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June 5, 2017

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Jordan S. Wigdor
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Re: Draft Comments on April 27, 2016, Responses to DEQ Comments on *Draft Field Data Report* dated October 2015 and the *Hot Spot Analysis and Ambient Concentrations Screening* dated November 24, 2015
Boise St. Helens/White Paper (ECSI No.14)

Dear Ms. Wooten and Mr. Wigdor:

Oregon Department of Environmental Quality (DEQ) staff have reviewed the April 27, 2016 letter providing responses to DEQ's comments on the "Draft Field Data Report dated October 2015" and the "Hot Spot Analysis and Ambient Concentrations Screening" dated November 24, 2015 for the Boise St. Helens Pulp and Paper Mill, ECSI #14. AECOM prepared the letter on behalf of Office Depot, Inc. (Office Depot). The letter included two attachments:

A. Analytical Results - Feasibility Study Data Gaps Investigation, Tables 3a through 3h, and
B. Feasibility Study Approach for Contaminated Sediments at Boise Mill, St. Helens.

DEQ's draft comments on the letter are attached. The main issues identified in DEQ's comments include the following:

1. The Feasibility Study (FS) approach document does not incorporate discussion concerning source control tasks (e.g., bank soils management is not clearly addressed). Groundwater and surface water decisions and conclusions require more detail.
2. The Preliminary Remediation Goals (PRGs) proposed in the document need further evaluation. Examples of required changes include:
    a. The incremental sampling (IS) investigation data for the background location in Multnomah Channel should be used to determine ambient background, not the ambient background as presented in the document.
    b. Hot spot levels cannot be used as PRGs.

   c. All chemicals of concern (COC) identified in the risk assessment should be carried forward into the FS. However, DEQ acknowledges that decisions regarding areas to be remediated may be largely based on the major risk driver COCs.
3. The composite data did not correlate well with the IS data, particularly in Mill Area 2. This makes interpreting the investigation results and determining which sub-areas in Mill Area 2 require active remedial measures potentially problematic.
4. DEQ does not agree with the proposed values for PRGs and Remedial Action Levels (RALs) presented in the above-referenced documents. In particular, DEQ has concerns about the use of statistical tools that do not incorporate estimates of uncertainty and have the potential to bias low the estimate of the mean.
5. Subsurface contamination is not adequately evaluated. The evaluation of significant subsurface contamination and how to address contamination that poses an unacceptable risk must be included in the feasibility study.
6. The future development plans for the City of St. Helens waterfront, which include mixed-use developments, two beaches and a walking trail, will require reevaluation of the exposure assumptions in Mill Areas 4 and 5, in particular recreational beach uses who may come into contact with current surface or subsurface contamination following future dredging or grading to accommodate site development.

DEQ has prepared draft comments on the above-referenced documents. If possible, DEQ would like to avoid an additional round of responses and DEQ comments regarding the FS approach document before proceeding to the FS. DEQ proposes that if Office Depot is agreeable to the following "key" concepts, the draft comments presented here could be largely addressed in the Feasibility Study.

- Concerning number 2a above with regard to PRGs, DEQ has concluded that the mammalian TEQ ambient background concentration for dioxins should be set at 2 ng/kg which equates to a human health fish consumption TEQ Hazard Quotient of 194. In addition, the total PCB ambient background concentration should be 2 µg/kg and no petroleum hydrocarbon sheen should remain in sediment. DEQ has no objections to the PRGs for HPAHs (for ecological risks) proposed by OfficeMax.
- Owing to the potential for beach exposure scenarios associated with the proposed waterfront redevelopment by the City of St. Helens, a PRG for benzo(a)pyrene equivalents (BaP Eq) for the human health direct contact pathway should be developed.
- Additional discussion related to PRGs/RALs and the approach for selecting them should be performed as the project moves into performing the FS.
- DEQ notes there is a lack of correlation in the total PCB concentrations measured across Mill Area 2 between sampling performed using IS methods and composite sampling methods, suggesting an area of elevated concentrations was not sampled as part of the composite sampling. Unless further assessment is performed in Mill Area 2 as part of the FS, DEQ believes that active remedial measures should be proposed for all of Mill Area 2.

Otherwise, we should continue to try to reach agreement on the key issues identified above and any other issues that might arise during Office Depot's review (including active remediation areas).

