements constructed outside the geogrid that bridges the top of the cutoff wall (10ft).

**Ecology EDR Comment #3:** *Section 8.3, Cutoff Wall Alignment, Station 1+50 to 3+15: Would it be possible to move the cutoff wall further to the west? It would likely capture more contamination originating from the TFA. The drawings indicate we could move as much as 30 ft. west. What issues and limitations are at play here?*

**Port Response to Ecology EDR Comment #3:** A sentence has been added to the bullet addressing this section of the alignment explaining that extensive utilities located in Coontz Avenue just west of the tank farm limit the ability to move the cutoff wall alignment further west.

**Ecology EDR Comment #4:** *Figure 8: Multiple documents in the 90% EDR submission package reference the Area of Contamination (AOC), which is identified on Figure 8. However, at the scale of Figure 8, it's hard to determine exactly which labeled border is represented by the AOC, and it does not appear the AOC is clarified or defined further elsewhere in the documents. Please further clarify the boundaries of the AOC as used in the EDR.*

**Port Response to Ecology EDR Comment #4:** Figure 8 has been modified to make the AOC easier to identify and title of the figure changed to "Area of Contamination" to more clearly identify the purpose of the figure. In addition, the AOC is also identified on Drawing C012.

**Comments on O&M Plan**

**Ecology Electronic Comments on O&M Plan:** *O&M Plan: I placed minor comments and highlighted questionable text within the electronic copy of the report at the following points: Pages 1, 2, 10, 11(2), Appendix A – Inspection Form - page 1.*

**Port Response to Ecology Electronic Comments on O&M Plan:** The editorial comments or request for clarifications in the above list have been addressed. The two more significant comments on the pages listed above were repeated in the written comments and are addressed below.

**Ecology O&M Plan Comment #1:** *Section 4.3 Final Cover: For the asphalt cover, what is the time frame for conducting repairs following an unsatisfactory inspection? Repair within 60 days of discovery seems reasonable.*

**Port Response to Ecology O&M Plan Comment #1:** The text in this section has been modified to indicate that minor repairs will be made within 60 days of the inspection, weather permitting, and that larger repairs that require outside contracting will be implemented as soon as practicable.

**Ecology O&M Plan Comment #2:** *Section 4.4 Stormwater Management: At minimum, have the stormwater inspections acknowledged and/or summarized in the periodic inspection and maintenance reports (covered in Section 4.6 of the O&M plan).*

**Port Response to Ecology O&M Plan Comment #2:** The text of Section 4.6 has been modified to include the stormwater management system O&M records in the periodic inspection and maintenance reports.

**Ecology Comments on Drawings**

**Ecology Comment on Drawings #1:** *C013 & C014: The legends indicate a symbol for monitoring wells to be decommissioned outside tank farm area. However all the subject wells (except one: UT\_MW39-2) on this sheet labeled for decommissioning are within the tank farm area. Please clarify.*

**Port Response to Ecology Comment on Drawings #1:** The legend has been changed so that the symbol refers to “Monitoring Well and Vapor Probe to Abandon” and does not reference the Tank Farm Area any longer.

**Ecology Comment on Drawings #2:** *C019: Notes 8 and 9 are confusing. Will the exploratory trench be backfilled with soil (as per note 8) or with engineered fill (as per note 9)? Please clarify.*

**Port Response to Ecology Comment on Drawings #2:** The two referenced notes have been modified to clarify the different backfill requirements. Note 8 addresses backfilling the exploratory trench with soil at the time the trench is excavated. Note 9 refers to placing engineered fill throughout the entire TFA to bring the site to the appropriate grade prior to installation of the cutoff wall.

**Ecology Comment on Drawings #3:** *R008 & R009: Note that these are the same drawing. Only the title text was changed.*

**Port Response to Ecology Comment on Drawings #3:** Drawing R009 should have been a different reference drawing that shows a different type of tank bottom; the correct reference drawing is now used.

