Electronic Copy

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775 • Olympia, Washington 98504-7775 • 360-407-6300

December 14, 2022

Lisa Hendriksen
Port of Longview Director of Planning & Environmental Services
10 International Way
Longview, WA 98632
lhendriksen@portoflongview.com

Re: Comments on Draft Remedial Investigation/Feasibility Study

- **Site Name:** Port of Longview TPH
- **Site Address:** 10 Port Way, Longview, Cowlitz County, Washington, 98632
- **Facility/Site No:** 42978181
- **Cleanup Site ID No.:** 9152
- **Agreed Order No.:** DE 15907

Dear Lisa Hendriksen:

Thank you for submitting the Draft Remedial Investigation/Feasibility Study (report) for Department of Ecology (Ecology) review.[1] Below are Ecology's comments on the plan. These comments were also previously communicated via email.[2]

Ecology's Comments

1. Executive Summary

- Conceptual Model, 5th paragraph. Please re-organize this paragraph. It talks about the perched zone, then the alluvial zone, then GRO without mentioning which zone, then jumps back to the perched zone.

[1] Floyd I Snider, *Draft Remedial Investigation/Feasibility Study*, October 29, 2021.
[2] Ecology, *Port of Longview TPH – Draft RI/FS Report – Ecology Comments*. Email to Lisa Hendriksen, Port of Longview, September 15, 2022.

2. Section 1.0, Introduction:

- 1.3 Report Organization. Please adjust the report organization to facilitate the review by Ecology and the public. Suggested adjustments can be found Section 7.0, 1st bullet point, Section 9.0, 1st and 4th bullet point, and Section 10.0, 1st bullet point.

- Figure 1.2. Please indicate why some sections of the pipelines are dashed. Figures say the rail lines are owned by the Port "and/or" BNSF, but the text says "and". Please check for consistency.

3. Section 2.0, Site Description and Background:

- Existing Buildings. A general description of the existing buildings and structures is missing. Please indicate which buildings are occupied and could be occupied in the future.

- Section 2.3.5. What is the "Port's maintenance building"? Is it the mechanic's shop?

- Section 2.3.7. "In August 1995…presence of TPH ranging from 55 to 66,000 mg/kg". Are UBV1 through UBV12 in Table 4.1 the verification samples 1-12 in Figure 2.2? Had 66,000 mg/kg been removed so these values are not included in Table 1?

- Section 2.3.9. "The analytical results from both 2011 and 2016 investigations indicate that no chemicals exceeded the SEF and SMS freshwater criteria or the MTCA Method A industrial criteria (Floyd|Snider 2019a)" In the referenced report, the data was compared against SMS freshwater criteria for benthic life but not for human health for bioaccumulative contaminants (e.g., cPAHs). If it is correct, please include explanation in the text.

As required by Sediment Management Standards, sediment quality needs to be evaluated against both benthic standards, and risk-based human health standards and higher trophic level risk. Add discussion explaining why there is no sediment-related human health risk and higher tropic level risk at the site.

- Section 2.3.9. Please consider mentioning when the next round of sediment sampling in support of a maintenance dredging will occur.

- Section 2.3.10. "Groundwater samples were collected from… do not extend to the Columbia River". Delete the last sentence of this paragraph because it is premature to make the conclusion in here before the hydrogeology is presented.

4. Section 3.0, Remedial Investigation Activities:

- Section 3.2.
    - "A total of 23 soil samples from these boring locations were collected for EPH/VPH analysis to calculate an average Site-specific MTCA Method C TPH CUL." Ecology's petroleum guidance says "median" instead of "average".
    - "Direct-push locations were selected… in future assessments of the volume of TPH-impacted soil." Please provide the volume of TPH-impacted soil in Section 4.0.

5. Section 4.0, Remedial Investigation Results:

- Section 4.1.
    - Please add a table for screening criteria because this is the section where RI results are compared against the screening criteria to identify exceedances. Readers need to know what values are used for screening. The table can be similar to Table 4.6 in the *Remedial Investigation Work Plan* (RIWP), but it has to highlight the selected value for each analyte.
    - "The RIWP and Interim Data Report also… were based on Ecology guidance (Ecology 2001)" The citied Ecology document does not suggest alternative residual saturation levels. Instead, it provides the basis of how the MTCA table values are derived. The correct reference for these values is *Mercer, J.W. and Cohen, R.M. (1990) A Review of Immiscible Fluids in the Subsurface: Properties, Models, Characterization and Remediation. J. of Contaminant Hydrol. 6 (1990) 107-163*. Provide justification for the proposed LNAPL screening levels. If it has been done in a previous report, provide brief discussion and reference the report.
    - "Selection of PCULs…discussed in Section 9.2.2." Please spell out PCULs.
- Section 4.2.1. "cPAHs were detected in P3 and P4 at toxic equivalents (TEQs) of 2.3 and 0.51 mg/kg, respectively (Table 4.2)." Compare cPAHs concentrations to its preliminary screening level.
- Section 4.2.5.3. "The greatest DRO concentration was detected in OIP-23 at 48,000 mg/kg between 19 and 20 feet bgs." Please indicate the vertical limit of the soil impact in the area.
- Section 4.2.5.3. "Soil concentrations exceeding MTCA Method A screening levels are delineated in the south-central portion of the Site to the east and west at OIP-31

and OIP-53…" Please indicate the north and south limits of the soil impact in the area if they also have been delineated.

