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October 31, 2018

Warren Snyder PE
Senior Manager, Environmental Engineering
Rayonier Advanced Materials
1301 Riverplace Boulevard, Suite 2300
Jacksonville, FL 32207

Re: Washington State Department of Ecology Comments on the *Public Review Draft Interim Action Report Volume III*

Dear Mr. Snyder:

The Washington State Department of Ecology (Ecology) is providing the final comments on the *Public Review Draft Interim Action Report Volume III*, submitted March 30, 2018. Included are comments on the revised groundwater sections provided July 27, 2018.

On August 6, 2018, we provided draft comments on the March 30, 2018, version of the report. These final comments supersede the draft comments.

As we have discussed, Ecology's comments will necessitate further revisions to the Volume III report. The Agreed Order did not anticipate an additional revision of the Volume III report, and does not provide for a schedule.

During our September 24, 2018, meeting we discussed a path for responding to comments, resolving issues, and revising the Volume III report. The proposed path forward is as follows:

- Rayonier will develop a comment resolution matrix based on the comments enclosed with this letter within a month of receipt. The matrix will identify issues requiring clarification or other resolution in order for Rayonier to be able to prepare a final Volume III submittal.

- Rayonier and Ecology will meet one or more times, as necessary, during the November through January timeframe, to resolve issues identified in the matrix. The meetings will be conducted as a "workshops" between Rayonier and Ecology. Resolutions of issues will be captured in the matrix by January 31, 2019. The first workshop is tentatively scheduled for November 26 or 27.
- Rayonier will revise the *Public Review Draft Interim Action Report Volume III* by the end of March 2019, and reflect the resolutions documented in the matrix. Rayonier will provide a **preliminary draft** of the revised report for Ecology review to ensure issue resolutions have been incorporated consistent with Ecology's expectations.
- Rayonier and Ecology will meet on the draft revised report in late April 2019.
- Rayonier will submit the revised *Public Review Draft Interim Action Report Volume III* in May 2019.

Ecology approves this plan and agrees to amend the schedule under the Agreed Order accordingly. **The Revised Public Review Draft Volume III Report is due by May 17, 2019.**

Please do not hesitate to contact me at (360) 407-6257 if you have any questions.

Sincerely,

Marian L. Abbett

Marian L. Abbett, P.E.
Project Manager
Toxics Cleanup Program
Southwest Regional Office

MLA:af

Enclosure: Agency Comments

By certified mail: 9171999991703647134793

cc: Matt Beirne, Lower Elwha Klallam Tribe
Carla Yetter, Rayonier Advance Materials
Rebecca S. Lawson, P.E., LHG, Ecology

Public Review Draft Interim Action Report
Volume III: Alternatives Evaluation
Ecology Comments

General Comments

Cultural Resources
Figure 2-2 should be edited, in consultation with the Lower Elwha Klallam Tribe, to eliminate display of sensitive cultural features.

Restoration and Cleanup
The soil cleanup alternatives include capping in the Ennis Creek restoration area which does not match with restoration plans for Ennis Creek. All soil alternatives should show excavation of contamination in the restoration area.
Suggestion:

- Include a figure that shows the Ennis Creek restoration area as cross hatching (similar to figures showing dock/jetty removed for restoration)
- Include Footnote - much of the Ennis Creek restoration area will be excavated for restoration and the materials will be managed under the Materials Management Plan (or revised MMP)
- Show on the figure that area which must be addressed for cleanup. This area will be excavated for cleanup. The handling of the material should be identified in the Volume III report.

Mitigation
Any remediation that involves in-water fill may trigger habitat mitigation in accordance with Chapter 220-660 WAC, Hydraulic Code Rules. For example, armoring shoreline may trigger habitat mitigation. The Volume III report should identify and evaluate the need for habitat mitigation with the various alternatives. If mitigation is required, then the cost of mitigation should be reflected in the cost of the alternative presented.

Climate Change
Adapting to climate change impacts is a critical challenge for cleanup sites in Washington. To that end, Ecology developed a guidance document "Adaptation Strategies for Resilient Cleanup Remedies, A Guide for Cleanup Project Managers to Increase the Resilience of Toxic Cleanup Sites to the Impacts from Climate Change (November 2017). After our meeting on January 30, 2018, Ecology provided a copy of this guidance via email. The Volume III report must evaluate the resilience of the remedies to the effects of climate change.

Extent of Contamination
For each media, figures showing the exceedances of cleanup levels and remediation areas should be included. For example, Figure A-6 in the ARD shows the marine remediation areas. This figure was not included in the PRD. Also, include a figure of exceedances of soil cleanup levels and remediation levels.

Sediments

Point of compliance
In our previous comments on the ARD of Volume III, we requested the use of a point of compliance of 45 cm for human health through ingestion of bivalves in the intertidal areas, a typical depth from which clams would be collected during intertidal clam-digging.

To clarify expectations, we provided the following table outlining the points of compliance in Port Angeles Harbor.

Area	Definition of area	Exposure Route	Point of Compliance	Applicable Indicator hazardous substances (IHS)	Comparison to standards
Entire SCU	MHHW to boundary defined by all contaminants of concern (COC) ≥SCL.	Protection of human health - Ingestion of fish and mobile shellfish (crab, shrimp)	10 cm	All	SWAC
Entire SCU	MHHW to boundary defined by all COC ≥SCL.	Protection of aquatic life (benthic organisms)	10 cm	All	Point by point
SMA	MHHW to MLLW	Protection of human health - Ingestion of sessile shellfish (bivalves)	45cm	Includes All (cPAHs, metals, etc.) except Total TEQ[1]	SWAC (SWAC beach segments separately)
Intertidal Area	MHHW to MLLW	Protection of human health - Direct contact (contact with and ingestion of sediment)	45 cm	All	SWAC

[1]. Total TEQ combines dioxin/furan and PCB TEQs

The 45 cm point of compliance was not incorporated in the PRD Volume III report. Please provide the rationale for not incorporating Ecology's comments. We will need to discuss and resolve.

Enhanced Natural Recovery (ENR) in Log Pond
We appreciate the modeling effort put forth in the Volume III report to evaluate the efficacy of ENR in the log pond. The evaluation is a good initial evaluation. The evaluation of waves indicates erosion potential. However, because of the shallow water nature of the site and proposed ENR, a more thorough evaluation is warranted. The evaluation should consider 100

year storms, and wave and current induced interactions together. Based on Ecology's Climate Change guidance, we should consider that extreme storms may be more frequent and more extreme. There will likely be effects on sea level rise, and wind, wave and current conditions.

If a more thorough evaluation indicates erosion potential, then other measures to protect the ENR layer (e.g., berms) should be considered and the cost to design and construct these other measures should be included in the alternatives. Other measures like berms might trigger mitigation requirements which will have a cost too.

Sediment Cap
In Section 4.4.3.2, sediment capping is screened out as a remediation technology. This section notes the "purpose of a cap would be to keep underlying fill in place and further control diffusion of underlying contaminants." Since "...prevention of contaminant diffusion is not a concern due to the relatively low concentrations of contaminants..." it was determined that capping is not a remediation technology to retain for further evaluation. However, sediment capping also serves as an isolation layer over contaminated sediments, even when diffusion is not a concern. Ecology requests that sediment capping as a remediation technology be retained and evaluated further.

Modify sediment remedies
Only one alternative (S-5) considers dredging under the dock. The sediments under the dock exceed cleanup levels for cPAH and total TEQ. When the dock structure is removed, the sediments beneath may erode and spread away from the structure. Dredging is an option to address the contaminated sediments quickly following structure removal. We would like to see more alternatives include dredging under the dock as a component. Consider modifying alternatives S-3 and S-4 with a dredging under the dock component.

Groundwater

Groundwater contamination does not pose an unacceptable risk
The Volume III report continues to include statements that the groundwater contamination does not pose an unacceptable risk. Measured groundwater concentrations exceed preliminary cleanup levels (PCULs) for protection of marine sediment and surface water at several shoreline wells. These concentrations represent an unacceptable risk. All of these statements should be deleted.

Groundwater mixes with oxygenated seawater and dilutes contamination
The Volume III report continues to include statements that the groundwater mixes with oxygenated seawater and dilutes the contamination to below cleanup levels. There is no evidence or proof that mixing of upland groundwater with oxygenated seawater will attenuate groundwater concentrations to below PCULs before the standard or conditional point of compliance. All of these statements should be deleted.

Only second quarter 2011 data used
It is not clear why the groundwater data discussion is limited to the data from the second quarter of 2011. The data discussion should include data from 2010-2011 as was done in Table 3 of

the Agency Review Draft Volume III report. Because of seasonal fluctuations, the use of only one sampling event is too limited of a timeframe to base decisions on.

Soil to groundwater not a concern
Ecology disagrees that it is unlikely that soil contamination at the Site poses a significant source to groundwater.

Monitored Natural Attenuation
Groundwater monitored natural attenuation (MNA) does not meet MTCA threshold requirements and therefore it must be dropped from further consideration. Analysis of the trend plots in Volume I, Appendix I show that for most constituents there is either no clear downward trend in concentrations, large fluctuations that appear to be related to seasonal or groundwater fluctuations, or an increasing trend. Therefore, MNA must be dropped from consideration as a stand-alone alternative because there is no evidence that it will be successful within a reasonable restoration timeframe. MNA could be retained as a polishing step with other remediation alternatives.

Soil

Cleanup levels vs remediation levels
Ecology provided comments on the ARD on the difference between cleanup levels and remediation levels. These comments were not incorporated into the PRD. Please refer to these comments.

Identification of remediation areas in the uplands should be based on the extent of contamination exceeding MTCA Method B cleanup levels. The use of remediation levels requires, in part, a determination that a more permanent cleanup action is not practicable, based on the disproportionate cost analysis. This step does not appear to be included.

The development of upland soil remediation alternatives should include at least one permanent cleanup action alternative. As noted above, the use of remediation levels requires, in part, a determination that a more permanent cleanup action is not practicable, based on the disproportionate cost analysis. This step does not appear to be included.

All upland soil alternatives rely on some form of capping. Where soil concentrations exceed ecological screening levels (and the conditional point of compliance would be the upper 6 feet of soil), it is not clear that the proposed caps would be protective.

Although it appears to have been overlooked, an area of contamination near the mouth of Ennis Creek was noted in the March 2003 Interim Action Report for the Ennis Creek Finishing Room, Fuel Oil Tank No. 2, and Machine Shop (Integral, 2003). That 2003 report states the following:

> Excavation near the north bridge ceased at a point approximately six feet from the western abutment footing, where any further efforts to remove visible contaminants could have compromised the integrity of the bridge and footing.

And:

> The soil sample collected from the northwest corner adjacent to the bridge support excavation (FW0070) had concentrations of DRO, RRO, and PCBs that were greater than the cleanup level.

