UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
805 SW Broadway, Suite 500
Portland, Oregon 97205

Reply to: 000

December 21, 2012

Mr. Bob Wyatt
Chairman
Lower Willamette Group
c/o Northwest Natural
220 NW Second Avenue
Portland, Oregon 97209

RE: Portland Harbor Superfund Site, Administrative Order on Consent for Remedial Investigation and Feasibility Study: Docket No. CERCLA-10-2001-0240
EPA Supplemental Comments on the *Portland Harbor RI/FS Draft Baseline Ecological Risk Assessment*

Dear Mr. Wyatt:

This letter provides EPA's comments, modifications, and direction to the Lower Willamette Group (LWG) for completing the Baseline Ecological Risk Assessment (BERA) for the Portland Harbor RI/FS. EPA's detailed comments, modifications, and direction are attached.

EPA provided comments to the LWG on July 10, 2012 on the second draft of the *Portland Harbor RI/FS Draft Baseline Ecological Risk Assessment*, submitted and dated July 1, 2011. On September 18, 2012 LWG provided a table with LWG's response to each of EPA's comments. EPA and LWG have been working over the past three months to resolve the issues raised in LWG's response to EPA's July comments. Significant progress was made and EPA believes that both parties now have a good understanding of the work required to address EPA's comments and complete the BERA.

EPA's comments, modifications, and direction to the LWG include the following:

- EPA's modified Executive Summary for the BERA. Please replace the Executive Summary in the draft BERA with EPA's modified Executive Summary, which is attached.

- Comment Resolution Table. The attached table showing EPA's July comments, LWG responses, and comment resolution noted comprise EPA's comments and direction for changes on the individual elements that must be modified to complete the BERA.

- EPA modifications to Section 11 of the BERA. Please replace Section 11 of the BERA with EPA's modified Section 11 that is attached. EPA also expects to provide two summary tables to LWG by January 11, 2013 for inclusion in this section: 1) a table

summarizing ecological risks by assessment endpoints and measurement endpoints, and 2) a table summarizing ecological risks for various media by river mile. Please note that EPA may have additional modifications to the text of the BERA that we expect to provide by January 11, 2013. EPA does not anticipate that additional modifications to the text will require any further revision of the calculations or presentation of the results of the BERA.

We look forward to working with the LWG on the specific revisions that are needed to address our comments and finalize the BERA. EPA believes it will be most productive to have our respective technical leads work closely together to ensure that the revisions required by these final comments are completed in a timely manner and provide an approvable document. The LWG's deadline for completing the final BERA is March 30, 2013.

If you have any questions, please contact Chip Humphrey at (503) 326-2678 or Kristine Koch at (206) 553-6705. LWG's technical consultants may contact EPA's technical lead for the BERA, Burt Shephard, directly at (206) 553-6359. For legal questions, please contact Lori Cora at (206) 553 1115.

Sincerely,

Chip Humphrey
Remedial Project Manager

Kristine Koch
Remedial Project Manager

Enclosure

cc: Jim Anderson, ODEQ
Rob Neely, NOAA
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Brian Cunninghame, Confederated Tribes of the Warm Springs
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Michael Karnosh, Conferderated Tribes of the Grand Rond Community
Tom Downey, Confederated Tribes of the Siletz Indians
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EPA Comment Category	No.	Section	Page Line(s)	Comment	Response	Comment Resolution Status
EPA July 10, 2012 comments on the July `1, 2011 Draft Final Baseline Ecological Risk Assessment						
1) Localized vs. sitewide risks/spatial scale (home ranges)	1			Exposure assessment for fish: The Oregon Dept. of Fish and Wildlife radiotelemetry study provided site specific information on the movements, site use and home ranges of several target ecological receptor fish species. This information was used to help define home ranges for fish species in the BERA problem formulation. While it appears the site specific home range was used, the BERA also performs risk calculations on fish using an assumption that fish use the entire site, thus diluting the magnitude of some of the identified risks when calculated on a smaller home range basis. Note that for several fish species (e.g. white sturgeon, northern pikeminnow) an assumption their home range is the entire site is warranted and provided where appropriate in the problem formulation. The BERA needs to identify localized risks to species (especially fish) based on home ranges rather than only as sitewide risks or larger home ranges than specified in the EPA Problem Formulation as currently presented in BERA, since significant risks to many receptors are localized. Transition zone water results presentation: The BERA still downplays chemicals that pose unacceptable risks in one or a relatively few areas of the entire site. This rationale has been used by LWG previously to largely eliminate transition zone water as posing unacceptable ecological risks, as there is limited spatial coverage of TZW throughout the site. TZW is the matrix with the highest individual chemical hazard quotients in the entire BERA (several chemicals have HQs in excess of 1000 in one or more TZW samples), and the BERA needs to more fully identify these chemicals and areas.	The statement that risk calculations were performed for all fish assuming that they use the entire site is incorrect. The same receptor-specific exposure areas used in the draft BERA were used in the draft final BERA. Receptor-specific foraging areas are presented in Table 7-1, and rationale for these foraging areas is provided in Attachment 13. Regarding TZW results presentation, the LWG will bring in additional information from the RI (Section 4.4.3) about the groundwater pathway assessment (GWPA), including information about: • Classification of Category A sites • Analysis of Category A sites to identify those that had sufficient evidence of a complete groundwater transport pathway to the Lower Willamette River (LWR) to carry them forward into the site-specific scoping process for the Round 2 GWPA • EPA and DEQ's determination of insufficient evidence to conclude that groundwater plumes associated with the remaining Category A sites were migrating to the LWR We will also note that all Category A sites with sufficient evidence of a complete groundwater transport pathway to the LWR are assessed in the BERA. If EPA and DEQ have determined that additional sites meet Category A criteria, and have sufficient evidence to conclude that groundwater plumes are migrating to the LWR, then the LWG will note that in the final BERA.	Resolved. BERA will be changed per LWG response. The TZW comment response is acceptable to EPA as long as the BERA acknowledges (or points to a section of the RI that acknowledges) that the areal extent of contaminated groundwater discharge to the river within the Study Area is not completely known.
1) Localized vs. sitewide risks/spatial scale (home ranges)	1			Exposure assessment for fish: The Oregon Dept. of Fish and Wildlife radiotelemetry study provided site specific information on the movements, site use and home ranges of several target ecological receptor fish species. This information was used to help define home ranges for fish species in the BERA problem formulation. While it appears the site specific home range was used, the BERA also performs risk calculations on fish using an assumption that fish use the entire site, thus diluting the magnitude of some of the identified risks when calculated on a smaller home range basis. Note that for several fish species (e.g. white sturgeon, northern pikeminnow) an assumption their home range is the entire site is warranted and provided where appropriate in the problem formulation. The BERA needs to identify localized risks to species (especially fish) based on home ranges rather than only as sitewide risks or larger home ranges than specified in the EPA Problem Formulation as currently presented in BERA, since significant risks to many receptors are localized. Transition zone water results presentation: The BERA still downplays chemicals that pose unacceptable risks in one or a relatively few areas of the entire site. This rationale has been used by LWG previously to largely eliminate transition zone water as posing unacceptable ecological risks, as there is limited spatial coverage of TZW throughout the site. TZW is the matrix with the highest individual chemical hazard quotients in the entire BERA (several chemicals have HQs in excess of 1000 in one or more TZW samples), and the BERA needs to more fully identify these chemicals and areas.	Regarding the issue of "downplaying" chemicals that pose potentially unacceptable risks in one or relatively few areas of the entire site, according to EPA's Ecological Risk Assessment Guidance for Superfund (ERAGS) (EPA 1997),[1] the BERA risk characterization should include an interpretation of ecological significance (see ERAGS exhibit 7-1). Location and areal extent of existing contamination above a threshold for adverse effects is one of the factors that may be used to interpret ecological significance (ERAGS Section 7.3.3). Consistent with that guidance, the following was decided during the 8/20/10 and 9/9/10 LWG-EPA meetings to resolve EPA directed changes: "The initial analyses will be point by point; the results will then be evaluated based on magnitude, spatial extent and ecological significance of any TRV exceedances." It is consistent with EPA guidance for the risk characterization's interpretation of ecological significance to say that the potentially unacceptable risks to ecological populations and communities from chemicals with HQs ≥ 1 in one or relatively few areas of the entire site are relatively insignificant. For further information about chemicals posing potentially unacceptable risks in one or relatively few areas of the entire site, please see the responses to Comments 25 and 28.	Resolved. The final BERA will include additional discussion as appropriate about risks of limited spatial extent, on an appropriate spatial scale. EPA's BERA lead has made revisions to the BERA Executive Summary in order to clarify its expectations for presentation of localized risk. The draft ES was shared with the LWG's BERA lead on December 14th. The two leads will work together to produce an Executive Summary acceptable to EPA.

[1] See specifically ERAGS Exhibit 7-1 and Section 7.3.3.

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	2	Executive Summary	p. ES-4, 5th full bulleted paragraph (redline strikeout version of the BERA)	Transition zone water (TZW) exceedances (i.e., HQs ≥ 1) are localized. While strictly speaking correct based on available information, this conclusion is based on a limited number of TZW stations that do not provide complete spatial coverage of the entire site. Given the limited spatial coverage of the TZW samples, a more accurate statement would be that the areal extent of TZW exceedances within the site is not completely known, and thus an uncertainty within the BERA.	This is a recurring comment (see Comment 92 in EPA's July 16, 2010, comments on the draft BERA [Attachment 1 of the draft final BERA, p. 850]) that has been addressed in the RI, and is addressed in Sections 6.6, 7.4, and 9.2 of the draft final BERA. The LWG will bring in additional information from the RI about how the TZW sampling areas were selected. If EPA has identified areas of contaminated groundwater discharge to the river within the Study Area that have not been sampled, the LWG will note that in the final BERA.	Resolved. Response acceptable to EPA and BERA will be modified per LWG response. In addition, the BERA needs to acknowledge (or points to a section of the RI that acknowledges) that the areal extent of contaminated groundwater discharge to the river within the Study Area is not completely known.
	3		p. ES-9	Effects Assessment, last sentence of first paragraph of section (redline strikeout version of the BERA). In addition to bald eagle and lamprey, risks to juvenile Chinook salmon were also estimated at the organism level, and should be added to the text.	Requested change is acceptable and will be incorporated into the final BERA. Per verbal instruction from Burt Shephard provided to John Toll on August 9, 2012, we will also remove bald eagle from the list of species assessed at the organism level.	Resolved. The final BERA will use LOAEL TRVs for bald eagle. EPA's legal counsel has advised that the 1941 Bald Eagle Protection Act is not grounds for continuing to use NOAEL TRVs.
	4		p. ES-12	end of 1st full paragraph on page (redline strikeout version of the BERA). The spatial analysis tends to identify only those COPC's posing potentially unacceptable risks over the entire, or at least a substantial areal extent within the site. It tends to miss contaminants such as tributyltin (TBT) that pose potentially unacceptable risks only in one or a few locations within the site. This should be noted in the text.	See response to Comment 25 regarding COPCs posing potentially unacceptable risk in localized areas.	Resolved. See comment 1 and 25.
	5		p. ES-12	footnote 11 (redline strikeout version of the BERA). This footnote is not completely correct. Water quality criteria, for example, are designed to protect aquatic communities, not organism level effects. The footnote should be amended to clarify that some, but not all measurement endpoints evaluated organism level effects.	Water quality criteria, like other TRVs, are based on tests that evaluate organism-level effects. They are assumed to protect aquatic communities because they protect most species, as determined by measuring organism-level effects.	Resolved. Response language will be used to amend footnote
	6	Section 7 Fish Risk Assessme nt:		Spatial Scale and Determination of COPCs – Tissue Residue Line of Evidence(Section 7.0) – see also the removed Section 2.0 by examining the red-lined version from Attachment 12: There appear to be new steps introduced into the risk assessment that expands the spatial scale for the evaluation of the fish tissue residue line of evidence. Further averaging is conducted beyond a composite by composite analysis (step 1) that was presented in the previous DRAFT BERA. Table 7-7 should be used to determine COPCs (Step1) and not Table 7-1 (Step 2) which expands the spatial scale. Composite samples already represent an average concentration over a relevant spatial scale that was selected according to the home range of the fish. COPCs should be identified based on Step 1 (Sample by sample basis) instead of further widening the scale beyond the home range of the fish in Step 2 (Table 1). (Note: The LWG cites an agreement made on Oct. 15th 2010 as justification, but the specifics of the agreement are not provided). See also Section 7.1.5 (risk characterization) and in particular the text that was removed. These include:	See response to Comment 1. Please note that the specifics of the agreement made on October 15, 2010, are provided in the response to Comment 1.	Resolved. No action needed. Fish home ranges used in the BERA were as follows: Sculpins – 0.1 mile Largemouth bass, northern pikeminnow – 1 mile Carp – 3 miles White sturgeon, largescale sucker, peamouth, Pacific lamprey, Chinook salmon - sitewide
	7	Section 7 Fish Risk Assessme nt:		Sculpin: Previously was composite by composite. Samples removed: Copper: 3 composite samples with HQs>1 (out of 38) PCBs: 4 composite samples with HQs>1 (out of 38) 4,4'-DDT: 1 composite samples with HQ>1 ((out of 38) Total DDX: 1 composite samples with HQ>1 ((out of 38) BEHP: 1 composite sample with HQ>1 ((out of 38)	See response to Comment 1. Sculpin was analyzed on a sample-specific basis, as reflected in Table 7-46. All of the listed chemicals are identified as COPCs posing potentially unacceptable risk for sculpin based on the tissue LOE, as reflected in Table 7-46.	Resolved. No action needed.

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	8	Section 7 Fish Risk Assessment:		Lamprey: Site-wide exposure, previously composite by composite. Samples removed: Copper: 4 composite samples (out of 4)	Copper was identified as a COPC posing potentially unacceptable risk to lamprey based on the tissue LOE, as reflected in Table 7-46. Based on verbal comments from EPA's BERA lead, the LWG understands that EPA intended to withdraw this comment.	Resolved. No action needed.
	9	Section 7 Fish Risk Assessment:		Largescale Sucker: Previously 3 mile composite by composite; now site wide. Samples removed: PCBs: 2 composite samples with HQs>1 (out of 6)	PCBs were identified as a COPC posing potentially unacceptable risk to largescale sucker based on the tissue LOE, as reflected in Table 7-46. Also, please see response to Comment 1.	Resolved. No action needed. BERA consistent with the facts presented in the comment.
	10	Section 7 Fish Risk Assessment:		Peamouth: Previously 3 mile composite by composite; now site wide. Samples removed: Lead: 1 composite with HQ>1 (out of 4)	Lead was identified as a COPC posing potentially unacceptable risk to peamouth based on the tissue LOE, as reflected in Table 7-46. Also, please see response to Comment 1.	Resolved. No action needed. BERA consistent with the facts presented in the comment.
	11	Section 7 Fish Risk Assessment:		Smallmouth Bass: Previously composite by composite; now averaged with other composites in arbitrary 1 mile (both side of the river) scenario. Composites should not be averaged with other composites as they already represent the appropriate spatial scale. Samples removed: Lead: 2 composites with HQ>1 (out of 32) PCBs: 9 composite samples with HQs>1 (out of 32) BEHP: 2 composite samples with HQs>1 (out of 32)	Lead, PCBs, and BEHP were identified as COPCs posing potentially unacceptable risk to bass based on the tissue LOE, as reflected in Table 7-46. Also, please see response to Comment 1.	Resolved. No action needed. BERA consistent with the facts presented in the comment.
	12	Section 7 Fish Risk Assessment:		Northern Pikeminnow: Previously composite by composite as fish were composited over 3 miles; now averaging over the site. Mercury: 1 composite with a HQ>1 (out of 6) Total PCBs: 2 composites with a HQ>1 (out of 6)	Pikeminnow were analyzed for 1-mile exposure areas. Total PCBs is identified as a COPC posing potentially unacceptable risk based on the tissue LOE, as reflected in Table 7-46. Mercury was eliminated as a COPC; the mercury TRV increased from 0.44 to 0.53 because the LOAEL from Sandheinrich and Miller (2006) was erroneously reported in the published paper. EPA agreed to this change in the meeting to resolve non-directed comments on October 15, 2010 (see Attachment 1 of the draft final BERA, p. 1248). Also, please see response to Comment 1.	Resolved. No action needed. BERA is consistent with prior agreements for this comment. Total PCB results are consistent with the comment. Reason for different results for Hg adequately explained.
	13	Appendix 12		Fish, Dietary Dose Line of Evidence: Sample by sample HQs in Appendix 12, show relevant spatial scale to different fish receptors of concern. However, these were then carried forward to be analyzed in a spatial scale larger than the home range of the organism by looking at a site-wide exposure scenario for all fish. What happened to TBT? Why are all the TBT HQs for fish changed to mercury? This appears to be a typographic error. Also, the arbitrary river mile breakpoints have a high potential to bifurcate known sources and average out exposure to fish prey and sediment. Addition of a table that summarizes the data for different but overlapping river segments, such as risks within a river mile summarized in half mile increments (e.g. RM 2-3, RM 2.5-3.5, RM 3-4, etc.) would address this concern. (especially in areas such as Willamette Cove area for mercury). Those removed by widening the spatial scale for the fish evaluation:	TBT was eliminated as a COPC because the TBT LOAEL TRV was increased from 0.0021 (based on Shimasaki et al. 2003) to 0.15 mg/kg bw/d (based on Nakayama et al. 2005), as documented in the TBT TRV memo sent to EPA on October 28, 2010 (see Attachment 1 of the draft final BERA pgs 1204-1212). In the Draft BERA, mercury was eliminated in Step 1 because only the sediment concentrations exceeded the TSC. In the draft final BERA, mercury was added as a COPC for evaluation in Step 2 for largescale sucker, sturgeon, chinook salmon, peamouth, and sculpin, because the LWG agreed to revise Step 2 to sum the dietary and sediment HQs in response to EPA Comment 128 on the Draft BERA. The potential for different exposure area breakpoints to influence COPC determinations will be mentioned in the final BERA as an uncertainty. Please see responses to Comments 1 and 6. The fish tissue compositing scheme makes it difficult to assess average exposure levels at overlapping 0.5-mile increments.	Resolved. Response acceptable to EPA. BERA will be modified per LWG response.

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	14			Smallmouth Bass: TBT, Swan Island Lagoon: Lab worm HQ of 45 for prey for fish; sediment HQ of 1.5 Others: Contrary to the previous draft where COPCs were "identified as those COPCs with HQs >1 based on ecologically relevant exposure scales for sculpin, smallmouth bass, and northern pikeminnow because fish samples were collected and composited over areas that represent what are conservatively assumed to be ecologically relevant exposure scales" (previous version). There now appears to be no analysis of composite by composite screening since COPCs are based on Step 2 (averaging over larger spatial scales).	See responses to Comments 1 and 13.	Resolved. TBT TRV was updated per agreement between LWG and EPA. LWG will identify where composite-by-composite screening results are documented.
	14			Cadmium: RM 1.5 to 2.5; RM 3.5 to 4.5 Copper: All river miles		Resolved. LWG verified that mixed species diet HQs < 1 (see draft final BERA Table 7-29).
	15	Section 7.1.3.1, Empirical Tissue EPCs:		There is a citation provided that under EPA guidance both composite and discrete samples are appropriate for calculation of UCLs using Pro UCL Software (EPA 2007b). This guidance is directed at calculating soil exposure point concentrations and not body burdens for the protection of fish populations. The calculation of exposure point concentrations for the protection of fish should be on a relevant spatial scale which is composite by composite, as the composites were already designed with home range in mind. The tables in attachment 10 showing these calculations should be moved (or repeated) in the main text of the BERA	Uses of composite and discrete sampling are the same for soil and organisms (i.e., characterization of the population of interest within the sampled area); therefore, UCL guidance applies. Attachment 10 does not present fish tissue calculations. Steps 1 and 2 of the fish tissue LOE analyses are presented in the main text. Also, please see response to Comment 1.	Resolved. 1) The specific question of whether the cited EPA guidance saying that both composite and discrete samples are appropriate for calculation of UCLs using Pro UCL Software has been resolved (affirmative). No change needed. 2) Fish home ranges specified in Comment 6, which will be the maximum spatial extent in the BERA for averaging contaminant concentrations in composite tissue samples for fish species.
	16	Section 7.1.5.5, Evaluation of Non-Target Ecological Receptors		The spatial extent (location of composites) for BEHP and PCBs identified as COPCS for brown bullhead are not outlined, so it is not possible to determine if the selected fish receptors are protective of bullhead as the text indicates.	The locations of composite samples for brown bullhead will be included in the final BERA.	Resolved. Response acceptable to EPA, BERA will be modified per response.
	17	Section 7.2.1, Fish Dietary Risk Assessme nt		Dietary risk conclusions should be based on Step 2 – derivation of HQs over a relevant exposure area for individual prey and species as outlined by EPA's Problem Formulation. The only justification for basing the conclusions on Step 3 is for the derivation of HQ's over a relevant exposure area accounting for the ingestion of multiple prey species. Additionally, it is unclear from this document what "multiple prey species" were used.	Dietary prey assumptions are summarized in Table 7-18 and presented in detail in Attachment 13. The LWG understands, based on verbal comments from EPA's BERA lead, that EPA would like to see everything that is called for in the BERA problem formulation included in the main body of the BERA. This could be unwieldy, but the LWG will work with EPA to determine exactly what EPA wants to pull into the main body. Also, please see response to Comment 1.	Resolved. Response acceptable to EPA. EPA recognizes that it would be unwieldy to include everything that is called for in the BERA problem formulation in the main body of the BERA and is not asking for that. The SLERA will stay in attachment 5.