- Section 4.3.3. The fact that the May 2020 sample chromatographic pattern from UST-4 did not resemble the fuel standard used for quantitation could be due to a variety of reasons such as weathering, biodegradation, and/or because the TPH that is present consists of a mixture of diesel- and oil-range hydrocarbons. Therefore, Ecology does not agree with the report's conclusion that these results are not representative of Site conditions and can be excluded as DRO and ORO exceedances in groundwater. Additional evidence would be necessary to support the conclusion that this result can be excluded.

- Section 4.3.4, 3rd paragraph, 1st sentence. Is there evidence to show that the groundwater plume doesn't extend to the site to the northeast of MW-06? (See also Figure 4.7) If yes, include the information.

- Section 4.3.7. The fact that selected sample chromatographic patterns from MW-04, MW-30, and MW-35 did not resemble the fuel standard used for quantitation could be due to a variety of reasons such as weathering, biodegradation, and/or because the TPH that is present consists of a mixture of diesel- and oil-range hydrocarbons.

- Boring/Well Logs: The R/FS report needs to include a copy of all the well/boring logs that are relevant to the investigation. This includes all the locations shown on Figures 3.1 and 3.2. The report does include some of the logs (for example Interim Data Report Appendix B) but these only include logs from 2019-2020. Please add an appendix that includes all the boring/well logs. Also, it would be preferable to have all the logs in one appendix rather than having to refer to the Interim Data Report for the more recent logs. The appendix from the Interim Data Report that contains the boring/well logs could be left out then since they will be combined with the older logs in the new appendix.

- Historical above-ground storage tanks (ASTs): Please review the 1927-1949 Sanborn® Fire Insurance Maps, which appear to show that there were additional ASTs in the vicinity of the 80,120 barrel (3.37 million gallon) fuel oil tank. These additional ASTs include: 165,500 gallon and 1,666 barrel fuel oil tanks; 354,000 gallon and 18,500 gallon kerosene tanks; and 19,500 gallon and 439,500 gallon gasoline tanks. Please add the locations of these ASTs to Figures 2.1, 2.2, 3.1, 3.2, 4.1 through 4.3, 4.5 through 4.15, and 9.2 to 13.5.

6. Section 5.0, Physical Setting:

- Section 5.2.1, Water-bearing units and groundwater flow and Table 4.9: This section states that there are several Site monitoring wells that are screened across both

water-bearing zones that result in some anomalously high groundwater elevation measurements. Based on the discussion in Section 5.2.1.2, it appears that these wells include MW-03, MW-05, MW-09, and MW-33. Please include the list of all wells that are screened across both zones in Section 5.2 and also identify them on Table 4.9. Please also indicate on Table 4.9 any wells that are suspected of being screened across both water-bearing zones even if the water-level appears to match the aquifer that the well is classified as monitoring.

- Section 5.2.1.2, Alluvial aquifer, last paragraph: Ecology agrees that there is evidence for local southerly flow from areas near the riverbank during low river stage. Transducer data, as illustrated on Interim Data Report Figures 3.20d (MW-33) and 3.20f (MW-23), show that the elevation of the Columbia River is not always higher than the alluvial aquifer but that there are regular cyclic periods at low river stage, when the groundwater elevation, even in the central portion of the Site, is higher than the river tidal elevation. Therefore, the statement that there is no southerly flow from portions of the Site located north of the MW-38 bank area is not correct because as seen in Figure 4.14, there appears to be periodic events of southerly flow from as far north as MW-22. However, based on the groundwater concentration data from the wells closest to the riverbank (MW-37 and MW-38), there does not appear to be a complete pathway from the groundwater contamination plume to the river. Please revise this paragraph to provide more complete clarification on the groundwater flow direction of the alluvial aquifer.

- Section 5.2.2: Perched water-bearing zone and alluvial aquifer interaction: This section examines head differences in paired perched water-bearing zone and alluvial aquifer wells. Two perched/alluvial well pairs are discussed, MW-17/MW-33 (central portion of Site) and MW-29/MW-23 (south-central portion of Site). However, at least one well from each pair appears to be screened across both zones and so these head differences may not represent actual site conditions. Section 5.2.1.2 identifies MW-33 as an alluvial aquifer well that may be in partial equilibrium with the overlying perched zone. MW-29 is classified as a perched aquifer monitoring well but based on cross-section A-A' and the well log, it appears that the 15-27.7 feet bgs screened interval extends through a clayey silt (23-25 feet bgs) that appears to form the boundary between the two zones. Please revise the discussion in this section to compare head differences from well pairs that are not screened across the two aquifer zones.