As you are aware, Deb Bailey officially retired at the end of April but will be available on a part-time basis through the end of June to assist in my transitioning into the project manager role. We propose meeting with you in June to discuss our comments and the path forward for the project. Please feel free to call me at (503) 229-5024 if you have questions.

Sincerely,

Jeff K. Schatz, R.G.
Project Manager
Northwest Region Cleanup Program

Attachments:
Draft Comments, DEQ, June 5, 2017

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Oregon Department of Environmental Quality's Draft Comments on
Responses to DEQ's Comments and Technical Memorandum – Feasibility Study Approach
(April 27, 2016), *Draft Field Data Report* (October 2015) and
Ambient Concentrations Screening (November 24, 2015)
June 5, 2017

Comments on Responses to DEQ Comments Letter

1. Response 1. The technical memorandum essentially presents the same analysis for ambient background as in the *Hot Spot Analysis and Ambient Concentrations Screening for Boise Mill, St. Helens, Oregon (AECOM, 2015)* report and did not address DEQ's comment. The ambient background concentrations used for the project should be the concentrations in the Multnomah Channel upstream incremental sampling locations and ambient background is defined that way in the comments below. The concentrations in the upstream sampling location are similar to the Port of St. Helens dioxin concentrations. The analysis should also include an assessment of the total dioxin TEQ bioaccumulative hazard quotients as compared to the site. For example, upstream sediment background congener detections (sediment mammalian TEQ of 2 ng/kg) equate to a human health fish consumption dioxin TEQ hazard quotient of 194 (piscivorous mammals 0.22, birds 0.12 and fish 0.46). In addition, as stated in our comment, the projects in the vicinity of Boise are under investigation and contaminant concentrations in sediment are expected to decline as cleanup is implemented.

   In an e-mail sent on June 27, 2016, a response to this question was provided with revision to Table 4. The Port of St. Helens data were added to the evaluation but the Armstrong locations that reflect releases from that site were not removed. As discussed in comments presented below, the background concentrations for the project should reflect the incremental samples results for the project. The mammalian dioxin TEQ ambient background concentrations should therefore be 2 ng/kg and the PCB ambient concentration should be 2 ug/kg.

2. Response 2. DEQ does not have any additional comments.

3. Response 3. DEQ requested a modification of the screening presented in the 2015 field and screening documents to present a measure of total dioxin TEQ bioaccumulation for human health consumption, fish, and piscivorous mammals and birds. For each site and ambient background sediment sample (surface and subsurface), the table should report each congener concentration, calculate congener specific hazard quotients using bioaccumulative SLVs for each receptor presented in Table A-1b in DEQ's *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (2007), and sum the congener specific quotients to calculate the total dioxin TEQ hazard quotient. DEQ's attached table shows the Boise data from Mill Area 2D in this format.

4. Response 4. DEQ's interpretation of the response is that in-water actions will extend to the top of the bank and that the sediment PRGs will apply on the bank. It is unclear how some of the alternatives presented will be implemented on the bank; i.e., dredging, capping, and use of amendments would likely be implemented differently in the bank area versus the sediment due to slope and inundation considerations. Note: SS-2, SS-3 and SS-4 are above the proposed PRG for dioxin TEQ and PCBs.

5. Response 5. Bank soil needs to be evaluated for risk exceedances and hot spots similarly to in-water sediment in order to determine the need for remedial action. This evaluation may identify areas of concern separate from the in-water investigation. For example, the highest mammalian dioxin/furan TEQ (61 ppt) occurs in SS-2 in the riverbank adjacent to the MA-1B area where no in-water action is proposed in the FS approach document. The highest PCB detection of 125 ppb is adjacent to MA-2E. Data are not available to fully review the riverbank but the current dataset suggests that some bank soils must be addressed in the FS. The lagoon area between MA-2C and MA2B is also of concern based on groundwater impacts detected in MW-12 and adjacent sediment contamination. See Response 6 below. In conclusion, the available data indicate potential unacceptable risk in bank soil and it is unclear how adequate response measures can be developed without additional data collection.