This report should confirm that this area is adequately identified and accounted for in the remedial alternatives

Specific Comments

1. Introduction

1. Paragraphs 4 and 5: The introduction mentions the 2002 Marine, 2004 Upland, and 2010 Interim Action Agreed Orders, but doesn't mention that the 2010 order supersedes the earlier orders. A statement should be added that the 2010 order supersedes the earlier orders.

2. Paragraph 6: "While evaluating remedial alternatives, Rayonier evaluated opportunities to perform remedial actions while enhancing habitat."

- Does this include the need for habitat mitigation? Table 3-4, under "Habitat impacts and mitigation," states that "the remedial actions should not result in any net loss of sensitive or critical habitats." Where is this habitat impacts evaluation in the Volume III report?

3. Paragraph 6: "These include removal of the former mill dock and jetty."

- Ecology considers the jetty peninsula as a part of the jetty. Please refer to the portion of the jetty to be removed as the subaqueous portion of the jetty.

4. Paragraph 7: "The peninsula associated with the jetty will remain in place as part of an integrated approach to implementation of the restoration and the remediation. Negative impacts to the existing shoreline hydrodynamics are minimized with this approach, particularly in the subtidal log pond where use of ENR is proposed."

- The success of the remedy in the log pond should not have to rely on the jetty peninsula remaining in place since it is not located on Rayonier property. Alternatives should be engineered in a manner that that they would be stable in the event that the jetty peninsula is removed at some point in the future.
- The modeling provided in support of this statement is displayed in Figure 5-13. The wind condition modeled does not provide assurance that ENR in the subtidal log pond will not be resuspended during the strongest storm conditions from the NE direction. Model results from an approximate 100-year storm from the NE direction should be provided to assess how the remedy for the log pond should be engineered.

5. Paragraph 7: "As discussed later in Section 5 of this report, the project enjoys the benefit of enhanced habitat as well as the development of a stable shoreline with an appearance consistent with other locations in Port Angeles."

- This implies that the appearance of the shoreline in other locations in Port Angeles is a sufficient or desired outcome. Since much of the Port Angeles Harbor shoreline is heavily armored, this isn't necessarily a good model of how the shoreline post cleanup or restoration should be designed.

6. Paragraphs 6 and 7: "The shoreline in the vicinity of these structures will be stabilized to minimize erosion using traditional methods." And "…as well as the development of a stable shoreline with an appearance consistent with other locations in Port Angeles.

- Stabilized how and with what? The use of rip rap to stabilize the shoreline surrounding the Mill site is not suitable habitat.

1.1. Purpose and Scope

7. Paragraph 2: "In proposing the preliminary cleanup standards, Rayonier has used the preliminary cleanup levels (PCULs) set by Ecology for the marine environment for the Port Angeles Harbor, as determined by Ecology based on the Port Angeles Harbor Sediment Characterization Study and other relevant information."

- Rayonier should be developing preliminary cleanup standards using the Preliminary Sediment Cleanup Objectives for Port Angeles Harbor report (NewFields, May 22, 2013), Preliminary Cleanup Standards for the Study Area (Agreed Order Task 4a deliverable, Rayonier, July 12, 2013), Ecology's comments on the Preliminary Cleanup Standards for the Study Area (January 28, 2014), and North Olympia Peninsula Regional Background Sediment Characterization (Ecology, Pub. No. 16-09-142, February 2016) to develop preliminary cleanup standards.

1.2. Principal Objectives

8. Paragraph 3: The report should clearly state that cleanup levels are based on unrestricted or industrial exposure scenarios for applicable areas based on zoning and foreseeable future use, and that all cleanup alternatives will address these cleanup levels. Risk based remediation levels, such as an open-space scenario, are used to define where different remedial technologies will be used as part of a cleanup action at a site. "Open-space" must be defined.

1.3. Report Organization

2.3. Site Physical Features

9. This section should describe what portions and features of the site are on lands leased from WDNR. The boundaries shown in Figure 2-3 are not easy to discern.

2.3.1. Upland Study Area

10. Figure 2-4 Land Use Areas: Based on anticipated future use for restoration under natural resource damage settlements, the parking lot area should be included in the Ennis Creek land use area instead of the West Mill Area.

11. Figure 2-5 Zoning Map: The zoning map does not include consideration of the 200' shoreline designations from the Port Angeles Shoreline Management Plan. According to this plan, the shoreline west of Ennis Creek is designated High-Intensity Mixed-Use

Environment and the shoreline east of Ennis Creek is designated Urban Conservancy-Recreation Environment.

2.3.1.1 West Mill Area

12. While these areas currently have "limited habitat value," that may change following remedial and restoration actions and thus those limited values should not be assumed to continue into the future.

2.3.1.2 East Mill Area

13. While these areas currently have "limited habitat value," that may change following remedial and restoration actions and thus those limited values should not be assumed to continue into the future.

2.3.1.4 Ennis Creek Area

14. Paragraph 3: "Similar to other areas of the mill property, access to the Ennis Creek Area by humans is currently limited to temporary construction workers and visitors, as well as occasional/infrequent trespassers."

- Is the access to the creek on the east side of the parking lot now fenced? Based on recent reports of homeless encampments in this area, it sounds like trespassers at this site are more than occasional/infrequent.

2.4. Nature and Extent of Contamination

15. Although this section references Volumes I and II, this report should provide figures showing the extent of contamination for each media relative to cleanup levels (not just remediation levels).

16. Paragraph 1: "Both Ecology and EPA have historically conducted routine regulatory compliance inspections at the former Rayonier mill, including a multimedia compliance investigation in 1993 and an ESI in 1997 (Ecology and Environment 1998)." The wording of this sentence makes it sound like the ESI was a routine regulatory compliance inspection.

2.4.1. Soil

17. Paragraph 4: "Environmental investigations completed between 2001 and 2011 did not identify any significant remaining sources of contaminants in soil that could impact groundwater. As discussed in Section 3, the low contaminant concentrations that remain in upland soil are not expected to pose a risk to groundwater."

- Ecology does not agree with the statement that the contaminant concentrations that remain in upland soil are not expected to pose a risk to groundwater. This statement

contradicts the discussion in Volume I. For example, in Volume I, Section 6.3, the text states:

> *"Soil and groundwater impacts from other COPCs (e.g., TPH, cPAHs, and/or PCBs) are more localized; these COPCs are limited in their extent and appear to be associated with distinct source areas such as the Fuel Oil Tanks 1 and 2 areas, Wood Mill Area, Machine Shop Area, and Finishing Room Area.*
>
> *Similar to the nearly ubiquitous presence of metals in soil at concentrations exceeding screening levels, several metals – manganese, copper, and nickel – have been widely detected in groundwater beneath the mill property at concentrations exceeding screening levels.*
>
> *The cumulative soil and groundwater sampling results indicate that several metals that may be related to former mill operations – arsenic, copper, manganese, mercury, nickel, and zinc – are present in soil in several functional use areas at concentrations that may represent a source of contamination to groundwater. The possible mill-related arsenic, copper, manganese, and nickel concentrations that may represent a source of contamination to groundwater are limited to the upper 5 feet of soil. The mercury and zinc concentrations that may represent a source of contamination to groundwater are limited to the upper 10 feet of soil."*

Volume I, Section 7.2.1 mentions that residual contaminants of potential concern (COPCs) are widely distributed across the mill property and that the soil-to-groundwater (leaching) pathway is an exposure pathway of potential concern. Volume I, Section .2.2 states that the groundwater-to-sediment pathway is being considered further for select contaminants in the Northwest Shoreline and North Shoreline functional areas.

Also, Volume III, Section 2.5.1, Historical Contaminant Sources, states that certain geochemical conditions (such as anoxic/reducing and/or acidic or alkaline pH) which may have been created as a result of the pulp manufacturing process, may be responsible for metals to "have leached" to groundwater.

Therefore, since upland soil concentrations and/or geochemical conditions created from past operations appear to be causing exceedances of groundwater preliminary cleanup levels for protection of marine sediment and surface water, it is incorrect to state that upland soil concentrations do not pose a risk to groundwater. Please revise the text accordingly.

2.4.2. Groundwater

18. Paragraph 4: Delete this and all other references to groundwater exceedances not expected to pose unacceptable risks. Measured groundwater concentrations exceed preliminary cleanup levels (PCULs) for protection of marine sediment and surface water at several shoreline wells. These concentrations represent an unacceptable risk.

19. Bullet 2: There is no evidence or proof that mixing of upland groundwater with oxygenated seawater will attenuate groundwater concentrations to below PCULs before

the standard or conditional point of compliance. Information from the tidal study suggests that groundwater discharge at the Site is very heterogeneous. Delete the text wording that states that this is expected to occur.

20. Paragraph 5: "The conceptual site model for groundwater indicates that groundwater beneath the upland discharges to marine surface water along the shoreline, at the approximate elevation of low tide."

- What other support do we have for this conceptual site model other than not identifying seeps in the intertidal area? Groundwater may also discharge deeper into the subtidal sediment.

2.4.3. Sediment

21. Paragraph 5: "In addition, two areas along the shoreline of the mill dock landing and the log pond were included to protect shoreline users."

- Intertidal sediments must also be protective of human health through the consumption of sessile shellfish.

2.5.1. Historical Contaminant Sources

22. Paragraph 2: "…may have leached to groundwater."

- Add "and/or may be continuing to leach to groundwater" after "may have leached to groundwater."

23. Paragraph 3: "The primary historical sources of contaminants associated with the mill operations were removed when the mill was decommissioned."

- This sentence is inaccurate and misleading because it states that the primary sources of contaminants were removed when the mill was decommissioned. Significant residual contamination still remained at the time of mill closure, hence the need to perform several interim actions. Also, it should be stated here that inferred historical releases of high and/or low pH solutions from pulp mill operations likely created conditions favorable for mobilizing naturally occurring metals that were present in soils beneath the mill. The changes in subsurface geochemical conditions caused by the pulp manufacturing process are thought to be responsible for the elevated metals concentrations that continue to be detected in groundwater beneath the mill property.

2.5.3. Transport Mechanisms

24. Figure 2-6

- For completeness, the "erosion of contaminated soil/fill" transport mechanism should be added to Figure 2-6.

2.5.4. Exposure Pathways of Potential Concern

25. Figure 2-6

- For completeness, the "direct contact with sediment or surface water by humans" pathway should be added to Figure 2-6.
- Exposure pathway D should also be labeled in the intertidal zone.

2.5.4.2. Soil

26. Paragraph 1: "These interim actions removed…contaminated soil and hog fuel from areas where high contaminant concentrations had been previously identified. The COPCs that remain in soil are generally present at lower concentrations and are more widely distributed across the former mill property."

- Note that the interim actions were not focused on areas of high dioxin concentrations (except coincidentally), and there are still locations with relatively high concentrations in the log yard, in the central and eastern portions of the West Mill Area, and along the eastern edge of Ennis Creek.