- Cross-Sections:

    - The cross-sections present an overly simplified description of the subsurface lithology. A maximum of three lithologies are shown on the cross-sections: **Sand** (fine to medium size with little to some silt and occasional gravel), **Sandy Fill** (heterogeneous mixture of silt and fine to medium sand), and **Silt**

(low to high plasticity and little to some sand), and For example, the B-B' cross-section shows a thick silt at MW-32 from approximately 9-18 feet below ground surface (bgs) with a well screen that completely penetrates the silt. However, the boring log for this well describes this interval as "interfingering layers of silty fine sand and silt." Likewise, the B-B' cross shows this thick silt layer from approximately 7-17 feet bgs at GP-31. However, the GP-31 log describes this interval as brown silty sand that grades to brown silt interbedded with silty, fine, medium sand to a depth of 13 feet bgs, then a layer of firm silty clay from 13-14 feet bgs, followed by silty sand with interbedded sandy silt to 16.5 feet bgs. A more obvious example is OIP-72 on the B-B' cross-section, which shows silt from 6-11 feet bgs and 14-15 feet bgs. However, the OIP boring log states that the perched aquifer is present from 6-13 feet bgs and the lithologies include sand (5-5.5 feet bgs), fine to very fine silty sand interbedded with sandy to clayey silt (5.5-10 feet bgs), coarse sand (10-14 feet bgs), then firm silt from 14-14.5 feet underlain by interbedded sand and silty sand. The point here is that the upper silt (implied to be non-water bearing by definition) shown on the cross-section is actually where the boring log interprets the perched aquifer to be. Please check the cross-sections against the boring logs and make any necessary corrections and/or add additional detail so that the hydrogeology is accurately portrayed.

- Ecology realizes that alluvial depositional environments result in complex interfingering layers of varying lithologies that may or may not be continuous. Therefore, some degree of generalization is necessary in constructing cross-sections. However, the main point of the cross-sections is to illustrate the dominant hydro stratigraphic units and how these units influence groundwater flow and contaminant migration. Please revise the cross-sections to include the information necessary for this illustration.

- Of critical importance to show on the cross-sections is the relationship between the screened intervals and the lower permeability unit that forms the boundary between the perched water-bearing zone and the underlying alluvial aquifer. Also, the relative thickness of the lower permeability boundary unit, where it is absent, and/or where its definition might be unclear. It should be clear from the cross-sections which wells are screened across the perched and alluvial aquifers and which wells are not, and if there are wells where this information might be unclear.

- It is helpful that the cross-sections show "higher" (measured February 23, 2021) and "lower" (measured August 10 or 11, 2020) groundwater levels. However, it would be helpful if areas that appear to have anomalous

groundwater levels (due to wells that are screened across both the perched zone and the alluvial aquifer) are indicated somehow on the cross-sections.

7. Section 6.0, Exposure Pathway Analysis:

- Re-arranging 2nd paragraph. Please improve the organization of pathway discussion to facilitate the review by Ecology and the public. This section starts with a summary of the complete exposure pathways, but not all of them are further discussed in the subsections (e.g., soil to groundwater pathway). Soil direct contact pathway is later concluded complete in Section 6.1.1 but not mentioned in the summary.

- Provide a conclusion section and/or figure to summarize which pathways are complete and which are incomplete.

- Soil to surface water and sediment pathway. Add a section for soil to surface water and sediment pathway since impacted soil are present beneath Berths 1 and 2. "However, there is no potential for erosion at the Site… permitted under Ecology's Industrial Stormwater General Permit (Permit #WAR001242)" in Section 7.2 can be moved to the new section.

- Terrestrial ecological receptors. Move the discussion related to TEE pathway from Section 5.0 to Section 6.0.

- Section 6.1.1.

    - "Minor surface impacts are also present beneath Berths 1 and 2 where the pipelines daylight." Please include discussion about if the workers who have to go underneath Berths 1 and 2 are under risk.

    - "Residual TPH impacts in soil is an exposure pathway for leaching to both the perched zone and the shallow alluvial aquifer." Add a new section to evaluate soil to groundwater pathway. Move this sentence to the new section.