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	18	Section 7.3.1, Fish Surface Water Risk Assessement Methods, Step 2		Step 2 is added as "agreed to between EPA and LWG on October 15, 2010" (footnote 47) in which surface water data are averaged over larger areas of the river and not evaluated on a location by location basis. This additional step is not appropriate given the small home ranges of different fish (e.g. sculpin, bass) and the wider spatial resolution of the collected surface water samples. Potentially unacceptable risk should be identified based on those COPCS that resulted in HQ>1 in Step 1, according to prior direction and the problem formulation. Averaging water samples does not appropriately correspond to protection of small home range fish receptors. Water samples in the new LWG Step 2 were averaged according to Table 7-1 (see also comments on Section 7.0 on appropriate fish exposure scale). These areas include averaging surface water over 1 mile (both sides of river) and site wide exposure areas. This is without consideration of acute water quality criteria, which could be exceeded on localized basis and should be evaluated. Fish home ranges as defined in the problem formulation should be the maximum allowable length of river over which surface water concentrations can be averaged.	See response to Comment 1. The methods used to calculate water EPCs for fish are consistent with those called for in the last sentence of this comment.	Resolved. Response acceptable to EPA. See Comment 6 for fish home ranges used in the BERA.
	19	Section 7.6.3	Table 7-46, Summary of Fish COPCs>1	The table should be re-done to indicate COPCs based on the appropriate spatial scale including localized screening composite by composite for fish, spatially distinct surface water samples (location by location), and using Step 2 of the fish dietary assessment as directed by EPA's problem formulation.	See response to Comment 1.	Resolved. New summary tables will be added near the ends of chapters 6-10.
	20	Section 8	Table 8-3, Shorebird Exposure Areas	The problem formulation calls for shorebird exposure areas in 1-mile increments. However, the exposure area has been changed in the ERA to 2 mile exposure areas calculated using 90% UCLs. Since many beaches are contaminant specific, this methodology in some cases bifurcates or dilutes out ecologically relevant concentrations. The 1 mile exposure area should be retained, and the LWG needs to provide justification for expanding the exposure area to a 2 mile range.	The comment is inaccurate. The PF does not call for shorebird exposure areas in 1-mile increments. Individual beaches and 2-mile increments were used in the draft BERA as well; they were not changed in the draft final BERA. The justification for the 2-mile exposure areas is found in the PF in Table 6 (minimum forage distance identified as 4-6 km [2.5-3.7 miles]). Different exposure would have little effect on risks to shorebirds. In order to characterize the potential for foraging range assumptions to affect risk conclusions in the final BERA, the risks characterization based on data from individual beaches will be moved from Attachment 17 to the main text and discussed along with results for 2-mile exposure areas, if EPA decides that it is important enough to include in the main body of the report.	Resolved. Based on information in Table 6 of the problem formulation, and a literature value of a 5 hectare home range, the 2-mile increment for the nearshore foraging range of spotted sandpiper appears correct, as a 2 mile shoreline reach 50 feet deep is an area of approximately 5 hectares. For clarity, a table and appropriate text summarizing the individual beach risk characterization in Attachment 17 will be presented in the main text of the BERA.
	21	Section 8.1.3	Table 8-8, Predicted Prey Tissue Concentrations and Attachment 4, Table 7-2	The use of the mechanistic model, which predicts average concentrations site wide, underestimates concentration for localized beaches smaller than the site. In addition, the text and attachment are not clear about what sediment concentration was used to predict "average prey concentrations". This needs clarification. Instead, BSARs or BSAFs should have been used to predict tissue concentrations of sediment invertebrates like clams and worms using sediment from localized beaches at the site identified in Table 8-7, which was been done in previous versions of the risk assessment.	The comment is incorrect. The mechanistic model does not predict average concentrations site wide unless we input a site-wide SWAC. Rather, the model predicts the average tissue concentrations associated with whatever exposure area SWAC is inputted. The same is true of BSARs or BSAFs: average tissue concentrations associated with whatever exposure area SWAC is inputted. An agreement was made at the June 6, 2006, LWG-EPA modeling meeting to use the mechanistic model for those chemicals that have it. The LWG has followed that agreement (i.e., used the mechanistic model for the chemicals that have it) in the Round 2 report, the draft BERA and the draft final BERA. The methodology has not changed from that used in previous versions of the BERA.	Resolved. The final BERA will include a table showing benthic BSAFs used to estimate shorebird prey tissue concentrations for total PCBs, DDx, and 2,3,7,8-TCDD.

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	22	Section 8.1.5.1, Spotted Sandpiper and Map 8-1		A 2-mile beach exposure area is outlined in Table 8-16. However, sandpiper would be using a linear shoreline and crossing the river would be unlikely. Therefore, if a larger area is considered, it should be 2 miles on one side of the river, which is also consistent with contiguous sources. Table 8-16 indicates river mile stretches on both sides as well as Map 8-1. This methodology diluted and bi-furcated shorebird habitat as well as sources and should be revised appropriately.	See response to Comment 20.	Resolved. No action needed. The 5 hectare home range described in Miller and Miller (1948), could be converted to approximately a 2 mile stretch of riparian habitat 50 feet deep. This is reasonably consistent with the 2.5 to 3.7 mile foraging range in Table 6 of the problem formulation. While energetically it makes more sense for sandpipers to forage on the same side of the river, in reality the fractured availability of foraging habitat in the Study Area does not preclude the possibility that sandpipers forage on both sides of the Willamette River within a 2 mile reach.
	23	Section 11.3.2	p. 93, fish risks from transition zone water (redline strikeout version of the BERA)	EPA continues to disagree with the LWG regarding some aspects of the importance, magnitude, and spatial extent of risks to fish from transition zone water, and believes this section requires additional editing and modification. Given the limited number of transition zone water samples available for use in the BERA, the spatial extent of risks from TZW is likely underestimated. The actual areal extent of risk from TZW is an uncertainty in the BERA. Depending on how one defines a population, it is entirely possible that a localized population of a small home range species, such as sculpin or many benthic invertebrates may be adversely impacted. The text on the sediment profiling results touches on this possibility for benthic invertebrates at 31 profiling locations as noted elsewhere in the BERA. And while LWG may be correct regarding the amount of TZW respired by demersal fish such as sculpin, the benthic invertebrate prey of some demersal fish may very well be more heavily exposed to TZW than fish themselves. Exposure of prey to TZW can result in trophic transfer of contaminants into predators on the benthos.	See responses to Comments 1 and 2. The reference to TZW COPCs not posing a risk to populations will be struck from the first sentence. A sentence will be added indicating these risks are localized to the discharge area of the contaminated groundwater plume, and so do not affect populations outside of the groundwater discharge area.	Resolved. Response acceptable to EPA, and BERA will be modified per LWG response. In response to a previous request by the LWG, EPA has identified literature reviews by Storey and Williams (2004), Brunke and Gonser (1997), and a study by Danielopol (1976) that describe the ability of some benthic invertebrate species to permanently reside in and obtain their oxygen requirements from what the Portland Harbor BERA terms transition zone water, including such waters with low oxygen content.
	24	Section 11.3.3, wildlife risk summary	p. 100 (redline strikeout version of the BERA)	The potential for osprey risks from PCBs and total TEQs may be more severe than indicated in the text. This is because of the relatively small home range of osprey (roughly one linear river mile) relative to the larger home range for bald eagles.	The osprey home range is considered in risk calculations and risk conclusions presented in Section 8.3.3. As indicated in the summary in Section 11.3.3, the extent of risk to osprey is less widespread than that calculated for bald eagle.	Resolved. Response acceptable to EPA. Text will be revised as needed after bald eagle risks are recalculated using LOAEL TRVs. Changing the bald eagle TRVs from NOAELs to LOAELs may alter the conclusions about relative spatial extent of osprey and bald eagle risks.

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Summary	25			In summary, the BERA needs to identify and present localized risks and associated chemicals as opposed to just sitewide risks for many receptors using the EPA recommended TRVs. Examples include TBT in several media in the vicinity of Swan Island Lagoon (shipyard), dioxins offshore of Arkema, and mercury in Willamette Cove sediments. While many of the calculations are in the BERA, the presentation and discussion is lacking.	Taking into account the fact that the draft final BERA already clearly identifies the locations where potentially unacceptable risk occurs, and also considering the quality and weight of evidence on which the potentially unacceptable risk conclusions are based, the LWG believes that the draft final BERA adequately and appropriately identifies and presents localized risks. In the case of dioxins, we understand from informal discussions with EPA's BERA lead that EPA would like the LWG to note in the BERA that the dioxin/furan fraction of the total toxic equivalent (TEQ) sediment concentration is higher in the area off the west shore near river mile (RM) 7 than elsewhere in the Study Area. The LWG will note this fact in the final BERA. Regarding TBT in Swan Island Lagoon: TBT was found to pose potentially unacceptable risk to sculpin based solely on a dietary TRV exceedance in 1 out of 81 prey tissue samples which, when combined with sediment ingestion, yielded HQ = 1 (see Figure 7-12 of the draft final BERA). The location of that prey tissue sample is already clearly identified in the BERA as the mouth of Swan Island Lagoon (see Table 7-46 of the draft final BERA). The HQs for the other 80 prey samples (98.8%) were all < 1. The toxicological effect associated with the dietary TRV (i.e. reduced reproductive success) was not dose responsive, which calls into question the TRV. In addition, the tissue residue and water LOEs found no evidence of potentially unacceptable risk to sculpin. TBT tissue residue is considered the most reliable predictor of toxicity (Meador et al. 2002). The fact that the location of the potentially unacceptable risk has already been identified, combined with the absence of evidence of potentially unacceptable risk to sculpin by the strongest LOE and the weakness of the evidence of potentially unacceptable risk by the dietary LOE (the only LOE that gave any evidence of potentially unacceptable risk to sculpin), should be sufficient to dissuade EPA from asking that the BERA focus even more attention on potentially unacceptable TBT risk to sculpin in the vicinity of Swan Island Lagoon. TBT also was identified as posing potentially unacceptable risks to benthic invertebrates. The specific locations are already explicitly called out in Section 6.5.4.2 (Risk Characterization Results and Uncertainty Evaluation) of the draft final BERA. The TRV was exceeded in empirical bioaccumulation samples only at one location (the mouth of Swan Island Lagoon), and again, that location is explicitly identified in the draft final BERA (Table 6-29). The fact that these locations are already explicitly identified seems to satisfy the intent of the comment. It is also important to keep in mind the quality of the evidence for potentially unacceptable benthic community risk from TBT when considering how much attention to pay to it in the BERA. As we report in the draft final BERA, the tissue residue TRV (0.15 mg/kg ww) was four times lower than the sublethal effect threshold (3 mg/kg dw or 0.6 mg/kg assuming 20% moisture) that Meador et al.(2002) proposed for protection of juvenile salmonid prey, based on reduced growth in multiple species. The species sensitivity distribution on which the BERA TRV is based is driven down by the inclusion of imposex as an endpoint (imposex only affects a subclass of gastropods). Tissue residues based on a laboratory worm biota-sediment accumulation relationship (BSAR) did exceed the TRV at the specific locations already identified in BERA Section 6.5.4.2, but the regression relationship is uncertain because it is highly influenced by the one high value in the dataset; moreover, the predicted tissue residues are not supported by the empirical data. Taking into account the fact that the draft final BERA already identifies the locations where potentially unacceptable risk occurs, and also the low quality and weight of evidence on which the potentially unacceptable risk conclusions for sculpin and benthic invertebrates are based, the LWG believes that the draft final BERA already adequately and appropriately identifies and presents localized TBT risks. In the case of Willamette Cove and mercury, the draft final BERA (Table 6-45) already identifies Willamette Cove as the location of the maximum mercury sediment concentration. Moreover, out of the 1,345 sediment samples, 69 dietary tissue samples, and 39 sculpin tissue samples, that maximum sediment concentration is the only datum indicating potentially unacceptable risk to sculpin. The other 1,452 samples all yield HQs < 1. The other receptor with potentially unacceptable mercury risk in the draft final BERA was bald eagle, based on the dietary LOE using a NOAEL TRV. Since the bald eagle is no longer listed by the State of Oregon as threatened or endangered, per informal direction from EPA, the final BERA will evaluate bald eagle risk using LOAEL TRVs, and the maximum bald eagle mercury HQ will be < 1. Therefore, there will be no need to call out locations of localized elevated mercury risk to bald eagles. Given that the draft final BERA already identifies Willamette Cove as the location of the maximum sediment mercury concentration (and the only sample associated with a sculpin mercury HQ > 1), and the absence of mercury risk to the bald eagle population, the LWG sees no reason to further emphasize localized mercury risks. See also the response to Comment 28.	Resolution of this comment will be as follows: EPA has revised the executive summary, Section 11 and provided to the LWG an overall summary table that will also be broken into individual section summary tables to address this comment. The EPA revisions include changes to the text, and several new tables. Included in the new tables for Section 11 is a table that will describe risks by medium within each river mile. For sediment and TZW, the summary tables will also identify risks by river mile and by nearshore area (i.e. east side and west side of river, center channel). This detailed breakdown by side of river will not be possible for some media (e.g. tissues of large home range species, surface water). The EPA text and table revisions to both the executive summary and other relevant sections will be incorporated into the final BERA. A primary goal of the additional tables will be to meet the needs of different users of information in the BERA. Some users prefer to see risks identified by media type, some prefer to see risks by assessment endpoint or ecological receptors, while others prefer to see risks identified by geographic locations. The additional tables will present the same conclusions and information from the BERA in different formats that will accommodate all of above user preferences.

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2) Sources of contaminants	26			Dioxin TEQ: The document confounds sources of total dioxin TEQ by not properly discussing the sources that contribute - dioxins and furans (dioxin TEQ) and dioxin like PCBs (PCB TEQ). It is true that PCBs are a major driver, but this is not the case near RM 7 near the Arkema facility where this source is driven by dioxin TEQ. This should not be lost by focusing solely on PCBs.	See response to Comment 25.	Resolved. The LWG will note in the final BERA that the dioxin/furan fraction of the total toxic equivalent (TEQ) sediment concentration is higher in the area off the west shore near river mile (RM) 7 than elsewhere in the Study Area.
	27	Section 8.1.5.1.3, Bald Eagle, Mercury		This section dismissed mercury as a basin wide contaminant. However, the text should be transparent that there are Site sources of mercury, namely Willamette Cove, where the highest mercury was detected in northern pikeminnow tissue. Mercury comparisons in Figure 8-2 are biased by the larger fish (e.g. smallmouth bass) collected upstream.	See response to Comment 3. The maximum LOAEL HQ for bald eagle is < 1.0; the final BERA will be revised accordingly.	Resolved. See response to Comment 3 for details.
	28	Section 8.1.5.1.5, Mink, Lead and Antimony		It is speculation to attribute risk from antimony and lead to a fish sinker in a composite without re-collecting the sample. It is also possible that sources in the area such as Gunderson could contribute to this result.	The concurrence of high lead and antimony in this sample suggests that the high concentration could be due to a sinker. The final BERA will acknowledge in the mink dietary risk characterization and uncertainty analysis section (currently Section 8.1.5.1.5) that a sinker is not the only possible explanation for the elevated lead and antimony concentrations in that smallmouth bass tissue sample from RM 9.5-10.5. We will also say that the preponderance of evidence – including sediment concentrations and other fish tissue samples – indicates that exposure levels in that reach generally are not elevated, and that the single smallmouth bass sample with elevated lead and antimony concentrations is an outlier.	Resolved. Response acceptable to EPA with the additional acknowledgement in the text that Goldendale Aluminum Co. (river mile 10E) has an NPDES permit limit for antimony, and may also be a possible source of the antimony in bass.

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3) COPCs/ TRVs	29			Identification of COPCs: The lack of inclusion of surrogates for components of some risk drivers is likely confounding and underestimating risk, particularity for butyltins and dioxins and furans other than 2,3,7,8-TCDD. This is also confounding the comparison between different receptors and media lines of evidence since in some cases these important COI were not further investigated or included in the COPC summary tables.	The selection of TRVs and development COPC screening methods has undergone years of collaborative effort and agreements, resulting in the values and methods that were used in the draft final BERA. These values and methods should not be changed at this stage of the RI/FS without clear and compelling justification. Some examples of what might constitute clear and compelling justification for changing TRVs are: • Availability of pertinent data that were unavailable at the time the BERA TRVs were developed • Previously undiscovered errors in published data or data analyses • Previously undiscovered errors in LWG or EPA calculations If one or more of these criteria are met, then the affected TRV(s) should be updated if and only if the update would significantly change the draft final BERA's risk conclusions. This is specifically applicable to Comments 39, 50, and 55. COPCs were identified according to EPA's PF; screening levels were provided or approved by EPA. Dioxins and furans were evaluated through use of toxicity equivalent factors (TEFs) in order to compare to the 2,3,7,8-TCDD TRV for all fish and wildlife. Invertebrate tissue was an exception, in that there are no TEFs to allow creation of a TEQ; only 2,3,7,8-TCDD was evaluated for this LOE. This also applies to Comment 40. With respect to butyltins, please see response to Comment 41.	EPA requires all fish tissue to be screened against a 50 pg/g TRV in the SLERA, and that available literature be used to derive a new BERA 2,3,7,8-TCDD TRV. In a July 6, 2006 letter to LWG regarding the TRVs to be used in the Round 2 Comprehensive Site Summary and Data Gaps Report, EPA provided clarification on several TRVs, including the 2,3,7,8 TCDD screening value for aquatic tissues. In that letter, EPA agreed with an LWG hierarchy for identifying aquatic tissue TRVs. Two of the tiers of that hierarchy were the Dyer et al. (2000) 5th percentile TRVs based on a review of the literature, which was a more preferred tier than the TRVs derived from multiplying ambient water quality criteria and a bioconcentration factor. Dyer et al. (2000) did not contain a 5th percentile value for 2,3,7,8-TCDD, but did describe the methodology for deriving TRVs by the AWQC x BCF approach, and cited an earlier published study (Shephard 1998) that contained a 50 pg/g aquatic tissue screening level TRV for 2,3,7,8-TCDD. This is the source of EPA's recommend 50 pg/g screening value. The July 6, 2006 letter further stated that while EPA was comfortable with moving forward with TRVs as presented in the Preliminary Risk Evaluaton (PRE), the source of the 90 pg/g screeing value, as correctly noted by LWG. The July 6, 2006 letter also stated that should new information suggest that important studies were left out that may influence the 5th percentile TRV derivation, EPA would work with the LWG to determine how to incorporate the additional information into the Round 2 report. Aquatic tissue TRV derivations for the BERA have subsequently been updated to base the preferred BERA tissue TRV on the 10th percentile of the appropriate residue-effects data set (procedures found in Attachment 1 of the BERA) for all aquatic species except for threatened or endangered species, in which case the 5th percentile of the residue-effects data set would become the TRV. Since the derivation of the 90 pg/g TRV, sufficient new information on 2,3,7,8-TCDD toxicity has been identified to warrant an update of the BERA 2,3,7,8-TCDD aquatic tissue TRV. Although LWG must confirm this, EPA does not believe that any benthic invertebrate tissue sample exceeds 50 pg/g 2,3,7,8-TCDD, and would not screen into the BERA.