6. Response 6. If there is no clear correlation between the incremental sampling (IS) results and the recent sampling, the implications of this in terms of the representativeness of the data should be discussed in the FS. In Mill Area 2, average concentrations of PCBs measured using the incremental sampling methodology (ISM) are 450, 2,900 and 440 ppb. These concentrations are all greater than the mathematically calculated SWAC of 218 ppb derived using the five Mill Area 2 subarea composites, presented in Table 9. The significant differences in average PCB concentrations associated with Mill Area 2 prevent the use of the composite data in feasibility study evaluations. Additionally, the combined Mill Area Wide (Mill Areas 1-3) SWAC, calculated using Mill subarea composites, is also lower than the site wide 90% UCL calculated using Mill Area incremental samples (886 ppb). This indicates that the limited composite sampling did not adequately characterize PCB concentrations in sediment, particularly for Mill Area 2. A possible explanation is that the smaller composite subsamples did not include important PCB source areas. For example, a large area of MA-2E and MA-2D, near shore and around the dock, was not included in the composite sampling. Lacking additional characterization data, in evaluating remedial alternatives in the FS, active remedial measures will need to be specified for the entire Mill Area 2 (i.e., MNR will not be adequate).

7. Response 7. In the Hot Spot Analysis and ambient concentrations Screening for Boise Mill, St. Helens the following is stated on page 9: “The cost/benefit analysis to evaluate the trade-offs of using alternative cleanup levels for the remedial action, other than the SLVs and/or ASLs is presented in this TM.” We did not find, as stated in your response, the additional details for the cost/benefit analysis in the technical memorandum. The meaning of “alternative cleanup levels for the remedial action” being considered must be further explained before the final FS is submitted.

8. Response 8. We appreciate the additional information in the report on the depth of contamination and materials (e.g., wood chips) reflecting industrial waste. However, the FS should include a discussion of the potential impacts of the site-related, significant subsurface organic waste (even that without contamination) to the benthic community (e.g., potentially creating anoxic conditions in the biologically active zone). In addition, there is a significant amount of subsurface contamination that has not been evaluated in the proposal. The highest subsurface detections (3 – 5 feet bml) of PCBs in MA-2D, MA-2B, MA-A are 92 ppb, 209 ppb, and 129 ppb, respectively. The subarea with the greatest subsurface PCB concentration, MA-2B, was not identified as an active cleanup area. The implications of subsurface contamination should be discussed in the FS. In addition, the FS should include discussion about the uncertainty resulting from the absence of chemical characterization data for the 0.8 to 3 foot interval. For FS screening purposes, it should be

assumed that the concentrations in that interval could be as high as either the surface or subsurface concentrations.

General Comments on the Technical Memorandum

The term Target Action Levels (TALs) is defined inconsistently within the report and should not be used in the presentation. In addition, the suggestion that multiplying the Remedial Action Level (RAL) by 10 results in a 10 year increase in the time frame to achieve RALs is not supported.

Source Control must be addressed in the FS document, including groundwater and overland flow from the banks.

Specific Comments on the Technical Memorandum

1. The title of the technical memorandum should have additionally reflected the source control component of the project (e.g., bank soils, stormwater, and groundwater).

2. Section 1.0, second bullet at bottom of page 1. The FS should provide information on the evaluation of upland source control (i.e., preventing future releases to sediment). Pathways to consider include stormwater discharge, bank erosion, and groundwater discharge as well as in-water source control (i.e., preventing areas of elevated sediment contamination from spreading to less contaminated areas).

3. Section 1.1. Source control belongs in the list of purposes for the FS.

4. Section 1.2, third paragraph. The decision to address the upland soils as a separate operable unit from the source control and sediment should be included in the list of project documents and project decisions. The upland area remains a part of the overall project and will need to be addressed in the future.

5. Section 1.2, second paragraph page 3. A debris survey would be helpful for FS decisions.

6. Section 1.3. The in-water Study Area should be defined both by the 150 foot distance and by the sampling that was implemented whichever is further out. Hot spots can be 10X or 100X the risk based concentration depending on target organs and receptors. References to Target Action Levels should not be carried forward into the FS.

7. Section 2.0. A discussion of source control pathways, including bank soils, groundwater and stormwater, should be part of the Conceptual Site Model.

8. Section 2.2. The FS should include a list of all COCs and/or CECs, including those that are not risk drivers, to assist with the discussion of confirmation sampling requirements. Petroleum sheen should be added to this list.

   It must be shown that the dioxin TEQ clean up value is protective of smaller scale ecological exposure and compositional differences in congeners, reflected in bioaccumulative hazard quotients

that drive bird and fish TEQ risk. These differences are captured in the approach outlined in response to comment 3 on Page 1 above.