**Ecology Comment on Drawings #4:** *R018: Sheet notes 21 & 22 appear to be at odds. Note 21 indicates that roof asbestos should be removed, but Note 22 indicates that the roof should remain intact. Please clarify.*

**Port Response to Ecology Comment on Drawings #4:** Comment noted and it does appear that the notes are contradictory. The current work does not, however, include abatement of any regulated materials associated with Building M-28, so the conflict does not impact the current design and no changes to the reference drawing will be made.

### **Ecology Comments on Compliance Monitoring Plan**

**Ecology Electronic Comments on Compliance Monitoring Plan:** *I placed minor comments and highlighted questionable text within the electronic copy of the report at the following points: Pages 2, 3, 6(2), 7(4), 8, 10(3), 11(3), 15, 16, 18(2), 19, 20, 21, 22, 25, 28, 29, Table 2(2), Table 3. QAPP: pages 1, 5, and 15.*

**Port Response to Ecology Electronic Comments on Compliance Monitoring Plan:** Unless otherwise noted below, the editorial comments or request for clarifications in the above list have been addressed. Several of the more significant comments on the pages listed above were repeated in the written comments and are addressed below.

- **Comment on Page 7.** Ecology commented that the reference to well PNO\_EW01 was incorrect and it should be PNO\_MW01. The EW01 reference is correct and this well, located inside the north excavation, will be eliminated as part of the cleanup action.

**Ecology Compliance Monitoring Plan Comment #1:** *Conduct a global search and replace "Figure 4". It should be "Figure 3".*

**Port Response to Ecology Compliance Monitoring Plan Comment #1:** References to Figure 4 were replaced with Figure 3 throughout the document.

**Ecology Compliance Monitoring Plan Comment #2:** *Section 4.2, CMP Monitoring Wells: The text reads “Seven wells (UT\_MW154 1 through UT\_MW152-7) that are located north of the TFAA and were previously included in the GMP as part of the larger T9I Complex (Discrete Unit A.1 listed in Exhibit C of the 2010 agreed order) are not included in this CMP.” What is the justification for dropping these from the CMP? Please discuss.*

**Port Response to Ecology Compliance Monitoring Plan Comment #2:** These wells, located more than 1,000 ft north of the north end of the TFAA, are not used or impacted by the Tank Farm Cleanup work. These wells were installed as part of an underground storage tank assessment in the mid 1990s and then were used as part of the site background demonstration for the TFAA work, but have not been monitored in recent years.

**Ecology Compliance Monitoring Plan Comment #3:** *Section 4.2, CMP Monitoring Wells: A second issue is that no deep monitoring wells are included in the CMP. Because of the level of disturbance at the site during cleanup implementation, wouldn't it be prudent to include at least some level of deep GW monitoring? Please justify why no deep groundwater monitoring is included.*

**Port Response to Ecology Compliance Monitoring Plan Comment #3:** Five deep monitoring wells have been added to the compliance monitoring network. These five wells - CP\_108B, CP\_203B, CP-205B, CP\_GP01B, and PNO\_MW06B – are the same wells that were included in the routine monitoring until recently. Changes to the text in Section 4.2.3, 6.3.2, Figure 3, and Tables 2 and 3 have been made to reflect the addition of these deep monitoring wells.

**Ecology Compliance Monitoring Plan Comment #4:** *Section 4.2.3, Groundwater Quality Monitoring: Monitoring well PNO-MW02 is confusing for a couple reasons. Should the well be labeled PNO-MW03 to be consistent with historical documents? Regardless of the label, isn't this well going to be decommissioned during the SWMU 30 excavation? If so, it can't be used for long term monitoring. If this is true, should a replacement monitoring well be installed?*

**Port Response to Ecology Compliance Monitoring Plan Comment #4:** The reference to well PNO\_MW02 is correct. This well is located immediately north of the northern SMWU 30 excavation and will not be abandoned as part of the work. PNO\_MW03 will be removed as part of the SWMU 30 excavation work. PNO\_MW02 was inadvertently left off of Drawing C004, but it has been added back in. As shown on Figure 3 of the CMP, PNO\_MW02 will be part of the compliance monitoring network.