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	30			For risks to fish themselves from chemicals eliciting dioxin-like toxicity, perform a TEQ calculation for risks using the World Health Organization TEFs for fish in conjunction with the appropriate dioxin, furan and PCB congener analytical data for fish tissues. The dioxin TEQ and total TEQ concentrations should be compared to the screening level benchmark of 50 pg/g (wet weight) for 2,3,7,8-TCDD. Calculations and results need to be presented in a new table, as this information appears to be unavailable in the draft final BERA. EPA believes that this screen, particularly when applied to the Round 3b fish tissue data, will identify at least one smallmouth bass composite sample as having a total TEQ hazard quotient greater than or equal to 1.0. This analysis may also identify other fish species with total TEQ hazard quotients greater than or equal to 1.0. For fish samples where the dioxin TEQ or total TEQ hazard quotients exceed 1.0, a baseline ecological risk TRV will need to be developed using the tissue residue TRV derivation methodology used to derive the other BERA fish tissue TRVs. The BERA TEQ TRV will then be compared to the measured TEQs in fish tissue to identify the baseline ecological risk hazard quotients for dioxin TEQ and total TEQ.	As shown in Attachment 5, Table 3-6 total dioxin/furan TEQ, PCB TEQ, and total TEQs in fish tissue were screened (based on fish TEFs) in the SLERA and eliminated as COPCs because maximum concentrations were below the screening level of 90 pg/g. This is also the screening level for 2,3,7,8-TCDD for fish (See Attachment 5, Table 3-1).	See comment resolution to Comment 29.
	31	Executive Summary	p. ES-5, 1st bullet on page (redline strikeout version of the BERA)	The reason that risks for many COI's or COPC's cannot be quantitatively described is because of the absence of TRVs for certain chemicals. Risks from such chemicals are correctly described as uncertain and unknown, not as posing unacceptable risks. This is one of the uncertainties in the BERA that may underestimate risks, and should be described as such. This bullet needs rewritten, as it does not discuss the primary reason (lack of TRV's) for many chemicals not having risks quantified.	The bullet will be rewritten to discuss lack of TRVs.	Resolved. Response acceptable to EPA. BERA will be revised per response.
	32	Executive Summary	p. ES-5, 4th bullet on page (redline strikeout version of the BERA)	The meaning of the statement "COPCs in sediment that are spatially associated with locations of potentially unacceptable risk to the benthic community or populations are PAHs, PCBs, and DDx compounds" is unclear. It also appears to be contradictory with the more extensive list of COPC's in the previous bullet. Either clarify this statement or eliminate it.	The text will be revised to clarify the meaning.	Resolved. Response acceptable to EPA. BERA will be revised per response.
	33		p. ES-16, amphibian and reptile risk estimates (redline strikeout version of the BERA)	EPA concurs with LWG that risk characterization estimates for amphibians and reptiles are generally highly uncertain, largely due to the lack of toxicity reference values useable with amphibians and reptiles. But it should be pointed out that EPA aquatic life criteria are intended to be protective of larval amphibians such as tadpoles, and that several of the EPA aquatic life criteria (e.g. cadmium) were derived using amphibian toxicity data.	Requested change will be incorporated into the final BERA.	Resolved. The amphibian risk characterization will state that EPA aquatic life criteria are intended to be protective of larval amphibians such as tadpoles, and that some of the EPA aquatic life criteria (e.g. cadmium) were derived using amphibian toxicity data.
	34			34 and 35 were inadvertently skipped when assigning numbers to EPA's July 10, 2012 comments on the July `1, 2011 Draft Final Baseline Ecological Risk Assessment.		
	35					
	36	Section 5	Table 5-3, Benthic Invertebrate COIs with No TRVs	Every effort should be made to include relevant SLVs in the screening stage. For example, it is unclear why there is not a SLV for tributyltin in sediment when several exist, including in DEQ guidance (use marine AET as a surrogate). Tributyltin should be used as a surrogate for the other butyltins in screening. EPA Region 3 also has a comprehensive list of sediment benchmarks that would fill many of these gaps available at: http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fwsed/R3_BTAG_FW_Sediment_Benchmarks_8-06.pdf	The SLERA was conducted according to direction give by EPA in EPA's PF, and included EPA-provided SQGs (see Table 2-1) of the SLERA. No TBT SQG was included in those sets.	Resolved. See comment 41 resolution - discusses placing mono-, di- and tetrabutyltin into the group of contaminants without TRVs whose risks cannot be quantified.

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	37		Table 5-6, Fish COIs with no TRVs	1. Transition Zone Water: TRVs for TPH in TZW: TRVs are available for TPH in transition zone water and were provided by EPA in the problem formulation. 2. ~~Surface Water: TRVs for surface water for 2,4-DB and MCPP are available:~~ a. ~~932 ug/L, LOAEL for green algae (*Selenastrum capricornutum*) from the Environmental Fate and Effects Division's Risk Assessment of the Reregistration Eligibility Document for 2,4-DB (EPA 2005). This comment also applies to Table 5-12.~~ b. ~~MCPP: 2.60 ug/L using MCPA as a surrogate, a Canadian Water Quality Guidance Surface Water Quality Screening Level Benchmark. This comment also applies to Table 5-12.~~	TZW was screened for TPH using the TRVs that EPA provided* (see Table 6-37 of the draft final BERA). *TZW TRVs for TPH were updated by EPA in the April 11, 2008, memo on *Toxicity Reference Values for the Baseline Ecological Risk Assessment*, and are based on five of the chemical groups that are blended to form gasoline (EPA 2008a). Average fractions of these components in gasoline were used to convert the total gasoline-range hydrocarbon concentration into gasoline fraction concentrations for comparison with the TRV. Comments 2a and 2b were struck out as indicated by Burt Shephard in a discussion with John Toll on August 9, 2012, and verbally confirmed in a meeting among Burt Shephard, Jim McKenna, and John Toll on August 20, 2012.	Resolved. Response acceptable to EPA. No action needed.
	38		Table 5-6, Wildlife COPCs	Dibutylphalate should be identified as a COPC for osprey given the detection limit was above the screening level. Justification is provided that inclusion is unnecessary based on the fact that sediment threshold concentrations were not exceeded regardless of other lines of evidence that identify elevations and exceedences of this contaminant in other prey tissue. Also, 40% of the non-detected carp tissue had detection limits >than the osprey tissue threshold making the elimination of this COPC in the refined screen a highly uncertain determination. It is also not clear why this contaminant was not carried over from the SLERA for other wildlife receptors (mink and river otter) – see footnote a.	(Note: the comment is referring to Table 5-8, not Table 5-6). We understand based on verbal clarification from Burt Shephard on August 24, 2012, that EPA would like the LWG to identify dibutyl phthalate as an osprey COPC and move Table 5-8 to Section 8 because of the 40% of carp samples with DLs above the osprey TTC. The LWG will do that, but the weight of evidence conclusion (no potentially unacceptable risk) will not change because all the tissue and sediment samples in which dibutyl phthalate was detected are below the TTC and TSC.	Resolved. Response acceptable to EPA. BERA will be revised per LWG response.
	39		Table 5-9, Wildlife COIs With No TRVs	Wildlife TRVs for silver in mammals and birds are available from EPA's Eco SSLs at: http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_silver.pdf	See response to Comment 29. This Eco-SSL was published in 2006 and so was available in April 2008 when EPA provided TRVs to LWG for the BERA (EPA 2008c).	Resolved. No action needed.
	40	Section 6-12		Benthic Invertebrate Tissue COIs with No TRVs, Dioxins / Furans: Sediment SQGs are available for dioxin TEQ (NOAA Squirts, Canadian Sediment SQGs and DEQ guidance) and should be used. Alternatively, the 2,3,7,8-TCDD value can be used as a surrogate for the other dioxin and furan congeners.	See response to Comment 29.	Resolved. No action needed..
	41	Section 6.4.5.4, Butyltins		This section concludes that the risk of the other butyltins are covered by the evaluation of tributyltin (e.g. monobutyltin ion, dibutyltin ion and tetrabutyltin ion). However, the concentrations of the other butyltins are significantly higher and are shown to be correlated with benthic toxicity and elevations in aquatic tissue. Based on this, the aquatic toxicity framework used in the BERA should be re-evaluated to ensure the toxicity of all butyltins are properly evaluated. One approach used elsewhere in the BERA is to use the available TBT TRVs as the toxicity reference values for the other butyltins. This would overestimate total butyltin risks, which should be discussed in the uncertainty section, particularly if additional HQs > 1 are identified using this procedure.	The statement about the relative toxicity of TBT versus mono-, di-, and tetrabutyltin is accurate (for example, page 2 of EPA's *Final Ambient Aquatic Life Water Quality Criteria for TBT* (EPA 2003)), but unnecessary and will be stricken from Table 6-28. Mono-, di-, and tetrabutyltin were screened against the TBT SLV in the SLERA. Based on verbal clarification from Burt Shephard on August 9, 2012, we understand that EPA appreciates that this is perhaps an overly conservative screening approach because, as TBT breakdown products, these less toxic moieties co-occur with TBT. The tissue residue LOE was only used for those COPCs for which EPA chose to develop tissue residue TRVs. EPA did not propose TRVs for mono-, di-, or tetrabutyltin. It would be inappropriate to rescreen mono-, di-, or tetrabutyltin tissue residues against the TBT TRV in the BERA, again, because these less toxic moieties co-occur with TBT, and it is the TBT concentration that should be compared to the TBT TRV. We will discuss the lack of TRVs for other forms of butyltin as an uncertainty.	Resolved. LWG will provide some additional discussion of mono-, di- and tetrabutyltin in the uncertainty section. EPA and LWG agree that it would not be appropriate to use the TBT TRV for mono-, di- or tetrabutyltin given the lesser toxicity of these chemical forms based on available literature. Mono-, di- and tetrabutyltin must be identified as contaminants without TRVs whose risks cannot be quantitatively evaluated.

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	42	Section 6.5.4, Effects Assessment, Fish, DDx and PCBs		EPA understands and on technical grounds does not disagree with LWG's reasoning for recalculating the national chronic EPA water quality criteria for DDT and PCBs, which are based on toxicity to terrestrial species, not aquatic species. Having said this, we are also bound to use the existing national water quality criteria for these chemicals as ARAR's given they are found in Oregon's water quality standards. Without agreeing or disagreeing with the approach used by LWG to derive its alternative water quality criteria, EPA has used both the national criteria and LWG's alternative criteria to characterize water column risks from these chemicals. Both hazard quotients are presented in our risk summary table appended to these comments. The BERA text should be amended to more fully discuss risks estimated from exceedances of the national criteria. As the document stands, only the alternative criteria are discussed in any detail.	The BERA does not use ARARs, it uses risk-based effects thresholds. Since EPA does not disagree on technical grounds with the LWG's recalculations, we will retain the current approach, wherein the risk-based thresholds are discussed in detail and the AWQC are presented as screening values that should be modified to get risk-based effect thresholds.	Resolved. Response acceptable to EPA but EPA will work with the LWG on exact wording.
	43	Section 6.5.5.4, COIs for Which Cannot Be Quantified		See previous comments on TRVS and use of surrogates.	The final BERA will identify absence of TRVs as an example of a source of uncertainty that could lead to underestimating risk.	Resolved. Response acceptable to EPA. BERA will be changed per response.
	44	Section 6.6.2	Table 6-37	a. Why were the 2,4' and 4,4' isomers of DDD, DDE and DDT (except 4,4,'-DDT) removed from the table? b. Dioxins and furans: Dioxins in addition to 2,3,7,8-TCDD should be carried forward using the TCDD AWQC as a surrogate. This is appropriate given the site risk is driven by the significant elevations of dioxins and furans other than 2,3,7,8-TCDD and results in these additional dioxin / furans included in the Summary tables (Table 6-39).	Four individual DDT metabolites identified in the SLERA (2,4′-DDD, 2,4′-DDT, 4,4′-DDD, and 4,4′-DDE) were evaluated as part of total DDx and were not evaluated individually; 4,4′-DDT was evaluated both individually and as total DDx because the TRV for DDx is based on 4,4′-DDT. The surface water TRV for dioxins and furans was based on TEQ sums; fish exposure to TZW was evaluated using this TRV, per EPA's direction. TEFs are not available for benthic invertebrates, amphibians, and aquatic plants, so individual dioxins and furans detected in TZW other than 2,3,7,8-TCDD could not be evaluated for these receptor groups.	Resolved. Response acceptable to EPA. BERA will be changed per response.
	45	Section 6.6.3.3	Table 6-40	Please note that this table only considers the alternative water TRVs for DDx (0.011 ug/L). It is also unclear why individual isomers other than 4,4'DDT were removed from the analysis. Each isomer and Total DDX water value should be compared to the water quality criteria.	See response to Comment 44.	Resolved. Response acceptable to EPA.
	46	Section 6.6.5.1	Table 6-41	Individual Isomers of DDT should added back into the table (2,4'DDD, 2,4'DDT, 4,4'-DDD, 4,4'-DDE) as indicated in Figure 6-25.	See response to Comment 44.	Resolved. Response acceptable to EPA.
	47	Section 6.6.5.3	Table 6-42	TRVs for total petroleum hydrocarbons (TPH, residual, diesel range, etc.) should be added to the table. There is a water threshold available. The 2,3,7,8-TCDD water value should be used as a surrogate for the other congeners.	See responses to Comments 37 and 44.	Resolved. Response acceptable to EPA.

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	48	Section 7	Table 7-5	Selected Whole-Body Tissue TRVs: Mercury: This TRV is increased by eliminating adverse effects associated with embryo residues. This is not appropriate and was not a EPA comment on the previous draft. The BERA implies that exposure to these life stages is not "directly comparable to the contaminant concentration data for the fully formed fish that were used to characterize receptor exposure in the Study Area". The fact that all sensitive life stages were not collected and analyzed should not preclude the assessment of these stages in the risk assessment. This change is not a result of an EPA comment on the previous draft so it is unclear why this change was made.	The mercury TRV increased from 0.44 to 0.53 because the LOAEL from Sandheinrich and Miller (2006) was erroneously reported in the published paper. EPA agreed to this change in the October 15, 2010, meeting to resolve non-directed comments. Embryo studies were eliminated as per the October 15, 2010, agreement with EPA (see notes on Comments 47 and 110 on draft BERA). Response to draft BERA Comment 47 states: In the 10-15-10 meeting, the LWG and EPA agreed that the appropriate fish tissue TRVs for the Draft Final BERA are those derived using all of and only those papers agreed to between EPA and the LWG in the series of communications beginning with EPA's initial submittal of the tissue TRVs in August 2008 (EPA 2008d) and ending with the EPA letter to the LWG on 1-23-09 (EPA 2009). Specifically, the set of TRV tables delivered from the LWG to EPA on November 20, 2008 (Attachment 1, pg 565; email from Helle Anderson to Chip Humphrey of EPA) with the following changes are the basis of the TRVs. Changes to these tables include addition of sac-fry studies as directed by EPA in its letter of 12-22-08 (EPA 2008b, d); addition of behavior studies determined by EPA to be ecologically significant as directed in its letter dated January 23, 2009 (EPA 2009); and addition of specific Great Lakes studies with elevated contaminant levels in control fish as directed by EPA in its1-23-09 letter (EPA 2009). As agreed by EPA, it is appropriate that the statistical distribution of the data be determined using @Risk software (Attachment 1, pg 638; email from Eric Blischke to Jim McKenna, etc). The @Risk output files are included in Attachment 9.	Resolved. Response acceptable to EPA. No action needed.
	49	Section 7.1.5.1, Mercury		Mercury should not be dropped as a COPC for fish based on the change in the TRV. The area where the elevation occurs (RM 6.5 to 7.5) is an area of elevated mercury in sediment and riverbank soils (Willamette Cove). This should be retained to line up with other lines of evidence in area (e.g. risk to fish eating birds).	See response to Comment 12.	Resolved. No action needed. BERA consistent with prior agreements. Reason for different results for Hg explained..
	50	Section 7.2,1, Attachment 5, Table 4-3		The footnote reads: "Note: The following chemicals were not identified as fish dietary COIs because while these chemicals were detected in sediment, they were not analyzed in tissue: barium, beryllium, calcium, hexavalent chromium, cobalt, iron, magnesium, potassium, sodium, tin, titanium, vanadium, 1,6,7-trimethylnaphthalene, 1-methylphenanthrene, and 2,6-dimethylnaphthalene." The absence of analytical chemistry data for the above chemicals in tissues is not a justification for not developing dietary TRVs for the PAH compounds, and the metals Be, Cr, Co, inorganic Sn, Ti and V. Dietary TRVs for these chemicals should be developed and risks from ingestion of these chemicals evaluated	See response to Comment 29. The lack of tissue data for these chemicals would make any dietary risk estimates highly uncertain. The metals are crustal elements and their detection in sediment does not justify the effort required to develop TRVs and conduct the screen. The LWG is willing to identify the lack of tissue data as an uncertainty. It will be noted that organotins were analyzed in tissue and evaluated as dietary COIs. Organotins are much more likely to cause toxicity than inorganic tin. The relevant form of chromium (i.e., trivalent, not hexavalent) was analyzed in tissue and evaluated as a dietary COI. Dietary risk to fish from PAHs was evaluated for total PAHs and benzo(a)pyrene, which are more likely to result in adverse effects. No additional dietary TRVs for PAHs were identified when TRVs were developed (EPA 2008c).	Resolved. EPA asked LWG to confirm that these chemicals weren't analyzed in tissue, which it has done. No action needed.