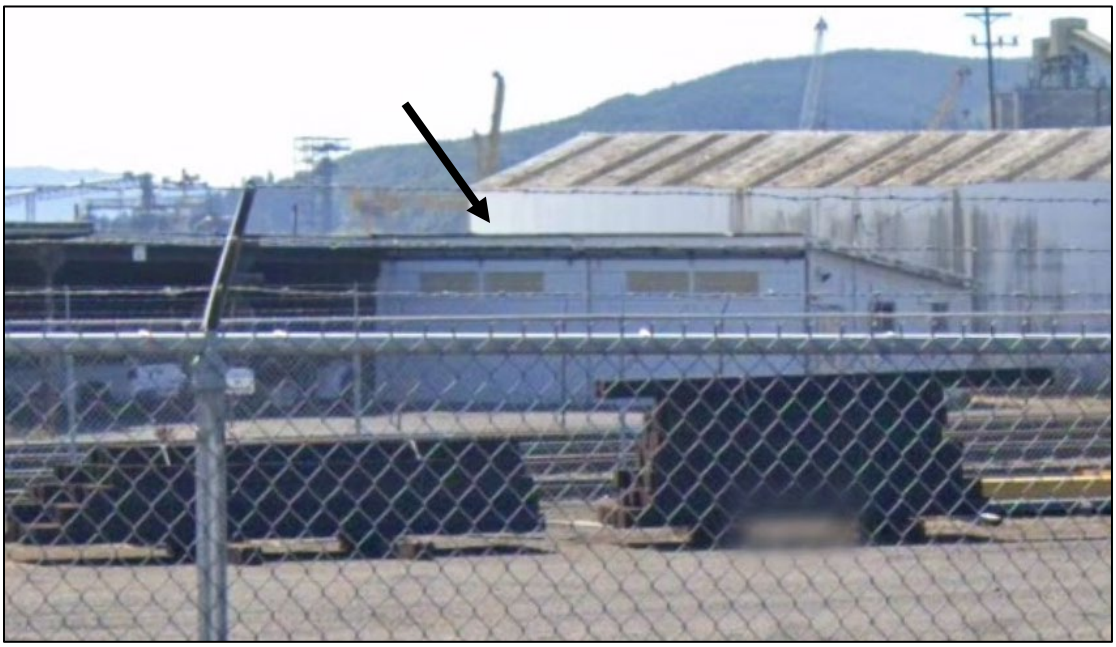
- Section 6.1.2, Soil vapor exposure pathway and Section 6.2.3, Groundwater to air: Ecology agrees that the conclusions of the soil vapor study may be applied to the specific area of investigation (VP-1 and VP-2). However, Ecology does not agree that the conclusions from this study can be used as an empirical demonstration (as stated in Section 8.3.1) to exclude the soil gas to indoor air pathway to be of concern for occupants of any future buildings constructed at the Site.

- Briefly explain how the soil vapor sampling locations (VP-1 and VP-2) were selected. As more data became available after the RI fieldwork, please evaluate if the risk of vapor intrusion needs to be assessed for the rest of the site. If the evaluation result

warrants additional soil vapor sampling, please prepare a work plan and submit it to Ecology for approval.

- After examining the RI results, without knowing the use of some existing buildings, Ecology concludes that the risk of vapor intrusion may need to be evaluated at least in two areas:

    - Area south of OIP-61. The extent of TPH contamination has not been defined due south of OIP-61. Of particular concern is the potential for vapor intrusion into occupied spaces within the nearby building (for example, see below screenshot and arrow). Ecology recommends that soil gas samples for TPH-air phase hydrocarbons (APH), BTEX, naphthalene, oxygen, carbon dioxide, and methane from the area between the building and OIP-61 to characterize the extent of TPH contamination. If there is not sufficient horizontal and vertical separation from the contamination and the structure, then it may be necessary to also collect sub-slab samples beneath this building and possibly indoor air samples.



    - Former US Army Reserve Building. There is limited TPH characterization data between the Former U.S. Army Reserve building and the TPH source area to the west and northwest. Also, since there were additional ASTs in the vicinity of the 80,120 barrel AST that were not previously identified during the RI, Ecology recommends that additional data be collected in the form of soil gas samples for TPH-APH, BTEX, naphthalene, oxygen, carbon dioxide, and methane from this area. If there is not sufficient horizontal and vertical separation from the contamination and the Former U.S. Army Reserve

building, then it may be necessary to also collect sub-slab samples and possibly indoor air samples from this building.

- Section 6.2.2.
    - Please identify the specific upgradient (closest to the river) wells that were examined as well as the numerical weathered DRO concentrations protective of aquatic receptors in freshwater that they were compared to.
    - The statement that Site hydrological studies have confirmed that the groundwater flow direction in the alluvial aquifer is permanently to the north is not completely correct. Please see above comments to Section 5.2.1.2 and revise Section 6.2.2 accordingly.