**Ecology Compliance Monitoring Plan Comment #5:** *Section 6.1.2 Monitoring Overview: This section indicates that “Monitoring will be conducted on a quarterly basis for the first year after cleanup actions are conducted, semiannually for the second and third years after cleanup actions are conducted, and annually for subsequent years.” This sampling approach is repeated several times in later sections of the CMP. From Ecology's perspective, given the amount of site disturbance more monitoring is warranted. Ecology would prefer the following sampling schedule: quarterly sampling for two years, followed by semiannual for two years, then annual.*

**Port Response to Ecology Compliance Monitoring Plan Comment #5:** The CMP has been modified to include an additional year of quarterly monitoring as suggested.

**Ecology Compliance Monitoring Plan Comment #6:** *Section 6.3.2 Monitoring Overview: Given that three monitoring wells in the SWMU 30 area are being decommissioned as part of the cleanup action, Ecology would like to leave open the possibility that a replacement monitoring well will be installed based on the results of the cleanup of this area. For example, if all the contaminated soil can't be removed, Ecology may request a replacement well downgradient of the source area.*

**Port Response to Ecology Compliance Monitoring Plan Comment #6:** As discussed in the May 16 meeting, the SMWU 30 excavation work should remove the majority of the LNAPL-containing soil from the area and additional monitoring wells should not be required. However, the potential to install a monitoring well in the backfill if significant LNAPL is encountered is identified in the following text that was added to Section 5.3 of the EDR:

“These three wells are not currently anticipated to be replaced following completion of the excavation activities. If significant LNAPL is observed along the western edge of the north excavation, which may migrate into the granular backfill after the excavation shoring is removed, a monitoring well may be installed in the backfill.”

**Ecology Compliance Monitoring Plan Comment #7:** *Table 2: Given the level of disturbance of the site during cleanup and past LNAPL presence, Ecology feels monitoring well PNO-MW104 would be a good candidate for inclusion in the groundwater sampling as part of the CMP.*

**Port Response to Ecology Compliance Monitoring Plan Comment #7:** Monitoring well PNO-MW104 has historically had LNAPL present in the well and was identified in the CMP as part of the LNAPL monitoring network. Given the historical presence of LNAPL in this well, the Port's position is that water quality samples collected from this well would not be accurate due to potential interferences from residual LNAPL that may be present on the well screen and/or in the sand pack.

### **Ecology Comments on Technical Specifications**

In addition to the changes based on the comments outlined below, the Port has made several additional changes to the technical specifications based on an internal review by the Port's construction management group. The most significant change is that “Part 4 Measurement and Payment” (M&P) has been added to each section to define how the contractor will be paid for each work element. The M&P text refers to “bid items” that are identified on a bid sheet that will be included in the final bid package. Specification 02621(LNAPL Recovery Trenches) has been modified to reflect the changes in design based on Ecology's comments and to be

consistent with the revised Drawings C026 and C027. The remainder of these changes are editorial or minor clarifications that focus on contract-related language and ensuring that the specifications conform to the Port standards. If Ecology wishes to see a detailed “mark up” that identifies all of the changes made to the specifications between the March 15, 2013 submittal and the July 11 revision, we can readily produce a comparison document for its review.

**Ecology Electronic Comments on Technical Specifications:** *I placed minor comments and highlighted questionable text within the electronic copy of the report at the following pdf page numbers: Pages 83, 104, 105, 110, 112, 130, 133, 145, 148(2), 149(2), 158, 167, 168(3), 169, 172, 173, 176, 182, 183, 186(2), 187, and 189.*

**Port Response to Ecology Electronic Comments on Compliance Monitoring Plan:**  
Unless otherwise noted below, the editorial comments or request for clarifications in the above list have been addressed.