9. Section 2.2.1 through 2.2.3. No summary of the IS results, comparison of the IS results to the more recent data, or a discussion of the implications of any discrepancies is provided. The more recent composite sampling results for Mill Area 2 significantly underestimate PCB concentrations detected in the incremental sampling Therefore, the IS PCB concentrations should be used in remedial investigation and cleanup analysis. The FS should present the dioxin TEQ bioaccumulation ratio discussed in the response to comment 3 (Page 1) and reference the associated table.

10. Section 2.2.1, last sentence, first paragraph. There are several documented releases of PCBs from onsite sources including wastewater discharge, and sediment adjacent to the site is contaminated with PCBs. Therefore, the statement that "No releases of PCBs from the Site are known to have occurred before or since that time" is inaccurate. The IS results with the maximum PCB concentration of 2,900 ug/kg in Mill Area 2 should be evaluated along with the composite sample data.

11. Section 2.2.2. The data from the Port of St. Helens site does not support the conclusion of an upstream source of dioxin for Mill Area 1E. Unless additional data are collected to support the conclusion, it is assumed that the dioxin in that area is site-related.

12. Section 2.3, page 7. The FS should discuss the receptors, pathways and spatial scales of exposure identified in the risk assessment in order to support the application of PRGs. In addition to human health, the ecological bioaccumulation pathway for higher trophic level ecological receptors includes total PCBs and dioxins / furans. For small home range fish and aquatic life, the appropriate scale for applying ecological PRGs is point by point (lamprey, benthic invertebrates) or mill subarea composites. Additionally, locations with observed petroleum impacts should be added to the FS evaluation (e.g. MA-2C @ M-371 & M-372). Ecological contaminants of concern for small home range receptors identified in the risk assessment include total PCBs, arsenic, cadmium, lead, mercury, dioxin TEQ (fish), total LPAH, total HPAH and total PAH. Large home range receptor CPECs include total PCBs, arsenic, cadmium, lead, mercury, dioxin TEQ (fish, birds and mammals), total LPAH, total HPAH, total PAH, and individual PAHs.

    a. Small Home-Range Receptors – point based (invertebrates, lamprey), Mill Area composites (fish, birds, mammals)
    b. Large Home-Range Receptors – Site Wide 90% UCL on the Mean Exposure Unit (fish, birds, mammals)
    c. Petroleum should be added to the CECs for the FS evaluation to address the locations with observed impacts. This evaluation should be point based.

13. Section 2.3.1. Subsistence fishing cannot be ruled out without a formal use survey which has not been performed in this area and would need to address both current and reasonably like future activities. Therefore, subsistence fishing must be considered. Regardless, due to the low risk-based concentrations for PCBs and dioxins, ambient background will have to be used to guide feasible cleanup.

14. Section 2.3.2, page 8. Petroleum sheens and benthic toxicity evaluations should be addressed point by point, not using SWACs.

15. Section 2.3.3: The benthic toxicity PAH PRG is used in the FS; however, benthic organisms are not considered in the Section 4.1 remedial action objectives, which are to "*reduce risk to higher trophic level ecological receptors (fish, birds, and mammals) via exposure to total HPAHs through the bioaccumulation pathway by reducing concentrations of COCs in surface sediment*…" Protection of the benthic community should be added to the RAOs, including lamprey, and invertebrates.

    We understand that the appropriateness of screening beach exposure using default urban resident screening values was taken from another DEQ project in 2013. Note however, that for some beaches, urban residential screening values would not be appropriately protective. Current exposure is limited at the Boise site so the use of urban resident screening values is acceptable for current beach exposure.[1] However, future exposure is expected to increase substantially if the proposed St. Helens Waterfront Development occurs. Therefore, additional evaluation of risk may be required.

16. Section 3.1, Page 8, Study Area boundaries: DEQ did not require further investigation of Mill Areas 4 and 5. It was assumed that after remedial action is implemented in the other areas natural attenuation would address the contamination, particularly for dioxin. Since concentrations are above the PRGs, these two areas should be included in the long-term monitored natural recovery evaluation and may need to be further investigated considering future development plans in the area. Also, contingency remedies that could be invoked if redevelopment occurs in these areas should be considered in preparing the FS.