27. Bullet 1: "Construction workers, visitors, occasional trespassers…"

- The primary exposure pathways and receptors of potential concern for COPCs in soil should include recreational users (as opposed to just "visitors").

28. Bullet 2: "Terrestrial ecological exposures are expected to be very limited in the West Mill and City Purchase Areas due to the widespread presence of concrete rubble, foundations, gravel, and/or pavement and the corresponding low availability of habitat in these areas."

- While this may be the current condition of the site, there may be more potential for ecological exposures following remediation and restoration actions, and this should be considered when selecting an appropriate remedy.

2.5.4.3 Groundwater

29. As stated in Volume I, Section 9.0, it appears that acenaphthene exceedances of Washington State sediment quality standards in surface sediments of Port Angeles Harbor are possibly associated with elevated groundwater concentrations in the North Shoreline functional use area. This information needs to be added to Section 2.5.4.3. It should also be noted that bis(2-ethylhexyl)-phthalate (BEHP) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) are also groundwater indicator hazardous substances (IHS) for protection of marine sediment according to Table 3-14.

30. Paragraph 3: The argument that drinking water is not a potential exposure pathway should be better supported. WAC 173-340-720(2)(d) includes 4 requirements (i)-(iv) that should each be discussed.

31. Paragraphs 5, 6, 7 and bullets: Delete and/or reword text. See comments on conceptual site model and tidal attenuation factor in Section 2.4.2.

32. Paragraphs 8, 9, 10: As stated in our comments on Section 2.4.2, there is no evidence or proof that mixing of upland groundwater with oxygenated seawater will attenuate groundwater concentrations to below PCULs before the standard or conditional point of compliance for protection of marine sediment and surface water. Delete and/or reword text accordingly.

2.6.1.1. Selection of IHS

33. Table 2-1, Footnote a: "In addition, ammonia, sulfide, wood waste, diesel fuel, and motor oil were identified as IHS in sediment."

- Why are these not discussed in the text or in the table, other than as a footnote?

2.6.1.3 Benthic Community Risk Evaluation

34. As stated in Volume I, Section 9.0, it appears that acenaphthene exceedances of Washington State sediment quality standards in surface sediments of Port Angeles Harbor are possibly associated with elevated groundwater concentrations in the North Shoreline functional use area. This information needs to be added to Section 2.6.1.3. It should also be noted that bis(2-ethylhexyl)-phthalate (BEHP) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) are also groundwater indicator hazardous substances (IHS) for protection of marine sediment according to Table 3-14.

35. Paragraph 2: "It should be noted that the study design for selecting bioassay locations was unusual because it involved the selection of bioassay locations prior to determining where exceedances of SMS occurred."

- This is not at all unusual. For the 2008 Ecology study in Port Angeles Harbor stations for toxicity were preselected based on existing sediment chemistry data and percent wood debris in depositional areas. Please delete this statement.

2.6.1.4. Fish Risk Evaluation

36. The text states that fish in Port Angeles Harbor are unlikely to be adversely affected by the concentrations of chemicals in their tissue, with the possible exception of arsenic. According to Table 3 of the Agency Review Draft Interim Action Report Volume III: Interim Action Alternatives Evaluation Report for the Study Area (July 12, 2013), arsenic concentrations exceeded the PCUL for protection of marine surface water in shoreline wells MW-54, -55, -59, -62, and PZ-9. Please discuss these data in this sub-section. Add also that arsenic is included as a groundwater IHS in Table 3-14.

2.6.2.1 Selection of IHS

37. Paragraph 2: "...and be detected in 5% or more of the samples..."

- MTCA states in WAC 173-340-703 (2) (f) that: "The frequency that the hazardous substance has been detected at the site…" There is nothing in MTCA that states an IHS has to be detected in 5% or more of the samples. Please revise to read: "…and be frequently detected in ~~5% or more of the~~ samples at the site, …"

3. Interim Action Objectives

38. Table 3-1, Sediment Column: "risks to benthic organisms through exposure to sediments that exceed benthic organism-based PCULs or result in benthic toxicity."

- Revise as: "…risks to benthic organisms through exposure to sediments that exceed benthic organism-based ~~PCULs~~ sediment quality standards or result in benthic toxicity."

3.1. Overall Approach

39. Paragraph 1, bullet 2: "Reuse of stockpiled soil as needed during construction"

- To be clear, the stockpiled soil has not been fully characterized so its re-use potential is unknown. The bullet should be re-worded "Reuse of stockpiled soil as appropriate during construction"

40. Paragraph 3: The discussion on conditional points of compliance should include the conditions required to approve a conditional point of compliance, rather than just stating "subject to certain conditions."

3.4.1.2. Risk-Based Levels

41. Paragraph 2: "The human health seafood ingestion, fish, and wildlife risk-based levels can be applied as an averaged concentration over the home range of relevant species (WAC 173-204-560)."

- WAC 173-204-560 only states that "For sediment cleanup standards based on other criteria [besides benthic], the department will determine compliance by area weighted or other averaging approach, individual station by station approach, or a combination of both. Home range is not mentioned in WAC 173-204-560. Home range is only mentioned in WAC 173-204-564 as one factor to consider during a site-specific ecological risk assessment.

3.4.1.5. Preliminary Point of Compliance

42. Paragraph 3: "Larger bivalves, such as geoducks and horse clams, which can be harvested by hand from the lower edge of the intertidal, exist deeper in the sediment (up to 3 ft deep for larger bivalves such as geoducks and horse clams)."

- The fact that geoducks and horse clams are large bivalves only needs to be mentioned once in this sentence.

43. Paragraph 3: "Bivalves are filter feeders, and thus their primary exposure is through their siphons in the upper sediment horizon[5]. Therefore, a 10-cm POC is protective of seafood consumption for human health as well."

- While bivalves are filter feeders, we must consider dermal absorption from COCs in porewater. Siphons of deep burrowing bivalves are exposed to porewater deeper than 10 cm. Therefore, a POC of 45 cm is required to assess the protection of human health through the ingestion of sessile shellfish in intertidal zones.
- Ecology supports the evaluation of a 45 cm point of compliance throughout the intertidal area for protection of human through ingestion of bivalves. Many of our native northwest bivalves typically reside in and are exposed to bedded sediment up to 45 cm. Geoduck, if present, are exposed even deeper. Arguments have been made that contamination in bivalve tissue and sediment are not correlated and that clams likely obtain most of their body burden through their siphons from the sediment surface or near the surface. This claim was presented in the Lower Duwamish Record of Decision (ROD, 2014). However, EPA's Responsiveness Summary to the Lower Duwamish ROD states there is not enough data to support this conclusion and in response, EPA has initiated research to better understand the relationship. Results from the first phase of research indicate that bedded sediment is a major pathway for clam arsenic exposure (Lotufo et al 2014). Results of the second phase indicate a significant linear relationship between total arsenic concentrations in bulk sediment and inorganic arsenic concentrations in siphon skin and main body tissue (Kerns et al 2017). Both of these papers include multiple additional references used to support this research, such as Kalman et al. 2014 that concludes sediment-dwelling invertebrates may accumulate arsenic present in the surrounding bed sediment particles and porewater. Communication with Ellen Hale, US EPA Region 10, confirms additional phases of study related to the Lower Duwamish will be completed in 2018. The additional work is being completed under an agreement with the four Lower Duwamish parties. The study will investigate the relationship between cPAH levels in sediment and clam tissue. We are tracking this work.

44. Paragraph 5: "Ecology has designated sediment management areas (SMAs) within Port Angeles Harbor and near the former Mill (Ecology 2017a). Near the former mill, the SMA is limited to intertidal areas within the SCU where there is, or may be in the future, reasonable access to the shoreline for shellfish harvest by the public."

- The human health – ingestion of sessile shellfish exposure route should be evaluated in this SMA.

3.4.1.6. Preliminary Cleanup Standards

45. Paragraph 5: "…six major urban creeks…" and "…a CSO outfall located just west of the log pond projected to continue discharging…"

- Studies have shown that sedimentation rates in Port Angeles Harbor are very low and there have not been any CSO discharges since the City completed their CSO project two years ago.

46. Paragraph 8: "For contaminants (other than the human health risk drivers listed in Tables 3-9 and 3-10, the cleanup levels would be based on the benthic criteria presented in the rule (WAC 173-204-562) (Table 3-6)."

- Benthic cleanup levels are based on SMS SCO and CSL only when sediment TOC values are between 0.5 – 3.5%, otherwise LAET and 2LAET. Table 3-6 only lists SMS SCOs and CSLs.

47. Footnote #6 at bottom of page 3-9: "These contaminants include nine individual PAHs, total LPAHs, total HPAHs, bis(2-ethylhexyl) phthalate, 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, and phenol."

- Look at Figure 3-3. The list should include mercury, total PCBs, and total PCB congeners.

3.4.2.1. Indicator Hazardous Substances

48. Please list the specific IHSs for groundwater at the beginning of this sub-section.

49. WAC 173-340-703 identifies 7 criteria to be evaluated when eliminating individual hazardous substances from further consideration and selecting indicator hazardous substances. This section should show this complete evaluation. Indicator hazardous substances should be listed as well as listing those COPC that were eliminated along with their reasons for being eliminated. Elimination should be based on weight of evidence after considering the 7 criteria.

50. Paragraph 3: "Groundwater COPCs with concentrations greater than the conservative levels protective of marine surface water or sediment in at least 50% of the samples analyzed from any given monitoring well in 2010-2011 were identified as groundwater IHSs.

- "…in at least 50% of samples…" is too high of a percentage for eliminating contaminants when selecting identification of indicator hazardous substances. Typically accepted levels for eliminating COPC based on frequency of detection are less than 1, 5 or 10% as one part of a weight of evidence approach.

3.4.2.2. Preliminary Cleanup Standards

51. Ecology disagrees that pH values from PZ-6 and MW-64 are appropriate to use as "local background" to reduce the low end of the PCUL for pH from 7.0 to 6.1. Well MW-64 contains 5 feet of fill and neither of these wells reflect pH values at the shoreline of the Site. Change the pH range of the PCUL to match the Washington State surface water criterion (7.0 to 8.5).

3.4.2.3. Groundwater Quality Relative to PCULs

52. Rather than limiting the discussion to data from only the second quarter of 2011, the data discussion in this section needs to include data from 2010-11 as was done in Table 3 of the Agency Review Draft Volume III (February 2015). Because of seasonal fluctuations, the use of only one sampling event is too limited of a timeframe to base decisions on.

53. Figures 3.4A-H: The dashed black line in the legend should be corrected to indicate the upland study area boundary instead of the site boundary.

54. Figure 3-4F: The dashed manganese 0.6 mg/l contour line is not defined in the legend and can be easily confused with the dashed site boundary line.