- **Comment on Page 187.** The units (mg-cm) are listed in the table are correct.

**Ecology Technical Specification Comment #1:** *The following specifications were referenced but were not included: 00700, 01300, 01304, 01305, 01500, and 01631.*

**Port Response to Ecology Compliance Monitoring Plan Comment #1:** The referenced sections are in the Division 0 and Division 1 contract documents, which were not part of the submittal. These sections will be available for review once the bid package is prepared.

**Ecology Comment on Specification 02405:** *Note: I did not place comments on the electronic copy. However, the following general comment is provided regarding the following text copied from page 9:*

**3.03 GENERAL REQUIREMENTS E.**

*“Maximize waste materials (soil not classified as highly contaminated) and certain debris (asphalt and concrete) generated inside the AOC in a manner that maximizes their reuse for engineered fill during the excavation, backfilling and final grading in the TFA. Existing site paving and crushed base rock, base course, and fill located beneath existing asphalt but above the surface of the former tank farm may be stockpiled either inside or outside the AOC and reused for engineered fill.”*

*Given the existence of petroleum seeps at the tank farm, Ecology is concerned that direct implementation of the underlined text above by contractors may result in highly contaminated material being recycled without first being tested to determine if reuse is appropriate. Even though the Port does not anticipate this material will be contaminated, the possibility that it might be should be acknowledged, and the contractor made aware of this.*

**Port Response to Ecology Comment on Specification 02405:** The potential for highly contaminated soil being present at the locations of the identified petroleum seeps has been addressed by making the following changes:

- The locations of the seeps have been identified on Drawing C015;
- Part 3.03 of Specification 02405 has been modified to specifically except the fill/base course materials associated with the seeps in the existing paving; and
- Numbered bullet 3 in Section 11.1.2 of the EDR, which identifies media and debris that is potentially suitable for reuse on-site, has been modified to include the potential exception of materials associated with the seeps.

### **Aspect Consulting Comments on Submittal**

Jeremy Port of Aspect Consulting (AC) is providing technical support and review to Ecology throughout the Tank Farm Cleanup design process and provided the following comments:

**AC Comment #1: EDR Section 2 – Background Information.** *Additional background information that affects design and would be helpful includes:*

- a. *A generalized geologic cross-section illustrating the geologic units and historical water table elevations. Such a section could then be used to show profiles of remedy components, such as the cutoff wall, in relation to site geology (see additional comments below).*
- b. *A brief summary of tidal influence, if any, within the Shallow and Deep Aquifers.*

**Port Response to AC Comment #1:** Regarding the generalized cross-sections, a reference to a new Appendix A1 has been added at the end of Section 2.2.1 that includes the cross-sections that were presented in the *Remedial Investigation/Data Evaluation (RI/DE) Report*. New cross-sections will not be developed as part of this design.

Regarding the summary of tidal influences at the site, a brief summary has been added to the hydrostratigraphy discussions in Section 2.2.2. for both the shallow and deep aquifers.

**AC Comment #2: EDR Section 4 – Former Fuel Transfer Pipelines.**

- a. *Briefly describe how, after one end of a pipeline is field-located, the pipeline alignment and terminus will be determined.*
- b. *Will any measures be taken prior to or during pipe cleaning to evaluate the potential for significant breaks or uncapped branches in the pipelines that could result in a release of contaminated fluids during cleaning?*

**Port Response to AC Comment #2:** Regarding comment 2.a, the following sentence has been added to Section 4.3.1:

“The pipeline alignment, including the terminal end and branch lines if possible, will then be established using standard utility locating techniques.”