    The area included in the FS should extend, at a minimum, 150 feet from the shoreline and in some areas further, based on the sampling data. In addition, post remedial action monitoring should include some sampling outside these areas to confirm that any remedial action that is implemented does not adversely impact surrounding sediments.

17. Section 3.2, page 9, first paragraph. For Mill Area 2, the PCB concentrations from the incremental sampling should be the primary characterization data used in Table 1, due to the significantly lower concentrations detected in the composite samples.

18. Section 3.2, page 9, second paragraph. Figures 11 and 12 show the FS cleanup area requiring remediation, not Figures 10 and 11. The appropriate scale of the PRG should be reflected in the tables and figures. For example, incremental removal of subareas or mill areas may be appropriate for assessments of human health and large home range ecological receptors, but achievement of PRGs over smaller areas should be considered for the protection of small home range fish and aquatic life. For example, smaller areas exceeding the PRGs protective of fish for PCB and dioxin

[1] The most relevant exposure factors are exposure duration (default 11 years total, 6 as a child), exposure frequency (175 days/year), incidental soil ingestion rate (100 mg/day adult, 200 mg/day child), skin surface area (6032 cm^2 adult, 2373 cm^2 child), and skin adherence factor (0.07 mg/cm^2/day adult, 0.20 mg/cm^2/day child). The characteristics of a beach exposure scenario may vary, but as long as the total exposure is similar to that of an urban resident, the screening values are acceptable. For example, the default urban resident assumption of 11 years at 175 days/year is protective of a beach scenario assumption of 22 years at 85 days/year because the total number of days of exposure is similar.

TEQ, and corresponding hot spot concentrations, are not identified in Table 9. Hot spots should be shown as 10 x the PRGs, or total dioxin hazard quotients greater than 10.

19. Section 3.2 page 9, second paragraph. The spreadsheet used to calculate SWACS for the various RALS as indicated was not provided. The basis for the replacement concentrations used in areas remediated is not clear. As indicated by the variability in the characterization results, the mathematically derived site or mill area wide SWACs may not represent the best estimate of a spatially weighted average of surface concentrations. The best estimate is an empirically measured surface weighted average concentration with adequate subsamples, such as incremental methodology. To properly incorporate this variability, Table 9 should include 90% UCL on the mean concentrations for each mill area and site wide exposure areas, along with the previously collected incremental sample means. The specific areas targeted for remediation will have to be revisited in the Feasibility Study.

20. Section 3.3, Depth of Contamination: A more detailed description of the contamination at depth should be presented including contaminant concentrations. The depths characterized should be clearly presented. For example, Unit 1 is only partially characterized (down to 0.33 ft), and the next characterized interval does not start until 3.5 feet. The anticipated stability of sediments in Unit 2 containing soft wood debris is not discussed. The assumption of a depositional environment should be supported by more than sediment cores; for example, contaminant concentration trends with depth should be considered.

21. Section 3.3, last paragraph: The Armstrong hydrodynamic model was not approved by DEQ and therefore should not be used to establish conclusions. Furthermore, site visits conducted last summer discovered a substantial layer of wood waste present in near surface sediments that would have been deposited many decades ago. This historical marker raises further concerns about the credibility of the Armstrong hydrodynamic model.

22. Section 4.1, RAOs. The FS should explain the areas to be addressed for each RAO. In addition, the following questions/issues will need to be addressed:

    a. RAO1: How will disturbance of deeper sediments and contaminant migration from the deeper sediments to the shallow sediments be evaluated in the FS?
    b. RAO2: This RAO needs to be updated to include bioaccumulation pathways for Total PCBs and dioxin/furan mammalian, fish and bird TEQs; Total PAH, LPAH and HPAH via bioaccumulation and direct exposure. Subsurface sediments should also be addressed.
    c. RAO3 should include the identification of hot spots for ecological risk for site wide and mill area exposure units for total PCBs, dioxin / furan mammalian, bird and fish TEQ and Total PAH, HPAH and LPAH. This evaluation should use both ISM mill area sediment concentrations as well as subarea data. Sheen and benthic risk falls into a point by point evaluation. Please remove the TALs language.
    d. RAO3. The COC evaluation should not be limited to risk drivers (i.e., described in the text as contaminants found at hot spot concentrations).
    e. Please remove RAO 4. Sustainability should not be used to diminish achieving protectiveness. It should be considered in the balancing factors.

f. Add a source control RAO. Source control to prevent erosion from the bank of contaminated soil above the in-water PRGs, including through stormwater; and migration from groundwater to surface water.