3.4.2.3.1. pH and Ammonia

55. Add a discussion of the shoreline wells that exceed the PCUL for pH (7.0 to 8.5, plus or minus less than 0.2 pH units). Shoreline wells that had one or more pH exceedances in 2010-11 include MW-51, -54, -55, -56, -59, -67, PA-24, and PZ-9.

56. Add a discussion of the shoreline wells that exceed the ammonia PCUL (35 µg/L). These wells include MW-51, -56, -62, and PZ-3. These wells are located adjoining each other along the north shoreline.

57. "Slightly elevated" shall not be defined as less than three times the PCUL.

3.4.2.3.2. Arsenic

58. Add a discussion of the shoreline wells that exceed the dissolved arsenic PCUL in 2010-11 (including maximum concentration). These wells include MW-51, -56, -59, and PZ -9. Note that dissolved arsenic was not measured in West Mill Area wells MW-54 and -55. However, total arsenic in these wells exceeded the PCUL.

3.4.2.3.3. Copper

59. Add a discussion of the shoreline wells that exceed the dissolved copper PCUL in 2010-11 (including maximum concentration). These wells include MW-51, -56, -59, -62 and PZ -9. Note that dissolved copper was not measured in West Former Mill Area wells MW-54 and -55. However, total copper in these wells exceeded the PCUL.

60. Add that changes in subsurface geochemical conditions caused by the pulp manufacturing process are thought to be responsible for the elevated metals concentrations that continue to be detected in groundwater beneath the mill property.

3.4.2.3.4. cPAHs

61. Add that cPAHs PCUL is for the protection of the groundwater-to-sediments pathway and that it is of concern for the North Shoreline Area.

62. Delete the existing sentence stating that measurements of cPAHs above the PCUL "may have been due to entrained sediment" unless additional evidence is provided to support this.

3.4.2.3.5. Manganese

63. Add a discussion of the shoreline wells that exceed the dissolved manganese PCUL in 2010-11 (including maximum concentration). These wells include MW-51, -53, -59, -62; PZ-3, -9; and PA-24. Note that dissolved manganese was not measured in West Mill Area wells MW-52, -54 and -55, -61, and -67. However, total manganese in all of these wells exceeded the PCUL.

64. Delete the sentence: "The occurrence of elevated manganese is not spatially correlated in any clear way with past Site activities or operations." Insert that the changes in subsurface geochemical conditions caused by the pulp manufacturing process are thought to be responsible for the elevated metals concentrations that continue to be detected in groundwater beneath the mill property. As stated in Volume I, Section 8.3.4.1, if organic materials (such as wood waste and/or ammonia process waste) were introduced locally to the saturated zone in the past, localized areas of low dissolved oxygen (DO) content may have resulted, which could have enhanced the desorption of metals from soil and increased dissolved metals concentrations in groundwater. Redox potential, like DO content, is relatively low (negative) beneath much of the mill property indicating reducing conditions. Reducing conditions can increase leaching (desorption) of metals from soil and increase dissolved metals concentrations in groundwater.

3.4.2.3. Acenaphthene

65. Add a subsection discussing acenaphthene and add that the acenaphthene PCUL is for the protection of the groundwater-to-sediments pathway and that it is of concern for the North Shoreline Area (as stated in Volume I, Appendix H).

3.4.2.3.8. Summary

66. Delete the existing text because it refers to attenuation in the tidal mixing zone and simply states that attenuation will be verified later.

67. The summary needs to include the following:

- While nearly all shoreline wells exceeded PCULs for at least one IHS (manganese), there are distinct shoreline areas and associated wells where multiple IHS exceedances

occur. These consist of West Mill Area wells MW-51, 54, -55, -56, and PZ-3; and East Shoreline Area wells PZ-9 and MW-59.

- West Mill Area: Well MW-54 had exceedances for pH, cPAHs, arsenic, copper, manganese, and nickel. Well MW-55 had exceedances for pH, arsenic, copper, manganese, and nickel. Well PZ-3 had exceedances for ammonia, pH, cPAHs, copper, and manganese. Groundwater in these wells is highly reducing. Well MW-51 had exceedances for ammonia, pH, cPAHs, copper, and manganese. No acenaphthene data was collected in 2010-11. However, previous data from 1998-2003 from MW-51 exceeded the acenaphthene PCUL (3.3 µg/L). Well MW-56 had exceedances for ammonia, pH, copper, nickel, and mercury. Well MW-56 is of high concern due to its extremely high pH (>11.30) and ammonia concentration 2,200 to 3,000 µg/L). Elevated ammonia concentrations from this area is also affecting adjacent Estuary Area well MW-62; the ammonia concentration in this well was 290 µg/L. The groundwater-to-sediments pathway for acenaphthene and cPAHs is also of concern for the North Shoreline Area. Groundwater in these wells is highly reducing.
- East Mill Area: Well PZ-9 had exceedances for ammonia, pH, arsenic, copper, and manganese. This well had the highest detected arsenic (38.7 µg/L) and manganese (4,890 µg/L) concentrations. Well MW-59 had exceedances for pH, arsenic, copper, manganese, and mercury. This well had the highest detected copper concentration (44.9 µg/L). Groundwater in these wells is highly reducing.
- Arsenic exceedances in groundwater may also be of concern for fish. As mentioned in Section 2.6.1.4, fish in Port Angeles Harbor possibly have the potential to be adversely affected by the concentrations of arsenic in their tissue. Arsenic concentrations exceeded the PUCL for protection of marine surface water in shoreline wells MW-54, -55, -59, -62, and PZ-9.

3.4.2.4. Preliminary Point of Compliance

68. Paragraph 2: "MTCA allows a conditional POC to be established when it is not practicable to meet the PCULs throughout the groundwater within a reasonable restoration time frame (WAC 173-340-720(8)(c)."

- This section proposes evaluating some alternatives using the standard POC and some alternatives using a conditional POC at shoreline wells, then using a conditional POC alternative if the alternatives using the standard POC are not practicable within a reasonable time frame (WAC 173-340-720(8)(c). WAC 173-340-720(8)(c) also states that for a conditional POC the cleanup action shall demonstrate that all practicable methods of treatment are to be used in the site cleanup. All practicable methods of treatment must be used if a conditional POC is granted. This analysis shows that Alternative G-2, Air sparging, is practicable.

3.4.3. Soil

69. Separate sections need to be added to discuss IHSs for unrestricted and industrial land use.

70. Paragraph 2: "The results of this sampling will be used to confirm the IHSs and define cleanup levels and remediation levels specific to the selected interim action for soil. If necessary, the IHSs will be adjusted based on the sampling."

- Additional soil sampling during design can be used to refine the limits of soil remediation, but cleanup levels and IHS are set in the interim cleanup action plan.
- Delete this paragraph. It does not make sense and is out of place at this point in the document.

71. Terrestrial Ecological Evaluation: The February 2015 draft of Volume III included Appendix A, Attachment A-2 – Terrestrial Ecological Update Technical Memorandum. Ecology's comments on the February 2015 draft of Volume III were sent to Rayonier on August 21, 2015 and included comments on Attachment A-2. The revised Attachment A-2 that incorporates Ecology's comments was not included in the current version of Volume III. Please incorporate Ecology's August 21, 2015 comments and include Attachment A-2.

3.4.3.1.1. Human Health

72. Paragraph 1: "...shallow soil and deep soil were evaluated separately because historical sampling conducted in the Upland Study Area generally resulted in separate characterizations for these two depth ranges."

- This seems like an insufficient rationale for treating shallow and deeper soils differently. How is this consistent with meeting cleanup levels at the standard point of compliance?

73. As stated in previous comments (Ecology Comments on the Agency Review Draft Interim Action Report Volume III, Sept. 18, 2007), manganese needs to be included as an indicator hazardous substance.

74. Selection of indicator Hazardous substances should follow the approach in WAC 173-340-703. Frequency of detection is only one of seven factors that should be evaluated when eliminating individual hazardous substances from further consideration. The maximum exceedance factor is not one of those factors. Revise this section to be consistent with MTCA.

75. Paragraph 6: "During the design of the selected interim action, additional sampling and data evaluation will be used to evaluate the post-remediation risks to human health. The human-health IHSs may be revised during this process."

- Will the new data collected be integrated with the old data, replace location-specific data, or replace the entire existing soil dataset?

- Delete the last sentence. IHS and cleanup levels are set in the Interim Action Plan and will not be revised during design.

3.4.3.1.2. Ecological

76. Paragraph 1: "A TEE was prepared for the Upland Study Area in 2007 (Malcolm Pirnie 2007b). This TEE was reviewed and updated to identify IHSs for terrestrial receptors. Revisions to the 2007 TEE included the calculation of site-specific RBCs protective of wildlife (i.e., shrew, vole, robin, and goose) and a site-specific evaluation of risks to plants and soil biota."

- An updated TEE was included as Attachment A-2 of the Volume III Public Review Draft. Ecology provided many comments regarding this document. Has the TEE been updated further? Regardless, it should be included as an appendix.
- Ecology's comments on the Volume III Public Review Draft TEE include, but are not limited to:
    - Unrestricted and open-space land uses were not included for the West Mill area.
    - Must include protection of plants and soil biota.
    - Can't be assumed that plant habitat in the West Mill will remain low habitat value.

77. Paragraph 2: "During the design of the selected interim action, additional sampling and data evaluation will be used to evaluate the post-remediation risks to terrestrial ecological receptors. The ecological IHSs may be revised during this process.

- Will the new data collected be integrated with the old data, replace location-specific data, or replace the entire existing soil dataset?
- Delete the last sentence. IHS and cleanup levels are set in the Interim Action Plan and will not be revised during design.

3.4.3.1.3. Protection of Groundwater

78. Paragraph 1: "Based on the past removal actions and the relatively low levels of contamination remaining in groundwater at last sampling in 2011 (see Section 3.4.2.3), it is unlikely that soil contamination at the Site poses a significant source to groundwater."

- As we have noted previously, the groundwater to surface water/sediment pathway is a pathway of concern. Therefore the soil to groundwater should be fully assessed and evaluated. It is not acceptable to dismiss the soil to groundwater pathway because you think the groundwater to surface water/sediment pathway is not a concern based on dilution/attenuation.

3.4.3.2.2. Ecological

79. "The ISCs were calculated in the updated TEE."

- As noted in a previous comments, the updated TEE should be included as an appendix.

3.4.3.3. Preliminary Point of Compliance

3.4.3.4. Preliminary Cleanup Standards

80. This section needs to discuss Cleanup Standards for soil. Not RELs. Ecology explained the difference between the two levels in our comments on the ARD. The Cleanup Standards need to reflect the different zoning and potential future use of the property (i.e., unrestricted or industrial). Please include figures that show where there are exceedances of the Soil Cleanup Standards. All soil cleanup alternatives must address exceedances of the soil cleanup levels.

