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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

February 26, 2003

Reply To
Attn Of: ECL-115

VIA FACSIMILE AND FIRST CLASS MAIL

Mr. Robert Wyatt
Environmental Compliance Specialist
Northwest Natural & Co-Chairman, Lower Willamette Group
220 Northwest Second Avenue
Portland, Oregon 97209

Dear Mr. Wyatt:

This letter provides EPA's official comments on the Draft *Portland Harbor RI/FS Round 1 Work Plan* (Work Plan) and Draft *Round 1 Field Sampling Plan* (Field Sampling Plan). The Work Plan and Field Sampling Plan documents were prepared by Striplin Environmental Associates and submitted by Respondents on June 7, 2002 and June 14, 2002, respectively, in accordance with the Administrative Order on Consent.

As you are aware, EPA previously provided the Respondents with all of the individual comments prepared by EPA staff and our project partners on the Work Plan and Field Sampling Plan documents on August 16 and 19, 2003. At the time EPA originally submitted these comments to Respondents, EPA and Respondents agreed that EPA would not require Respondents to provide a formal response to comments at that time, and that EPA would delay formally transmitting the comments until certain other issues had been resolved. For instance, at the request of Respondents, Respondents, EPA, and EPA's partners agreed to focus on tasks described in the Work Plan and Field Sampling Plan that would expedite collection of fish tissue, co-located sediment and other specific data.

The attached comments are based on the individual comments EPA previously provided. They point out several deficiencies in the Work Plan and Field Sampling Plan that must be addressed by Respondents. We have had numerous discussions about the issues raised by these comments with Respondents over the past few months and are continuing to work with the Respondents to resolve these issues through our ongoing joint technical subgroup meetings. However, a lack of resolution on issues in the subgroups prior to submission of a Work Plan shall not serve as a basis for failing to submit a complete or acceptable Work Plan.

Respondents shall address the attached comments in a revised RI/FS Work Plan to be submitted by

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the Respondents by March 31, 2003. The Work Plan shall include a schedule for completion of the all tasks associated with the RI/FS. Respondents shall also prepare and submit Field Sampling Plans for future field work. While we recognize that the Respondents may have already addressed some of the attached comments on the Field Sampling Plan through other submittals related to the fish tissue and co-located sediment sample collection work that EPA has approved, the outstanding issues need to be addressed in future Field Sampling Plans. Respondents shall submit Round 2 Field Sampling Plans by April 17, 2003.

EPA looks forward to continuing our technical discussions and receiving a Work Plan and Field Sampling Plans that address our comments and provides the planning and tasks necessary to complete the RI/FS.

If there are any questions regarding these comments, please contact Chip Humphrey at 503-326-2678 or Tara Martich at 206-553-0039. All legal inquiries should be directed to Elizabeth McKenna at 206-553-0016.

Sincerely,

Tara Martich

Chip Humphrey
Tara Martich
Remedial Project Managers

List of ccs for EPA letter dated February 26, 2003: pertains to September 28, 2001 Administrative Order On Consent (AOC) between EPA & nine potentially responsible parties to conduct Portland Harbor RI/FS.

cc: [Note: project roles are sometimes used to help clarify project structure for cc recipients.]

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AOC PRP REPRESENTATIVES

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Work Plan Comments

Work Plan General Comments

Data collection

The sampling scheme currently proposed is not adequate to determine the nature and extent of contamination (horizontal and vertical) or to identify localized in-water sources of contamination within Portland Harbor. Although both the Work Plan and Field Sampling Plan identify nature and extent of contamination as an objective of Round 1 of the remedial investigation (RI), the proposed sampling approach will not achieve the stated objectives. Additional sampling is necessary to characterize potential in-water source areas. This should include a higher sampling density in the vicinity of suspected source areas that have not been well characterized. In addition, subsurface samples must be collected to provide an understanding of the vertical extent of sediment contamination. By focusing solely on surface sediments, it is possible that only relatively clean, recently deposited sediments will be characterized. Minimal sampling of potential in-water source areas precludes characterization of the nature and extent of sediment contamination. In addition, the lack of toxicity testing through bioassays to evaluate effects on the benthic community precludes characterization of benthic effects.

We are concerned about language regarding the scope and intent of the Round 1 Work Plan and associated sampling and the lack of any data objectives that would be employed to determine whether or not additional rounds of data collection would be necessary or unnecessary. The document (page 13, 68) states that, "Round 1 is anticipated to be the most significant data-gathering event of the RI/FS, with Round 1 data focused on determining the nature and extent of contamination in sediments in the ISA and the concentrations of chemical constituents in the tissues of a variety of fish species." Round 1 is not the, "most significant data gathering event of the RI/FS." Rather, Round 1, as presented, is a limited and initial data gathering effort that will not answer the question of nature and extent, nor will it provide all the tissue data and supporting evidence necessary for conducting the baseline risk assessments. While it is recognized that a Round 2 sampling effort may be needed, it appears that too much emphasis and expectation is placed on the Round 1 data. Page 68 states that, "The Round 2 sampling program will likely focus on obtaining information from areas that were not defined following the Round 1 sampling program." What does this mean? Round 1 focuses entirely on the ISA and does not address harbor-wide nature and extent issues making everything outside the ISA "undefined" after Round 1.

The proposed sampling is inadequate to characterize potential effects on ecological and human receptors resulting from surface water exposures. Grab sampling for PCBs and other bioaccumulative contaminants is not appropriate, and may lead to conclusions that these compounds are not present, when in fact ineffective sampling was used to detect the compounds. Different sampling methodology, such as high volume or diffusion sampling (e.g., lipid bags) with lower detection limits are needed to collect these samples properly and to ensure that the contribution of contaminants present in surface water to fish tissue burdens are quantified appropriately.

Round 1 has an emphasis on tissue collection, which is proposed to be used in a "data evaluation" to preliminarily assess risk for the site. Tissue evaluations, while important to assess risk to higher level organisms, are limited in that they concentrate on the potential effects to a limited set of bioaccumulative compounds and receptors. Due to the lack of focused sediment sampling and the absence of toxicity testing as described above, the direct effects of non-bioaccumulating chemicals are not adequately considered during Round 1. The assessment does not include an evaluation of localized effects on the benthic community, nor does the proposed sampling support a rigorous evaluation of these effects in order to provide a focus to round 2 sampling. The tissue sampling will provide an initial look at tissue COPCs, however, given the fact that fish integrate exposure from large areas of sediment, surface water and potential groundwater and seep exposure, this is not a good method for determining areas within the ISA that are contributing to unacceptable effects and levels of contaminants in ecological species. Additional sampling is needed to specifically address effects on the benthic community, which is in direct contact with the sediments. Although evaluation of effects to the benthic community are largely ignored in this round of sampling, a detailed historical data review combined with the limited sediment sampling proposed in Round 1 could be used (with the appropriate screening criteria) as a tool to direct future rounds of sediment sampling and bioassay testing.