EPA Comment Category	No.	Section	Page Line(s)	Comment	Response	Comment Resolution Status
	51	Section 7.2.2, COPCs Evaluated		The omission of mono, di, and tetrabutyltin from the evaluation because "no LOAEL was available from the literature" leaves a significant data gap. A NOAEL should be used if no LOAEL is available, and would be relevant to use for the protection of threatened and endangered species such as juvenile salmonids. Concentrations of mon, di and tetrabutyltin are expected to be significantly higher than TBT, so it is unclear if ONLY evaluating TBT "covers" risk from the other butyltins. Attachment 5, Table 4-4 shows all the butyltins with the screening value of 0.03 µg/kg bw/day using TBT as a surrogate. It is unclear why this was not carried through the risk assessment and the uncertainty discussed. This is converted to a Tissue Threshold Concentration (TTC) of 594 ug/kg wet weight (Table 4-6 using Largescale sucker as an example; using other fish the TTC is even lower). Since the maximum monobutyltin concentration in fish tissue was 3,600 ug/kg (well above the TTC) this needs further discussion in the risk assessment.	See response to Comment 41.	Resolved. See resolution to Comment 41.
	52	Section 7.2.5.1, Large Home Range Fish and Section 7.2.5.1.2 Small home range fish, Footnotes 34, 36, 37, 39, 40, 42, and 43		The footnotes state "monobutyltin, dibutyltin and tetrabutyltin were not included in this count because TBT was used as a surrogate". This is not accurate**.** TBT toxicity was not used as a surrogate to evaluate the potential effects associated with concentrations of the other butyltins as the footnotes imply. Instead, these buyltins were dropped from the risk assessment and it was assumed that by only assessing TBT the others were addressed. Since there are significantly higher concentrations of the other butyltins present in tissue and the environment, the concentrations of these butyltins should be evaluated as independent COIs. Please see attachment 5 for some of the tissue concentrations. It should also be noted that all butyltins screened through the SLERA and refined screens for dietary risk to fish. ****Please note that monobutyltin was also identified as a surface water COPC for fish. Multiple lines of evidence would indicate this should be investigated further for the dietary assessment.	See response to Comment 41.	Resolved. See resolution to Comment 41.
	53	Section 7.3.5.1.2, Monobutyltin		The text on the potential overestimation of risk of monobutytin does not indicate that exceedences of the TRV could indicate exposure (and conversion) from an initial exposure to TBT. Therefore, the use of a TBT surrogate may actually be a more accurate approach.	See response to Comment 41.	Resolved. Comment noted; no action required.
	54	Section 7.6.3	Table 7-46, Summary of Fish COPCs>1	Footnote "J": The footnote indicates that "monobutyltin could not be evaluated because not LOAEL TRV was available from the literature. A LOAEL TRV was available for TBT. Because TBT is the most toxic butyltin, risks from monobutyltin is assumed to be lower than those of TBT. TBT screens out in Step 1". This does not consider the significantly higher concentrations of monobutyltin in fish tissue, which is not covered by only looking at TBT. Include a NOAEL for monobutyltin or use the TBT TRV as a surrogate for concentrations detected in fish tissue. Also, it should not noted that multiple lines of evidence point to monobutyltin as a COPC (fish dietary – if it was evaluated, fish surface water, fish tissue).	See response to Comment 41.	Resolved. See resolution to Comment 41.
	55	Section 8.1.4.1 and Table 8-10, Selected Dietary TRVs and Table 8-13		In addition to high molecular weight PAHs (HPAHs), a TRV should have been developed and applied for low molecular weight PAHs (LPAHs) from the same source (EPA Eco SSLs). The NOAEL TRV is 65.6 mg/kg bw/day) - a LOAEL can be derived from the database just as was done for the other COPCs (e.g. HPAHs). LPAHs were detected in fish and invertebrate tissue.)	See response to Comment 29. A screening level TRV for both sediment and prey based on the SSL for LPAHs was provided in the SLERA. LPAHs were not identified as a COPC; therefore, there is no need to develop a TRV for LPAHs in the BERA	Resolved. Response acceptable to EPA. No action needed.

EPA Comment Category	No.	Section	Page Line(s)	Comment	Response	Comment Resolution Status
	56	Section 9.0, Amphibian Risk Assessment		It is unclear why the dioxin / furan water quality criteria was removed from this assessment. This should be used to assess water concentrations of dioxins and furans to amphibians and other aquatic life.	Dioxin congeners and TEQ were screened out as surface water COPCs in the SLERA (see Attachment 5, Table 6-4).	Resolved. LWG verified facts per EPA request.
	57	Section 9.1.4.1, Risk Characterization Results and Uncertainty		AWQCs should be used in addition to the alternative water TRVs. Instead, the risk characterization is only based on the alternative water TRVs.	See response to Comment 42.	Resolved. Response acceptable to EPA but EPA will work with the LWG on exact wording.
	58	Section 11	p. 71, 2nd paragraph, chemicals without TRVs (redline strikeout version of the BERA)	Potential risks from these chemicals cannot be quantified. This should be explicitly stated in the text. Risks from such chemicals are unknown, and are a source of uncertainty in the BERA, as stated in this section. This is one of the primary areas where the BERA potentially underestimates risks, as discussed by LWG in the 3rd paragraph on p. 71.	Requested change is acceptable and will be incorporated into the final BERA.	Resolved. Response acceptable to EPA, BERA will be changed per response.
	59	Section 11	p. 73, footnote 25 (redline strikeout version of the BERA)	Counts of COPC's with HQ ≥ 1.0 should be based on the ambient water quality criteria values for TRVs, not the LWG derived water column TRVs for several chemicals such as PCBs. While EPA understands LWG's rationale for deriving several water quality criteria, the fact remains that the EPA AWQC, as well as the versions of the AWQC promulgated as state standards by Oregon, will in all likelihood be ARAR's at the site, and thus form the basis for the tally of the number of COPC's with HQ ≥ 1.0.	See response to Comment 42. ARARs should not be used to tally COPCs unless they are risk-based effect thresholds for the assessment endpoint that is being addressed. The DDT and PCB AWQC are risk-based effect thresholds for wildlife, not aquatic life. The alternative values are the equivalent risk-based effect thresholds for aquatic life.	Resolved. Response acceptable to EPA but EPA will work with the LWG on exact wording.
	60	Section 11	Table 11-1, p. 80, footnotes B and C (redline strikeout version of the BERA)	These two footnotes need to be modified. As noted in other comments, risks from waterborne PCB and DDx will be evaluated using both the TRVs in the problem formulation and the TRVs calculated by the LWG (footnote B). Footnote C discusses the TPH fraction analysis as a CERCLA contaminant previously discussed in other comments.	Regarding alternative PCBs and DDx TRVs, see responses to Comments 42 and 59.	Resolved. Response acceptable to EPA but EPA will work with the LWG on exact wording.
	60	Section 11	Table 11-1, p. 80, footnotes B and C (redline strikeout version of the BERA)	These two footnotes need to be modified. As noted in other comments, risks from waterborne PCB and DDx will be evaluated using both the TRVs in the problem formulation and the TRVs calculated by the LWG (footnote B). Footnote C discusses the TPH fraction analysis as a CERCLA contaminant previously discussed in other comments.	Regarding TPH, see response to Comment 37.	Resolved. Response acceptable to EPA.
	61	Section 11.3.2	p. 98, fish community risks, 3rd paragraph of section (redline strikeout version of the BERA)	EPA does not agree with the statement that the PCB fish tissue TRV is conservative because it is based partially on uncertain toxicity data, including field data from contaminated sites where other contaminants were also present, suggesting that the TRV reflects toxicity from chemicals other than PCBs. Tissue TRVs were not derived using field data. This statement apparently comes from disagreements between EPA and LWG regarding the interpretation of one or more of the individual studies used to derive the PCB fish tissue TRV. The statement should be removed.	The studies discussed in this paragraph have substantial uncertainty that will be discussed in the final BERA.	Resolved. Response acceptable to EPA, BERA will be changed per response.

EPA Comment Category	No.	Section	Page Line(s)	Comment	Response	Comment Resolution Status
	62			There are two TRVs that need to be changed in the document: bis(2-ethylhexyl)phthalate in fish tissue and the DDX in fish tissue values. The BEHP TRV should be raised from 0.39 mg/kg (the screening level benchmark) to the BERA TRV of 1.6 mg/kg. The DDX change goes back to the originally proposed total DDX in fish tissue benchmark, which the LWG changed based their position on interpretation of a specific study. It is noted that LWG did not take the study out of the database used to derive the DDX TRV, but used a higher effect residue from the study which results in elevation of the DDX TRV from 0.68 mg/kg to 1.6 mg/kg.	Regarding BEHP – no LOAEL TRV was identified as per response to EPA Comment 110 on the draft BERA. Regarding DDx – See notes on Comment 110 on draft BERA. It appears that EPA has questions about the LWG's interpretation of one of the toxicity studies (Allison et al. 1964). The interpretation is the same as what was presented in the LWG's November 20, 2008, TRV transmittal to EPA (LWG 2008), which EPA did not comment on. The TRV has not changed since that time. EPA is suggesting that the TRV be changed based on a reinterpretation of one of the scientific papers that was used to set the TRV in 2010. The LWG is not addressing the technical aspects of EPA's suggestion at this time, because it understands that a TRV agreement has been established and the time for deliberations has passed. The merits were discussed collaboratively and at great length while EPA and the LWG were developing the TRVs and during the draft BERA comment response period. A new DDx TRV for fish tissue residue would presumably necessitate recalculating the sculpin DDx PRG and trigger extensive revisions to FS tables, maps, and text. The TRV change that EPA suggests in its comments on the draft final BERA would reduce the total DDx PRG for sculpin by approximately a factor of 2.4. Changing the TRV would also increase the HQs for smallmouth bass and northern pikeminnow such that the maximum values, which are < 1.0, would become slightly > 1.0, which would trigger still more revisions to the draft final BERA. Given the magnitude of the change to the TRV and PRG, the sculpin DDx PRG still would not bound any AOCs, so the practical purpose that would be served by these revisions is unclear.	EPA believes that the BEHP in fish tissue TRV sent to LWG on 9/5/2008 (1.6 mg/kg wet wt.) and the total DDx TRV in fish tissue (10 th percentile = 0.68 mg/kg wet wt., 5th percentile = 0.46 mg/kg wet wt.) sent to LWG on 9/12/2008 are correct and based on a correct interpretation of the literature used to derive these TRVs. The LWG will use these TRVs in the BERA to recalculate risks in fish tissue from these two contaminants, and revise text and tables as appropriate to present the recalculated results. EPA recognizes that EPA and LWG used different software to calculate the percentiles of the species sensitivity distribution for DDx, and acknowledges that the final DDx TRVs may differ slightly from those given above.
4) Lines of Evidence/ Identification and Presentation of Risks	63			Spatial Scale and Proper Alignment of Lines of Evidence: The document is focused on developing a list of COPCs for each receptor group and media. The COPC identification process focuses on data rules that extend beyond an evaluation of those receptor / contaminant pathways that have a hazard quotient greater than one. ALL combinations with an HQ>1 should be clearly outlined and more importantly described between different media and receptors such that ecological lines of evidence are clearly articulated. While the description of each receptor group is necessary, the more important high level analysis is the integration of lines of evidence between different media and receptor groups on an appropriate spatial scale.	The final BERA will incorporate EPA's tables summarizing all chemicals within each LOE with HQs ≥ 1.0, as requested in EPA's cover letter to these comments. The draft BERA followed the agreed upon process for identifying COPCs posing potentially unacceptable risk, and the process for characterizing risk across all LOEs. The process for characterizing risk is discussed in response to Comment 1. The process for identifying those COPCs posing potentially unacceptable risk was resolved in resolution of directed comments in the August 20. 2010, LWG-EPA meeting. This process is described in response to Comment 6 on the draft BERA.	Resolved. Response acceptable to EPA and the final BERA will include additional discussion re: integration of lines of evidence between different media and receptor groups on an appropriate spatial scale.
	64			Ammonia: Ammonia in sediment is a contaminant not quantitatively assessed despite its potential to pose unacceptable risk to benthic invertebrates. It is possible that ammonia may be responsible for some of the Level 2 toxicity observed in the Hyalella biomass endpoint given the known sensitivity of Hyalella to ammonia. There are many more stations with Level 2 effects on Hyalella biomass than there are for any of the other three sediment toxicity test endpoints. This results in the Hyalella biomass test showing a much larger area of toxicity than any of the other sediment toxicity tests. A plot of areas with Hyalella Level 2 toxicity and sediment ammonia concentrations would be useful in identifying portions of the site where ammonia is driving Hyalella toxicity as opposed to the other CERCLA contaminants. Such information would be useful going forward into the FS to bound areas potentially subject to CERCLA remediation.	There are several reasons for the apparent higher proportion of Hyalella L2 hits in the dataset. The LWG will re-evaluate the distribution of ammonia vs. this response endpoint to see if we can provide a useful interpretation for use in the FS.	Resolved. Response acceptable to EPA.

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	65	Executive Summary	p. ES-15, last paragraph on page (redline strikeout version of the BERA).	While EPA agrees with LWG that use of empirical osprey egg contaminant concentrations to evaluate risks to bald eagle introduces significant uncertainty into the bald eagle risk characterization, risks to osprey themselves are considerably less uncertain. This is particularly true since osprey, unlike bald eagle, feed almost exclusively on fish. As noted in the exposure assessment for birds, contaminated fish are the primary source of DDx exposure to piscivorous birds. The text should be amended to point out that osprey risk estimates are considerably less uncertain than the eagle risk estimates.	Requested change is acceptable and will be incorporated into the final BERA.	Resolved. Response acceptable to EPA. BERA will be changed per response.
	66	Section 4	Table 4-2, RM 11 E Sediment,	~~Footnote "h": Sediment from this river mile were only used "for the benthic community evaluation in order to be consistent with the data lockdown agreements between the LWG and EPA. " Omission of these data from other lines of evidence in the ERA could underestimate risk to the sources in this area.~~	This comment was struck out as indicated by Burt Shephard in a discussion with John Toll on August 9, 2012.	Resolved. Comment withdrawn
	67	Section 6.4.1, Tissue-Residue Risk Assessment Methods		: A TRV exceedance in one sample should be interpreted as posing an unacceptable risk to the benthic community (or bivalves or crayfish) in a given area. Invertebrates are immobile or nearly immobile and therefore the proper exposure point concentration is a point by point evaluation. Furthermore, effects on benthic invertebrates have cascading effects on nutrient cycling and fish resources that extend beyond risk to invertebrate populations themselves. The protection of a benthic community is linked to assessment endpoints to protect amphibians, fish and wildlife.	Sample-specific assessments of tissue residues were conducted in the BERA and were included in the identification of benthic risk areas, so no change is needed.	Resolved. Response acceptable to EPA. No action needed.
	68	Section 6.6.3.3, Uncertainty Associated with Ecological Exposure to TZW		This section is biased toward the potential exposure of one group of invertebrates without considering that many species of insects and invertebrates (and ammocoetes) do not utilize tubes or burrows. Furthermore, there is not sufficient evidence that those that do use burrows are not also exposed to contaminated surface and groundwater surrounding them.	The LWG will revise the text to more explicitly discuss the likely exposure of organisms that do not construct tubes or burrows, based on the literature review already provided to EPA. EPA has indicated that it will provide additional literature. The LWG will review and incorporate that information, if we receive it in time to consider for inclusion in the final BERA.	Resolved. Response acceptable to EPA, see also resolution of comment 23.
	69	Section 7.1.3.2, Effects		Contrary to the text in this section, effects from exposure to multiple chemicals that share the same mode of action should have been factored into the risk assessment. This would be particularly important in the assessment of dioxin like toxicity attributed to the combined effect of dioxins, furans and PCB congeners.	As suggested by Burt Shephard in a discussion with John Toll on August 9, 2012, the final BERA will note that the PAH equilibrium-partitioning sediment benchmark (ESB) and TEQs for dioxin-like chemicals are hazard indices, and so will consider the combined toxicity of PAHs, and dioxins furans and PCB congeners, respectively.	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
	70	Section 7.1.4., Fish Whole – Body Tissue Residues and TRVs		Several fish TRVs have been changed based on the removal of egg or embryo residue data. Although the residue we currently have for the site is whole-body fish, these residues are an indication of levels that could also accumulate in embryos and eggs and these evaluations are also meant to be protective of amphibians. These life stages may accumulate these contaminants to greater concentrations given they are in direct contact with the sediment and do not average exposure over larger areas. Since the protection of eggs and embryos is an assessment endpoint, these values should be included in the development of tissue residues for the protection of fish.	No fish tissue TRVs, besides those for mercury and antimony, were changed from those in the Draft BERA. The antimony TRV was changed from 9.0 to 1.1 by applying an acute to chronic ratio as requested in EPA Comment 124 on the draft BERA. Regarding the mercury TRV, see response to Comment 12. The 5th percentile NOAELs for total PCBs and total DDx were slightly revised to correct for rounding errors.	Resolved. Response acceptable to EPA
	71	Section 7.1.5.1, Antimony		Elevated risk is attributed to potential fish sinker. While this is a possible explanation, there are two sediment samples that are elevated for antimony in the area where the composite was taken (RM 9.5 to 10.5).	In the final BERA, the presence of the elevated sediment concentrations of antimony will be evaluated and noted if appropriate.	Resolved. Response acceptable to EPA

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	72	Section 7.3.5.1 and Table 7-36, Number of Individual Surface Water Samples with HQs>1		This table should also provide locations where the exceedances occurred, or should refer to appropriate maps.	Requested change is acceptable and will be incorporated into the final BERA.	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
	73	Section 8.1.5.1, Table 8-16, Total TEQ		Total TEQ HQ should be the addition of dioxin /furan TEQ and PCB TEQ. However, for beach area B14-B24 the two values do not add up. PCB TEQ HQ is reported as 11 and dioxin /furan TEQ reported as 17, which should equal 28 and not 20.	Requested change is acceptable and will be incorporated into the final BERA.	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
	74	Section 8.1.5.1.2, Hooded Merganser		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.17 for multiple prey portions (step 3). Information from Attachment 17, Table 3-1 and 3-2 should be brought to the main text and it should be clear what additional areas are identified.	The final BERA will present the Step 2 analyses in the main text rather than in an attachment (i.e., Attachment 17 analyses will be moved to the main text).	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
	75	Section 8.1.5.1.2, Bald Eagle		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.18 for multiple prey portions (step 3). Information from Attachment 17, Table 4-1 and 4-2 should be brought to the main text and it should be clear what additional areas are identified.	See response to Comment 74.	Resolved. Response acceptable to EPA
	76	Section 8.1.5.1.4, Osprey		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.17 for multiple prey portions (step 3). Information from Attachment 17, Table 5-1 and 5-2 should be brought to the main text and it should be clear what additional areas are identified. Also, carp, largescale sucker, pikeminnow and brown bullhead were collected and composited over 3 mile stretches of the river for all wildlife species. However, when these data were used in the osprey (and eagle, mink, etc) assessment (Attach 17, Table 5-1), the 3 mile composites were averaged site wide according to footnote "b" of Table 5-2. This should be revised to be in 3 mile segments.	See response to Comment 74. The exposure areas for carp and largescale sucker are site wide, so site-wide EPCs are appropriate for these species. EPCs for northern pikeminnow were calculated based on northern pikeminnow sampling areas, as indicated in Table 5-2, footnote c.	Resolved. Response acceptable to EPA except for carp – 3 mile homerange. See resolution of comment 6.
	77	Section 8.1.5.1.5, Mink COPCs		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.17 for multiple prey portions (step 3). Information from Attachment 17, Table 6-1 and 6-2 should be brought to the main text and it should be clear what additional areas are identified.	See response to Comment 74.	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
	78	Section 8.1.4.1.6, River Otter		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.17 for multiple prey portions (step 3). Information from Attachment 17, Table 7-1 and 7-2 should be brought to the main text and it should be clear what additional areas are identified.	See response to Comment 74.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	79	Section 8.1.5.2.2, Belted Kingfisher		COPCs with HQ>1 based on step 2 (EPA problem formulation) should be identified in table format along with locations, as is done in Table 8.17 for multiple prey portions (step 3). Information from Attachment 17, Table 8-1 and 8-2 should be brought to the main text and it should be clear what additional areas are identified.	See response to Comment 74.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.