81. The REL discussion, if appropriate, must be in its own section. There will need to be a demonstration as to why RELs are needed.

3.4.3.X. Remediation Levels

82. Ecology's August 21, 2015 comments were not incorporated in this section. Revise the section to include Ecology's previous comments. For example, Ecology determined that for the open space scenario, the appropriate recreation exposure frequency should be 104 days per year rather than 48 days per year, due to the large number of residences near the property. Another example is that Ecology's comments regarding area-averaged IHS concentrations were not incorporated.

83. Paragraph 1: "Ecological risks are not expected to differ significantly for these two land uses; consequently, the terrestrial ecological exposure pathway was not considered in developing RELs."

- Ecology does not agree with this statement. For instance, The TEE soil biota ISC for TPH diesel-range organics of 200 mg/kg is significantly lower than the risk-based concentration shown in Table 3-17. The TEE pathway shall be considered in developing RELs.
- The statement is contradicted in paragraph 3, "RELs were derived for the soil IHSs that have unrestricted land use PCULs lower than ISCs for terrestrial ecological receptors."

84. Paragraph 2: "In open-space areas where IHS concentrations are greater than the unrestricted land use PCULs presented (Table 3-17) but less than the RELs, potential exposures greater than MTCA acceptable risk criteria would be prevented using institutional controls (ICs) (e.g., environmental covenant to prevent residential land use."

- Please identify these areas on Figure 3-5.

85. Paragraph 4: "The first step in deriving RELs was to calculate RBCs protective of open-space users, consistent with WAC 173-340-708(10)(b)(ii). MTCA modified Method B equations were used to calculate open-space RBCs for arsenic, cPAHs, dioxins/furans, and PCBs, as described below (WAC 173-340-740(3)(c)(iii), Equations 740- 4 and 740-5). These equations were not used for lead or TPH because applicable toxicity factors

for these IHSs are not available for use in the Method B equations. The alternative approach for these RBCs is described separately."

- As noted in the comments to Table 3-17, a TPH ISC of "NA" (not applicable) is not acceptable. As shown on MTCA Table 749-3, the soil biota ISC value for TPH-diesel range organics is 200 mg/kg. An open-space REL for TPH does not need to be derived because the TPH ICS for terrestrial ecological receptors is less than the unrestricted land use PCUL.

86. Paragraph 5: "The potential exposures associated with open-space land use are lower than those associated with residential use, which is the default MTCA RME for unrestricted land use. In the MTCA residential scenario, people are assumed to be potentially exposed every day (i.e., 365 days per year). In contrast, it is assumed that people might visit open-space areas of the Upland Study Area up to 48 days per year."

- Ecology Comment 2: The exposure frequency (EF) that Ecology agrees is acceptable for the Site for Open-Space Use is 104 days per year (rather than 48 days). Ecology requests increasing the exposure frequency from 48 days per year to 104 days per year (2 days per week average, with more visits during the summer and fewer during the winter) due to the large number of residences near the property. A quick look at Google Maps suggest that there are more than 200 residences within 0.5 miles of the property. Please modify the calculations accordingly.

87. Paragraph 11: "For comparison with the soil RBCs for the open-space user, open-space user exposure concentrations were estimated for each IHS by calculating area-averaged IHS concentrations in the upper 2 ft of soil throughout the West Mill and East Mill Areas (Table 3-20) based on the assumption that open-space users would most likely visit one or both of these areas during a given visit."

- Ecology does not agree with the averaging method that was used to calculate the area-averaged IHS concentrations shown in Table 3-20. This averaging method does not provide enough certainty that there are limited areas of unacceptable exposure and the existing data set does not appear to be adequate to make such a demonstration. For example, only three results for dioxins/furans toxic equivalent concentration (TEQ) are available from the North Shoreline Area within the 0-2 feet interval and two out of three exceed the Table 3-20 area-averaged TEQ concentration of 65 nanograms per kilogram (ng/kg) and the maximum concentration of these three (PC20) was 274.6 ng/kg. Instead, it is more likely that the area-averaged concentrations do <u>not</u> represent reasonable maximum exposure concentrations. As required by WAC 173-340-708(3)(a), remediation levels shall be based on estimates of reasonable <u>maximum</u> exposures.

- All discussion of area averaging can be removed from this document since averages are not used to determine cleanup levels.

88. Paragraph 11: "It should be noted that none of the 0-to-2-ft-bgs soil samples in the West or East Mill Areas that were analyzed for TPH had concentrations greater than the TPH RBCs (Table 3-21); therefore, area-averaged TPH concentrations were not calculated."

- This text references Table 3-21. It should really reference Table 3-19, which contains the TPH RBCs.

89. Paragraph 13: "All of the area-averaged IHS concentrations calculated for the West Mill and East Mill Areas (Table 3-20) were less than the RBCs presented in Table 3-19. Therefore, based on the assumptions for open-space land use described above, existing IHS concentrations in the Upland Study Area do not pose unacceptable risks to open-space users."

- Data analysis procedures in WAC 173-340-740(7) require that: the upper one sided ninety-five percent confidence limit on the true mean soil concentration shall be less that the soil cleanup level; that no single sample concentration be two times the soil cleanup level; and less than ten percent of the sample concentrations shall exceed the soil cleanup level. Therefore, Ecology disagrees with the statement that existing IHS concentrations in the Upland Study Area do not pose unacceptable risks to open-space users. Additional remedial actions will be needed.

90. Table 3-14:

- As stated above, change the pH range of the PCUL to match the Washington State surface water criterion (7.0 to 8.5, plus or minus less than 0.2 pH units).

91. Table 3-17:

- As stated in our August 21, 2015 comments, NWP et al. (2014) found that protective concentrations for soil biota ecological receptors at two representative areas was 28.5 mg/kg and 438 mg/kg, respectively for TPH-D and was 552.8 mg/kg and 1,124, respectively for TPH higher-range petroleum hydrocarbons. Therefore, use of "NA" in the table for the terrestrial ecological indicator soil concentration for TPH as diesel and heavy oil is not acceptable.
- Soil preliminary cleanup levels and indicator soil concentrations need to be added for soil-to-groundwater for protection of marine sediments.

92. Tables 3-19 and 3-21:

- The values in Table 3-19 (Calculated Risk-Based Soil Concentrations for Open-Space Land Use (Human Health)) and Table 3-21 (Soil Remediation Levels for Open-Space Land Use (Human Health)) are different and the difference is not explained. Please provide the rationale for these differences.

93. Table 3-21

- Ecology disagrees with the proposed remediation level for lead of 3400 ppm. Using a recreation exposure frequency of 104 days per year and the exposure equation, the open-space user risk-based concentration for lead would calculate as 800 ppm.

94. Table 3-22:

- This table should include ecological values for lead and TPH from MTCA Table 749-3. The heading titles in this table indicate the cleanup and remediation levels are based on "unrestricted land use"; however, they were calculated using alternative exposure scenarios ("open space" or construction worker) and are not unrestricted. They could only be applied if there are land use restrictions required as part of the remedial action, and are therefore not unrestricted.

3.5.1. Upland Soil

95. "The portions of unrestricted land use areas where active measures (i.e., capping and/or soil removal) are proposed in the soil remediation alternatives (Section 5) were defined based on the soil RELs and the PCULs summarized in Table 3-22."

- The soil RELs and PCULs in Table 3-22 are not based on unrestricted land use.

96. Although it appears to have been overlooked, an area of contamination near the mouth of Ennis Creek was noted in the March 2003 Interim Action Report for the Ennis Creek Finishing Room, Fuel Oil Tank No. 2, and Machine Shop (Integral, 2003). That 2003 report states the following:
Excavation near the north bridge ceased at a point approximately six feet from the western abutment footing, where any further efforts to remove visible contaminants could have compromised the integrity of the bridge and footing.

And:

The soil sample collected from the northwest corner adjacent to the bridge support excavation (FW0070) had concentrations of DRO, RRO, and PCBs that were greater than the cleanup level.

- The Volume III report should confirm that this area is adequately identified and accounted for in the remedial alternatives.

3.5.3. Sediment

97. Paragraph 4: "Per SMS, the SCU is defined as the area in which any contaminant has a concentration greater than the cleanup level. By applying the SMS rule to the Ecology-approved dataset, the SCU would have been 403 acres."

- In order to delineate the SCU boundary, you need to specify what values you are using as the cleanup level. Please note the specific cleanup levels used for SCU delineation.

98. Paragraph 4: "The smaller SCU resulted from exclusion of one data point (SD-67), where selenium was detected at 0.93 J mg/kg, which is about the cleanup level of 0.6 mg/kg set by the PQL. The data point was excluded from due to the uncertainty associated with this point."

- More accurately, the data point was excluded when delineating the spatial extent of the SCU because of the uncertainty associated with this selenium result in the context of the remainder of the selenium data for the Site. This data point had an estimated concentration when other results from the same sampling set were non-detected at the same or higher concentrations. The original lab packages to check the validity of this result were not located.

99. Figure 3-12:

- It is difficult to follow the text and imagine what the footprints that were layered looked like. Please provide the separate major footprints that were layered to produce the remediation area.
- Why has the log pond subtidal footprint changed to now exclude a notched area on the southwest side? Is this because sediment stability, as shown on Figure 5-13B, shows coarse sand being mobilized in this area making ENR a poor choice?

100. Figure 3-13

- In a similar manner to Figure 3-6 through 3-11, a figure should be produced that shows the individual spatial extent of the analytes that are driving the SCU shape (Total TEQ, cPAH TEQ, mercury???).

101. Paragraph 6: "If the SWAC was greater than the highest of these three values for a risk driver, as was the case for cPAHs and total TEQ, then the concentrations within the active remediation area shown on Figure 3-3 were replaced with natural background concentrations,[9] and a post-remediation SWAC was calculated."

- Using the natural background value as replacement value for surface sediments when using ENR as a remedy is not appropriate. Natural background as a replacement value is only appropriate when a containment technology like capping is used. Since the ENR material is assumed to mix with the existing surface sediment, a replacement value greater than natural background should be used. Please provide a benthic mixing model and a surface sediment dilution factor resulting from the applied ENR thin-layer.
- It appears that the extent "Mill dock subtidal area" on Figure 3-12 was defined based on a REL for cPAH TEQ. Please indicate the value of that REL.

102. Paragraph 7: "As noted above, this remediation area is conservative because the selenium data point was excluded. Had the selenium data point not been excluded, the remedial footprint would have been significantly smaller (21.9 acres vs. 51.7 acres). Therefore, design sampling will be conducted in the area between these two footprints to determine the final area to be remediated."

- While there are good reasons for remedial design sampling, the single selenium data point is not one of them.
- Upon agency approval of the RI/FS, the extent of the SCU will be final. New remedial design data may be collected within the SCU for calculation of an updated pre-remediation SWAC.