Regarding comment 2.b, the utility locating used to trace the alignment should identify any significant branches in the pipeline. With respect to possible leaks, the following text has been added to the end of Section 4.3.3:

“The volume of grout pumped into a section of pipeline will be compared to the calculated volume; significant discrepancies between the measured and calculated volumes may indicate incomplete grouting or breaks in the pipeline.”

**AC Comment #3: EDR Section 5 – SWMU 30.**

- a. *P.19, last paragraph states that ‘Excavated soil in the vadose zone is not expected to be highly contaminated’. Is this true along the former pipeline alignment, particularly in the area where the release occurred? Are there any abandoned pipeline segments that are anticipated to be within the excavation limits and will need to be removed?*
- b. *The area of excavation is based on the estimated area of LNAPL and highly contaminated soil, but is constrained by utilities and subsurface structures; therefore, it is possible that some highly contaminated soil (including soils containing LNAPL) may be left in place. The excavation area is to be backfilled with highly permeable material and the north area is adjacent to the short fill impoundment. What measures will be taken to ensure that the backfill will not act as a preferential migration pathway for contamination to the short fill impoundment?*

**Port Response to AC Comment #3:** Regarding comment 3.a, since the release that created SMWU 30 was a leak from a pipeline located west of the proposed excavations, with the LNAPL migrating east towards the bulkheads, the vadose zone soil should be relatively un-impacted above the smear zone. There are no known fuel pipelines within the proposed excavations.

Regarding comment 3.b, see response to Compliance Monitoring Plan Comment #6 above.

**AC Comment #4: EDR Section 7 – Tank Farm Area Site Preparation.**

- a. *Section 7.6. Clarify what the ‘oil-sand layers’ refer to, and if these are anticipated or assumed to be highly contaminated materials.*
- b. *Section 7.7. 10th bullet on p.31. Building 27 is referenced twice. Meant to include Building 17?*

- c. *Section 7.7. 1st bullet on p.32. Will removal of highly contaminated soil beneath demolished structures be limited to a particular depth range, or to the maximum vertical extent that highly contaminated soil is observed? Would these removals also extend laterally from the demolished structures? Specification 02332 indicates excavation of highly contaminated soil in the TFA is not to extend below the groundwater surface, does this mean that there will be no removal of highly contaminated soil beneath structures such as the Oil Water Separators that may extend below the water table? It appears that some excavation below the groundwater surface is planned during reinstallation of the OWS and Storm Filter treatment system in the Black Oil Yard.*
- d. *Section 7.7. 2nd bullet on p.33. Clarification: should this bullet indicate 'Groundwater is expected to be encountered below an elevation of 13 ft...' to be consistent with the last bullet on p.31.*
- e. *Section 7.7, 2nd bullet on p.33. Please clarify: will 'in-the-wet' excavation be allowed in the TFA, as it is in SWMU 30?*

**Port Response to AC Comment #4:** Regarding comment 4.a, the referenced bullet has been modified to clarify that the oil-sand layers will be assumed to be highly contaminated soil for waste management purposes.

Regarding comment 4.b, the first reference to Building 27 should have been to Building 25. A reference to Building 17 was also added.

Regarding comment 4.c, the referenced bullet has had the following new text added (italicized below) to clarify how far the excavation of highly contaminated soil will proceed:

*“Remove any highly contaminated soil observed beneath demolished concrete structures in order to minimize the potential for these soils to act as a source of future seeps. Excavation of highly contaminated soil will continue downward vertically until non-highly contaminated soil or the water table is encountered, whichever is first. Excavation of highly contaminated soil will extend horizontally until non-highly contaminated soil or the edge of the TFA is encountered, whichever is first.”*

Regarding comment 4.d, the requested change has been made.

Regarding comment 4.e, the following sentence has been added to indicate that “in the wet” excavation techniques may be employed in the TFA:

*“As with SWMU 30, the excavation may performed “in the wet”, with groundwater maintained above the bottom of the excavation for stability purposes.”*

And following text regarding backfilling this type of excavation has been added to the last bullet of that section:

“If excavation is conducted “in the wet,” a geotextile separator will be deployed in the bottom of the excavation and gravel fill (essentially self-compacting material) will be placed to a minimum of 1 foot above the groundwater surface. Compacted engineered fill will then be placed above the gravel fill.”