8. Section 7.0, Preliminary Cleanup Levels:

- Re-organizing Section 7.0. Section 7.0 currently includes too much information that is repetitive with the pathway analysis in Section 6.0. It would be confusing to the readers when information is presented twice.
- Mixing MTCA Method A and Method B Cleanup Levels: The groundwater preliminary cleanup levels in the report (summarized in Table 7.1) list a combination of MTCA Method A and MTCA Method B Cleanup Levels. As stated in Ecology (2001), when using Method B or Method C to develop a TPH soil cleanup level using TPH fractions, the Method A TPH ground water cleanup level cannot be used as the ground water cleanup level. This is because the ground water TPH cleanup levels were developed based on an assumed composition that may be different from the composition of TPH at the Site.[3] Instead, WAC 173-340-720, equation 720-3 must be used to develop a Method B TPH ground water cleanup level (using analyses results of groundwater samples for TPH fractions) or a predicted ground water composition can be used (for example, the value shown in A2, item 3.1 in the soil calculation workbook).
- Adjustment for total site risk: Please note that as required by WAC 173-340-700(5)(b), when there are multiple hazardous substances and/or multiple pathways of exposure, then Method B cleanup levels for individual substances must be adjusted downward for additive health effects if the total cancer risk exceeds one in one hundred thousand (1×10^{-5}) or the noncarcinogen hazard index exceeds one (1).
- Section 7.1.

[3] Concise Explanatory Statement for the Amendments to the Model Toxics Control Act Cleanup Regulation, Chapter 173-340 WAC. Washington State Department of Ecology Publication No. 01-09-043, February 12, 2001. See GQ 9.1.4.

- 2nd bullet: Insert "generally" before "northerly" in the first sentence. Also, revise the second sentence to state that "the RI confirms that *contaminated* groundwater does not discharge to surface water…"

- 3rd bullet: Please note that there is a revised version of Ecology's vapor intrusion guidance (Ecology, 2022).[4] Also, as noted above, Ecology does not agree at this time that there is sufficient data to conclude that the soil vapor pathway is incomplete. This comment also applies to all other sections of the report that discuss the soil vapor pathway.

- Section 7.3. MTCA Method B and Method C Soil Cleanup Levels are not the proposed preliminary cleanup levels for TPHs, as they are not included in Table 7.2. Will they be used as endpoints of a remedial action or the remedial action objective in certain areas? If yes, the content in this section fits Section 11.4 better.

  Also, please note that unless established using MTCA Method A, soil cleanup levels shall be as least as stringent as all for the following: applicable state and federal laws, environmental protection, and human health protection (including ground water protection, direct contact, and soil vapors). However, the calculated Method C soil cleanup levels for TPH exceed proposed residual saturation levels and are not protective of groundwater.

- MTCA Methods B and C calculation workbooks:

  - In June 2021, Ecology published information on updated toxicity data and physical/chemical properties for petroleum mixtures. The updated information provided into this 2021 guidance has been incorporated into a revised version (MTCA TPH Ver. 11.1) of the Excel Workbook tool for calculating cleanup levels for petroleum contaminated sites.[5] The worksheets provided in Appendix B are incorrect because they were prepared using an outdated version of the workbook tool. Therefore, the calculations will need to be redone using the June 2021 version.

  - Ecology checked the workbook results shown in the report for selected samples, using the June 2021 version, and Ecology's input parameters differ somewhat from the ones used in the report. The reasons for this may include the following:

[4] Guidance for Evaluating Vapor Intrusion in Washington State, Investigation and Remedial Action, Toxics Cleanup Program, Washington State Department of Ecology, Publication No. 09-09-047, March 2022.

[5] The revised workbook tool can be downloaded from: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Clean-up-petroleum-contamination

- Because the report used "rounded" laboratory results. Ecology used the values shown on the laboratory reports, with no rounding.

- Whether corrections were made to avoid "double-counting." Ecology followed the recommendations in Section 8.5 of Ecology's petroleum guidance document (Ecology 2016) to adjust equivalent carbon (EC) fractions to avoid double-counting.[6]

- Differences in the dilution factor that was used. For example, the report's calculation for OIP-08, 19-20' used the default dilution factor of "20" (unsaturated zone soil) because the "sample [was] collected above groundwater and thick silt layer." However, Ecology disagrees that it is appropriate to use this dilution factor. The OIP-08 boring log notes that "heavy rainbow sheen and droplets" are indicated from depth of 14.5 feet below ground surface (bgs) to 16.5 feet bgs and moderate sheen is from 16.5 feet to 22.5 feet bgs (including within the approximately 1.5 feet thick silt layer). Although the boring log indicates the water table at approximately 21 feet bgs, it is likely shallower. Nearby well MW-40 has depth to water values in Table 4.9 ranging from 16.4 to 18.71 feet. Also, the OIP/HPT log indicates high fluorescence below the water table from 21.5 to 23 feet bgs. Therefore, Ecology used a dilution factor of "1" (saturated zone soil) to provide a conservative value for the calculation.

- Differences in the data entry values for petroleum fractions and/or carcinogenic polycyclic aromatic hydrocarbons (cPAHs). For example, the report's calculation used values of zero for some polycyclic aromatic hydrocarbons (PAHs), including benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene because the "constituents have never been detected within this area." Ecology used one-half reporting limit values for all cPAHs that were below the reporting limit because each of these constituents have been detected from at least one location at the Site.