The Work Plan does not include any methodology for correlating tissue concentrations to surface water and sediment concentrations. Without this step, it is not possible to develop, evaluate and implement response actions to reduce tissue concentrations to acceptable levels. Ultimately, the link between sediment contamination and fish tissue will need to be made if unacceptable chemical concentrations in fish are found. To complete the link, synoptic fish tissue and sediment samples need to be collected.

Groundwater

The Work Plan is completely inadequate in addressing groundwater. This presents a major problem since it does not seem to be leading the project to achieving full characterization of the Portland Harbor Site, documenting both the ambient contamination and the specific contamination areas, or to understanding the magnitude of all the major inputs to the system from groundwater and surface water sources.

When there is groundwater sampling incorporated into this, or future plans, there must be a clear understanding that volatiles are not the only contaminant in groundwater or the sediments. In the next revisions it must be made clear that groundwater samples will need to include all, or the majority of the contaminants of concern (VOCs, semi-volatiles, metals, PAHs, etc). While it is possible that some of the more hydrophobic contaminants will need not be analyzed, that should be a decision based on supportable logic and data, and not as a general rule before any sampling locations or methods are proposed.

The groundwater sample section is so limited that in practicality it simply postpones any groundwater sampling until Round 2 on the best scenario, or never as a worst scenario. While postponing groundwater collection to Round 2 could be useful if additional analysis of the existing

sediment data is completed, and only if additional samples are taken in an attempt to more carefully define the areas of concern, it is not clear that either one of these approaches are being considered in the sediment plans for Round 1 or 2, and therefore, not likely to influence any future groundwater sampling. In addition, this lack of sampling or incorporation of known groundwater contaminant discharges into the sediment plan sampling location choices ignores the locations where we should be obtaining sediment quality data based on existing discharges.

Data analysis

A major disappointment with the RI/FS Work Plan is that the existing data were not evaluated in the document in such a way that the reviewers could understand how these data were being used in designing Round 1. While there is mention of many of the studies already completed and of the potential sources, an evaluation of these studies/sources was rarely done (except for the QA) nor is there much discussion as to how these studies impacted the sampling design of sediment, fish, and water.

The analysis of the existing data also needs to consider physical changes to the river (deposition and erosion), including flood events, to determine if the data is still representative of current site conditions. Given that most of the existing data was collected several years ago, it cannot simply be presumed that it all category 1 data is still usable data. The analysis should consider the results of recent bathymetric surveys, sediment profile imaging, and other work to determine data usability.

The data analysis provided in the Work Plan is inadequate in that it did not include subsurface or category 2 data. Although data of unknown quality may not be appropriate for use in the risk assessment, it may be useful for the identification of areas and contaminants of concern. Similarly, it is known that subsurface sediment concentrations are generally higher than surface sediments. What is unknown is the degree to which subsurface sediments may result in exposure to human or ecological receptors. Again, these data may be useful for the identification of areas and contaminants of concern. In addition, the analysis would be greatly aided by a comparison to sediment screening criteria. Overall, any data analysis must recognize the limitations on use of the data described in the proceeding paragraph. Category 1 data should be used as appropriate, assuming it has been analyzed according to the same criteria to make sure it still represents current site conditions.

In many areas, the plan lacks sufficient detail to allow the government team to understand exactly what has been done to date, what is planned, or how Round 1 data will be used. Throughout the document, the point is made that some type of risk based analyses will be done after Round 1. However, the methodology to be used is not presented clearly or consistently. Meetings with Respondents have failed to clarify this issue. Sometimes the words "risk screening" and "screening levels" are used to describe this process, other times the words "risk assessment" are used. The RI/FS Work Plan must present the methods and data/assumptions that will be used to evaluate the results from Round I.

We disagree with the approach outlined for evaluating effects on the benthic community due to its reliance on Probable Effect Concentrations (PECs) and the lack of toxicity testing. The ecological risk assessment Work Plan states that sediment data will be compared to sediment quality benchmarks such as PECs, to assess the potential for adverse effects on the benthic community. PECs are not conservative screening numbers, and are defined as a benchmark where effects are likely to occur. In Table 5-1 of Appendix C of the Work Plan, the null hypothesis is given for the benthic community as "the adverse effects concentration does not exceed peer-reviewed literature based LOEC for survival, growth, or reproduction." A LOEC may be an appropriate screening tool for the benthic community, but a PEC does not correspond to a LOEC. Rather a PEC is a benchmark where about 85% of the benthic community is showing effects. By definition, a LOEC would be closer to a TEC, where about a 15% effect is seen. By using a PEC for exposure and effects screening, areas where adverse effects on the benthic community are occurring could potentially be missed. Appropriate protection levels are also outlined in Oregon's statute and Rule, which state that "For protection of ecological receptors, if a release of hazardous substances causes or is reasonably likely to cause significant adverse impacts to the health or viability of a species listed as threatened or endangered pursuant to 16 U.S.C. 1531 et seq. or ORS 496.172, or a population of plants or animals in the locality of the facility, the acceptable risk level shall be the point before such significant impacts occur (ORS 465.315)". Perhaps a better approach is to screen using a TEC (threshold effects concentration), where effects are infrequently expected, and a PEC, such that gradients of potential effects could be defined. Areas that exceed a TEC, but are lower than a PEC could be identified for further evaluation, such as toxicity testing through bioassays. Areas above a PEC would identify areas where effects are likely occurring, and should be considered areas needing potential action (i.e., early action candidate areas).

The rationale and objectives for the Round I investigation need to be further developed. Without a presentation of how the entire RI/FS will be conducted (clear investigation objectives and an understanding of the general scope of future phases of investigation) it is difficult to see how Round 1 fits in with subsequent investigation phases and to comment on the proposed sampling locations. The Work Plan must fully describe the anticipated phases of the RI/FS. Clear objectives should be set forth for each known phase of work. The Work Plan should be revised to include:

- Clear objectives for known phases of investigation;
- Identification of known data gaps that must be addressed in subsequent investigation phases (e.g., vertical extent of contamination, characterization of localized sources and/or hot spots (principal threats)); testing adjacent to suspect site or sources;
- The RI schedule should reflect the major tasks associated with data gaps; and
- Recognition that multiple phases may be needed to meet DQOs.

It is unclear how the Feasibility Study (FS) will proceed based on Round 1 data. Critical information is lacking to allow the FS to move forward in a meaningful way. The proposed sampling approach does not clearly describe a process for delineating localized areas of contamination to identify hot spots or principal threats, determining the vertical extent of contamination to estimate potential dredge volumes or evaluating sources and inputs of contamination to determine the contaminant loading from outfalls, groundwater discharge, upstream, and the potential for recontamination be performed.