4. Identification and Screening of Remedial Technologies

103. Ecology's comments on the Draft Development of Interim Action Alternatives for the Study Area (October 2014) stated that evaluating technologies based only on their ability to treat the whole COPC list is inappropriate. Technologies should be screened and evaluated based on their ability to remediate classes or types of contaminants, not the whole list. Revisions to this evaluation were to include combination of remedial technologies to treat the list of COPCs. Few additional technologies or new combinations of treatment technologies were added.

4.2. Upland Soil Technology Screening

104. Ecology's comments on the Draft Development of Interim Action Alternatives for the Study Area (October 2014) had specific comments that requested ex-situ and in-situ technologies be retained, such as ex-situ soil washing for metals, cPAHs, and TPH; and enhanced bioremediation, thermal desorption, monitored natural attenuation and bioventing for TPH.

105. Paragraph 1: The GRAs and technologies retained for the development of the soil remediation alternatives are identified below:
- Soil removal (excavation)
- Containment (capping)
- ICs

- As noted in our comments on the Draft Development of Interim Action Alternatives for the Study Area, *In Situ* and *Ex Situ* soil treatment technologies should be retained.

106. Table 4-1

- Please present the technologies in the document (Sections 4.2.1 – 4.2.6) in the same order as Table 4-1, or vice versa.

4.3. Groundwater Technology Screening

107. Paragraph 1, sentence 1: Delete this sentence. Available groundwater data shows exceedances at multiple shoreline wells and there is no evidence that there is sufficient potential for tidal mixing/attenuation due to the heterogeneity of the Site. Unless shown to be impracticable within a reasonable timeframe, the point of compliance is groundwater throughout the site, therefore the focus should be on

selecting a groundwater technology that will allow meet the cleanup levels through the site groundwater, not prior to discharge to the marine environment.

108. Bullet 4, MNA: The sentence following the last bullet references Table 4.2. This table states that monitored natural attenuation (MNA) as a stand-alone remediation alternative for groundwater is therefore not considered retained as a stand-alone remedial technology. Ecology agrees that MNA is not sufficient to be a stand-alone alternative. This point should be added to Section 4.3.

4.3.2.4. Air Sparging

109. Ecology disagrees that air sparging would not be appropriate for broad-scale application "due to the heterogeneity of subsurface conditions and range of groundwater COPCs." Air sparging should be included as an alternative for remediating groundwater along the West Mill Area.

4.3.4. Monitored Natural Attenuation

110. As stated above, MNA is not a viable stand-alone remedial technology. Revise text accordingly.

4.3.5. Nearshore Sand Filter

111. In Ecology's 9/23/14 comments, additional detail was requested (including case studies with similar Site COPCs) on why Nearshore Sand Filtration (NSF) is expected to be effective. Section 4.3.5 mentions one site as an example where NSF was has been used or selected for use: Cornwall Landfill site in Bellingham. It is correct that NSF was selected for implementation at the Cornwall Landfill but no results are available yet regarding its effectiveness. Therefore, with regard to the selection of this technology at the Rayonier Mill Site, no proof was been provided that NSF is a "proven technology." Either reword the reference in the text regarding "proven technology" or provide additional case studies to back up this claim.

4.4. Sediment Technology Screening

112. Paragraph 2: GRAs for sediment include those potentially applicable actions ("cleanup action components") set forth in the SMS WAC 173-204-570(4)(b) (Ecology 2013a), as identified below:

- Removal
- In situ treatment
- Containment
- ENR
- Monitored natural recovery (MNR)
- Institutional controls (ICs)

- The list of remedial technologies is ordered differently than presented in the document (Sections 4.4.1 – 4.4.6).

113. Table 4-3: ENR, Application of thin-layer material (e.g., sand)

- Ecology has reservations about the use of a thin-cap especially in the Log Pond. In the past, and currently, a feeder berm was established to replenish sediment in the Log Pond due to erosion. This condition will only get worse when the mill dock and subaqueous jetty are removed.

4.4.1. Dredging

114. Paragraph 3: "Shore-based sediment excavation has been successfully implemented elsewhere in the region…"

- Please provide an example (citation)

4.4.3. Containment

115. This section includes the following several statements regarding containment of contaminated sediment using fill and/or ENR. It is not clear based on these various statements whether ENR is anticipated to be used to contain contaminants, when it is noted that "contaminant diffusion is not a concern."
"Containment was retained as an engineered control for sediment. It can be accomplished through the placement of fill and an ENR layer or using sediment caps."
"As noted in Table 4-3, only fill (followed by application of ENR) is retained as a containment technology for the Study Area."
"Prevention of contaminant diffusion is not a concern due to the relatively low concentrations of contaminants in the SRSs where this technology would be applied, if retained."
"[ENR] is an effective method for sequestering contaminants when properly designed and implemented under appropriate conditions."

116. Paragraph 1: "Containment was retained as an engineered control for sediment. It can be accomplished through the placement of fill and an ENR layer or using sediment caps."

- ENR alone is not considered a containment technology. A thin layer of sand over fill can only be considered ENR if the fill substrate is suitable habitat for benthic organisms.

4.4.3.1. Fill

117. Paragraph 2: "Specific fill thicknesses and materials would be determined during design."

- Please provide a list of materials to be considered as fill.

4.4.3.2. Sediment Cap

118. Paragraph 1: "As noted in Table 4-3, only fill (followed by application of ENR) is retained as a containment technology for the Study Area (Figure 4-1, top cross section)."

- Depending upon the fill material used, an ENR layer may not provide a sufficient inhabitable benthic thickness. For example, if shell hash from underneath the dock is used to fill berths, a cap would be necessary because the shell hash is not suitable benthic substrate.
- The bottom section of Figure 4-1 (fill with capping) is not currently evaluated as a remedial alternative and therefore should not be included in the figure. However, based on the previous comment, the figure can remain as is if capping will be used to cover unsuitable benthic substrate.

4.4.5. Enhanced Natural Recovery

119. Paragraph 1: "Should monitoring results indicate an issue with the ENR effectiveness (e.g., erosion of the placed ENR layer), a contingency plan can be developed that includes adaptive management to address the long-term effectiveness of the remedy through the placement of additional ENR material."

- If Enhanced Natural Recovery is chosen for parts of the site and the remedy fails, the contingency plan should be more aggressive than just placement of additional ENR material. This contingency plan should be developed during design, not after the remedy fails.

120. Paragraph 2: "ENR is commonly implemented at locations where contaminants are less than approximately three times the target cleanup levels and natural recovery processes are accelerated through the additional of a thin layer of cleanup sediment (EPA 2014c).

- Contaminants in the log pond and near the mill dock are found greater than three times the target cleanup levels making ENR a poor choice.

121. Paragraph 2: "Within the sediment remediation area, ENR should benefit from the ongoing sediment input to the Strait of Juan de Fuca shoreline resulting from the recent removal of the Elwha Dam west of the Study Area (Gelfenbaum et al. 2009 and Magirl et al. 2014) as well as sediment input from creeks that discharge into the harbor."

- There is no data to show or confirm that sediment from the Elwha River will reach the Rayonier Mill site. Gelfenbaum (2009) modeled that 0.5 cm per year will settle in the immediate vicinity of the tip of Ediz Hook. Elwha River sediment is not expected to supply much, if any, sediment in the vicinity of the Rayonier nearshore area.
- The sediment load from the creeks is very small and settles near the mouths of the creeks.

122. Paragraph 2: "The proposed implementation of the technology takes into account calculated "ENR upper limits" where contaminants are less than approximately three times the target cleanup levels and identified zones of expected sediment recovery where there is a low potential for scour or disturbance (EPA 2014c)."

- Please provide a figure that identifies areas suitable/unsuitable for ENR based on the restrictions mentioned.

123. Paragraph 5: "The hydrodynamics and potential for sediment transport in the Study Area was evaluated under various conditions to assess the stability of an ENR layer within the sediment remediation area (Appendix A). The evaluation found that the conditions are appropriate within the sediment remediation area for coarse sandy material to be used for physical stabilization in an ENR remedy, and that an appropriately designed cap or ENR layer is at negligible risk of mobilization."

- The sediment stability assessment provided in Integral (2015) is insufficient to predict long-term stability of ENR or a cap in the log pond, as it only considers the wave conditions over a 2 year period and medium-strong wind conditions. For long-term effectiveness of ENR or a cap in this setting, they should be engineered for a 100-year storm.

4.4.6. Institutional Controls

124. Paragraph 1: "ICs may include the institution of maintenance requirements, as well as measures to discourage activities that might disturb remediated areas and result in the exposure of underlying contamination. They could also include restrictions on navigational dredging, anchoring, or use by large vessels (to prevent prop wash)."

- Institutional controls should not prevent access to the shoreline by small vessels.

- To the extent that institutional controls are required in ENR areas, they should in no way limit the exercise of tribal treaty rights, including harvesting geoduck, or other cultural uses or activities.

- ICs proposed for upland areas may include fencing and signage. How effective are these expected to be over the long-term, since dioxin concentrations are not anticipated to diminish greatly over time?

5. Development of Alternatives

125. This section needs to be revised to incorporate the above comments regarding changes in remedial actions.

5.2. Upland Soil Remediation Alternatives

126. Alternatives meeting PCULs protective of human health and the environment throughout the site should be provided, not just alternatives meeting ecological PCULs

and open-space RELs. RELs can help define where different technologies may be required as part of a cleanup action at a site, but the REL doesn't change or replace the PCUL.

127. Please discuss the benefits and disadvantages of the use of a permeable cap (alternatives SL-1, SL-3, SL-4) verses a low-permeability cap that includes a high-density polyethylene (HPDE) geomembrane (alternative SL-2). For example, while an impermeable cap would serve to eliminate or severely reduce the soil-to-groundwater (leaching) pathway it would also likely cause dissolved oxygen concentrations to be further reduced in groundwater (due to lack of infiltration by oxygenated rainwater) and may also perpetuate the current highly reducing conditions in groundwater throughout much of the Site. Therefore, it is questionable if the use of an impermeable cap would be recommended as an alternative to consider. For protection of the leaching pathway, it would seem that the alternatives that involve excavation (SL-3 and SL-4) would have a much higher likelihood of benefit and success.