**AC Comment #5: EDR Section 8 – Cutoff Wall.**

- a. *This section would be aided by a profile of the wall in context of site groundwater levels and geologic units along the alignment.*
- b. *P.36, first full paragraph, last sentence indicates cutoff wall depths of 16.3 to 15.9 feet. Based on the other information provided, these ‘depths’ are assumed to represent the total height of the cutoff wall (elevation of the top of the wall minus the elevation of the bottom of wall), not the depth below ground surface. Please confirm.*
- c. *Section 8.4.2, 3rd bullet: references a target field value of  $1 \times 10^{-7}$  cm/sec; conflicts with  $1 \times 10^{-6}$  cm/sec value in Section 8.4.2.3*
- d. *Section 8.5.2, Construction Method. The design report recommends one-pass trenching for cutoff wall construction. The specifications appear to require it.*
  - i. *Will alternative construction methods be allowed? Does the CQA plan assume one-pass trenching construction? If a different construction method is selected, will the CQA plan be modified?*
  - ii. *Will the one-pass trencher be used to construct the upper 2 feet of the wall (the 6-ft wide soil-cement-bentonite portion). If not, what will be the method of mixing/placement for this portion?*

**Port Response to AC Comment #5:** Regarding comment 5.a, the water level information, as well as the newly included cross-sections, are provided elsewhere in the EDR and can be referred to as needed. The cross-section information will not be added to the profile drawings.

Regarding comment 5.b, the reference text has been modified to read “These elevations will result in total cutoff wall heights ranging from 16.3 to 15.9 ft . . .”

Regarding comment 5.c, the referenced field value of  $1 \times 10^{-7}$  cm/sec in the 3<sup>rd</sup> bullet of Section 8.4.2 has been changed to  $1 \times 10^{-6}$ .

Regarding comment 5.d, alternative construction methods will be allowed, although the specifications are weighted towards a one pass trenching approach. If a contractor successfully proposes an alternative method that will meet the performance standards, the CQA manual will need to be modified to address the alternative method. The specifications have asked the contractor to prepare a work plan that will address the method for constructing the top 2 feet of the wall.

**AC Comment #6: EDR Section 9 – Enhanced LNAPL Recovery System.**

- a. *Section 9.4, LNAPL Collection Pipe. This pipe, to be located at an elevation of 10.3 feet, is 6 inches in diameter, yet the seasonal fluctuation of groundwater is closer to 2 feet. Therefore for some of the year the floating product layer may be above or below the collection pipe. Typically, LNAPL recovery is greater when the water table is low. Additional discussion would be helpful as to why the selected diameter and elevation is adequate to optimize LNAPL recovery, or if a larger or additional pipe would assist recovery. Given that the water table elevation varies by approximately 1 foot across the TFA, should the elevation of the collection pipe be different depending on trench location?*
- b. *Section 9.4, Collection Sump. The Design Basis Memorandum indicated a collection sump would be located at each end of the trench. The Draft Engineering Design Report calls for only one sump, located at one end of the trench. The trenches are 75 feet long. It seems unlikely that the method of product removal (periodic skimming using a peristaltic pump) from one sump at the end of the trench would be able to capture LNAPL distributed across the entire trench, particularly if the LNAPL elevation is above or below the LNAPL Collection Pipe elevation (see above). A sump in the middle of the trench could be more effective than at the end; two sumps as proposed in the Design Basis Memorandum spaced along the trench would be better.*

**Port Response to AC Comment #6:** The design of the LNAPL collection trenches has been modified to address the above comments. The original design was prepared so that the LNAPL collection trenches could be installed using the same one pass trencher technology as the cutoff wall. Specific changes to the design include sumps at both ends of the horizontal collection pipe, the diameter of the collection pipe and sumps has been increased to 12 inches, and the elevation of the individual collection pipes has been specified. See revised Drawings C026 and C027, revised specification 02621, and the updated Section 8 of the EDR.