Page 68, section 6.1.3 generally describes potential sampling rounds but no criteria are provided that would assist in guiding us into Round 2. What media and what contaminant levels in those media will be used to justify a decision to take or not take more samples?

Round 1 data will be confounded by the fact that several aspects of the RI/FS Work Plan are undeveloped and in many cases, little or no site-specific data exists to support propositions and assumptions made in the Work Plan. For example, additional criteria for how Round 1 data will be used needs to be provided for Round 1 sampling of target species. We also caution against the use of mixed terminology, such as "risk estimates" and "preliminary assessments." Respondents are required to conduct risk assessments. There is no proposed process to go from a determination of risk to cleanup levels, or even to define areas requiring cleanup. The Work Plan needs this basic framework. It also needs a master list of data needs, with a clear and logical plan for collecting the needed data, in this and subsequent sampling efforts.

Subsurface sediment chemistry, sediment bioassays, and additional water column sampling using low detection methods will be needed to define adequately the nature and extent of contamination. More surface sediment chemistry will be needed to define the boundaries of areas requiring cleanup, and to ensure that all hot spots have been identified. These and other data adequacy issues are addressed in our detailed comments.

The Work Plan needs some key definitions up front. What is a reference area? What is a background area? What is a comparison area? If any of these are to be used in the plans there should be a non-ambiguous definition up front, and if they are synonymous terms, then <u>only one should be used</u> in the documents.

We do not disagree with the goal of obtaining as much information as possible from this sampling round, but there is neither sufficient historical Category 1 data nor understanding of the breadth and extent of contamination to support the assumptions in the Work Plan. In addition, the sampling plan, as presented, lacks the breadth to determine the extent of the contamination and proposes insufficient sampling of key receptors. For example, Round 1 focuses on the ISA, and so will not address contamination in the rest of Portland Harbor. Key species life stages, e.g., adult chinook salmon and lamprey, are not included. The emphasis on sediment and tissue samples precludes obtaining contamination data from other sources and receptors. An additional concern is that the document makes many assumptions about critical issues, such as sources of contaminants in fish tissue and sensitivity to contaminants. Generally, little or no site-specific data exist to support those assumptions. The question of what the data needs are to confirm or rebut those assumptions must be answered.

<u>Risk Assessment and Exposure Pathways</u>

The workplan describes a risk assessment that attempts to assess risks to a large section of river, but fails to identify local sources or assess the risks associated with those local sources. For example, bioaccumulative compounds found in fish tissue may describe a general risk in the river but they will not point back to sources areas. Sampling that would determine nature and extent around in-water

sources is missing. Focused sampling, sampling at depth, pore water samples, sediment bioassays, and additional water column sampling using low detection methods will be needed to define the nature and extent of contamination and assess risk adequately.

The risk assessment may compare sediment values to Probable Effect Concentrations (PECs) and Threshold Effects Concentrations (TECs) to demonstrate the range of potential toxicity, but areas above a TEC must be identified for further evaluation.

The analyses of exposure pathways in the document fails to consider, or regards as minor, several pathways that are likely significant. Humans, mammals, and birds all ingest significant amounts of water, and so that is a major pathway of exposure. Also, especially during high water periods, there can be high levels of suspended sediment in the water. Therefore, ingestion of the water will include ingestion of sediments making that a major exposure pathway. Even if these pathways prove to be minor compared to other pathways, they may be important due to cumulative and threshold effects.

Maps

The maps and aerial photographs are of very high quality and well done, but should have additional details added to them to have a more complete, and consistent, set of site names, landmarks (river miles, bridge names, selected area features, etc.). These should be labeled consistently in all the maps and photographs, as much as possible, to allow easy comparison from one type of figure to the next of the same area. In addition, it would be best if more of the maps were at the same scale if easily done to allow more overlapping of maps.

There should be a comprehensive contaminant map which compiles all that is known along the river to help define the area better in a composite manner. It should include the visible or similarly defined contaminant areas (NAPL, seeps, etc.), the potentially major contamination discharge pipes, the previous locations where samples have been taken and a general interpretation of data can be graphically shown, visual observations where there is no "data", etc. This type of a complete map will help to focus the work areas, the types of contamination in each, and the future work that needs to be done.

The names of facilities used in the maps needs to be much more descriptive than just "Port of Portland" (or other such), even if they are the present owner. Too many of those are presented in the maps, and they are not descriptive enough to be of any use for characterization. It is suggested that each facility have a parenthesis behind the name which indicates what the most potentially problematic historical industrial use of that site or parcel has been. In addition, at a minimum, the names included in all the maps and tables should include all the ones that are in the ODEQ list, shown in Figure 3-2. All those names which are included in maps should be consistent over all the different maps and photos presented in the Work Plan.

The reports should have a summary in the beginning of each major section (surface water, sediments, fish sampling, groundwater, etc.) which states what that section will cover and what further work

will be done, or, alternatively, what limits to future work are being implied by that section. This is a problem, for example, in sections where there are statements which imply that this is the "major field work season", and therefore anything in the future would be expected to be significantly less than what is presented in this plan.

Conceptual Model

The Work Plan needs an acceptable graphical sediment conceptual model to support the sampling proposals. That model should also be discussed and explained in a related section of the text which describes the assumed model for the ISA or selected subareas (nearshore areas, coves, main channel, deposition areas, etc.). The model should take into consideration the downstream flow patterns and how contaminants have reached the sediments through the near-shore activities. Furthermore, the Work Plan must include this information when making the general statement that transects to mid-channel show decreases in concentrations. Gradients should be defined based on a group of samples, not on one or two samples.

Subsurface sediment data

The subsurface sediment data should be incorporated if available, to document sediment sources or clean areas. While we recognize that the subsurface data is category 2 data, using the existing deeper sediment data, together with other category 2 data would create a more complete picture of the nature and extent of contamination. On a related note, it seems interesting that there is very limited U.S. Geological Survey (USGS) data or references used in the Work Plan. The Work Plan should document what USGS data is available which supports the sediment work and plans.

The sediment sampling should be based on compiling all the available information, and not simply on filling the gaps of the previously sampled locations or on a subset of the data. While only the appropriate category 1 data should be used for compliance or risk assessment type of work, all the available data should be used in the planning since it will provide the best indication of the extent of contaminated areas.