128. The cap/cover areas shown in Figures 5-2 and 5-3 do not appear to be adequate because they do not include the 200 foot shoreline buffer area throughout most of the Site. As stated in our August 21, 2015 comments:

> Ecology does not agree with the averaging method that was used to calculate the area-averaged Indicator Hazardous Substances (IHS) concentrations shown in Table A-14. This averaging method does not provide enough certainty that there are limited areas of unacceptable exposure and the existing data set does not appear to be adequate to make such a demonstration. For example, only three results for dioxins/furans toxic equivalent concentration (TEC) are available from the North Shoreline Area within the 0-2 feet interval and two out of three exceed the Table A-14 area-averaged TEC concentration of 65 nanograms per kilogram (ng/kg) and the maximum concentration of these three (PC20) was 274.6 ng/kg. Instead, it is more likely that the area-averaged concentrations do <u>not</u> represent reasonable maximum exposure concentrations. As required by WAC 173-340-708(3)(a), remediation levels shall be based on estimates of reasonable <u>maximum</u> exposures. Also, data analysis procedures in WAC 173-340-740(7) require that: the upper one sided ninety-five percent confidence limit on the true mean soil concentration shall be less that the soil cleanup level; the no single sample concentration be two times the soil cleanup level; and less than ten percent of the sample concentrations shall exceed the soil cleanup level. Therefore, Ecology disagrees with the statement that existing IHS concentrations in the Study Area do not pose unacceptable risks to open-space users. Additional remedial actions will be needed. As previously stated in our comments on Agreed Order Task 4B Deliverable, Draft Development of Interim Action Alternatives for the Study Area, due to the wides"4."pread exceedances of dioxins/furans and cPAHs, the capping area will need to include the unrestricted/open-space use shoreline setback area adjacent to the shoreline throughout the Site.

5.2.1. SL-0 – No Further Action

129. The no-further action alternative is not required under MTCA.

130. National Contingency Plan (NCP) is not defined.

5.2.2. SL-1 – Cover

131. Figure 5-1 shows capping in the Ennis Creek Area which is incompatible with the proposed usage of this area for Natural Resource Damage restoration. Remedies proposed in areas being considered for restoration should be compatible with a restoration end use.

132. Paragraph 2: "Access to the interior portion of the West Mill Area and City Purchase Area would be restricted through the repair/installation of fencing as necessary and the installation of appropriate signage."

133. Please identify on Figure 5-2 where fencing would be necessary.

5.3. Groundwater Remediation Alternatives

134. This section should also include alternatives that use a combination of technologies with a conditional POC, based on their estimated effectiveness for specific areas. For example, this alternative would use air sparging in the North Shoreline Area of the West Mill Area (particularly in areas of high pH and ammonia concentrations) and then use permeable reactive barrier (PRB) and/or in-situ chemical treatment in portions of the West Mill Area and the East Mill Area. Other combinations of technologies could be used for selected portions of the Site shoreline.

5.3.2. G-1 – Monitored Natural Attenuation

135. The time frame for groundwater concentrations to dissipate to PCULs through the site is estimated at decades. Even if a conditional POC is selected, Table 6-2 lists the ability of this remedy to comply with MTCA threshold requirements of compliance with cleanup standards (WAC 173-340-360(2)(a)(ii)) as "probably" and the requirement of a reasonable restoration time frame (WAC 173-340-360(2)(b)(ii)) as "uncertain" and likely to be 20 years or longer. For these reasons, Alternative G-1 MNA does not satisfy MTCA's threshold requirements and this alternative should be eliminated.

5.3.3. G-2 – Sparging

136. Please explain why "the full area of groundwater impacts would not need to be addressed to meet PCULs at the conditional POC." Also, what evidence is there that air sparging would only need to be applied for a limited time (weeks or months) in order to achieve a permanent reduction in concentrations where applied? Additionally, please explain how this can be evaluated as a stand-alone groundwater alternative if the sparging area does not include the East Shoreline Area and the Estuary Area on the east side of Ennis Creek (Figure 5-4).

5.3.4. G-3 – Permeable Reactive Barrier

137. Please explain how this can be evaluated as a stand-alone groundwater alternative if the treatment area does not include the NW Shoreline Area (Figure 5-5). Also, please discuss the pros and cons of increasing the length of the PRB treatment area and reducing the length of the diversion barrier. It is not clear whether or not cutoff walls are necessary to act as diversion barriers for groundwater for the PRB. Please provide separate cost estimates with and without cutoff walls.

5.3.6. G-5 – In-Situ Chemical Treatment

138. Could this alternative be applied with a conditional POC? If so, please add this in a separate alternative.

5.4. Sediment Remediation Alternatives

139. Figure 5-8

- ENR should not be considered as an appropriate remediation alternative in the subtidal log pond unless modeling is provided as to assess the long-term stability of the remedy under 100-year storm conditions.
- Sediment chemistry data under the mill dock is very limited. ENR shouldn't be considered an appropriate remediation alternative under the dock if remedial design sampling indicates concentrations greater than three times the cleanup level.
- Dock removal activities will likely cause severe disruption of the accumulated materials underneath the dock. The substrate present under the mill dock after removal is unlikely to be suitable benthic habitat for recolonization. ENR is not an appropriate remedial alternative unless it can be expected to mix with this surface substrate to create suitable benthic habitat. Therefore capping or dredging are more appropriate remedies for under the mill dock and should be considered in more of the alternatives.

140. Paragraph 5: "Following sediment excavation in the nearshore areas, these areas will be backfilled to minimize the deposition of suspended sediment that could be deposited in the vicinity of excavation operations, resulting in dredging residuals."

- Will excavated areas be returned to grade? What material will be used as fill?

5.4.1. Long-Term Stability of ENR

141. Paragraph 1: "Compared with other technologies, ENR has the least likelihood of impacting existing benthic habitat and infauna.

- Not completely true, a nominal 6" cap will destroy all suspension feeding and surface dwelling organisms.

142. Paragraph 2: "Sediment transport field investigations and site-specific hydrodynamic modeling have been conducted to evaluate the long-term stability of ENR predicted under the remedial alternatives."

- It cannot be said that the modeling evaluated long-term stability, as only a 2 year wind/wave record was considered.

143. Paragraph 3: "Field investigation data were used to validate the propagation of waves offshore of the former Rayonier mill, as well as to provide model initial parameters that are representative of typical and storm conditions."

- To assess the long-term stability of ENR we don't necessarily care about typical conditions or moderately strong storm conditions. The remedy should be engineered for a 100-year storm.

144. Paragraph 3: "(2) storm conditions (wind direction from 67.5° and wind speed equal to 11.03 m/s) that result in northeasterly swell."

- During the 2 year wind period considered, the strongest storm from the 67.5 degree direction had a wind speed >18 m/s, substantially greater than the wind speed modeled (Appendix A, Figure 18). A much longer wind record should be considered, and modeling should be conducted to assess the stability of the remedial alternatives under 100-year storm conditions from the NE direction.

145. Figure 5-9

- The figure caption reads "Study site with net transport directions." The original figure from Ebbesmeyer et al. (1979) is titled "Plan view of net circulation in the Harbor." Please relabel as "net circulation" rather than "net transport", as to create confusion about water circulation versus sediment transport.

146. Figure 5-13

- Figure indicates phi = 2 -3 mobilization in the outer log pond. This corresponds to medium to fine grain sand mobilization.
- Modeling results should be presented for 100 year storm conditions. Would coarser sand from the outer log pond be resuspended under stronger storm conditions?
- SWAN Model inputs were based on only one month of data (Feb 5 to March 7, 2014). This snapshot does not adequately capture the range of expected wind and wave conditions during the year and underestimates the potential magnitude of storm events.
- Model output does not indicate any substantive protection of the northwest Log pond by a retained jetty peninsula during storm conditions. This is likely to adversely affect the long-term performance of the ENR technology.
- The model run only appears to have used a fairly modest storm event of 11 m/s (24 mph) for this area. Storm events in this vicinity often exceed these wind speeds.
- The locations of the current meters deployed in this study are unlikely to capture the local conditions within the log pond.

- The reference station used for historical wind and wave data (No. 46088) includes data from 2004 to present. Why were the histograms prepared in Fig. 17 based on the much narrower time frame (Jan. 2012 to March 2014)? It does not appear that the 95th percentile wave height and wind speed data were included in the model runs, but rather the average and lesser values.
- Among the 10 model runs, none included *both* high wave height (Hs) and high winds (m/s). Why was this not modeled?
- What was the purpose of the four additional model runs? They appear to be based on 95th percentile wind speeds, but no waves. Under what conditions would we expect high winds and a lack of waves?

147. Paragraph 4: "In the active remediation area, sediment with a Phi (Φ) of 1 or greater (greater than 500 µm; see Appendix A, Table 6) would remain stable under both mean typical wind and the northeast storm conditions (Figure 5-12B and Figure 5-13B)."

- The figures show that a Phi (Φ) of 1 or *less* would remain stable under the modeled conditions.

148. Paragraph 5: "An appropriately designed ENR layer is at negligible risk of mobilization."

- The modeling presented to date does not sufficiently support this statement.

5.4.2. S-1 – Excavate/Dredge Intertidal Log Pond, ENR in Remainder

149. Figure 5-14

- Alternative S-1b should be developed for site conditions in which the jetty peninsula is removed.
- ENR is not likely to be an appropriate remedial technology under the mill dock after dock removal because of the substrate assumed to be present.
- There is no need for "Total PCB > SCO" to have its own symbology. These exceedances should be included in with the other chemistry SMS exceedances.

150. Figures 5-14 to Figure 5-18:

- All figures show a gap between the remediation area (around the dock) and the shoreline. There are few data points along the shoreline making it difficult to determine if remediation should extend all the way to the shoreline. Additional data will need to be collected in this gap during remedial design.

5.4.4. S-3 – Full Log Pond Dredge, Extended Fill and ENR around Dock, ENR in Remainder

151. Figure 5-16

- Comments regarding Figure 5-14 also apply to Figure 5-16.

5.4.5. S-4 – Full Log Pond Dredge, Dredge around Dock, ENR in Remainder

152. Figure 5-17

- Comments regarding Figure 5-14 also apply to Figure 5-17.
- Dredging around the dock doesn't make sense without also dredging the material under the dock. The area around the dock is already deeper due to historical dredges leaving deeper areas on either side for vessel traffic. The area under the dock has trapped sediment and shell materials over the years leading to mounding. We have limited samples of the sediments under the dock and it is likely some of this material contains contamination. Develop an option that dredges this material.

5.4.6. S-5 – Dredge all Subareas

153. There is no need for "Total PCB > SCO" to have its own symbology. These exceedances should be included in with the other chemistry SMS exceedances.

6.1. Process for Evaluating Alternatives

154. Paragraph 1: "Cleanup actions performed under MTCA must meet certain minimum requirements. The minimum requirements consist of "threshold" requirements and "other" requirements.

- Please cite MTCA -173-340-360(2)(a)(b); and the Sediment Management Standards - 173-204-570(3).

6.3.1. Upland Soil Remediation Alternatives

155. Table 6-1

- With only 4 alternatives to evaluate, a scoring of 1-4 is more appropriate than 1-10. Alternatives should be scored relative to each other, with the lowest ranked alternative receiving a score of 1.
- The description of the permanence score for SL-1 reads, "Same as SL-1." Please provide a description to justify the score.
- Alternative SL-1 and SL-2 do not consider monitoring or maintaining the caps in perpetuity or until cleanup levels are met.