23. Section 4.2, page 12. Remedial goals (RGs) are not derived based on hot spot concentrations as suggested in the first bullet in this section but do consider RBCs, ambient background levels, and analytical detection limits.

24. Section 4.2.1 and Table 5, Human Health. It appears that the PCB SLVs for infant exposure were taken from another project. DEQ provided incorrect values on the PGE RM 13 project in 2013. Although the error was discovered, corrected values were apparently not included in the final staff report for that project. The correct PCB infant exposure screening levels are 0.27 µg/kg general consumption, 0.033 µg/kg subsistence consumption and 0.027 µg/kg tribal consumption. Including the correct screening values does not substantially alter the conclusions of the report.

    SLVs and HSCs are provided for human health total dioxin/furan TEQ, but the actual evaluation of cumulative effects is more complicated (see Comment 3 and the accompanying example table). DEQ is available to discuss the approach for calculating bioaccumulative dioxin TEQ hazard quotients.

25. Section 4.2.1 and Table 5, Ecological Risk. These sections should identify risk based screening levels and hot spots for all contaminants of potential ecological concern (CPECs) and receptors. The appropriate scale for comparison should be indicated, as area wide SWAC based PRGs are not applicable for all ecological receptors as proposed in the notes section. Hot spots are applied on a point basis for all receptors.
    - Point Based: benthic toxicity and fish (including lamprey)
    - Mill Area (90% UCL): small home-range fish
    - Site-Wide (90% UCL): larger home range fish, birds and mammals

26. Section 4.2.2 Upriver Background. Samples collected as a part of the environmental assessment of upriver sources and clean-up sites should not be used to establish ambient background. For example, the dioxin/furan TEQ ambient background as established by the upstream incremental sampling result was less than 2 ng/kg, and PCBs were not detected.

27. Section 4.3. Page 15. A preliminary remediation goal (PRG) should not be defined as a hot spot value. Instead, define the PRG as a risk based concentration. The corresponding probable or upper effect level from the same source used in the risk assessment may be identified as the PRG, which is 6,500 ppb for HPAHs (5,300 ppb LPAH and 12,000 ppb Total PAHs) for ecological risks. Hot spots based on these PRGs can then be identified, if applicable.

28. Section 4.4. The figures with the information on other sites and benchmarks are on Table 10 a, b, and c. not 9. These figures should be removed. They are misleading and inaccurate in some cases; for example, the level shown for PCBs at Evraz was used to guide which material could be capped and which could be removed. Furthermore, Zidell and Station L are listed as source control but they were in-water dredging and capping remedial actions. Therefore, action levels may be defined differently at each site identified.

29. Section 5.1. Bullet 1. The relationship between surface and subsurface concentrations is not consistent. In some locations the surface concentration is higher than the subsurface concentration and in other locations the subsurface concentration is higher than the surface concentration (See Section 2.2.1 of the technical memorandum). We therefore cannot agree that surface concentrations are necessarily improving.

    Bullet 2: The Armstrong hydrodynamic model was not approved by DEQ and therefore cannot be used to support hydrodynamic conclusions.

    Bullet 3: The upstream ambient background for PCBs established by the incremental sampling results is non-detect; therefore these comparisons are inaccurate. Table 8 MAST samples results should be presented to include dioxins and furan congener concentrations, and congener specific hazard quotients for mammals, fish and birds (similar to response to comment 3). It should be noted that in some locations the MAST concentrations in a given mill subarea were greater than the composite surface sediment samples (e.g. MA-2E MAST 2; and MA-2A / MA-3E border, MAST 3), indicating that the composites may be under-representative of sediment concentrations in those areas.

30. Sections 6.0 and 6.1. See general comment with respect to the use of TALs. DEQ does not agree with the PRGs and RALs that are presented in the document and these will need to be revisited in the FS.

31. Section 6.1.1. A spatial weighted average is one methodology to evaluate the implications of potential remedial options, but measures that incorporate variability and uncertainty in sediment concentrations (i.e., using the 90% UCL on the mean) should also be used. Additionally, the remedial goals should be applied over spatial scales associated with the receptor of concern. For some ecological receptors, the point of compliance (e.g. as shown in Table 6) should be revised to match exposure areas smaller than site-wide exposure. Clean up objectives should include evaluations for achieving ecological clean up levels within each mill subarea.