Most of the sediment samples planned are from very shallow samples, and may not allow sufficient characterization of the site. If only additional shallow data is obtained, and interpreted with only the existing shallow data to develop a site characterization comprehensive picture of the site, we may bias the nature and extent of contamination, or miss some of the important sediment sources. Different mapping criteria for the contamination should be used, using deep cores data, shallow samples data, groups of data sets, combinations of contaminants, etc., to characterize the ISA with the existing data and to indicate where there are data gaps. In addition, to place an inordinate amount of hope on characterizing and understanding the site based on only shallow sources may be a fatal flaw if a high flow event occurs that smears the sediments down river. The Work Plan should incorporate the deep sediment data; plan to obtain additional deep core data to plan for future remediation; and it should not be limited to sampling for the risk assessment. Previous subsurface sediment sampling should be incorporated into the present characterization and additional deep sediment cores should be used to further define that characterization.

The only deep cores which are proposed are already selected to be for "natural attenuation". This objective seems a bit premature since the river sediments have not been fully characterized and concentrating data collection for a selected "remedy" in a few random area may bias future remedial action alternatives. Numerous deeps cores analyzed for multiple suites of chemicals are necessary to characterize the existing sediment contamination, not just for purposes of "natural attenuation."

Sediment stakes

Previously submitted comments on the limitations of sediment stakes have been ignored and the stakes are proposed as the only method to sample the changes of the sediment surface. There are no clear explanations of how those measurements will define the changing sediment surface to support the use of the stakes. It is also not clear who or how the stake readings will be done during a high flow event (which would be the events of interest). Once the high velocities and flows drop, the net change of the sediment caused by moving sediment may not be noticed at the stakes. No backup system is proposed, so that if the stakes do not work, there will be no way to change the method until the next sampling plan is proposed, reviewed, and implemented (probably delaying these measurements an entire year).

Early Actions

The Work Plan does not adequately address the need for early actions. More attention should be given to the identification, evaluation and implementation of early actions. The Round 1 sampling effort should be adequate to identify potential early action areas through a comparison to sediment screening criteria. At the conclusion of Round 1, data should be evaluated to determine which early action candidate areas warrant further characterization.

Source areas

The logic of "sources" so far is limited to upland sources, but that is only one of many "source areas" affecting Portland Harbor. Within the ISA there are sources located in the river sediments, which were created by a number of activities and processes which need to be identified and characterized. Some of these were likely discharges directly into the river (solid wastes or liquids -- dissolved or NAPLs); on-going pipe discharges; discharging groundwater and related contaminants flowing into the river; shallow sediment contaminants which may be smeared over a large area; deeper contaminants which may be related to old processes which may be in a fairly thick zone, but now buried by a veneer of cleaner sediments, spills, etc. This logic is not apparent in the Work Plan and deserves more discussion.

Work Plan Specific Comments

Section 1.0, Page 1: Second paragraph, "*The purpose of the RI/FS is to investigate the nature of sediment chemical distributions ...*" Strike the word "*sediment.*" The investigation is not limited to sediment and other media should be included.

Section 1.3.1, Page 9: Item #7 in list, "*Select Site-specific, Project-specific, and Sediment-specific Risk Management Approaches that will Achieve Risk-based goals.*" It will be impossible to achieve this without collecting site-specific information on bioavailability and toxicity. Because the plan relies on literature-based BSAFs and national sediment screening levels, the risk-based goals will not be site-specific.

Page 12: It is not clear what methodology will be used for the "risk-based evaluation of available information and assessment of uncertainty associated with risk management decisions."

Section 1.3.3, Page 13: Third paragraph, "*Round 1 is anticipated to be the most significant data-gathering event of the RI/FS, with the Round 1 data focused on determining the nature and extent of chemicals in sediments ...*" EPA disagrees that the proposed sampling is sufficient to achieve this goal. More samples are needed near suspected source areas to identify and define the extent of hot spots, and subsurface data is needed to define the mass of material that exceeds risk-based concentrations. Although the proposed sampling is a good first step in addressing the area wide concentration in fish, it is inadequate to characterize the nature and extent of in-water contamination. EPA disagrees that Round 1 will comprise the "most significant data gathering event of the RI/FS."

Section 1.3.3, Page 14: Second paragraph, "*Subsurface sampling to determine the depth of contamination may occur in Round 2 ...*" The implication here is that subsurface sampling will only occur if the surface sediments are contaminated. The further implication is that subsurface contaminants do not cause risk and will not be exposed due to chemical diffusion, advection, bioturbation, erosion, dredging, or other forces in the future. Respondents cannot simply assume that subsurface contaminants are not a problem. Respondents should propose appropriate studies to determine whether subsurface contamination causes risk or is likely to do so in the future.

The source and nature and extent from subsurface contamination should be investigated in Round 1 sampling. Subsurface sources may become exposed as the river changes and the potential future risk needs to be assessed.

Section 1.3.5, Page 15: First two paragraphs. The text here also appears on page 12; omit redundancy.

Section 1.4, Page 15: Cultural resource issues and legal responsibilities apply to both the uplands and the in-river portion of the site. Because the natural banks of the Lower Willamette River have been altered and flooded over time, cultural sites may exist below the high water mark. Additionally, the Yakama Nation considers natural resources, especially fish and water, cultural resources.

Cultural resource issues must be addressed with the Tribes, and they must agree to approaches to handling cultural sites and objects. In addition, collection of beach sediment samples may uncover cultural sites or objects.

Section 2.1, Page 20: The presentation on the physical setting and geologic history would benefit from the addition of simple figures (e.g., Generalize Geologic History – Figure 3-18 from the Doane Lake RI, Geraghty & Miller, 1991).

Section 2.1, Page 20: First bullet, the statement that "*there is no evidence that the CRBG is a significant aquifer along the margins of the ISA*" is not supported. CRBG wells are known to be present historically and a limited number of production wells are still in use (e.g., Chevron Asphalt production well). In addition, a pump test at the GASCO facility identified an interflow zone that produced approximately 1,000 gallons per minute.

Section 2.2, Page 23: A figure should be added that shows how river stages vary over time. A figure of this type can illustrate trends in river levels and is essential in the interpretation of data (i.e., with respect to a river stage) in a dynamic setting.

Section 2.3, Page 25: The Acoustic Doppler Current Profiler data collected to date by David Evans and Associates, Inc. should be summarized in the Work Plan.

Section 2.3, Page 26: It is unclear whether all dredging projects have been included in the summary. For example, dredging recently took place adjacent to the Willbridge docks and at Terminal 5. These are not depicted on Figure 2-1.