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	80	Section 11		Ecological Risk Assessment Conclusions**.** In general, this section is much improved over that in the first draft of the BERA. Most of EPA's comments on this section have been addressed either in Section 11 itself or the new Attachment 19, which is LWG's version of the summary table of maximum observed risks and the number of samples where unacceptable risks were identified that EPA provided to LWG in our comments on the first draft.	The LWG and EPA made substantial progress in reconciling differences about how to present risk conclusions during the review of the draft BERA. The LWG appreciates EPA's acknowledging of that in the draft final BERA comments.	Resolved. Comment acknowledged; no action required.
	81	Section 11	Table 11-1, p. 78 (redline strikeout version of the BERA)	This page requires at least two changes. Any exceedance of an ambient water quality criterion points to potentially unacceptable risks to omnivorous fish, thus, the LWG conclusion of no risks to omnivorous fish from COPCs in surface water is incorrect. It should be noted that lesion prevalence, which is potentially associated with elevated sediment PAH levels, is not a primary line of evidence in the BERA, as it does not directly address any assessment endpoint in the BERA.	As indicated in response to Comment 1, risk conclusions were made at the appropriate scale. EPCs for water were derived at the scale appropriate for each receptor.	Resolved. See comment 1.
	81	Section 11	Table 11-1, p. 78 (redline strikeout version of the BERA)	This page requires at least two changes. Any exceedance of an ambient water quality criterion points to potentially unacceptable risks to omnivorous fish, thus, the LWG conclusion of no risks to omnivorous fish from COPCs in surface water is incorrect. It should be noted that lesion prevalence, which is potentially associated with elevated sediment PAH levels, is not a primary line of evidence in the BERA, as it does not directly address any assessment endpoint in the BERA.	Regarding use of alternative PCB and DDx water TRVs, see response to Comment 42. In the final BERA, lesion prevalence will be removed from this table.	Resolved. Comment 42 response acceptable to EPA but EPA will work with LWG on exact wording. Lesion LOE will remain in the table but EPA will provide verbiage for a footnote saying that the LOE does not directly address any BERA assessment endpoints and will not be used for risk management.
	82	Section 11	Table 11-1, p. 79	Any exceedance of an ambient water quality criterion points to potentially unacceptable risks to detritivorous fish, thus, the LWG conclusion of no risks to detritivorous fish from COPCs in surface water is incorrect.	See response to Comment 81	Resolved. See comment 1.
	83	Section 11.3.3, wildlife risk summary	p. 100 (redline strikeout version of the BERA)	It is not surprising that the primary risk to mammals is from PCBs, given the known sensitivity of mustelids (e.g. mink, otters) to PCB in the toxicological literature. A brief reference to this known sensitivity would result in one area where it would be appropriate to make what would normally be a somewhat subjective statement that PCBs pose the primary risk to aquatic dependent mammals at the site. The justification used by LWG to derive an alternative water column TRV for total PCB is that the national chronic PCB criterion is based on protection of mink, further evidence of their sensitivity.	The fact that the AWQC is based on protection of mink will be added to this discussion in the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	84	Attachment 19 (redline strikeout version of the BERA)		This new attachment addresses several EPA comments on the first draft of the BERA requiring all contaminant-receptor pair with HQ values equal to or exceeding one, along with a count of individual samples where HQ ≥ 1.0. This is a very useful addition to the BERA.	The LWG appreciates EPA's comment.	Resolved. Comment acknowledged; no action required.
Miscellaneous (#5?)	85			The BERA assumes the site specific osprey eggs would be equivalent to eagle eggs, and ignores the higher trophic level of the bald eagles, and that contaminants in the lower Columbia River eagles eggs tend to around 2 times higher than osprey	A discussion of uncertainty due to use of osprey eggs as a surrogate for eagle eggs will be added to the final BERA.	Resolved. Response acceptable to EPA. BERA will be changed per LWG response.
Miscellaneous	86			Where LWG selects an alternative approach or TRV, the EPA preferred approach/value and LWG one should be presented equally and conclusions presented for both. The approach/value provided by EPA should not be excluded from the evaluation or discounted when conclusions are presented.	Please see response to Comments 42 and 59.	Resolved as per comments 42 and 59 (response acceptable to EPA but EPA will work with the LWG on exact wording).

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Miscellaneous	87			LWG should clarify definition of sum DDTs, total DDx, etc. to ensure consistency of TRVs and risk estimates (e.g., do all consider both 2,4- and 4,4 forms?)	Requested clarification will be incorporated into the final BERA. Application was consistent throughout the BERA, so there is no effect on the outcome of the risk estimates.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
Miscellaneous	88			The BERA evaluated risks to macrophytes but should have evaluated risks to phytoplankton as per the conceptual site model.	The risk analysis for benthic invertebrates provides a point-by-point analysis of surface water samples relative to water quality criteria. Therefore, this additional analysis would result in an identical list of COPCs with HQs ≥ 1. The final BERA will discuss these results as they pertain to phytoplankton in the plant section of the BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
6) Data inclusion/data presentation	89			BERA data file: Available ammonia and sulfide surface water and TZW data should be added to the BERA data file. We note this data is presented in the attachment where the reference envelope derivation is presented, but it should also be in the BERA raw data file for completeness.	Requested change will be incorporated into the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	90	Section 4	Table 4-3, Round 3B Biota Sampling, Smallmouth Bass	The range given is from 225 to 355 mm. This is not the correct range retained in the Round 3 FSP and in fact larger fish were not included on a site wide basis although they were caught in order to be consistent with the smaller range fish that were collected during Round 1. Fish larger than 335 mm were not routinely retained and included in composite samples.	Requested change will be incorporated into the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	91	Section 4.1.3, Bird Egg Tissue	Footnote 33, Diphenyl Ethers	~~It is unclear why these data were not included in the SCRA and assigned a QA/QC level of Category 2. This designation should be reviewed given the source of polybrominated diphenyl ethers at the site.~~	This comment was struck out because no PBDE TRV is available, as indicated by Burt Shephard in a discussion with John Toll on August 9, 2012.	Resolved (comment withdrawn)
	92	Section 4.2, Non-Study Area Data		It is unclear why the downstream reach includes RM 1.9 which is generally co-located with sources offshore of the Evraz facility.	Study area boundaries and datasets have been agreed to (Attachment 1, page 10; *EPA Problem Formulation* (EPA 2008e)); this agreement includes RMs 0 to 1.9, 11.8 to 15.4, and the Multnomah Channel in addition to the Study Area (RM 1.9-11.8).	The BERA Study Area will be defined throughout the BERA as River Miles 1.9 to 11.8. Samples and stations located at River Mile 1.9 are considered as being within the Study Area.
	93	Section 6.5.5.2.2, Uncertainty Analysis of Surface Water Sampling Methods		All surface water samples regardless of the sampling protocol (XAD or peristaltic pump) should be included in the screening and used to determine COPCs (samples with HQ>1) and EPCs for all lines of evidence where surface water chemical concentrations are compared to water column TRVs. Instead, some peristaltic samples were only included in an evaluation of uncertainty. The fact that XAD has lower detection limits does not invalidate the results of peristaltic samples that captured exceedances of water quality thresholds at different sampling locations, positions in the water column or time of year. Some samples that have been excluded: 4,4'-DDT and Total DDX: W027 (Mult. Channel) and W031 (GASCO) were exceeded by a greater magnitude (by one order of magnitude) than XAD samplings in that location during different sampling periods. 4,4'-DDT: Two additional peristaltic sample locations – W030 at RM 5.5 and W036 at RM 8.6 exceeded benchmarks and should be included in the list of locations where HQ's >1.	On October 15, 2010, the LWG and EPA agreed that the LWG would compare XAD and peristaltic results on a point-by-point basis for discussion in the uncertainty analysis (Attachment 1, page 1,258, repeated from *General Responses to EPA's Non-Directed Comment Key Issues on the Draft Baseline Ecological Risk Assessment*, dated November 18, 2010). XAD samples were co-located with peristaltic pump samples and were specifically used to refine the assessment of organic chemical concentrations. In many cases, the XAD samples were the only samples that were analyzed for PCBs and DDx, so they are the only representation of those COCs. In cases where both XAD and peristaltic samples were analyzed for the same chemicals, the peristaltic sample analytes were not detected, but the XAD analytes were. Since risk characterization was based on detected analytes, there is typically no overlap or issue in "dropping" the peristaltic results.	Resolved. LWG will add text based on comment response.
	94	Section 6.0	Tables 6.4 and Text	Samples from the peristaltic pump water samples excluded from the risk assessment (Section 6.5.5.2.2) should be added into these tables and list of samples with HQ>1. These samples have not basis being relegated to the uncertainty section, as there is no additional uncertainty in the data quality or applicability of these samples.	See response to Comment 93.	Resolved as per comment 93

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	95	Section 7.1.5.2 and Table 7-11		The text states "this information can be used to compare the Study Area to upriver locations". Based on the size of fish collected in the upriver location compared to the Study Area these comparisons may not be valid for mercury. The size of the fish are significantly greater in the upriver locations and comparable sizes from the Study Area are not available (esp. for bass).	A brief discussion of potential uncertainty from differences in sizes of fish will be added to the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	96	Section 7.1.5.2 and Table 7-12		it is unclear why this table comparing BEHP between the Study Area and the Upriver tissue was added to the BERA as it was not requested by any of the previous comments. Again, there are problems with establishing the upriver dataset as appropriate for comparisons to Study Area fish tissue concentrations. BEHP may be a COPC that does not show distinct differences in concentrations between older, larger fish and smaller, younger fish but for other more bioaccumulative chemicals such as PCBs, organochlorine pesticides, dioxins and furans and mercury.	The comparison for BEHP was added because no acceptable TRV was available for this chemical. The comparison to background provides perspective on whether this chemical could pose a risk above that presented by background BEHP concentrations. Regarding fish sizes, see response to Comment 95.	Resolved. Comment asked for clarification, which has been provided.
	97	Section 7.3.3.1, Surface Water EPCs		Peristaltic Pump Samples should be included in risk estimates. The reason for removal is that the XAD samples achieved lower detection limits. This fact does not discount the results of peristaltic samples taken at different times, in different locations, or different sampling depths than the XAD. It is also not a commonly held position that the peristaltic samples are less representative of exposure than spatially and temporally averaged concentrations when assessing effects to aquatic life.	See response to Comment 93.	Resolved. Response acceptable to EPA per comment 93 resolution
	98	Section 8.1.5.1.1, Spotted Sandpiper		Use of predicted rather than measured concentrations in prey species: The text states "the absence of a relationship between sediment and tissue concentrations means that there is not a relationship between dietary risk (should it occur) and sediment concentrations". This is not accurate – it only means a relationship could not be developed between sediment and tissue not dietary risk.	Requested change will be incorporated into the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	99	Section 11.2	p. 85, background and upriver contaminants (redline strikeout version of the BERA)	EPA policy is that risks from chemicals at background concentrations should be assessed in the risk assessment. For naturally occurring contaminants in their natural form at natural background, EPA cannot under CERCLA require remediation of such chemicals. This EPA policy on background should be discussed and cited in this section. Mercury risks are one area where this policy may come into play as we go forward into the FS.	Requested change will be incorporated into the final BERA.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.

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7) Refined screen	100	Section 5.1.2, Refined Screen		It is still unclear if the decision criteria outlined in the flowchart were appropriate. As a part of resolutions on comments from the July 2010 DRAFT BERA, a table showing each chemical screened out of the refined screen and the reason was supposed to be developed. This information was not included in the revised document. The flowchart indicates that chemicals were screened out based on frequency of detection, which may not appropriately consider appropriate spatial scale.	Tables 5-2 (benthic inverts), 5-5 (fish tissue), and 5-8 (wildlife) are included in Section 5 of the BERA, and identify all chemicals screened out of the refined screen and the rationale for screening out based on the refined screen. Please note that the flowcharts for the refined screening process were developed based on EPA's directed process for screening provided in EPA's PFD (Attachment 2 of the BERA).	LWG must confirm that for media with limited sample numbers and where individual samples may be indicative of localized effects (i.e., surface water, transition zone water and clam, sculpin, crayfish and smallmouth bass tissue) the 5% frequency of detection rule was not applied to eliminate COPCs from evaluation in the BERA, per the problem formulation. If contaminants were improperly eliminated, they must be evaluated in the BERA. Detected chemicals without TRVs will be considered as contaminants whose risks cannot be quantified in the BERA, thus potential risks from such contaminants are an uncertainty in the BERA. This approach will resolve issues such as how to describe potential risks from contaminants such as mono-, di- and tetrabutyl tin that do not have TRVs in the BERA.
	101			1. Benthic Invertebrates, Section 5.2: Samples where the detection limit exceeded the screening level TRV should be retained in the SLERA. Dropping COIs at this stage does not allow for proper alignment of different lines of evidence in the risk assessment. In addition, COIs without SLVs should be retained in the SLERA and analyzed with other lines of evidence where SLVs are available. COIs dropped include: a. Sediment (occurred 30% of the time): Diethyl phthalate, dimethyl phathalte, 1,3-dichlrobenzene, and heptachlor b. Crayfish (occurred 80% of the time): dibutylphalate and dimethyl phthalate	Decisions to retain or drop COIs from evaluation in the BERA were implemented per EPA direction regarding the refined screening in the SLERA. The COIs in sediment were not retained because no detected concentration exceeded the SLV; phthalates were never detected in crayfish tissue. COIs without SLVs represent an uncertainty in the BERA, but did not represent unique chemical classes (i.e., there were other similar compounds that were retained and evaluated in the BERA).	See resolution to Comment 100.
	102			2. Fish (See Table 5-5): a. Dietary: Monobutyltin, dibutyltin, and tetrabutyltin should be included in these counts separately even if tributyltin is used as a surrogate for effects. The assessment of tributyltin specific concentrations should not be assumed to cover those of the other butyltins. b. Tissue (17-57%): butyl benzyl phthalate, dibutylphthalate, diethylphthalate, hexachlrobutadiene, endrin, alpha-HCH, beta-HCH and delta HCH c. Surface Water (30%): 2,4-DDE d. TZW: Selenium and styrene	Please see response to Comment 101. The screening was conducted per EPA's direction.	Resolved. See resolution to Comment 100.
	102			2. Fish (See Table 5-5): a. Dietary: Monobutyltin, dibutyltin, and tetrabutyltin should be included in these counts separately even if tributyltin is used as a surrogate for effects. The assessment of tributyltin specific concentrations should not be assumed to cover those of the other butyltins. b. Tissue (17-57%): butyl benzyl phthalate, dibutylphthalate, diethylphthalate, hexachlrobutadiene, endrin, alpha-HCH, beta-HCH and delta HCH c. Surface Water (30%): 2,4-DDE d. TZW: Selenium and styrene	For butyltins, please also see response to Comment 41.	Resolved. See resolution to Comment 100.

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	103	Section 8.1.2, COPCs Evaluated		Screening tables for the SLERA and refined screen should be provided so it is completely transparent how the receptor / COPC pairs were identified for birds and mammals. It is not clear how the list in Table 8-1 was developed.	As indicated in the text preceding Table 8-1, the SLERA is provided in Attachment 5 of the BERA. Including this in the main text would reduce the readability of the document.	Resolved. SLERA will remain an attachment. LWG will add a sample count column
8) Models	104		**Floating Percentile Model (FPM)**	Section 6, Objectives of FPM Model Selection and Risk: This section states "the FPM with the most balanced error rates and the LRM selected by EPA were carried forward to help assess benthic risk". Since the FPM with the most balance error rates is not model selected for the risk assessment but rather for the feasibility, this section will need to be carefully worded to ensure the reader does not assume that SQVs developed from a model with balanced rates ***is also indicating appropriate risk thresholds / areas***. Section 6.2.5.1 of the BERA (p. 175 of the main text reads as follows ". . . SQVs must be used together to predict the toxicity of the contaminant mixture they are not independent. Each SQV explains toxicity along with all the other SQVs that were derived from the model . . ." We agree with LWG on this point, which is why individual chemical SQVs from the FPM cannot be used to predict toxicity to benthic receptors. The FPM should not be used to develop sediment SQGs for individual chemicals since it is a mixture model. The FPM is a mixture model, so if any one individual chemical is above a threshold value, the location should be considered as toxic. One exceedance at a location is enough to say that the location is potentially toxic. The model should not be used to identify individual SQGs.	The FPM that provided the most balanced error rates was also used to assess benthic toxicity at individual locations where no bioassays were performed for the purposes of the BERA. It is how the weight of evidence was ultimately applied that differed between the BERA and the FS. The use of the FPM suite of chemical SQVs along with the LRM likelihood assessment, empirical toxicity, and measured and predicted tissue residues, collectively indicate the most likely areas of benthic risk. Each chemical that was included in the floating percentile model has a role to play in accurately predicting toxicity within the LWR. The suite of chemical SQVs that formed the basis of the model can be used to identify those areas of likely benthic risk.	Resolved. EPA is not asking for any changes to FPM or use of benthic toxicity models.
	105		**FPM Questions:**	**1. Chemical List for FPM:** What are the data rules for the development of the chemical list in this version of the risk assessment? The chemical list is perhaps the most critical piece of the use of the floating point model. Since the chemical list affects the output and values of the FPM model, disagreement at this stage represent a serious concern with the FPM. At this point, there are several discrepancies in the decision framework used to develop the list. a. It appears that several chemicals showed significant difference between hit and not hit distributions were not included because according to the text they did not exceed the SQG used in the SLERA. This has not been a decision rule used in previous versions of the predictive models. Any chemical detected 30 times or more that shows statistical difference between the hit and not hit distributions should be included. The goal of the predictive models is to develop site specific models that correlate with toxicity and not pre-determine the chemical list using non-specific criteria. i. Antimony ii. Dibutylphthalate iii. Diethylphthalate iv. Dimethylphthalate	The data rules for inclusion of chemicals in the FPM are described in Section 6.2.1, Chemical Selection for Model Development. Antimony, dibutylphthalate, diethylphthalate, and dimethylphthalate did not exceed their respective SLERA SQVs and are not considered COPCs. In addition, there were other reasons within the model decision framework to exclude some of these chemicals: **Antimony**: The only significant difference where the mean hit > mean no-hit was only for Hyalella growth (HG2) based on the nonparametric test. More than one L2 difference was needed to be included. Also, the maximum no-hit concentration exceeded maximum hit concentration. **Diethylphthalate**: There were no significant differences between hit and no-hit for any endpoint and the maximum no-hit concentration exceeded the maximum hit concentration. **Dimethyl phthalate**: There were not enough detects: n = 19.	
	106			b. It appears some chemicals without SQGs were not included in the floating point model. This is not consistent with objectives to determine a site specific model and is not consistent with previous versions of the model. i. Butyltin ii. Tetrabutyltin	None of the butyltins were included in the model because none had a significant difference between hit and no-hit distributions (except for TBT, for which the mean hit concentration was lower than the mean no-hit concentration). Butyltin ion — No SLERA SQV, no sig diffs betw hit, no-h Dibutyltin ion — No SLERA SQV, no sig diffs betw hit, no-h Tributyltin ion — No SLERA SQV, mean hit < mean no-hit Tetrabutyltin — No SLERA SQV, no sig diffs betw hit, no-h	

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	107			c. It appears that chemicals were added to the model that did not appear to have any correlation with toxicity according to the analysis between hit and no hit distributions provided. On what basis were these chemicals included? Chemicals not associated with toxicity can affect the SQVs for other chemicals in an inappropriate way. This is especially important if they co-vary such as Endrin and DDX compounds. i. Endrin ii. Endrin Ketone	These two chemicals were included because they were associated with toxicity: • Endrin had two L2 and two L3 differences between hit and no-hit means. • Endrin ketone had three L2 and three L3 differences between hit and no-hit	
	108			d. It appears that chemicals initially included in the model were removed because they were not correlated with toxicity. If the hit and no hit distributions are statistically different then the chemical is correlated with toxicity. Please clarify the decision framework to remove lead. Previous versions have used measures of reliability as justification. However, overall error and reliability rates are not the only measure of interest. Furthermore, if a chemical is removed from as a relevant SQG, it must be removed and the model re-run without that chemical. Otherwise, the inclusion influences the SQVs for other chemicals in the model inappropriately. In addition to the concern above, the removal of lead this appears to have been made analyzing Level III threshold effect reliability and not Level II. Please explain. i. Lead (included in all previous versions of the model)	Lead was included in the FPM because of significant differences between hit and no-hit distributions, but its SQV was always greater than or equal to its maximum concentration (essentially, not defined). Lead's max no-hit concentration exceeded its max hit concentration.	
	109			e. Chemicals determined to be non-CERCLA chemicals in the document were not considered in the predictive models. This is not appropriate as these chemicals have been found by both LWG and Government Team models (NOAA) to be highly correlated with toxicity. i. Diesel-Range Hydrocarbons ii. Residual-Range Hydrocarbons	Per agreement with EPA, in the FPM, PAHs were used as a marker for petroleum compounds because they were measured throughout the site and can be accurately measured. Regardless of their status under CERCLA, TPH and the ranges of TPH designated here as diesel-range and residual-range hydrocarbons, as EPA recognizes in its comments, are shorthand terms covering a broad range of several hundred compounds that come from a variety of sources, including coal, peat, coal tar, creosote, and microbial breakdown products of both plant and animal biomolecules, and exhibit a range of effects on exposed organisms. As the LWG demonstrated in its November 3, 2006, *Review of Proposed TPH Sediment Quality Values and an Alternative Method to Define Hydrocarbon Values for Portland Harbor* (LWG 2006), SQVs derived from diesel-range and residual-range hydrocarbon concentrations are inappropriate for screening the potential toxicity of sediments because they do not account for the heterogeneity of the organic mixture in diesel-range and residual-range hydrocarbon samples. What ASTDR has noted in its toxicological profile for TPH is true for the categories diesel-range and residual-range hydrocarbons: "In part due to the complexity of TPH components themselves, little is known about their potential for health or environmental impacts. As gross measures of petroleum contamination, TPH results simply show that petroleum hydrocarbons are present in the sampled media" (Toxicological Profile for Total Petroleum Hydrocarbons, p. 17 (ATSDR 1999).	
	110			f. Conventional: Previous versions of the model have included %fines and organic carbon. This version includes only ammonia and sulfides. Presentation of significance between hit and no hit distributions are not included for additional conventional such as fines and OC and it is unclear why these were not included in this version of the model. Ammonia and sulfides are highly associated with contaminated areas and likely co-vary significantly with other contaminants in the model. Why were these included?	Fines and TOC did have significant differences between hit and no-hit distributions, but are not considered contaminants so were not included in the model.	