- Differences in the total soil porosity value used. The report's calculation used a porosity value of 0.466. Ecology used the default value of 0.43.

- Differences in the fraction organic carbon (f_{oc}) value used. The report's calculation used a site-specific value of 0.0403 (unitless) for

[6] *Guidance for Remediation of Petroleum Contaminated Sites*. Department of Ecology, Publication No. 10-09-057, Revised June 2016.

f_{oc} based on an average site total organic carbon (TOC) while Ecology used the default f_{oc} value of 0.001. Please describe in detail how the site-specific f_{oc} value that you used in the calculations meets the requirements of WAC 173-340-747 Sections (5)(b)(i) and (6)(d)iii)(A) or use the default value.

- Target TPH GW concentration: The report used an input value of 800 milligrams per liter (µg/L) as the target TPH groundwater concentration (worksheet A1, item 4). According to the workbook tools guidance document (Ecology 2007), this is an optional parameter that is to be used to account for concentrations based on: surface water impacts, the nonaqueous phase liquid (NAPL) limitation, total site risk (where chemicals other than petroleum mixture exist at a site), or non-potable groundwater.[7] None of these conditions are applicable for the TPH Method B cleanup level calculation. Therefore, this parameter should be left blank.

- The samples that were analyzed for VPH/EPH fractions included several samples contained relatively low TPH concentrations that either do not appear to exceed any potential screening levels or do not represent the highest concentration for that particular location. These samples consist of: GP-1, 19.5-20'; MW-33, 19.5-20'; OIP-15, 20-21', OIP-39, 16.5-17'; and OIP-47, 17'. These samples should not be included with the VPH/EPH samples for determining a MTCA Method B Cleanup Level because will make the calculated TPH result less representative.

- Please include an estimate of the total area and volume of soil that exceeds an applicable screening level for protection of groundwater. Ecology (2007) notes that the use of a default dilution factor of "20" (unsaturated zone soil) may not be sufficiently protective of the ground water where the source size is significantly larger than a half-acre, as specified by EPA (1996).[8]

- Please see Section 8.5 (and particularly Figure 8.1) of Ecology (2016) for a recommended overview of the procedure for calculating Method B Soil TPH Cleanup Levels.

[7] *Workbook Tools for Calculating Soil and Ground Water Cleanup Levels under the Model Toxics Control Act Cleanup Regulation: Users Guide for MTCATPH 11.1 & MTCASGL 11.0*. Washington State Department of Ecology, Toxics Cleanup Program, Publication No. 01-09-073, Revised December 2007.

[8] U.S. EPA, 1996, *Soil Screening Guidance: Technical Background Document*, EPA/540/R-95/128.

9. Section 8.0, Development of IHSs and Proposed Cleanup Standards:

- 8.1 Determination of Indicator Hazardous Substances. "These selection criteria are established in MTCA to determine compliance with groundwater cleanup standards". Are the criteria for both soil and groundwater?

- 8.2.1 Point of Compliance. One of the criteria for a conditional point of compliance (CPOC) is that the CPOC does not exceed the property boundary. However, since groundwater contamination exceeds the Port's property boundary, and is present on the neighboring Washington State Department of Transportation (WSDOT) property, this criteria is not met. There are exceptions to this requirement provided for under WAC 173-340-720(d) but they do not apply to the Site because contaminated groundwater from the Site does not pose a risk to surface water. Therefore, it does not appear that a conditional point of compliance is an option at the Site.

  Also, the statement that "impacted soil beneath active rail lines is inaccessible to nearly all potential treatment technologies" is debatable because there are potential in-situ technologies that could be used in this area. The selected ISCO injection could potentially be repeated until the more stringent cleanup levels are achieved. Also, access for in-situ treatment technologies could be achieved by angled and/or horizontal wells. Therefore, additional justification would be needed to support this conclusion before Ecology could concur.

- 8.3.1 Point of Compliance.

  - 1st bullet, 1st sentence: The referenced section of MTCA does not use the term "irrespective of receptor." Also, the terrestrial ecological risk was excluded via TEE but it is mentioned here again. How is ecological risk assessment in WAC 173-340-7490(4)(b) related to "Direct Contact" for human?

  - 1st bullet, 2nd sentence: Please reword this sentence. The standard point of compliance (POC), as defined in -740(6)(d) is the point or points where soil cleanup levels via direct contact with the soil is required to complete the pathway. The POC is simply where the cleanup standard must be met for that pathway. Establishing cleanup standards, as defined in WAC 173-340-200, requires specification of the hazardous substances that protect human health and the environment (cleanup levels), the location on the site where the cleanup levels must be attained (POC), and the additional regulatory requirements that apply to a cleanup action because of the type of action and/or location of the site. This sentence says that the "POC is protective…" It is the cleanup standard that provides the protection.