Sections 2.5-2.6, Pages 28-30: Sediment Transport and Dredging.
The historical and projected sediment transport trends are critical to better understanding where ISA contaminants may have become located and what remedial options are feasible in certain river locations. In addition, historical and recent sediment transport as well as dredge/fill activities may greatly influence the outcome of the sampling and analysis effort if sampling locations are not carefully selected. The sediment trend analysis (STA) provided very useful information that needs to be supplemented with additional transport data. To this end, sediment samples below the ISA need to be analyzed to better understand the nature and extent of historical and current contamination on a harbor-wide basis. A lot of bathymetry, sedimentation and historical contaminant data are provided in graphs in the Work Plan. To make sure that this data is considered in a coordinated fashion with species and habitat use, CSOs and other data provided, a river-mile-by-river-mile analysis of potential sampling sites would be beneficial.

Section 2.5, Page 29: Last paragraph. The text here refers to Table 2-2. There is no Table 2-2.

Section 3.1, Page 31: Other contaminants that may be present in the ISA include herbicides (Rhone Poulenc), pentachlorophenol (McCormick and Baxter and Time Oil), and perchlorate (ATOFINA).

Section 3.2, Pages 32-34: Permitted Discharge, Storm water and CSOs.
While the volume of overland flow may be small relative to the amount of discharges from outfalls, the amount and toxicity of contaminants in the runoff that enters the river will add to the severity of the problem.

Section 3.2, Page 32: A discussion of TMDLs for the Willamette would be a very helpful addition to this section. Which chemicals have TMDLs, what is the daily load allowed, and how does the current daily load from all of the permitted outfalls compare to the TMDLs?

Section 3.2.1, Page 33: Copper, lead and zinc may appear to be the most prevalent heavy metals present in stormwater because they are typically the only metals analyzed for under general stormwater permits. In fact, they are used as indicators of metals contamination in storm water. It is likely that other metals are present in storm water as well.

Section 3.2.2, Page 34: "*Since 1997, CSO discharges in the ISA have been reduced to an average of three events per year, discharging about 1 million gallons annually.*" Is the reduction due to increases in system capacity or the lack of large storm events?

Section 3.3, Page 34: Groundwater Discharge. It is unacceptable that the entire discussion of groundwater sources in only two sentences long. The Work Plan should at least summarize the contaminants and levels found in the groundwater at sites where data is available. It is clear from this section that groundwater sources played absolutely no role in determining the location of sediment or surface water samples. See also general comments on groundwater.

Page 34, second paragraph. Respondents, with help from DEQ, need to identify the areas where contaminated groundwater may be discharging to the river. These need to be investigated (i.e., collection of water and sediment samples) and the risk assessed.

Section 3.3, Page 34: The statement "*There are few data documenting the quality of groundwater discharging to river sediments.*" is misleading. The upland investigations have generated a considerable amount of groundwater data from monitoring wells and direct-push technology grab samples. Most of the available data documents groundwater gradients to the river and the presence of hazardous substances in groundwater. Therefore, it can be concluded that hazardous substances are being discharged to surface water through the river sediments. EPA would agree that few data exist documenting groundwater quality at the point of discharge into the river (i.e., groundwater/surface water interface). However, the Work Plan needs to address how to fill this data gap.

Section 3.4, Page 34: It is unclear whether spills resulting from over-water activities will be evaluated during the RI/FS. More detail should be provided.

Section 3.6, page 35: It is unclear whether chemical leaching from coated surfaces will be evaluated during the RI/FS. More detail should be provided.

Section 3.8, Page 36: Upstream Sources (and Pages 86-87)
The description of contaminant sources upriver of the ISA and Lower Willamette River warrants attention. Adequate upriver sampling is needed and these areas should not necessarily be considered "baseline" or "reference" areas until further studies are done. In all likelihood, "reference areas" may need to be selected from areas off the main stem Willamette River.

Sections 3.9-4.1, Pages 37-38: Chemical Transport and Distributions (including the July 19th revised section 4.1 on Chemical Distributions in Sediment).
The recognition that chemicals may settle out "some distance from the original source" and can be "rapidly transported away from sources" is contrary to the discussion on page 66 which states that, "existing sediment data clearly show elevated concentrations of sediment chemicals in the immediate vicinities of many upland facilities that are actively involved in DEQ-led soil and/or groundwater investigations. This distribution of chemicals demonstrates that sediment contamination is not widespread and that sediments transport processes are not so significant as to distribute sediment chemicals throughout the area." This is a premature conclusion in that sediment transport and bathymetry studies are not complete and Category 1 data in Table 4-2a reflects a very small number of samples taken between RM 0-3 and RM 10-24 and this data should not be the basis for determining "current conditions" in these parts of the lower river.

Section 3.9, Page 37: The chemical transport section should discuss changes in chemistry and/or toxicity, the chemical fate and transport of contaminants in groundwater discharging to surface water, and bioaccumulation.

Section 4.1, Page 38: Chemical Distributions in Sediment. The statistics provided are all for surface sediment chemistry. There should be an analysis of subsurface chemistry as well.

Section 4.1, Page 38: Chemical Distributions in Sediment (not including the July 19th revised section 4.1 on Chemical Distributions in Sediment).
The statement in the document that "chemicals with a detection frequency of 10% or more may have a relatively broad distribution" raises concern that chemicals with a lower detection frequency will not be considered to be of concern. Initial results cannot be used to make such assumptions about distribution.

Section 4.1, Page 39: Elevated levels of metals are associated with Mar Com (TBT) Crawford Street Corporation (Copper), Schnitzer (TBT) and the US Moorings sites. The organic compound discussion should include petroleum contamination associated with bulk fuel facilities and polychlorinated dibenzo-dioxin and furan (PCDD/PCDF) contamination associated with the Rhone Poulenc and McCormick and Baxter sites.

Section 4.1, Page 39: Metals and Tributyltin: This section describes "elevated" metal and TBT concentrations within the ISA. What does "elevated" mean? Compared to other samples in the ISA, some "background" concentration, or a risk-based screening level?

Section 4.2.2, Page 44: In discussing the USGS water sample data for pesticides, the Work Plan states that thirty compounds were detected, including atrazine, metolchlor, simazine, and deethyl atrazine. If pesticides were detected in surface water, they should have been included as chemicals of interest, and screened for inclusion in the risk assessment. Also, in the USGS study cited on this page, the most frequently detected pesticides in water samples from the Lower Willamette were atrazine, metachlor, simazine and deethyl atrazine. These compounds are not on the list of analytes for water in the QAAP. Will these be analyzed for in surface water and/or groundwater to determine their source? What about the other compounds detected in the USGS water samples?

Section 4.3.1, Page 45: Discussion of bioassay data. The text here does a nice job of explaining what data exists, but says absolutely nothing about the results. The Work Plan should at least include a map showing where sediments were toxic.

Section 4.3.3, Page 46: Enzyme Induction Studies. "*Per the AOC/SOW, the risk assessment will only consider effect endpoints associated with growth, reproduction, and mortality.*" It is unclear how enzyme induction, histopathology, and biomarkers will be treated in the effects assessment. These responses, along with behavioral alteration, hormonal imbalance, increased cortison, are a few of the responses that may lead to mortality or severely impaired biological functioning.