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	111			**2. Statistical Difference Between Hit and No Hit Distributions:** The use of parametric methods (ANOVA) have been shown to be inaccurate in determinations of significant difference between distributions. These distributions are often non-normal and the variances are not equal. In the statistical tests between hit and no hit distributions it appears the data were log transformed for the non-parametric tests. This doesn't appear to be necessary and appears to negate the advantages of using a non-parametric model. Can you explain why this was done?	The log-transformed data were used in statistical comparison of hit and no-hit distributions simply as a convenience. Since any monotonic transformation of the data does not affect the ranks of the data (and, therefore, the outcome of the nonparametric test), and log-transformed data were used for the parametric tests, using the log-transformed data simplified the analyses by not requiring that a new file be read to conduct the nonparametric tests.	
	112			**3. Chemical List by Species and Endpoint:** The determination of statistical significance and associated chemical list should be species and test specific. Instead, the chemical list is the same between endpoints and species when tests between hit and no hit distributions between the two show differences. A separate chemical list should be developed based on statistical difference of hit / no hit distributions for each endpoint. Why was this not completed?	A chemical was included in the FPM if it met a variety of criteria, including that there was a difference between the hit and no-hit concentrations for any endpoint. The use of a different set of chemicals for each toxicity endpoint would have greatly complicated the development of a final SQG set for the entire site. The inclusion of chemicals that are not related to toxicity in an FPM should not affect the selection of final SQVs, except by creating an SQV (which would be set equal to the maximum no-hit concentration) for any chemical that was included that did not affect toxicity.	
	113			**4. Predictive Models and Risk Assessment versus Risk Management:** There is text in the document that indicates the "balanced model" (balanced in terms of false negatives and positives), is also the model used to predict risk. This is not correct and should be clarified in the document. However, predictions should be made on the full range of risk as defined and presented in EPA's problem formulation. This includes Levels 1, 2,and 3 thresholds to lower false negative rates than is achieved by using the balanced model. Where are the floating point model runs and results for predicative models other than the balanced model?	The results of the sensitivity analysis for the FPM are in Attachment 6, Section E. You can find the reference on page 163 of the Draft BERA. We understand that EPA wants us to add a brief discussion of L1 toxicity data in the BERA, in part to document that L1 reference envelopes overlap the allowable control effects (i.e., L1 hits are indistinguishable from control). Burt Shephard verbally offered on August 24, 2012, to provide specific language regarding L1 toxicity data.	
	114			**5. Comprehensive Benthic Approach:** Where are the details presented on this management approach? Is this presented in another document such as the FS or additional management document?	The information about where to find the details of the comprehensive benthic approach is provided in Section 12.3 of the draft final BERA. Developed by the LWG after receiving directives and guidelines from EPA on April 21, 2010, the comprehensive benthic approach was first presented informally to EPA by the LWG on July 20, 2010, to elicit early feedback. It was formally presented to EPA during the September 29, 2010, LWG Small Technical Group Benthic Toxicity AOPCs Meeting with EPA. Item 11 in Attachment B to the LWG's January 12, 2011, letter to EPA, and the attachment to EPA's February 25, 2011, response letter to the LWG, document the decision to proceed with an updated version of the comprehensive benthic approach. These communications are provided in Attachment 1 to the draft final BERA.	
	115			**6. Evaluation of Reliability for FPM Model SQVs:** An evaluation of reliability presented individually based only for each endpoint and species separately is misleading. Although SQVs can be developed for each endpoint separately, the evaluation of reliability should include the combination of these 4 sets of SQVs into one SQV.	As mentioned in several of the comments, each SQG set must be used as a set, so it is not possible to combine SQVs across sets and maintain the desired reliability of results. To create a set of SQVs for all endpoints, a separate FPM run would need to be conducted using a pooled endpoint. Although the question of whether or not to use a pooled endpoint has been discussed more than once over the course of the project, a November 17, 2010, email from John Toll to Eric Blischke summarizes decisions about how the final LRM and FPM models should be run and documents the decision to use only the individual endpoints.	

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	116			**7. Mean Quotients:** The text accurately states "once that set is determined, the SQVs must be used together to predict the toxicity of the contaminant mixture – they are not independent. Each SQV explains toxicity along with all the other SQVs that were derived from the model…". While we are in agreement with these statements, it is unclear why specific individual FPM SQVs were used outside the context of the rest of the model set in mean quotient analysis.	Specific individual FPM SQVs were not used outside the context of the rest of the model set in mean quotient analysis. MQs are not used in the BERA. They are used in the FS. It was EPA's decision to use MQs and an MQ threshold of 0.7 in the comprehensive benthic approach (for the FS).	
	117	Attachment 4	Table 7-2	It is unclear why only the average concentrations in shorebird prey was predicted. It appears the average sediment concentration was used to calculate an average worm and clam prey concentration for shorebirds, which is not appropriate. Each shorebird area should be calculated separately and encompassing the range in concentration as indicated by the range presented in this table.	Models were used to predict concentrations for individual beaches. EPCs are presented in Attachment 4d. This will be clarified in the text associated with Table 7-2.	Resolved (response acceptable to EPA pending EPA review of use of individual beach EPCs in Attachment 4d).
	118	**LRM Appendix Comments:**		1) p.1: x-axis in Figure not clear----what does it represent?	Axis in figure will be clarified.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	119			2) Text in Figure: "*...greater than the mean concentration in the non-toxic samples*". As explained later in the text, 3 screening alternatives were evaluated: greater than the mean (1X), greater than 2*mean (2X), and 2*geometric mean (2G)	No response required.	Resolved. EPA provided clarifications about the LRM. No action required.
	120			3) p.14: "*Based on the idea that chemistry is less bioavailable in silty sediments than in fine-grained sediments, adjusting the fines results in a reduced effect of chemistry in siltier sediments.*" Actually, it's based on the observation that samples with high percent fines and elevated chemistry have a higher probability of showing toxicity than samples with low percent fines and elevated chemistry. It may be that chemistry is less available in coarser-grained sediments, possibly due to chemistry associated with larger less available particles. Also, as indicated in LWG 2006, samples with higher chemistry concentrations tended to be associated with fine-grained sediment. LWG 2006 states that "*Even if correlations were not highly linear throughout the range, it was true for nearly all chemicals that high concentrations occurred in sediments with the highest fine-grained fractions (i.e., high concentrations implied high percent fines, but high percent fines did not always imply high concentrations)*." This implies that, in general, high percent fines is a good indicator of high chemistry and that low percent fines is a good indicator of low chemistry.	No response required.	
	121			4) p.15: "*In the model selection step (Step 3, Section 2.4), a fines-adjusted model would be selected if a correlation existed between toxicity and both chemistry and fines, but also if there was a good correlation between toxicity and percent fines alone. If increased chemical bioavailability does occur in siltier sediments, then this adjustment is reasonable. Otherwise, this adjustment implicates the presence of chemistry in the silt as the source of the apparent toxicity, when in fact it is being caused by the physical structure of the siltier sediments. Note that of the 40 final models, more than 75% are fines adjusted (20 are dw_FINES, and 11 are OC_FINES). This suggests that some relationship between toxicity and grain size exists; fines-adjusted models would not be selected if the correlation was present between toxicity and dw- or OC-normalized sediment chemistry only*." Not necessarily. It suggests that there is a relationship between chemistry and grain-size, which we know is true. It's important to keep in mind that although we're developing individual chemical models, they are indicators of chemical mixtures. (Field)	No response required.	

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	122			5) p.20: "*Goodness-of-fit. Only models with a normalized chi-square greater than 0.15 were considered acceptable for inclusion in the combined models. The normalized chi-square is a measure of the goodness-of-fit of the relationship between the screened chemical concentrations and the observed toxicity. Neither the formula for the chi-square goodness-of-fit statistic nor the interpretation of the 0.15 threshold were confirmed as of the date of this publication.*" *The chi-square statistic was generated from SAS logistic model runs (the difference between the -2 ln-likelihood statistics for the model runs with and without intercept terms. This information and the calculation from the SAS output was provided to LWG. The "0.15 threshold" was used in our 1999 and 2002 papers and the 2005 EPA report. It was based on the observation that individual models with a normalized chi-square <0.15 were visually much poorer fits, so even though the models may have been statistically significant, we decided to exclude them from the model pool.	No response required.	
	123			6) p.21: "*The predicted hit reliability describes the probability of toxicity in the samples predicted to be toxic by the model. Note that positive predictive power generally suffers in a population with low prevalence. The low prevalence (or base rate) of toxicity in the Portland Harbor dataset suggests that predicted hit reliability is not expected to be high. This step, however, is a method of checking calibration: do we observe approximately 50% toxicity in those stations with a predicted probability of toxicity exceeding 50%?"* Selected individual models were required to have >50% toxicity (percent of samples toxic at Level 2 or greater) for samples with probability of toxicity>0.5 Individual models had a predicted hit reliability for p>0.5 between 60 and 100%, with an average of 83%.	No response required.	
	124			7) p.36: "*Uncertainty exists regarding the degree to which the underlying correlative relationship fit by the model exists on a chemical-by-chemical basis. The screening step in the modeling process assumes that the toxicity of a sample with a low concentration of a chemical is caused by higher concentrations of other chemicals not under evaluation. Consequently, the screening criteria create a somewhat contrived relationship (of selected toxicity and chemistry data) that is then described by a logistic model.*" The screening process eliminates only toxic samples (all non-toxic samples are included) with low concentrations, making it possible to develop models for individual chemicals that reduce the influence of other chemical stressors in the environmental mixtures present throughout the study area. The floating point model attempts to deal with this problem by filtering/ignoring most or all toxic samples for individual chemicals that have concentrations less than the highest non-toxic concentration for that chemical.	No response required.	
	125			8) p.37: "*However, the potential for a relationship to be found following the screening step is affected by prevalence: the modeling approach is biased towards accepting individual model endpoints that have a higher prevalence of toxicity*." This is not accurate. The screening approach makes it possible to develop individual chemical models when multiple chemical stressors are present. The modeling approach selects the models that do the best at predicting toxicity from the entire (unscreened database), using the Level 2 toxicity threshold.	No response required.	

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	126			9) p.37: "*Prevalence will also affect the individual model selection process. Consider the situation wherein there is little to no association with chemistry for either Level 1 or Level 2 responses. The chemical distributions for toxic and non-toxic stations would overlap at both toxicity levels. The reliability metrics' sensitivity, efficiency, and positive likelihood ratio would be constant (or comparable) for the Level 1 and Level 2 models. The major distinction between these two models would be their hit reliability, in both rate and number of correct predictions. These latter measures would bias selection toward the Level 1 model, simply because prevalence is higher at Level 1 than at Level 2. So, when the selected model for each individual chemical turns out to be based on the Level 1 response, we should not conclude that simply because the Level 1 response is the basis for the model, these chemicals are more sensitive indicators of toxicity. The Level 1 and Level 2 models may have had nearly identical associations with chemical concentrations; the Level 1 model was chosen simply because it had more toxic stations to predict.*" This is not correct. The model selection process is based on an evaluation of toxicity at Level 2 or greater. So, a Level 1 model would need to correctly predict toxic samples to a comparable degree as the Level 2 or Level 3 model. For example, the individual model selected for Diesel was a Level 1 model. The selected model did not have the highest Positive Likelihood value, but correctly predicted 6 more samples than the highest ranked model and had a similar percent toxic (85% compared to 89%).	No response required.	
	127			10) p.37: "*Finally, the specifics of the modeling approach remain somewhat vague. This model was developed by NOAA for EPA use, and not all of the components of the model are fully documented or understood. Uncertainties are associated with several of the decision criteria used to accept or reject individual chemical models, and best professional judgment was utilized at several stages to develop the final set of models. Our best understanding of the process is described herein, but at this point in time we do not believe that this is a fully replicable model.*" It is true that the model selection process is not entirely automated and requires some best professional judgment. However, it is important to recognize that there is no unique solution to development of the multi-chemical mixture model. Field reference: LWG 2006: Portland Harbor Superfund Site Ecological Risk Assessment: Draft Interpretive Report: Estimating Risks To Benthic Organisms Using Predictive Models Based On Sediment Toxicity Tests. March 17, 2006	No response required.	

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9) TPH	128			Total petroleum hydrocarbon (TPH) risks evaluated but not carried through (multiple locations in BERA). Any TPH fractions identified as posing potentially unacceptable ecological risks should be carried through to the completion of the risk characterization. Given that Portland Harbor has multiple potential sources, in many instances, chemicals released into the environment that are quantified within a TPH fraction may not have all originated from petroleum which is excluded from the definition of a hazardous substance under CERCLA. Even if some of the TPH contamination is from petroleum, TPH is a pollutant or contaminant and must be carried through the entire BERA so that an assessment of risk and the need for response action may be determined. See 42 U.S.C. Section 9604(a)(1)(B).	TPH was not ignored in the BERA, but it should not be represented in the toxicity table in a manner inconsistent with its relevance as recognized by ATSDR's toxicological profile (ATSDR 1999). TPH fractions were represented in the water quality assessment. PAHs, which are a component of petroleum, were assessed in sediment, dietary pathways, and selected receptor tissues. TPH was included in the logistic regression model for the benthic assessment. TPH, as EPA recognizes in its comments, is not a single substance, but simply a shorthand term covering a broad range of several hundred compounds, including benzo(a)pyrene, n-hexane, ethylbenzene, and xylene, that come from a variety of sources, including coal, peat, coal tar, creosote, and microbial breakdown products of both plant and animal biomolecules, and exhibit a range of effects on exposed organisms. As the ASTDR states in its toxicological profile for TPH, TPH is appropriately considered as simply an indicator of the presence of contamination: "In part due to the complexity of TPH components themselves, little is known about their potential for health or environmental impacts. As gross measures of petroleum contamination, TPH results simply show that petroleum hydrocarbons are present in the sampled media" Toxicological Profile for Total Petroleum Hydrocarbons, p. 17 (ATSDR 1999). For that reason, it is not appropriate to list TPH as a COPC posing potentially unacceptable risk and to carry it through the entire BERA as EPA requests. As ATSDR has noted, TPH values do not provide useful information for the purpose of determining response actions. Constituents of TPH that are specifically listed under CERCLA, or that are better characterized, such as PAHs, are the appropriate COCs to be used in the BERA analysis.	Appendix A of EPA's 4/11/2008 direction to LWG that transmitted the section of the problem formulation describing the derivation methodology and the TRVs to be used in the BERA includes a table of sediment TRVs for several fractions of TPH. Evaluation of TPH risks in sediment is described in Section 5.2 of the BERA. The TPH in sediment fractions that screened in during the SLERA must be forwarded to the BERA, and identified as posing potentially unacceptable risks to benthic invertebrates at the conclusion of the BERA.
	129	Executive Summary	p. ES-4, footnote 4 (redline strikeout version of the BERA)	C10 – C12 range aliphatic hydrocarbons are in the low end of the diesel range, not within the gasoline range. Also, see above comment on TPH.	The footnote will be corrected.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	130		p. ES-14, footnote 12	p. ES-14, footnote 12 (redline strikeout version of the BERA). See above comment	See response to Comment 128. TPH will not be added to the COPC count. The BERA meaningfully assesses the risks from compounds that fall within the broad category of TPH through the assessment of those particular compounds on which there is an existing, well-developed base of information.	See comment 128. All identified TPH fractions posing risks in sediment, surface water and TZW will be included in the final listing and count of chemicals posing potentially unacceptable risks at the conclusion of the BERA. This resolution applies to Comments 130, 131 and 132.
	131	Section 7.4.5.1, TZW Risk Characterization Results		Table 7-42, Footnote f: See above comment	See response to Comment 130	
	132	Section 11	p. 69, footnote 24 (redline strikeout version of the BERA)	See above comment	See response to Comment 130	

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10) Reference Envelope/Toxicity Tests	133	Executive Summary	p. ES-5, 2nd bullet on page (redline strikeout version of the BERA)	COPC's occur at concentrations posing unacceptable risks for about 7% of the study area. It is unclear how this number was calculated, as the areal extent of toxicity varied for each of the four toxicity test endpoints (ie, does it include areas where Level 1 (minor effect level) occur for the empirical toxicity data. EPA considers areas with Level 1 effects as posing unacceptable ecological risks to benthic invertebrates, but made a management decision that only areas with the more severe Levels 2 and/or 3 toxicity need to be carried forward as areas potentially requiring remediation in the FS.	Estimation of the areal extent of benthic risk was based on the weight of evidence for all benthic LOEs, including L2 and L3 benthic hits for all toxicity endpoints, empirical toxicity, empirical bioaccumulation, and modeled bioaccumulation.	Resolved. EPA has verified the accuracy of the 7% figure. EPA found the area with potentially unacceptable benthic risk was 4-8%, , and this result has been added to the revised executive summary.
10) Reference Envelope/Toxicity Tests	133	Executive Summary	p. ES-5, 2nd bullet on page (redline strikeout version of the BERA)	COPC's occur at concentrations posing unacceptable risks for about 7% of the study area. It is unclear how this number was calculated, as the areal extent of toxicity varied for each of the four toxicity test endpoints (ie, does it include areas where Level 1 (minor effect level) occur for the empirical toxicity data. EPA considers areas with Level 1 effects as posing unacceptable ecological risks to benthic invertebrates, but made a management decision that only areas with the more severe Levels 2 and/or 3 toxicity need to be carried forward as areas potentially requiring remediation in the FS.	Estimation of the areal extent of benthic risk was based on the weight of evidence for all benthic LOEs, including L2 and L3 benthic hits for all toxicity endpoints, empirical toxicity, empirical bioaccumulation, and modeled bioaccumulation.	Resolved. LWG has confirmed that the Level 1 hits are already presented, on Maps 6-2 through 6-5. The appropriate BERA text will be amended to describe the locations and extent of Level 1 risks.
	134	Section 6	p. 141, Table 6-2 (redline strikeout version of the BERA).	The 90% threshold definition (84%) for the *Chironomus dilutus* survival reference envelope contains a typographic error. The correct value is 84.5%. The rest of Table 6-2 is correct.	The table will be corrected.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	135	Section 11	Table 11-2, p. 84, footnote A (redline strikeout version of the BERA)	Another location with TPH not a CERCLA contaminant, EPA believes TPH in the environment is a CERCLA contaminant.	See response to Comment 128.	See resolution to Comment 128.
	136	Section 11.3.1	p. 97, benthic community risks (redline strikeout version of the BERA).	There needs to be a discussion that LWG's conclusion that 7% of the site poses unacceptable benthic risk may be an underestimate of the proportion of the site posing unacceptable benthic community risks. This is due in part to the biased sampling locations of the toxicity test stations, which were intentionally focused, as agreed to by EPA and LWG, on nearshore locations near known or suspected contaminant releases or sources; and in part to not including Level 2 Hyalella biomass results in this calculation.	To clarify, Hyalella growth was included in the assessment of benthic toxicity. Overall, the proportion of samples in the Lower Willamette that exhibited significant toxicity was very low and supports the assessment of the areal extent of benthic risks. In addition, multiple lines of evidence were applied to this assessment, which tends to strengthen the overall estimate of benthic risk.	Resolved. Response acceptable to EPA.. No action needed.
11) Risk Management Language/Subjective Statements	137			Risk Management Conclusions within BERA text. Although much improved over the first draft of the BERA, there remain a considerable number of risk management conclusions or inferences throughout the text of the BERA. A substantial amount of editing is still needed to either eliminate the risk management text, or make reference to Section 12, the risk management recommendations. Risk management language should be removed from the BERA and limited to the LWG risk management section.	EPA's comments on risk management language/subjective statements contradict the following agreement, captured in the resolution of directed comments on the draft BERA: Per ERAGS (EPA 1997), in addition to developing numerical estimates of existing impacts, risks, and thresholds for effect, the LWG will put the estimates in context with a description of their extent, magnitude, and potential ecological significance. This information will be detailed in the Risk Characterization section and summarized in a revised Table 11.2." In the final BERA, the LWG will make every effort to objectively explain the rationale for subjective statements about risk, and we are willing to listen to EPA's suggestions about specific language. However, ERAGS calls for describing the ecological significance of the risk assessment, which requires the application of professional judgment about how to integrate the body of scientific evidence. Exercising professional judgment does not amount to making management decisions about how to act on the body of evidence.	The LWG and EPA will continue to work together to ensure that the risk management language accurately reflects the LWG and EPA risk assessors' professional judgment and the EPA risk manager's communication needs. Failure of EPA to identify every example of risk management conclusions in Sections 1 through 11 of the BERA does not mean that EPA approves of the risk management language not specifically identified in these comments. EPA and LWG will also work together to develop text regarding the ecological significance of identified risks. As per