- 2nd bullet: Leaching to groundwater, 2nd and 3rd sentences. It is not consistent with MTCA requirements because an empirical demonstration is a method for deriving soil concentrations rather than demonstrating compliance;[9]

- 3rd bullet: Soil vapor. See Comment #31.

- 8.3.2 Proposed Cleanup Levels. Please make it clear that the soil to groundwater pathway is also complete. Table 8.3 says the standard point of compliance is proposed for the groundwater, which conflicts with the 2nd bullet of Section 8.3.1.

10. Section 9.0, Conceptual Site Model:

- Nature and extent of COCs. CSM is usually a concise and comprehensive summary of RI findings (i.e. COCs, nature and extent of COCs, fate and transport, complete pathways, etc.). This section currently contains detailed discussion about the nature and extent of COCs which is repeating with the discussion in Section 4.0.

- 9.1 Original Release Mechanisms and Primary Contaminated Area. Include the information below regarding the pipelines. The December 7, 1994, Phase IV Characterization Report – Bunker C and Diesel Fuel Investigation by Golder Associates indicates at least one pipeline that was plugged with concrete had an oily substance leaking from the bottom of the pipe. This suggests the cleaning was not sufficient to remove residual product, or some of the pipelines were not cleaned. In addition, the spills occurred in 2016 indicate upland side of the Longview Fibre pipeline have remaining product. Therefore, the former Longview pipeline is considered a potential source.

- 9.2.1.1 Total DRO and ORO, Alluvial Aquifer. Figure 9.3 shows that the southern dissolve-phase plume potentially connects with the central dissolved plume. Please explain why the southern plume and central plume are considered separate.

- 9.2.1.3 Natural Attenuation of Contaminants. This subsection talks about natural attenuation without specifying where it is occurring. Natural attenuation is also discussed in 9.2.1.1 for the perched water bearing zone. Is it also occurring to the alluvial aquifer?

  Instead of presenting the information here, it is more appropriate to move it to the RI results section since one of the RI activities is to measure natural attenuation parameters.

[9] WAC 173-340-747(9)

- 9.2.2.1 Nature and Extent of LNAPL. It belongs to Section 4.0. Add discussion regarding why LNAPL are not present in the locations where TPH in the soil samples are much higher than in the soil sample from MW-09.

- 9.2.2.2 Preliminary Residual Saturation Levels. The discussion of residual saturation levels doesn't fit in here. Please consider moving it to Section 11.4 Remediation levels if your intent is to use them as the remediation levels for TPHs in the soil.

11. Section 10.0, Remedial Investigation Summary and Conclusions:

The discussion under this section and Figure 9.1 makes a good conceptual site model section.

12. Section 11.0, Feasibility Study Introduction and Objectives

- Please define "CAA".

- 11.1 Remedial Action Objectives. Delete "Remediate contaminants in a method that does not interfere with or limit current or future operations of the Port terminal." It's not a remedial action objective. Cleanup considers current and future site use, but prioritizes reducing the unacceptable risk to human health and the environment.

  "To the extent practicable" in the other objectives has indicated that current and future land use will be considered when establishing alternatives.

13. Section 12.0, Identification and Screening of Remedial Technologies:

- This could be the place to demonstrate the statement that "it is impractical to meet proposed groundwater CULs throughout the Site within a reasonable restoration time frame because of the large volume of contaminated soil located beneath active rails; impacted soil beneath the active rail lines is inaccessible to nearly all potential treatment technologies." Add detailed discussion about which of the screened technologies have been considered for destroying/removing the contamination in the subsurface within CAA-2 and reasons why they're not feasible. Also see Section 8.0, 2nd bullet.

- 12.2 In Situ Technologies. Change "Surfactant Soil Flushing" to match the name used in the subsequent alternatives, which is "Surfactant Injection and Extraction". Otherwise, it can be confusing.

14. Section 13.0, Description of Remedial Alternatives:

- Estimated restoration time frames. For Alternatives 2 to 5, only the restoration time frames to meet CULs in the groundwater at CPOC are provided. What are the

estimated restoration time frames to meet the proposed cleanup standards as shown in Table 8.3?

- Off-Property ISCO Injections Extent, Alternatives 2, 3, and 4.
    - Please explain how the depth of 20 ft bgs is determined. Also, please clarify if the remedy is targeting both water bearing zones.
    - Ecology is concerned that the number of injection points and restoration timeframe has been underestimated because:

- Perched water-bearing zone: For the reason stated in Section 4.0, 5th and 7th bullet, the groundwater further west beyond MW-30, MW-35, and MW-5 may also need treatment in order to meet the cleanup levels.

- Alluvial aquifer: Figure 9.3 indicates that the dissolved plume in the alluvial aquifer may have reached the WSDOT property as well.