Section 4.3.4, Page 47: Fish Histopathology, third full paragraph. The text here describes two skeletal deformity studies performed in the Portland Harbor area, but only summarizes the results for one of the studies. What did the EVS 2000 study show?

Page 49- It is not clear how the population distributions described on this page would be used for the human health risk assessment. Risk assessments for Superfund are to be done using exposures for the individual with the "reasonable maximum exposure." How do census data relate to the individual? What is the nature of the "Portland specific data" that is referred to? This language should be deleted from the Work Plan, unless the use of the population data methods are described in more detail and agreed to by EPA.

Section 4.4.2, Page 50: Human Activities in the Lower Willamette. The document states that there is no Native American cultural use within the ISA. Although this may be true at present, historical use cannot be ignored and should be addressed in the Work Plan.

Section 5.2.3, page 54: Although there is generally a downward gradient from shallow fill zones to the underlying alluvial zones, the gradient is very slight in some instances. In addition, an upward gradient between deep alluvial and basalt water bearing zones to the intermediate alluvial zone is sometimes observed.

Section 5.2.5, Page 55: DNAPLs. "*Experience at other locations has shown that a DNAPL commonly perches on the CRBG flows unless or until a fully penetrating fracture is encountered by the DNAPL, which allows deeper migration and spreading.*" Where was this seen? What constitutes a "fully penetrating fracture" and how common are these fractures in the CRBG?

Section 5.2.5, page 55: Dissolved or Aqueous Phase (e.g., VOCs, metals, ketones). In addition to halogenated VOCs, dissolved metals may also partition to aquifer materials and sediments as they migrate from anaerobic zones to more oxygenated zones. The discussion regarding dissolved or aqueous phase should further evaluate the potential for some metals pesticides and PAHs to migrate through the river sediments and enter the Willamette River as dissolved constituents.

Section 5.2.5, Page 55: Last sentence, "*VOCs should be the focus of any evaluation of groundwater contribution to ecological risk.*" EPA disagrees with this statement - VOCs should not be the only focus. Dissolved metals, pesticides, and PAHs can also move into the river in dissolved form in

concentrations high enough to cause adverse effects. The groundwater evaluation should not be limited to VOCs.

Section 5.3.1, Page 58: Fish Species, Piscivores. Northern pikeminnow should be included as an additional (not instead of) piscivorous fish. Pikeminnow have a larger range, integrate food items over a larger area, and are more strictly piscivorous (above a certain size) than smallouth bass. This issue was discussed, and an agreement reached to include northern pikeminnow as an additional species, at a June 26, 2002 meeting with the Respondents.

Section 5.3.1, Page 58: Fish Species, Carnivores. Juvenile chinook salmon should be evaluated as a unique resource to represent anadromous fish. However, because of the variation in life history characteristics exhibited by juvenile chinook in the Willamette River, the varying lengths of time a particular stock may reside in the river, and the limited information with which to design an appropriate sampling program, they are not appropriate to represent carnivorous fishes. The sculpin, which is a good representative of a benthivorous carnivorous fish, should be retained. In addition to the sculpin (not instead of), the peamouth (*Mylochelius caurinus*) should be collected as a representative of this group. This resident fish is common in the Willamette River, is primarily insectivorous, and feeds across a wider range of habitats than the sculpin. This issue was discussed, and an agreement reached to include peamouth as an additional species, at a June 26, 2002 meeting with the Respondents.

Section 5.3.1, Page 58: Fish Species, Carnivores. Juvenile chinook salmon are not the only fish present within the site during a sensitive life state. Resident fish may spawn within the site and therefore be present as eggs and larval fish. These sensitive life stages should be addressed in the risk assessment.

Section 5.3.1, Page 59: Birds. It is stated that the osprey was chosen as the representative species for the piscivorous birds, but that the bald eagle will be evaluated to ensure the osprey exposure model is representative of bald eagle exposure. The same exposure time, and effects level (NOAEL) should be used for the osprey as would be used for the bald eagle.

Section 5.3.2, Page 60: Bulleted description of exposure pathways. What is the difference in how these will be addressed? From the descriptions of pathways in the following sections, it appears that "complete and minor" pathways, which "will not be evaluated explicitly" in the data evaluation, will not be evaluated at all. Another designation needs to be made for pathways – "incomplete and of unknown significance;" which would lead to more data evaluation and potential investigations in Round 2 sampling. This would be consistent with the intent of a risk assessment, as stated on Page 72 of this document: "*The first tier is often conservative and broad in scope to ensure no potential pathways, COPCs, or potential receptors are prematurely eliminated from the analysis.*"

Section 5.3.2, Page 60: Last bullet (Complete and Uncertain). More detail is needed on what is meant by the "uncertainty assessment." How will it be used to assess risk? Will it be used to identify data gaps to be filled during Round 2 sampling investigations? More discussion is needed on how pathways identified as complete and uncertain will be addressed in the ecological risk assessment.

Section 5.3.2.1, Page 60: Aquatic Receptors. Benthic infauna may be exposed to chemicals associated with pore water; an exposure not reflected in sediment concentrations for chemicals such as volatile organic compounds and dissolved metals. How will the pore water pathway be addressed?

Section 5.3.2.1, Page 61: *(changed #, used to be 5.3.1)* The direct sediment pathway should be evaluated for PAHs and metals, and the pathway should not be considered complete and uncertain. Pathways considered complete and minor should be considered in the risk assessment. For example, sediment ingestion is considered complete and minor for the smallmouth bass, and therefore will not be evaluated in the risk estimate. However, it is possible this is a significant exposure to contaminants, as bass are feeding on crayfish and other sediment dwelling organisms.

Section 5.3.2.1, Page 61: Fish: Piscivore-Smallmouth Bass. Are data available to substantiate the determination that sediment ingestion is a minor pathway? A comparison of the determination of the significance of sediment ingestion for smallmouth bass, piscivorous birds (Page 62), and mink (Page 63), is interesting. All three species consume similar prey items, yet sediment ingestion is considered a complete pathway of exposure for piscivorous birds and mink, but not for smallmouth bass. The basis for this determination should be explained in the Work Plan. This is a candidate for an "incomplete and of unknown significance" designation.

Section 5.3.2.1, Page 61: Fish: Carnivore-Sculpin Species. Is the fact that sufficient toxicological data are not available to assess the PAH and metals risk via the direct sediment pathway a reason to relegate this to a discussion in the uncertainty assessment? This is a pathway that could cause significant exposure. Some discussion is needed on how this will be incorporated into the risk assessment.