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	138			"Per agreement with EPA", multiple locations. Many locations in the BERA have a clause stating per agreement with EPA that refers to the February 15, 2008 EPA prepared problem formulation. EPA is well aware that the BERA analyses were based largely on the guidance in this problem formulation. It is appropriate to discuss this in Section 1 of the document, and in the relevant Attachments to the BERA. But EPA believes that not every instance in the BERA that refers back to the problem formulation needs to begin with "per agreement with EPA". Much of this text can be eliminated. It is appropriate to mention "per agreement with EPA" when discussing specific approaches and decisions not documented in the problem formulation. Examples of this include recommendations not to use water column TRVs for diesel range and residual range TPH fractions due to concerns about the toxicological utility of these benchmarks, or the recommendation not to use the EPA aquatic life criterion for aluminum in the BERA, because it was derived from data generated in acidic, very soft water that does not reflect site conditions at Portland Harbor.	The LWG will evaluate the use of this phrase on a case-by-case basis and minimize repetitive references to the same agreement. It is important for the LWG to distinguish work done in the BERA at EPA's direction from other work done to analyze risks.	EPA's 1997ecological risk assessment guidance document, risk assessors are to use professional judgment when describing the ecological significance of risks. EPA's revised executive summary text describes criteria that EPA Region 10 used to identify chemicals most likely to pose ecologically significant risks. Comments 138, 139 and 140 are resolved per LWG's response. Comment 141. Will be resolved through EPA and LWG discussions on definition of ecological significance. EPA's criteria to define ecological significance are presented in the revised executive summary, and will need to be expanded upon in the main text of the BERA. Comments 142 and 143. Unless specific definitions of low and negligible are given in the ecological significance discussion, these terms will be eliminated from the text. Comments 139 through 145. The EPA revisions to the executive summary will be used in lieu of the language discussed in these comments.
	139	Executive Summary	p. ES-2, 2nd full paragraph (redline strikeout version of the BERA)	While Section 12 of the BERA presents risk management recommendations from the LWG, the July 22, 2011 standalone document "Risk Management Recommendations: Contaminants of Concern, Receptors, Pathways, and Benthic Areas of Concern for the Feasibility Study" also presents risk management recommendations. Reference should be made to this standalone document, and a consistency check should be made to ensure recommendations between the two documents are not contradictory.	The final BERA will reference the standalone document. Both documents were checked for consistency. Any revisions to either document will be made consistent between both documents.	
	140		p. ES-3, 2nd bullet on page (redline strikeout version of the BERA)	The primary risk of ecologically significant adverse effects on ecological receptors in the Study Area is from four groups of chemical mixtures: polychlorinated biphenyls (PCBs), dioxins and furans, polycyclic aromatic hydrocarbons (PAHs), and total DDx." This conclusion is still somewhat subjective, as primary contributor to risk is not defined here. The statement is more of a risk management conclusion by LWG than an objective discussion of risk. An EPA risk manager may, for example, consider transition zone water samples with hazard quotients in excess of 1000, which occur for multiple chemicals, to be a primary risk of ecologically significant adverse effects, rather than the risks from much more sitewide spread chemicals such as PCBs and PAHs, but which have lower hazard quotients. Since Section 12 of the BERA is LWG's risk management recommendations, perhaps the modification should be to amend the bullet text to point out this conclusion is LWG's risk management recommendation for the site.	In the final BERA, the rationale for this conclusion will be added or the bullet will be removed.	
	141		p. ES-3, footnote 3 (redline strikeout version of the BERA)	The second sentence of this footnote "Therefore, the potentially unacceptable risks range from negligible to significant" is a risk management conclusion and should be deleted.	See response to Comment 137.	
	142		p. ES-4, 2nd bulleted paragraph (redline strikeout version of the BERA)	Low to negligible risk is not defined. Provide the range of HQ's of DDx to bald eagle instead of this subjective description of risks.	The rationale for this risk conclusion will be included in the bullet.	
	143		p. ES-4, 3rd bulleted paragraph (redline strikeout version of the BERA)	What is the basis for concluding population risks to sculpin and spotted sandpiper are low? Again, this is a subjective statement, not a quantitative description of ecological risk. Elevated concentrations of COPCs in transition zone water is not likely to overstate risks as claimed in the text, because the home range of species such as sculpin is small, meaning that exposure and thus risks are elevated for that portion of the population in those locations where TZW COPC concentrations are elevated.	The rationale for this risk conclusion will be included in the bullet.	

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	144		p. ES-14, line 12 (redline strikeout version of the BERA)	Water column TRVs such as EPA aquatic life criteria have a design goal of being protective of 95% of aquatic genera. While the toxicity tests run with Pacific lamprey ammocoetes did indicate that ammocoetes were generally not sensitive to the suite of chemicals tested, EPA does not agree with LWG that the exposure assessment for lamprey was necessarily overly conservative. This statement should be removed from the BERA.	The indicated text does not discuss the exposure assessment. The summary is factually accurate and supported by the data.	
	145		p. ES-16, 1st sentence on page (redline strikeout version of the BERA)	Risk to wildlife from other COPCs with HQs ≥ 1 in the final step of the risk characterization were found unlikely to result in ecologically significant adverse effects in the receptor populations: the HQs are of low magnitude and over a limited spatial extent, with uncertainties in exposure and effects likely to result in overestimated risk.". This is an example of the risk management decisions EPA commented on in our review the first draft of the BERA. EPA risk managers will make the determination whether or not risks identified for any COPC result in adverse effects ecologically significant enough to warrant remedial action.	See response to Comment 137.	
	146	Section 11	Table 11-1, starting on p. 76 (redline strikeout version of the BERA).	This table, more than any other table in the BERA, provides risk managers with the information they need to begin to make their risk management decisions regarding ecological risks at the site. When combined with Attachment 19 (which should be referenced in the text of the discussion of Table 11-1) it provides risk managers with a nearly complete list of chemicals posing potentially unacceptable risks, the number of samples posing risk, and the magnitude of the risks. As noted in other comments, TPH risks have not been identified in the list of chemicals posing unacceptable risks. Other minor discrepancies occur because different sections of the BERA use different TRVs for various individual or groups of chemicals (e.g. Total DDx vs. 4,4'-DDT, 4,4'-DDD aand 4,4'-DDE; Total PAH vs.low and high molecular weight PAHs, or individual PAH compounds, etc.) These variations can result in different tallies of the number of chemicals causing potentially unacceptable risks, depending on whether one "lumps" or "splits" the various combinations. In part to reconcile this, and in part to summarize risks by assessment endpoint, measurement endpoint and lines of evidence as defined in the problem formulation, EPA developed the attached spreadsheet as our version of Table 11-1 of the draft final BERA. This table, attached to these comments, summarizes risks by measurement endpoint and line of evidence for each assessment endpoint. It also includes the maximum hazard quotient for each chemical with one or more samples with a HQ ≥ 1.0, and the portion(s) of the site where the maximum HQs are found. This table combines the best features of the existing Table 11-1 and Attachment 19 into a single table identifying all potentially unacceptable ecological risks except for those found from toxicity testing. Once Table 11-1, Attachment 19 and the attached EPA risk summary are reconciled, EPA risk managers will have a summary of the BERA that is useful in making risk management decisions. The attached table should also be broken up into smaller tables that describe results from only one assessment endpoint, and placed into the appropriate summary section of the individual risk characterization sections of the BERA.	The final BERA will include versions of EPA's suggested tables reconciled with Attachment 19.	Resolved; response acceptable to EPA BERA will be changed per LWG response.

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	146	Section 11	Table 11-1, starting on p. 76 (redline strikeout version of the BERA).	This table, more than any other table in the BERA, provides risk managers with the information they need to begin to make their risk management decisions regarding ecological risks at the site. When combined with Attachment 19 (which should be referenced in the text of the discussion of Table 11-1) it provides risk managers with a nearly complete list of chemicals posing potentially unacceptable risks, the number of samples posing risk, and the magnitude of the risks. As noted in other comments, TPH risks have not been identified in the list of chemicals posing unacceptable risks. Other minor discrepancies occur because different sections of the BERA use different TRVs for various individual or groups of chemicals (e.g. Total DDx vs. 4,4'-DDT, 4,4'-DDD aand 4,4'-DDE; Total PAH vs.low and high molecular weight PAHs, or individual PAH compounds, etc.) These variations can result in different tallies of the number of chemicals causing potentially unacceptable risks, depending on whether one "lumps" or "splits" the various combinations. In part to reconcile this, and in part to summarize risks by assessment endpoint, measurement endpoint and lines of evidence as defined in the problem formulation, EPA developed the attached spreadsheet as our version of Table 11-1 of the draft final BERA. This table, attached to these comments, summarizes risks by measurement endpoint and line of evidence for each assessment endpoint. It also includes the maximum hazard quotient for each chemical with one or more samples with a HQ ≥ 1.0, and the portion(s) of the site where the maximum HQs are found. This table combines the best features of the existing Table 11-1 and Attachment 19 into a single table identifying all potentially unacceptable ecological risks except for those found from toxicity testing. Once Table 11-1, Attachment 19 and the attached EPA risk summary are reconciled, EPA risk managers will have a summary of the BERA that is useful in making risk management decisions. The attached table should also be broken up into smaller tables that describe results from only one assessment endpoint, and placed into the appropriate summary section of the individual risk characterization sections of the BERA.	With respect to the comment regarding the listing of TPH, see responses to Comments 109 and 128.	Resolved. LWG will include additional tables summarizing risk conclusions. With regards to the presentation of risks from TPH, see resolution of Comment 128.
	147	Section 11.3	p. 85, last paragraph (redline strikeout version of the BERA)	Where are terms such as limited and moderate defined, in the context of describing LWG's impression of the magnitude of risk? Without these subjective terms being defined, EPA is forced to conclude that LWG is still making risk management decisions within the BERA that must be eliminated from the text.	See response to Comment 137.	Resolved. The LWG and EPA will continue to work together to ensure that the risk management language accurately reflects the LWG and EPA risk assessors' professional judgment and the EPA risk manager's communication needs. See also EPA modifications to Section 11. See response to Comment 137 for additional details. Failure of EPA to identify specific risk management text in Sections 1 through 11 of the BERA does not mean that EPA accepts the risk management language.
	148	Section 11.3.2	p. 98, fish community risks (redline strikeout version of the BERA)	The term "low risks" is also a subjective description of the magnitude of risk.	See response to Comment 137.	
	149	Section 11.3.3, wildlife risk summary,	p. 101, 1st paragraph on page (redline strikeout version of the BERA).	This entire paragraph is a microcosm of EPA's concerns with the first draft of the BERA. EPA's comment 181 on the 1st draft of the BERA touches on all of the issues in this paragraph. LWG discusses justifications for minimizing risk, including the low magnitude of HQs > 1, disagreements between different lines of evidence regarding whether or not risks exist, the limited spatial extent of identified risks, similarities between identified site risks and risks to receptors upstream of the study area, a perceived high uncertainty and/or lack of reliability of lines of evidence, etc. It's disappointing to see this type of text in the BERA after EPA's previous comments directing LWG not to make these types of statements.	See response to Comment 137.	

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	150			**Specific Examples of Unacceptable Risk Management Discussions** 2) Page ES-2, 2nd bullet on page. "The primary risk of ecologically significant adverse effects on ecological receptors in the Study Area is from four groups of chemical mixtures: polychlorinated biphenyls (PCBs), dioxins and furans, polycyclic aromatic hydrocarbons (PAHs), and total DDx . . ." It is not within the purview of a risk assessment to provide a subjective ranking of the primary risks, primary not being well defined in the BERA. The risk assessment establishes whether a risk is present and defines a range or magnitude of the risk. The proper role of the risk assessment is to identify all chemicals, media, and receptors exposed to potentially unacceptable risks, a quantitative discussion of the risks (e.g. HQ range between 1.3 and 571), locations where potentially unacceptable risks are found (e.g. highest cadmium in sediment risks are found between river miles 8 and 10, as well as offshore of the Widget Corporation at river mile 5.2), and to describe which receptors are and are not at risk, as well as what portions of the site pose unacceptable risks. It is acceptable for LWG to discuss strength of evidence for each line of evidence evaluated in the BERA, as well as to discuss the agreement or lack thereof between the risk conclusions of different lines of evidence. It is also acceptable to discuss uncertainties in risk assessment methodologies and conclusions, but those uncertainties should not be used to draw risk management conclusions in the BERA.	See response to Comment 137.	
	151			3) Page ES-2, footnote 3: "The likelihood and ecological significance of the potentially unacceptable risk varies across COPCs and LOEs from very low to high. Therefore, the potentially unacceptable risks range from negligible to significant." The terms very low to high are not defined in terms of risk. The risk assessment should not describe a quantified potentially unacceptable risk as 'negligible'. That judgement should not be in the risk assessment, which informs risk managers of the potential risk, its uncertainties, and whether media concentrations exceed thresholds for adverse effects on the BERA assessment endpoints. EPA previously commented that risk management recommendations should be in a separate risk management recommendations section. Risk management recommendations or opinions, including subjective judgements regarding the magnitude and ecological significance of identified risks, should not be in the BERA text.	See response to Comment 137.	
	152			4) Section 5.0, Identification of COPCs, p. 101. "The screening of COPCs in this BERA was conducted in two tiers as directed by EPA (2008j)." Although correct as written, the statement implies that EPA somehow forced the LWG to perform the screening in two tiers. In fact, EPA's ***Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final*** (June 1997) clearly allows for two tiers of screening. The second tier, the refined screen, was optional within the BERA Problem Formulation. Indeed, the LWG chose not to perform some steps identified as refined screens, with no comment other than concurrence from EPA.	See response to Comment 138.	
	153			5) Section 7.6.3, p. 448. "Of the 53 TZW COPCs with HQ ≥ 1, 15 have HQs ≤ 10 and are thus likely to pose negligible risk." No justification is given for calling an HQ ≤ 10 as a level posing negligible risk. Indeed, the term "negligible risk" is found 89 times in the draft BERA. While EPA can accept the use of the phrase "negligible risk" as synonymous with "acceptable risk" when describing the situation where the HQ≤ 1, as is often the case in the BERA, we cannot accept its use in the situation where a HQ ≥ 1. The inappropriate use of the phrases "negligible risk" and "risk is negligible" need to be removed from the BERA.	See responses to Comments 1 and 137.	

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	154			6) Table 7-46, p. 459, risk conclusions for fish: 4,4'-DDT with a maximum HQ in transition zone water of 160: Conclusion: "Negligible risk" Rationale for risk conclusion: "Maximum TZW HQ not indicative of ecologically significant risk." A maximum HQ of 160 in any medium hardly indicates negligible risk. At least the potential is present for unacceptable ecological risk. While we agree with LWG that risks to many pelagic fish species are likely overestimated by the TZW HQ of 160, the potential for unacceptable risks to demersal fish with small home ranges such as sculpin is much higher than acknowledged by the LWG.	See responses to Comments 1 and 137.	
	155			7) Table 7-46, p. 459, risk conclusions for fish: Total DDx with a maximum HQ in transition zone water of 280: Conclusion: "Negligible risk" Rationale for risk conclusion: "All LOEs in reasonable agreement." A maximum HQ of 280 in one medium is not in substantial agreement with maximum HQs of 1.8 and 1.9 in other media, while an HQ of 280 hardly indicates negligible risk. At least the potential is present for unacceptable ecological risk.	See responses to Comments 1 and 137.	
	156			8) Section 8.3.3.1, p. 559, wildlife risk assessment conclusions. "The remaining COPCs resulting in HQs ≥ 1 (i.e., aluminum, copper, mercury, benzo(a)pyrene, and aldrin) were not found to pose ecologically significant risk to the wildlife receptors evaluated, given the low magnitude of HQ values and the limited spatial extent of the exceedances; these low risks were estimated using conservative assumptions." The term "low risks" used here is another subjective determination of risk magnitude that is not acceptable in the BERA.	See responses to Comment 137.	
	157			9) Table 11-1, p. 633 - 634, risks to invertivorous, omnivorous, detritivorous and piscivorous fish. Line of evidence: "Concentrations in surface water compared with state WQS, national AWQC,b or effects based values derived from the literature that are protective of fish survival, growth, and reproduction". COPCs with HQs ≥ 1 "No COPCs with HQs ≥ 1" Any exceedance of an ambient water quality criterion points to potentially unacceptable risks to detritivorous, invertivorous and/or omnivorous fish, thus, the LWG conclusion of no risks to detritivorous fish from COPCs in surface water is incorrect and not supported by data in the BERA.	See responses to Comments 1 and 137.	
	158			10) Table 11-1, Footnote B, p. 635. "Risk estimates for total PCBs, 4,4′-DDT, and total DDx for the surface water and TZW LOEs are based on the alternative total PCBs and 4,4′-DDT TRVs for protection of directly exposed aquatic organisms, rather than the selected AWQC-based TRVs." Risks from these chemicals should be evaluated on the AWQC based TRVs, especially since it is likely that AWQC (or Oregon water quality standards for aquatic life derived from EPA AWQC) will be ARAR's at the site. It is acceptable for LWG to evaluate risks from the second set of aquatic TRVs they derived, as the Problem Formulation sets out EPA's minimum expectations for the BERA, which LWG exceeded in this case. However, risk conclusions from the primary TRVs must be presented in the summary of risks.	See response to Comment 42.	
	159			11) Section 11.3, p. 640, Ecological Risk Conclusions. "this section (11.3) contains statements with qualitative adjectives like "limited" or "moderate" when describing the spatial extent of exposure to a COPC at concentrations yielding HQs ≥ 1." The terms 'limited' and 'moderate' are not defined as far as I can tell. Without such definitions, one is left to infer that the areal extent of potentially unacceptable risks may be smaller than they actually are. More quantitative descriptions of the areal extent of unacceptable risk, such as the surface area or range of river miles of shoreline where unacceptable risks are found gives a much more useful description of risks to EPA risk managers.	See response to Comment 137.	