**AC Comment #7: O&M Plan Section 4.**

- a. *Section 4.1. Suggest adding a note that water level monitoring activities include monitoring of LNAPL presence/thickness to evaluate potential for LNAPL migration.*
- b. *Section 4.2.1. Given the recovery trench design, the proposed skimming procedure may not remove LNAPL from the entire length of the trench during skimming. Potential measures to more effectively recover LNAPL include:*
  - i. *Altering the trench design to include additional sumps or collection pipes at a wider elevation range (see EDR comments above).*
  - ii. *Modifying the peristaltic pump procedure to allow a period of recovery and re-skimming during a particular recovery event.*

- iii. *More frequent skimming at trenches that produce significant volumes of LNAPL.*
- iv. *Optimizing the recovery schedule based on seasonal changes in LNAPL recoverability; for instance, targeting periods of low groundwater elevation.*
- v. *Installing passive recovery devices that accumulate product over an extended period of time.*

**Port Response to AC Comment #7:** Regarding comment 7a, the suggested modification to the text has been made. Regarding comment 7b, the following paragraph has been added to identify the potential modifications to optimize LNAPL recovery:

“The procedures for LNAPL collection from the recovery trenches will be evaluated based on the amount of LNAPL removed and may be modified to optimize recovery rates. Examples of potential modifications include increasing the frequency of skimming if a collection trench produces significant volumes of LNAPL, staggering the skimming schedule if recovery rates vary significantly on a seasonal basis, and modifying skimming procedures to increase LNAPL recovery during a specific event.”

**AC Comment #8: Compliance Monitoring Plan Section 8.**

- a. *Section 8.1.3. Item 7; probe tips used in wells containing LNAPL may need more than a distilled water rinse to adequately decontaminate.*

**Port Response to AC Comment #8:** The following text has been added to this section to address additional decontamination requirements that may be necessary in some circumstances:

“If LNAPL has high viscosity or is not readily removed using distilled water rinse, the equipment decontamination procedures included in Appendix B will be followed.”

**AC Comment #9: Technical Specifications.**

- a. *Section 02332 1.04G. defines Highly Contaminated Soil as ‘Soil that is visibly and highly contaminated with petroleum product; i.e., product-saturated soil.’ The ‘i.e.’ defines highly contaminated soil as product-saturated soil. As explained elsewhere in the specifications, highly-contaminated soil will be determined in consultation with Ecology. It may include highly contaminated soil with residual product that is not fully saturated. If the intent of the definition was to provide an example of highly contaminated soil, ‘e.g.’ should be used instead of ‘i.e.’.*

**Port Response to AC Comment #9:** The definition of highly contaminated soil included in the specifications was based on discussions with Ecology during the development of the feasibility study. The intent was to remove the “product saturated

**Mr. Fred Chou**  
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PES Environmental, Inc.

soil” – those soils with the highest potential to act as a future source of LNAPL. The term “product saturated” is intentionally not quantitatively defined so that the Port and Ecology can work together to identify those soils that pose the highest risk and should be removed from the site.

If you have any additional questions or would like to discuss this letter, please call Brian O’Neal at (206) 529-3980 or Fred Chou at (206) 787-3217.

Sincerely,

**PES ENVIRONMENTAL, INC.**



Brian O’Neal, P.E.  
Associate Engineer

**VISTA CONSULTANTS, LLC.**



Roger North, P.E.  
Principal

cc: Fred Chou, Port of Seattle  
Kathy Bahnick, Port of Seattle  
Sue Roth, Roth Consulting  
Greg Caron, Ecology  
Sharon Aboe, HWTR, Ecology