  In order to refine the three alternatives, and demonstrate compliance in the future, additional groundwater monitoring wells are needed at the following locations:

    - Perched water-bearing zone, west of MW-30 and MW-35: Wells MW-30 and MW-35 are listed as perched monitoring wells in Table 4.9 but based on cross-section C-C' (Figure 5.3), these wells appear to be screened across both aquifers. Therefore, these are not representative monitoring wells for the perched water-bearing zone. Both of these wells need to be properly abandoned and replaced with perched monitoring wells that does not penetrate the lower boundary unit of the perched aquifer. Since both of these wells have exceedances of combined diesel and oil-range TPH, additional well(s) will also need to be installed further west (downgradient) so that the western edge of the plume can be defined.
    - Perched water-bearing zone, west of MW-4: An additional well is needed to the west to define the western edge of the TPH plume.
    - Perched water-bearing zone, northwest of MW-2: An additional well is needed to the northwest to define the edge of the TPH plume.
    - Alluvial aquifer, west of GP-2, GP-1, and MW-05: Additional wells are needed to the west and north to define the western edge of the TPH plume. Telescoping method is recommended during well installation to prevent aquifer intercommunication.

Please prepare a work plan for installing and sampling the additional groundwater wells listed in Section 13.0, 2nd bullet.

- Isolated soil contaminations. There are several areas that isolated soil contaminations were found. These areas include P1 to P6, SCR-7, and GP-18 as highlighted in Figures 13-1 to 13.5. Please be specific about how the risks associated with these isolated soil contaminations will be addressed.

- Shallow subsurface contaminations. Shallow subsurface contaminations were documented at MW-19 (@2-4 ft and 4-8 ft), SCR-1 through SCR-3 (@0-1 ft), MW9 (@2ft and 7ft), MW-40 (@1-1.5 ft), etc. Although they are within the footprint of ISCO, they are relatively shallow and not likely to be affected by the injection. It is not clear how the risks associated with these shallow soil contaminations will be addressed.

- 13.6.1 Former Longview Pipeline Inspection. Rename the action to reflect the nature of this component, which is a source control. Please see Comment #44 for why Ecology considers it a source. To control the source and stop the release/prevent future release, actions below will be needed:

    - Survey the conditions of the pipeline if it is also unknown
    - Inspect the contents in the pipeline
    - Specific measures to stop the release and/or prevent future release

  Include potential options for different situations that can be found during the inspection. If the pipeline is determined not in a good shape and leaking, is decommissioning an option?

- 13.6.2 Surfactant Injections and Extractions. Please provide case studies where the selected surfactant has been successfully used. Can the surfactant injection and extraction be used in other areas where soil concentrations are above residual saturation? Is using surfactant injection and extraction quicker than using ISCO injection in terms of removing/destructing the source in the soil?

  Can the technology be used anywhere else if LNAPL is encountered (e.g. soil seems to be saturated) during the preliminary design investigation or implementation of ISCO injection? Below is just an example.

  DRO is 42,000 mg/kg in the soil sample collected from MW-26 @18ft within the alluvial aquifer, but the well is screened within the perched zone. Is there any information to indicate that no LNAPL in the alluvial aquifer at MW-26?

- 13.6.4 Monitored Natural Attenuation and Groundwater Monitoring. What is the purpose of MNA? What is the endpoint of MNA?

15. Section 14.0, Alternatives Evaluation and Disproportionate Cost Analysis:

- 14.1.1 MTCA Threshold Requirements. Please use definitions of Protection Monitoring, Performance Monitoring, and Confirmation Monitoring in MTCA.

- 15.6 Compliance with MTCA. "Because it is not practicable to meet the CULs… a CPOC along the northwestern and northern boundary of the Port property." Demonstrate why it is not practicable to meet the CULs throughout the Site within a reasonable time frame. Also see Section 8.0, 2nd bullet, and Section 12.0 1st bullet.

On Oct 19th, Ecology met with the potentially liable persons (PLPs) and your consultant, Floyd Snider, to discuss the comments and potential revisions to the report in response to the comments. The proposed revisions were later approved by Ecology on Nov 22nd.[10]

According to the Agreed Order Schedule of Deliverables, you shall provide a revised Draft Remedial Investigation/Feasibility Study report within 60 calendar days of receipt of Ecology's comments. However, Floyd Snider, on behalf of the PLPs, requested to extend the deadline to February 1st, 2023. Ecology approved the request due to the time needed for making the proposed revisions. If you have any questions about this letter, please contact me at 360-999-9587 or sam.meng@ecy.wa.gov.

Sincerely,

Sam Meng, PhD, PE
Cleanup Project Manager/Environmental Engineer
Toxics Cleanup Program
Southwest Region Office

cc: Gabe Cisneros, Floyd Snider, gabe.cisneros@floydsnider.com
Rebecca S. Lawson, Ecology, rebecca.lawson@ecy.wa.gov
Jerome Lambiotte, Ecology, jerome.lambiotte@ecy.wa.gov
Ecology Site File

[10] Floyd I Snider, *Response to Comments Port of Longview TPH Site Draft Remedial Investigation/Feasibility Study*, November 8, 2022.