Section 5.3.2.1, Page 61: Fish: Carnivore-Juvenile Chinook Salmon. Juvenile salmonid stomach content analysis in Puget Sound estuaries indicates that they ingest sediments. Sampling has shown PAH concentrations in juvenile salmonid stomachs in the hundreds of parts per million. These concentrations are higher than those found in prey items consumed, indicating that these fish may be ingesting sediment or tar balls that may be on the sediment surface. Sediment is also ingested through the gut content of prey items. This is a candidate for an "incomplete and of unknown significance" designation. An explanation for the basis of this determination is needed.

Section 5.3.2.1, Pages 61-62: Fish: Omnivore/Herbivore-Largescale Sucker. Similar comment as sculpin. How will metals and PAH exposure via direct sediment contact and sediment ingestion be incorporated into the risk assessment?

Section 5.3.2.1, Page 62: Fish: Detritivore-Pacific Lamprey Ammocoetes. Similar comment as sculpin. How will metals and PAH exposure via direct sediment contact and sediment ingestion be incorporated into the risk assessment?

Section 5.3.2.2, Page 63: Surface water contact and ingestion and direct sediment contact may by mammals not be minor and should be considered in the risk assessment.

Page 64 - The combination of exposures for some individuals through different receptor categories (e.g., a transient who would be in direct contact with sediment, use water from the river, and eat the fish) should be addressed quantitatively in the HHRA (see Appendix D comments). (Note: as agreed upon in the human health subgroup).

Section 6.0, Page 66: Remedial Investigation and Feasibility Study Approach.
The statement that sediment contamination is not widespread is not proven, and is also contrary to the assertion earlier in the document (Section 4.1) that sediment can be transported long distances.

Section 6.0, page 66: The Work Plan states that additional sampling will better define the nature and extent of sediment contamination adjacent to upland facilities. However, the proposed sampling scheme does not accomplish this. In addition, it unclear how the proposed scope of work will be used to validate or refine the Site Conceptual Model presented in Section 5.

Page 66, Section 4.4.3, Fish. Although the effects of Portland Harbor contaminants on Salmon reproduction may be small, it should not be eliminated at this stage in the process.

Page 66 - The opening paragraphs on this page which are an introduction to the RI/FS approach focus only on sediments. The discussion should be expanded to include all media that are an important part of the site conceptual model.

Section 6.1.1, Page 67: The RI should gather the information necessary to identify potential early action areas. Although parties who wish to voluntarily pursue early action should be encouraged to do so, the RI must evaluate potential early action areas in a meaningful way. If the RI determines that an early action is appropriate from a technical and environmental stand point, it should be identified to EPA for follow-up.

Section 6.1.3, Page 68: The current characterization approach is not adequate to determine the nature and extent of contamination at the site. Furthermore, characterization of in-water source areas is not contemplated during Round 2. With respect to subsurface sampling, it is likely that characterization of subsurface sediments will be required to evaluate the nature and extent of contamination and to evaluate potential exposures in a dynamic river system.

Section 6.2, page 69: The sediment sampling approach proposed is more of a site assessment sampling approach. The Work Plan correctly notes that elevated levels of contamination tend to be present in the vicinity of upland and in-water source areas. However, no focused sampling of these areas is proposed in Round 1 or contemplated for Round 2. Round 1 should include an additional objective: Characterize the nature and extent of in-water sources that have not been characterized previously.

Section 6.2.1, Page 69: Sediments, first paragraph. The text here asserts that chemical concentrations in the navigational channel "tend to be low." This theory has heavily influenced the location of proposed samples, so it deserves a more rigorous examination and explanation than the few sentences provided here.

Section 6.2.1, Page 69: Sediments, second paragraph. "*The focus of the nature and extent evaluation is to identify potential areas of concern (i.e., hot spots) in Portland Harbor.*" If this is true, why isn't a portion of the sediment samples biased toward collecting data near suspected sources? There are some obvious sources in the ISA, including the outfalls that drain Rhone Poulenc and Wacker Siltronic for example, where no samples have been proposed.

Section 6.2.1, Page 70: End of second full paragraph. "*Sediment data may also be correlated with tissue residue data in the ecological risk assessment process to help identify areas associated with unacceptable risk.*" Are Respondents planning to correlate sediment chemistry and fish tissue?

Section 6.2.2, page 70: The approach to surface water is unacceptable. Bioaccumulative chemicals present in surface water may accumulate in fish at concentrations that represent a risk to birds, wildlife or humans through fish consumption. As a result, better detection limits for bioaccumulative chemicals in surface water are required. The use of lipid bags or high volume sampling devices is needed.

Section 6.2.2, Page 71: First bullet on page. "*If the Round 1 water quality data are comparable at the locations sampled, consider those data to be representative of conditions throughout the site.*" This would only be acceptable if water quality sampling was proposed throughout the site, including immediately offshore of sites where contaminated groundwater may be moving into the river, and if a low-detection technique was used, such as high volume sampling or diffusion samplers. Grab samples from three locations won't provide enough data to represent conditions throughout the site.

Section 6.3, Page 72: The ERA approach should include sediment toxicity testing to evaluate the effects on the benthic community.

Section 6.5, page 74: The data necessary to identify areas and volumes of contaminated sediment that pose unacceptable risks to human health or the environment will not be obtained through the proposed sampling approach.

Page 74 - What methods will be used for human health data evaluation process following Round 1?

Section 7.1, Page 77: Items 1 - 6. The preliminary RAOs all discuss reducing risks to acceptable or ambient levels. EPA guidance on the role of background data says that comparison to ambient levels, if it occurs at all, should happen in the risk management context, not in the risk assessments themselves. If Respondents intend to compare risks in the ISA to "ambient" risks, that should be stated up front, and there should be an extensive discussion of how "ambient" risk will be defined. Defining "ambient" should be listed as a clear data gap, and the samples and analyses that will go into defining "ambient" should be clearly enumerated.

Page 77, Evaluation of Data Needs, Bullet 4. The word "ambient" implies that risks from outside sources will be subtracted from the site risk. The risk assessment determines risk at the site. Comparisons to levels outside of the site are only considered in risk management.

Section 7.1, page 77: The remedial action should be selected in accordance with EPA and DEQ's remedial action selection factors. RAOs should include statements such as Consider the effects of the remedial action on current or planned uses of the river," or "Evaluate the feasibility of remedial actions with respect to the physical system of the Willamette River."

Section 7.1, Page 77: Additional project objectives should be considered, for example:

- Reduce ecological health risks from direct contact with contaminated sediments.
- Reduce ecological or human health risks from direct contact or ingestion of contaminated groundwater discharge to the river.