32. Section 6.1.2. The TAL concept is not supported. The use of a time reference of 10 is not supported and should not be used for analysis of the progress of the remedial action. Predicted sedimentation rates have not been determined yet.

33. Section 6.2. Information on the calculations performed for the bed-replacement values was not provided. It is not clear why ½ the ambient background level was used; ambient background concentrations should be used. See comments on Table 9. Remedy cleanup areas should be determined considering spatial scale of the receptor / exposure pathways. For fish and aquatic life, achievement of remedial goals within each mill subarea should be evaluated.

34. Section 6.3. None of the remedial alternatives clearly address contamination on the banks. A description of reactive ENR is not provided. As noted previously, TALs should not be carried forward into the FS. The depth of dredging should be subarea specific but 6 feet below the sediment surface is probably acceptable for cost estimates.

35. Section 6.4. As mentioned above, do not use the Armstrong model. If modeling is necessary for the remedial action, preparation of a site-specific model should be considered.

36. Section 6.5. The FS should consider the impact of wood waste, which was identified in varying quantities in Stratigraphic Unit 2, on remedy selection. DEQ believes the FS balancing factors represent the appropriate framework for evaluating the potential impacts of such wastes. For example, the potential for buried wood waste to influence geochemistry and/or generate hazardous substances that could migrate through a cap should be considered under the "effectiveness" balancing factor. Furthermore, Department of State Lands (DSL) lease requirements could come into consideration during permitting for a future remedial action and should be considered under the "implementability" balancing factor. With regard to the latter, in order to identify and resolve potential concerns by DSL that could derail a proposed remedy, DEQ strongly recommends early coordination and consultation.

37. Table 1. The IS concentrations for PCBs should be listed in the table in addition to the composite samples. Tables 1 and 2 should also indicate the type of sample, such as composite, ISM, and discrete samples. Composite and ISM should indicate the area and number of subsamples comprising the sample.

38. Table 4. The source of the 1254 PCB data for EPA Background MCBS1 (6.4 JQ) and MCBS2 (32JQ) was not provided. The data tables from the URS report show these as 0.053U and 0.048U. Only the 12JQ would therefore be considered for the upriver ambient background as presented in the report, corresponding to a value of 12 ug/kg.

39. Table 5. The total dioxin/furan bioaccumulative acceptable risk should be added to the table, as "the sum of congener specific hazard quotients < 1."

    See Comment 24 regarding PCB SLVs for infant exposure. The correct PCB infant exposure screening levels are 0.27 µg/kg general consumption, 0.033 µg/kg subsistence consumption, and 0.027 µg/kg tribal consumption. Including the correct screening values does not substantially alter the conclusions of the report.

40. Table 6.
    a. Please use appropriate definitions for terms. For example, an ecological hot spot value is not a PRG.
    b. Add total PCBs and dioxin TEQ to RAO 2.
    c. Total PCBs: Ecological points of compliance are not correct as shown. For example, the fish total PCB sediment criterion is 22 ppb, which is greater than ambient background. The hot spot in this case is 220 ppb, which is exceeded in Mill Area 2 ISM samples, and MA-2D and MA-2C composite samples.
    d. Protection of benthic receptors including fish and invertebrates should be added as an RAO. RAO 4 (Non Risk-Driver COCs) should be removed.
    e. The table currently only shows risk driver COCs; it should comprehensively summarize all COCs.

40. Table 9.
    a. Table 9 should provide the 2010 incremental sample results, and 90% UCL on the mean for each COC and Mill Area and for Mill Areas 1-3 combined. For example the table below presents results of calculated 90% UCLs for total PCBs compared with ISM results and Area 1-3 ISM 90%

UCLs. Depending on the sampling methodology and statistical method used, significantly different conclusions can be drawn about areas exceeding remedial goals.

b. 17 ug/kg is the proposed PRG derived from the calculations in the report of ambient background for PCBs, when the ISM PCB anthropogenic background was not detected at 2 ppb.
c. The basis for selection of remediated concentrations should be clarified; they vary by mill area, and in some cases are significantly below the ambient background identified in the report. For example, a remediated concentration of 17 ppb is selected for Mill Area 1, but 6 ppb for Mill Area 2. Please justify the selection of the concentration reduction post remediation. While the footnote states that for areas where remedial action is implemented, the assumed post remedial concentration is "½ the ambient background level or below," 6 ppb is selected for PCBs as the substituted value instead of 8.5 ppb. Remove the TAL from the table, use HSC.
d. The table below presents Mill Area total PCB Concentrations (ppb) by sample and statistical methodology.