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	160			12) Section 11.3.2, p. 642, PCB risks to fish. "The tissue-residue TRV for total PCBs is conservative because it is based partially on uncertain toxicity data, including field data from contaminated sites where other contaminants were also present." EPA does not agree with this statement, because the tissue TRV was not based on field data. While one can legitimately argue the meaning of the term 'conservative', EPA believes that the PCB tissue residue-effects data is among the best, least uncertain residue effects data for any chemical.	See response to Comment 61.	Resolved. See comment resolution for comment 61.
	161			13) Section 11.3.2, p. 642, Risks to fish. "Because TZW exceedances are localized, none of the TZW COPCs is likely to pose risk to Study Area benthic invertebrate or fish populations." For species with no mobility (e.g. mussels, clams) or very limited mobility and/or home ranges (e.g. most benthic macroinvertebrates, sculpin), a localized area with elevated contaminant concentrations in TZW is likely to pose unacceptable ecological risks to that portion of the population living in the vicinity of the contaminated TZW. To the extent that the areal extent of contaminated TZW to which benthic invertebrates is exposed is unknown due to limited sampling, TZW risks are unknown. And as several TZW contaminants have maximum HQs in excess of 1000, the statement that none of the TZW COPCs is likely to pose risk is simply not supported by the data.	See response to Comments 1 and 137.	Resolved. See comment resolution for comment 1 and 137.
13) Tissue/Dietary Assumptions	162	Section 7.2.3.2.1, Exposure Parameters		Risk estimates should be based on a reasonable temperature, as indicated in previous comments. Temperature significantly impacts fish ingestion rates, and the temperature used here of 13.4 C underestimates temperatures during a significant portion of the year which are 16.2 C (EPA recommended). Section 7.2.5.4.3 outlines the uncertainty between using the two different water temperatures and finds the hazard quotients would increase by 16% to 17%. The new hazard quotients should be used. While the same COPCs may be identified as the text indicates, the areas of concern would likely increase – also an important component of the risk assessment to clearly identify	The assumption of a water temperature of 13.4°C is reasonable and goes back to the PRE; the warmer temperature is evaluated in the uncertainty section. As suggested by Burt Shephard in a discussion with John Toll on August 9, 2012, a subjective statement (1-2 sentences in the uncertainty section) will be added to the final BERA saying that assuming a warmer water temperature could have some effect on the spatial extent of potentially unacceptable risk during the period of the year when temperatures are elevated.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	163	Section 7.2.3.2	Table 7-18, Receptor Specific Prey Species	It is unclear why northern pikeminnow is assumed to eat sucker, carp, peamouth and other pikeminnow. The fish dietary assessment applies to contaminants that are metabolized (e.g. PAHs) or regulated (e.g. metals). Therefore, the inclusion of larger fish in the dietary estimates where accumulation of these COIs in tissue is not expected is not relevant to the assessment. In addition, the assumptions of what fish prey the fish receptors of interest are consuming is not defensible. This should be removed and the fish dietary assessment based on the consumption of Step 2 as outlined by EPA which incorporates primarily invertebrate prey should be used.	See response to Comment 1. Specific prey portions are presented in Table 7-19. These are consistent with those specified by EPA in the PF (EPA 2008e).	Resolved. Response acceptable to EPA Northern pikeminnow dietary preferences in Table 7-19 are the same as those specified in the problem formulation.
	164	Section 8.0, Wildlife Risk Assessment		The text states "risk conclusions were based on the final step (i.e. step 3 for the dietary LOE)" "*as agreed to between EPA and LWG on October 15, 2010 meeting* (footnote 5 and Section 8.1.1 footnote 6)". Risk conclusions should be based on step 3 unless the range of receptor prey species is varied probabilistically as indicated by the problem formulation. There is too much uncertainty in attaching simple prey portions especially for receptors like the hooded merganser. The proportions presented imply an inaccurate precision. Risk characterization should be based on Table 8-15, Maximum HQs for Dietary COPCs based on individual prey species.	Prey fractions are those specified by EPA in the PF (EPA 2008e). Section 8.1.5.2.1 analyzes the potential for different prey assumptions to affect the outcome of the risk assessment. These uncertainty analyses are incorporated into the risk conclusions. Regarding step 1 vs. Step 3, see notes on Comment 1.	Resolved; response acceptable to EPA.

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	165	Section 8.1.1, wildlife dietary risk assessment methods (redline strikeout version of the BERA)		Although hard to follow in the text, it appears as though the calculation method used to estimate COPC ingested doses for wildlife has been corrected to account for the combined COPC intake from prey and sediment.	Wildlife dietary exposure accounts for both sediment and prey fractions in the diet.	Resolved. Response acceptable to EPA. No action needed.
14) Miscellaneous Text Comments	166	Executive Summary	p. ES-1, footnote 1 (redline strikeout version of the BERA)	While correct as written, the footnote (or its associated text) should also acknowledge that the BERA describes ecological risks from the no action alternative in the feasibility study.	The BERA does not describe ecological risks from the no-action alternative in the FS. The FS finds that sediment quality in Portland Harbor will recover naturally over time. Therefore, baseline risks are higher than the expected future risks under the no-action alternative.	Resolved. . EPA modified executive summary resolves comment. No change needed to address specific comment.
	167		p. ES-6, line 9 (redline strikeout version of the BERA)	Two words in this line are misspelled: conservative and minimize.	Spelling will be corrected.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	168			The executive summary should have a description of the study area, including multiple sites, PRPs, sources, chemicals per site, etc and it should describe the project history. Additionally, it should explain why the BERA is focused on the aquatic environment.	A description of the study area will be incorporated into the executive summary in the final BERA.	Resolved. Response acceptable to EPA. EPA revisions to the executive summary have added the study area description text.
	169		p. ES-14, 2nd paragraph (redline strikeout version of the BERA)	As noted in several EPA comments on the first draft of the BERA (e.g. Comments 40 and 43), EPA's national guidance and policy on risk assessments indicates that using organism level measurement endpoints to estimate population or community level effects is an acceptable risk assessment methodology. Taken as a whole, EPA believes the paragraph is still not consistent with EPA guidance (OSWER Directive 9285.7-28P, EPA's Guidance on Risk Characterization for Risk Managers and Risk Assessors, dated February 26, 1992) stating that risk assessors do not make decisions on the acceptability of any risk level for protecting the environment, and should be eliminated	It is not clear which paragraph this is referring to. In our version of the document, this paragraph is the last paragraph prior to ES.4 and starts "Risks to fish from other COPCs with HQs ≥ 1..." The comment does not appear pertinent to this paragraph.	Resolved. EPA clarified which paragraph this the comment is referring to. Risk characterization conclusion will remain the same but the language will be revised.
15) Problem Formulation	170	Attachment 2, Problem Formulation Text (redline strikeout version of the BERA)		The EPA prepared problem formulation, including its associated text, tables, figures and TRV calculations should be updated to reflect the BERA as it was finally performed. As originally written, a problem formulation outlines the procedures to be used in performing a BERA. BERA's are usually iterative documents, with some analyses, lines of evidence, toxicity reference values and/or receptor categories added, modified, or eliminated depending on the findings of tasks and analyses performed earlier in the BERA process. As such, it is not unusual for a problem formulation written prior to the completion of the BERA to not fully reflect the risk analyses and risk characterization performed during the BERA. The problem formulation should be updated to reflect these changes.	This seems unnecessary. As EPA notes, it is not unusual for a PF written prior to the completion of the BERA to not fully reflect the risk analyses and risk characterization performed during the BERA. The PF is not meant to fully reflect what is contained in the final BERA, it is meant to describe EPA's intent for the BERA. Therefore, the LWG questions the value of updating the problem formulation after the BERA has been completed.	Resolved. The LWG will add a table documenting significant post-problem formulation changes to the BERA methods.

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	171	Section 5, COPC selection and refined screen, and Attachment 5		EPA reviewers have been having difficulty following the COPC selection and refined screening processes in the BERA to ensure that all appropriate chemicals are forwarded from this step of the ecological risk assessment process to the BERA. The working or spreadsheet tables actually used to perform these steps of the BERA do not appear to be in either the main text or in any attachment of the draft final BERA. EPA cannot fully confirm the conclusions of this chapter without these tables. These tables should be in the final BERA as part of Attachment 5.	See response to Comment 100. The results of the SLERA are shown clearly in tables in Attachment 5 (e.g., comparison of screening thresholds to maximum concentrations, detection frequencies, and detection limits).	Resolved. The LWG will work with EPA and clarify as necessary. See also resolution for comment 100.
	172	Attachment 4, Part B, BERA data file		The sediment chemistry tab in the Excel file does not contain the ammonia and sulfide in sediment data, although some of this information is found in the data used during reference envelope derivation. This information must be added to the BERA data, along with the fish tissue dioxin TEQ and total TEQ calculation results discussed in another EPA comment. These are errors of omission in the BERA data. As we have previously informed LWG, the remainder of the BERA data file is correct to the best of our knowledge.	Ammonia and sulfide data will be added to the BERA dataset.	Resolved. LWG will add ammonia and sulfide data to the BERA database - resolved.
	172	Attachment 4, Part B, BERA data file		The sediment chemistry tab in the Excel file does not contain the ammonia and sulfide in sediment data, although some of this information is found in the data used during reference envelope derivation. This information must be added to the BERA data,	Ammonia and sulfide will be added to the BERA database.	Resolved. Response acceptable to EPA.
	172	Attachment 4, Part B, BERA data file		The sediment chemistry tab in the Excel file does not contain the ammonia and sulfide in sediment data, although some of this information is found in the data used during reference envelope derivation. This information must be added to the BERA data, along with the fish tissue dioxin TEQ and total TEQ calculation results discussed in another EPA comment. These are errors of omission in the BERA data. As we have previously informed LWG, the remainder of the BERA data file is correct to the best of our knowledge.	See response to Comment 30 regarding fish TEQs.	Resolved. LWG has agreed to provide ammonia and sulfide data in the BERA sediment data file. Dioxin and the various TEQ risks in fish tissue will be re-evaluated based on the revised tissue TRVs as discussed in Comment 29. The risk characterization of the various TEQ calculation results for fish tissues will be presented in Section 7 of the BERA, while the raw calculation results will be reported in the appropriate BERA fish tissue data files in Attachment 4.

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	173	Section 6, benthic invertebrate risk assessment		The reviewers could not find the data discussed for the benthic invertebrate assessment endpoint, measurement endpoint 4, line of evidence 1. Empirical (field-collected) whole body benthic macroinvertebrate concentration relative to tissue TRVs. No data was presented, but a screen of epibenthic invertebrates from Hester-Dendy samplers (2 to 7 samples available, depending on chemical) against the benthic invertebrate tissue TRVs would satisfy the line of evidence requested in the problem formulation for this assessment endpoint. This analysis appears not to have been provided in the BERA.	EPA has not previously asked the LWG to screen epibenthic invertebrates from Hester-Dendy samplers. That would be a new analysis that is not warranted because it is highly unlikely to make any difference in the BERA. Field-collected and laboratory-exposed clams, laboratory-exposed worms, field-collected crayfish, and field-collected epibenthic organisms were compared to tissue TRVs and collectively represented exposure of the benthic macroinvertebrate community.	Resolved. LWG verified that EPA had previously asked the LWG to screen epibenthic invertebrates from Hester-Dendy samplers to benthic macroinvertebrate-specific tissue TRVs where possible (limited tissue mass was available for the epibenthic invertebrate samples collected from Hester-Dendy samplers so only a limited suite of chemicals could be analyzed for in these samples). LWG will perform requested analysis and present results in the BERA. LWG will evaluate risks from this line of evidence to confirm EPA's initial review which indicated tissue residues in Hester-Dendy samples do not rise to the level that they pose unacceptable risks.
	174	Section 6.3, Benthic invertebrate risk assessment, and Attachments 6 and 7		The reviewers were unable to find hazard quotient tables comparing sediment chemistry results to either probable effect concentrations (PECs) or probable effect level (PEL) sediment quality benchmarks. This appears to be a major omission in the BERA, as these two comparisons are required lines of evidence in the problem formulation. Although some of the findings of these comparisons are discussed in the text, the tables are missing. Provide the results of these comparisons, with the associated hazard quotients in tabular form.	This evaluation was conducted as part of the BERA. Tables will be added.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	175	Section 6	Tables 6-13 and 6-44, benthic invertebrate risk assessment	For dibutyl phthalate hazard quotients from the logistic regression model, BERA Table 6-13 shows no HQ > 1 but BERA Table 6-44 gives max. HQ = 2.8. Identify and correct this discrepancy.	The discrepancy will be corrected.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	176		Table 6-20, benthic invertebrate risk assessment	Mistake in BERA Table 6-20, endrin has at least one bulk sediment PEL sample with HQ > 1 (maximum HQ of 3.2 based on our comparison to site data), table says 0 samples have HQ ≥ 1.0. Identify and correct this discrepancy.	This discrepancy will be corrected.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.
	177	Section 7.1, fish tissue assessment		As per the problem formulation, modeled sculpin and smallmouth bass chemical concentrations resulting from the Gobas food web model were to be compared to tissue-based TRVs. While the sculpin results are presented, the BERA does not contain results of this comparison for smallmouth bass. Present the exposure assessment (essentially the food web model predicted whole body chemical concentrations in bass tissue) and risk characterization results for this line of evidence.	As noted in Footnote 8 in Section 8.1.5.2.1, no tissue chemical concentrations were predicted for smallmouth bass because samples were available to represent each home range (1-mile segment) within the Study Area (Map 4-11).	Resolved. Response acceptable to EPA. No action needed.

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	178	Section 7.1, fish tissue assessmen t		Based on information developed during the fish tissue TRV development, we believe two fish tissue TRVs are incorrect in the BERA. For bis(2-ethylhexyl)phthalate, it appears the BERA screening level TRV of 0.39 mg/kg was reused instead of the correct 1.6 mg/kg TRV. For total DDx, based on the studies EPA believes should have been used to calculate the total DDx TRV, the value should be 0.68 mg/kg. This total DDx TRV may change slightly if recalculated using the @Risk software instead of the Burrlioz software originally used by EPA. The correct TRVs should be used for these two chemicals, and hazard quotients recalculated. We believe these are the only two incorrect TRVs in the draft final BERA.	See response to Comment 62.	EPA believes that the BEHP in fish tissue TRV sent to LWG on 9/5/2008 (1.6 mg/kg wet wt.) and the total DDx TRV in fish tissue (10 th percentile = 0.68 mg/kg wet wt., 5th percentile = 0.46 mg/kg wet wt.) sent to LWG on 9/12/2008 are correct and based on a correct interpretation of the literature used to derive these TRVs. The LWG will use these TRVs in the BERA to recalculate risks in fish tissue from these two contaminants, and revise text and tables as appropriate to present the recalculated results. EPA recognizes that EPA and LWG used different software to calculate the percentiles of the species sensitivity distribution for DDx, and acknowledges that the final DDx TRVs may differ slightly from those given above. See resolution of comment 62.
	179	Section 7.1, fish tissue assessmen t		For risks to fish themselves from chemicals eliciting dioxin-like toxicity, perform a TEQ calculation for risks using the World Health Organization TEFs for fish in conjunction with the appropriate dioxin, furan and PCB congener analytical data for fish tissues. The dioxin TEQ and total TEQ concentrations should be compared to the screening level benchmark of 50 pg/g (wet weight) for 2,3,7,8-TCDD. Calculations and results need to be presented in a new table, as this information appears to be unavailable in the draft final BERA. EPA believes that this screen, particularly when applied to the Round 3b fish tissue data, will identify at least one smallmouth bass composite sample as having a total TEQ hazard quotient greater than or equal to 1.0. This analysis may also identify other fish species with total TEQ hazard quotients greater than or equal to 1.0. For fish samples where the dioxin TEQ or total TEQ hazard quotients exceed 1.0, a baseline ecological risk TRV will need to be developed using the tissue residue TRV derivation methodology used to derive the other BERA fish tissue TRVs. The BERA TEQ TRV will then be compared to the measured TEQs in fish tissue to identify the baseline ecological risk hazard quotients for dioxin TEQ and total TEQ.	See response to Comment 30.	See resolution of Comment 29.
	180	Section 7.1, fish tissue assessmen t		No risk characterization was done on the measured bullhead and black crappie fish tissue data. This risk characterization should be performed, and hazard quotients presented.	Consistent with the PF, Table 4 (EPA 2008e), risk to bullhead and black crappie are discussed in Section 7.1.5.5 as an uncertainty. This section indicates other fish receptors are protective of bullhead and black crappie.	Resolved. Response acceptable to EPA. No action needed.
	181	Section 10.1, aquatic plant surface water risk assessmen t		Phytoplankton are one of the target ecological receptors for this assessment endpoint. As phytoplankton can be found anywhere in the water column of the Willamette River, the hazard quotients should be calculated for all surface water samples, not just those surface water sampling locations within the bounds of the aquatic plant habitat survey shown on Map 2-5. This will add several chemicals to the list of chemicals with HQ ≥ 1.0, and will change the values of several of the maximum HQs.	See response to Comment 88.	Resolved. Response acceptable to EPA BERA will be changed per LWG response.

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	182	General Comments		General comment on summary tables at end of Chapters 6 through 10, and in Chapter 11. EPA has developed a format, based in part on Table 1 of the problem formulation, and in part on Attachment 19 of the BERA, to summarize all chemicals within each line of evidence with hazard quotients ≥ 1.0. One table has been developed for each of the 13 assessment endpoints within the BERA. To improve consistency, readability and usability of the BERA, these tables should be inserted at the end of Chapters 6 through 10, and repeated for all assessment endpoints in the summary Chapter 11 of the BERA.	The tables EPA describes will be added at the ends of Sections 6-10. Repeating the tables in Section 11 would be extremely unwieldy, so we would like EPA to reconsider that suggestion.	Resolved. The tables EPA describes will be added at the ends of Sections 6-10.
	183			~~General comment on the number of chemicals posing potentially unacceptable risks at the end of the BERA. Depending on how one lumps or splits the various toxicity reference values in different sections of the BERA, the count of chemicals ranges between 89 and 105. One example is that for PCBs, most TRVs are for total PCB, but at least one TRV is for Aroclor 1254. Lumping these two together would result in a reduction in the total number of chemicals posing potentially unacceptable risk. The same issue comes up for various combinations of the DDD, DDE, DDT and total DDx TRVs, also for some of the PAH compound lumping and splitting. EPA is open for suggestions on how to explain what might appear to be a discrepancy in the BERA conclusions regarding the number of PUR chemicals, but which really is not a discrepancy. Aside from this lumping/splitting issue, the only major discrepancy appears to be the failure to include TPH fractions as chemicals posing potentially unacceptable risks, discussed in other comments.~~	This comment was struck out as indicated by Burt Shephard in a discussion with John Toll on August 9, 2012.	Resolved. Comment withdrawn

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EPA. 2008a. Calculation of aquatic biota toxicity reference values (TRVs) for petroleum alkanes, alkenes, cycloalkenes, BTEX and PAH compounds. US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

EPA. 2008b. EPA e-mail dated December 22, 2008 (Eric Blischke to Bob Wyatt, Rick Applegate, Jim McKenna) regarding fish TRVs for EPA submittal with attachment: EPA response to fish tissue-residue toxicity reference value reconciliation tables. Remedial Project Manager, US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

EPA. 2008c. EPA letter and attachment dated April 11, 2008 to Lower Willamette Group (from E. Blischke and C. Humphrey to J. McKenna and R. Wyatt) regarding Portland Harbor RI/FS: Toxicity reference values for the baseline ecological risk assessment. US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

EPA. 2008d. EPA letter dated August 5, 2008 to Lower Willamette Group (from E. Blischke and C. Humphrey to J. McKenna and R. Wyatt) regarding Portland Harbor RI/FS tissue TRV methodology, with attachments titled "Aquatic Tissue TRV response." Aquatic Biota Tissue TRV Derivation, and LWG Tissue TRV Response. US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

EPA. 2008e. Problem formulation for the Baseline Ecological Risk Assessment at the Portland Harbor Site. Report and letter dated February 15, 2008 to Lower Willamette Group (from E. Blischke and C. Humphrey to J. McKenna and R. Wyatt). US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

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LWG. 2006. LWG technical review: "A Review of proposed TPH sediment quality values and an alternative method to define hydrocarbon values for Portland Harbor," and accompanying cover letter to EPA from B. Wyatt and J. McKenna, LWG co-chairs, dated November 3, 2006. Lower Willamette Group, Portland, OR.

LWG. 2008. E-mail dated November 20, 2008 to EPA (from Jennifer Woronets to Chip Humphrey and Eric Blischke): transmittal of fish TRV reconciliation tables, with attached files: Fish Tissue TRV Reconciliation Summary Table and Summary of Fish Tissue-based Toxicity Values. Lower Willamette Group, Portland, OR.

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