6.3.2.1. MTCA Threshold Requirements

156. Groundwater remediation alternative G-1, monitored natural attenuation (MNA), does not meet MTCA threshold requirements and therefore it must be dropped from further consideration. Analysis of the trend plots in Volume I, Appendix I show that for most constituents there is either no clear downward trend in concentrations, large fluctuations that appear to be related to seasonal or groundwater fluctuations, or an

increasing trend. Therefore, MNA must be dropped from consideration as a stand-alone alternative because there is no evidence that it will be successful within a reasonable restoration timeframe. MNA could be retained as a polishing step with other remediation alternatives.

6.3.3. Sediment Remediation Alternatives

157. Table 6-3

- With only 5 alternatives to evaluate, a scoring of 1-5 is more appropriate than 1-10. Alternatives should be scored relative to each other, with the lowest ranked alternative receiving a score of 1.
- "Permanence" and "Long-Term Effectiveness" of alternatives with log pond ENR should receive much lower scores until modeling is completed to show resuspension is not expected under **strong** storm conditions.

6.3.3.2. Other MTCA and SMS Requirements

Table 6-4

158. Row 2, Criteria: "Length of time estimated for the cleanup action to achieve the sediment cleanup standards once remedial construction is complete."

- Given the length of time it takes to conduct ENR over larger areas depending on the alternative; and the amount of time to dredge depending on the alternative; how can all alternatives be the same as S-1 and 2? This needs to be clarified and expanded.

159. Row 8, Criteria: "Likely effectiveness of source control measures to reduce the time to achieve cleanup standards." And "Source control measures are not part of the sediment remediation alternatives. Source control actions are being implemented in the larger upland region outside of the Study Area."

- The statements in these 2 cells are not completely correct. Figure 5-4 shows that for groundwater remediation G-2, there will be a "Nearshore sand filter placed in the intertidal and shallow subtidal zones.

6.4.2.6 Consideration of Public Concerns

160. Rating all alternatives equal pending public input doesn't adequately recognize the considerable public input already received on this site. The public has attended multiple public meeting and commented many times of the slow speed of the cleanup process. It is clear the public wants a very protective, permanent, and faster cleanup. (This comment also applies to soil and sediment.)

6.4.3.1. Protectiveness

161. Paragraph 1: "Therefore, all alternatives were ranked similarly for protectiveness."

- Protectiveness still needs to be discussed in Table 6-4

6.5. Disproportionate Cost Analysis

162. Paragraph 2: "The benefit-to-cost ratios for all of the alternatives are then compared to determine whether any alternatives have costs that are disproportionate to benefits and are therefore not practicable."

- All alternatives evaluated should be practicable. DCA may identify the alternative that is the most practicable.

6.5.1. Upland Soil Remediation Alternatives

163. Table 6-5

- Suggest using weightings outlined in SCUM II:
  - Protectiveness 30%
  - Permanence 20%
  - Long-Term Effectiveness 20%
  - Short-Term Effectiveness 10%
  - Technical and administrative implementability 10%
  - Consideration of Public Interest 10%
- Footnotes for table are not included.
- Cost/benefit ratio is calculated differently than what is presented in Figure 6-1. Be consistent.
- "Costs disproportionate to incremental benefits" – how was this determined?
- "Practicability based on test of disproportionate cost" – there is no description in the document of how this was determined.
- Suggested scoring:

Criteria	SL-1	SL-2	SL-3	SL-4
Protectiveness	3	3	3	3
Permanence	1	2	3	4
Long-Term Effectiveness	1	2	3	4
Management of Short-Term Risks	4	4	2	1
Technical and Administrative Implementability	4	4	2	1
Consideration of Public Interest	3	3	3	3

164. Figure 6-1

- Benefits/Costs do not match up with those presented in Table 6-5.

6.5.2. Groundwater Remediation Alternatives

165. Paragraph 2: "The analysis indicates that the estimated costs of Alternatives G-1, G-2, and G-3 are not disproportionate to their benefits."

- Not sure how it was determined that G-2 and G-3 costs are proportionate to their benefits. Please provide some description as to how this was evaluated.

166. Paragraph 3: "Based on the results of the DCA, the preferred groundwater remediation alternative is Alternative G-1."

- According to Table 6-6, Alternative G-1 will probably be compliant with MTCA threshold criteria in an uncertain timeframe. This should disqualify Alternative G-1 as the preferred alternative.

167. Table 6-6

- Suggest using weightings outlined in SCUM II.
- Footnotes for table are not included.
- Cost/benefit ratio is calculated differently than what is presented in Figure 6-2. Be consistent.
- "Costs disproportionate to incremental benefits" – how was this determined?
- "Practicability based on test of disproportionate cost" – there is no description in the document of how this was determined.
- Suggested scoring:

Criteria	G-1	G-2	G-3	G-4
Protectiveness	1	3	3	3
Permanence	1	1	2	3
Long-Term Effectiveness	1	1	2	3
Management of Short-Term Risks	1	3	2	1
Technical and Administrative Implementability	4	3	2	1
Consideration of Public Interest	3	3	3	3

168. Figure 6-2

- Benefits/Costs do not match up with those presented in Table 6-6.

6.5.3. Sediment Remediation Alternatives

169. Table 6-7

170. Criteria 2, Restoration time frame:

- Explain in more detail how the restoration time frame is the same for all alternatives when dredging and residual containment could take multiple years to conduct.

171. Table 6-7

- A 1 year restoration timeframe cannot be assumed when ENR is used as a remedy. Mixing of ENR sand with existing surface sediment will take multiple years. Monitoring will be required to show that the SCU meets cleanup levels after this natural mixing period.
- Use weightings outlined in SCUM II.
- "Costs disproportionate to incremental benefits" – how was this determined?
- "Practicability based on test of disproportionate cost" – there is no description in the document of how this was determined.
- Scores are reported differently in this table than 6-5 and 6-6. In Table 6-7, scores are shown after being multiplied by the criterion weighting. Be consistent.
- Benefit/cost ratio is calculated differently than Tables 6-5 and 6-6. In Tab le 6-7 the benefit score is divided by cost in millions and multiply by 100. This is not the calculation shown in the "criteria" column.
- Unlike Tables 6-5 and 6-6, Table 6-7 doesn't contain a row for "Practicability based on test of disproportionate cost" – Why?
- Suggested scoring:

Criteria	S-1	S-2	S-3	S-4	S-5
Protectiveness	1	2	3	4	5
Permanence	1	2	3	4	5
Long-Term Effectiveness	1	2	2	4	5
Management of Short-Term Risks	5	4	3	2	1
Technical and Administrative Implementability	5	4	4	3	1
Consideration of Public Interest	3	3	3	3	3

7.2. Groundwater Remediation

172. Paragraph 1: "As discussed in Section 2, significant physical and chemical changes are expected to occur as upland groundwater migrates through the tidal transition zone beneath the upland margin. It is expected that contaminant concentrations in groundwater are attenuated to below the PCULs through these natural processes."

- As stated in previous comments, there is no data to show this occurs and the existence of multiple preferential pathways means the cleanup cannot rely on this pathway for attenuation.

173. Paragraph 1: "However, four groundwater alternatives involving in-situ treatment were developed in the event that groundwater remediation is required."

- This report is proposing to wait to select a groundwater remedy until after the upland actions are complete and waiting for monitoring results to show necessity. This is essentially a selection of no action as a preferred groundwater alternative, with a contingency action of G-1 or G-2 if needed, though no process is proposed for determining how that decision will be made. This is unacceptable under MTCA. Both the No Action alternative and MNA do not meet the MTCA threshold requirements.

174. Paragraph 2: "As summarized in Section 6, all of the groundwater alternatives (except no-action) meet the MTCA threshold requirements. The DCA results indicate that the alternative with the highest benefit-to=cost ratio is Alternative G-1 – MNA.

- Alternative G-1 is only listed as "probably" meeting MTCA criteria and the timeframe is "uncertain." This alternative should not have been carried forward to the DCA.

7.3. Sediment Remediation

175. "Alternative S-2 includes the following elements: excavate/dredge the intertidal portion of the log pond and dock landing, fill and apply ENR in the berth area around the dock, and apply ENR (based on additional pre-design characterization) …"

- The alternatives should be fully documented and not in need of additional pre-design data.

7.4. Integrated Interim Action Plan

176. Paragraph 1: "the combined cost for MTCA and SMS-related cleanup in the upland (Alternative SL-2) and in-water area (Alternative S-2) is estimated to be $13,351,000, with an additional $5,185,000 if groundwater Alternative G-2 is required."

- Section 7.1 states that the preferred alternative is SL-1, not SL-2 as shown here.

Appendix A: Hydrodynamic and Sediment Transport Investigation

177. **General Comments:**

- The Guidance for Subaqueous Dredged Material Capping (Palermo 1998) is never referenced, nor is any other methodology to determine the long-term suitability of a location for a cap. The study here can be considered a good initial evaluation, but because of the shallow water nature of the site and proposed ENR here, a more thorough evaluation would likely be warranted. The evaluation of waves indicates

erosion potential. This is in absence of the consideration of wave-current interactions in the boundary layer, so the study cannot be viewed as taking conservative assumptions.
- Model results using only a 2 year wind record suggest multiple events during this time period cause wave-induced resuspension of silt and sand in the log pond. Alternatives for the log pond should address 100-year storm conditions.

3.2 Results

178. Paragraph 2: "Net current transport was toward the east at the shallower location…"

- Net current *direction* is not equivalent to *transport*.
- Current measurements made at the 5m station near the jetty aren't necessarily characteristic of a 5m water depth everywhere surrounding the site, particularly near the mill dock.

4.0 Wave Modeling

179. The data used to parameterize the SWAN model is based on 2 years' worth of buoy data collected near the San Juan Islands. The most intense wind condition modeled was a wind speed of 11 m/s from the northeast. Model results for this condition suggest resuspension of sand and silt in the log pond. Figure 18 shows that during only a 2 year period there are multiple northeasterly events with wind speeds greater than 15 m/s. For long-term effectiveness of a cap in this setting, we should be engineering for a 100-year storm.

5.0 Remedial Design Evaluation

180. Paragraph 2: "During this rare event, the results show that material in the coarse sand range (greater than 500 um) would resist mobilization, and thus a cap or ENR layer consisting of coarse sand would be physically stable in this area."

- This is hardly a rare event. Multiple events occurred with winds 50% stronger over the 2 year period considered.
- The SWAN model is used to simulate waves, but the combined impacts of waves AND currents are not considered. This is important because the effect of waves on top of currents essentially increases the apparent bed roughness making sediment more easily eroded.
- The modeling conditions should be presented that allow for the assessment of remedial alternative stability under 100-year storm conditions from the NE direction.

6.0 Summary

181. Paragraph 5: "A grain size mobility analysis was also conducted and the results are shown in Figures 32 through 35."

- This should read "…Figures 32 through 34."