	Incremental Mean 1	Incremental Mean 2	Incremental Mean 3	90% UCL of Composite Samples	SWAC of Composite Samples
Mill Area 1	8.5 U	33	23	25.6	19
Mill Area 2	450	2,900	440	375.7	218
Mill Area 3	48	22	23	17.5	11.6
Site Wide Mill Area 1-3	90% UCL Incremental Means 2,412			265	80.3

Calculated Bioaccumuation Dioxin TEQ Indices for Human Health and Ecological Receptors for Boise Mill, St. Helens Oregon

Location	Analyte	Sediment Concentration (ng/kg)	Qualifier	Eco Mammal SLV (ng/kg)	Human Health Subsistence SLV (ng/kg)	Bird SLV (ng/kg)	Fish SLV (ng/kg)	Eco Mammal Hazard Quotients	Human Health Subsistence Hazard Quotients	Avian Hazard Quotients	Fish Hazard Quotients
MA-2D	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	951.00		4.20E+02	8.50E+01	2.70E+06	4.30E+05	2.26	11.19	0.00	0.00
	1,2,3,4,6,7,8-Heptachlorodibenzofuran	119.00		4.30E+02	8.50E+01	2.70E+05	4.30E+04	0.28	1.40	0.00	0.00
	1,2,3,4,7,8,9-Heptachlorodibenzofuran	13.70		1.10E+05	8.50E+01	2.70E+05	4.30E+04	0.00	0.16	0.00	0.00
	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	11.50		4.20E+02	3.40E-01	2.10E+03	3.40E+01	0.03	33.82	0.01	0.34
	1,2,3,4,7,8-Hexachlorodibenzofuran	12.80		4.20E+02	3.40E-01	1.10E+03	1.70E+02	0.03	37.65	0.01	0.08
	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	22.70		4.20E+02	3.40E-01	1.10E+04	1.70E+03	0.05	66.76	0.00	0.01
	1,2,3,6,7,8-Hexachlorodibenzofuran	7.56		4.20E+02	3.40E-01	1.10E+03	1.70E+02	0.02	22.24	0.01	0.04
	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	9.53		4.20E+02	3.40E-01	1.10E+03	1.70E+03	0.02	28.03	0.01	0.01
	1,2,3,7,8,9-Hexachlorodibenzofuran	2.67	J	4.20E+02	3.40E-01	1.10E+03	1.70E+02	0.01	7.85	0.00	0.02
	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.78	J	4.20E+01	3.40E-02	1.10E+02	1.70E+01	0.04	52.35	0.02	0.10
	1,2,3,7,8-Pentachlorodibenzofuran	4.49	J	4.00E+02	3.10E-01	3.00E+02	9.50E+01	0.01	14.48	0.01	0.05
	2,3,4,6,7,8-Hexachlorodibenzofuran	5.49		4.20E+02	3.40E-01	1.10E+03	1.70E+02	0.01	16.15	0.00	0.03
	2,3,4,7,8-Pentachlorodibenzofuran	7.08		4.70E+00	3.70E-03	3.50E+00	1.10E+00	1.51	1913.51	2.02	6.44
	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.90		1.40E+00	1.10E-03	3.50E+00	5.60E-01	1.36	1727.27	0.54	3.39
	2,3,7,8-Tetrachlorodibenzofuran	15.40		1.20E+02	9.40E-02	3.00E+01	9.50E+01	0.13	163.83	0.51	0.16
	Octachlorodibenzo-p-dioxin	9820.00	J	3.60E+06	2.80E+03	2.70E+07	4.30E+06	0.00	3.51	0.00	0.00
	Octachlorodibenzofuran	686.00		3.60E+06	2.80E+03	2.70E+07	4.30E+06	0.00	0.25	0.00	0.00
	Total Dioxin TEQ Hazard Quotient							5.8	4100	3.2	10.7