Page 77 - Under the second objective, "fish" should be changed to "aquatic organisms" since we are concerned about crayfish and clams as well as fish.

Page 79 - It's difficult to understand how the physical system can be defined and/or modeled without more information on sediments at depth and groundwater inputs.

Section 7.2, Page 79: Physical System Data Needs. "*Sediment transport modeling will be conducted to determine the scale over which sediment deposition or erosion may occur; model selection, assumptions, and inputs will be documented in a separate technical memorandum.*" This deserves more discussion. How will sediment transport modeling results be used in the overall site assessment? If site-specific data is needed for the model, when will it be collected – as part of Round 1?

Section 7.2, page 79: It is likely that episodic events of high magnitude (i.e. major flood events) will control sediment transport within Portland Harbor. As a result, the assessment of the physical system must be robust enough to account for these events.

Section 7.3, Page 80: Nature and Extent Data Needs. "*chemical distributions beyond the current ISA boundaries have not been fully evaluated.*" Having identified this data gap, the Work Plan should explain how it will be addressed. How many samples will be taken above and below the ISA and how will the resulting data be analyzed? How do the Respondents propose to define the site boundaries?
Section 7.3, Page 80: It is unclear why the evaluation of porewater chemistry should be evaluated by DEQ. Unless there is a need for this data to support a source control activity, the responsibility for this evaluation belongs to Respondents.

Section 7.3, Page 80: Nature and extent of contamination data needs to include information on in-water and upland contaminant sources and subsurface sediment data to evaluate chemical distribution and potential exposure.

Section 7.3, Page 81: Bullets at top of page. The data listed here will define only the extent of surficial sediment chemistry, and won't even do that very well. As discussed previously, there needs to be more sampling near suspected sources; the water column sampling is inadequate; and porewater should be added to this list. Also missing is any attempt to gain an understanding of the nature of contamination. Is TBT bound up in paint chips, or is it readily bioavailable? Are PAHs

bound to soot particles, in tar balls, in creosote, or in dissolved form? The extent of contamination is certainly important, but understanding the nature of the contamination, the form in which chemicals occur and their bioavailability is important, too.

Section 7.4, Page 81: This section should be expanded to included other contaminants known or suspected to be present in groundwater such as pesticides, selected PAHs and metals. The identification of potential preferential groundwater flow pathways should also be included.

Page 81 - Summaries of the available groundwater data and analyses of groundwater should include not only VOCs but other chemicals as well. In discussing groundwater with the Respondents, EPA used VOCs as an example of a class of chemicals of concern, but never intended to limit investigations to this class of chemicals. Depending on the site, groundwater may need to be analyzed for many of the contaminants listed in the QAPP for "water;" elimination of classes of chemicals should only be done after consultation with EPA. The contaminants detected in surface water in the USGS study (see comment on page 44), including the pesticides, should be included in the QAAP list of analytes for water. Respondents should also include all chemicals in their data summary for groundwater, not just VOCs.

Section 7.5, Page 82: Benthic Invertebrates. Item c says that crayfish and shellfish will be collected. This is the first reference to shellfish collection, and it appears to be inconsistent with the Field Sampling Plan. We support the collection of shellfish, but if it is going to occur, collection areas should be shown on the sampling maps, and the sampling plan should discuss handling, compositing, and chemical analysis.

Section 7.5, Page 82: Fish. The list here does not include the collection of benthic invertebrates for use in evaluating the dietary pathway, as is discussed elsewhere.

Page 84 - A statement on this page says, "To evaluate potential risks associated with consumption of biota, estimates of the quantity and types of fish and shellfish that are consumed by people using the ISA as a fishing area are necessary. Differences in use (e.g., amount and type of tissue consumed) among groups that may collect fish and shellfish in the river needs to be evaluated in order to refine estimates of consumption rates." How will these differences in use be evaluated and used to refine estimates of consumption? A good fish consumption study takes several years to design, implement, and analyze. It is extremely unlikely this could be done in time to impact the risk assessment or decision-making process for this site.

Section 7.7, Page 85: Potential for Recontamination and Source Evaluation. It is unclear why DQOs for this work are not identified, as they are for other types of data collection.

Section 7.7, Page 85: This section does not describe what actions will be taken by the Respondents to specifically evaluate the potential for recontamination or for source evaluation. These activities are not likely to be fully addressed by DEQ's upland activities as suggested. In fact, the Statement of Work for this RI/FS clearly states that "Respondents will identify source areas that are contributing contamination to the in-water portion of the site. Although DEQ is primarily responsible for ensuring that parties responsible for upland sources institute source control, as part

of the RI/FS, Respondents shall evaluate the distributions of sediment contaminants, and, if appropriate, make recommendations to EPA and DEQ if the need for further investigation or control of sources is identified." Ultimately, the in-water RI/FS must determine recontamination potential.

Section 7.7, Page 85: Third paragraph. "*This will include an assessment of methods to determine concentrations of volatile organic compounds in sediment offshore of facilities with VOCs in groundwater.*" This is too limited; the assessment should include chemicals other than VOCs (including metals and PAHs), should address porewater as well as sediment, and should not be limited to areas next to known VOC plumes.

Section 7.7, page 87: The Work Plan states that Respondents will lead the investigation and evaluation of in-water sources that could affect site risks and remedies. A plan for this should be included. The evaluation of recontamination should be included as part of a detailed early action evaluation for early action candidate areas.

Section 7.8, page 87: Oxidation/Reduction potential should be included as a natural attenuation parameter.

Page 87 - It is not clear how the current sampling that is proposed will provide information on the "chemical inputs that are likely occurring regardless of any activities in the ISA" nor what is meant by "These levels will be compared to risk-based levels generated from the risk assessments to determine whether river flow may be transporting chemicals at levels causing risk in the site." What "incoming levels" are being referred to here? Are these from upstream? Are they water or sediments? What data is being gathered to "establish these incoming levels as representing background?"

Section 7.8, Page 87: The rationale behind the Natural Attenuation (NA) investigation is not clearly presented. It seems premature to begin this study until the nature and extent of contamination has been defined and contaminant fate and transport is understood. What is the rationale for the selection of the proposed sites and what are they considered representative of? For example, it is unclear what the data from the Willamette Cove sample will mean. While the extent of contamination in the Cove associated with the McCormick and Baxter site has been defined, sediments have not been investigated to determine the impacts from past site activities (dry docks, ship building, plywood and lumber mill, cooperage, etc.).

Section 8.0, Page 89: Groundwater Work Plan
The groundwater investigation is inadequate. Work elements (section 8.2) should address more than just the VOCs and should include all known chemicals that are of concern for upland sites and have the potential for entering groundwater and surface water. Pesticides, PAHs, metals, and compounds that may be transported due to cosolvency should also be investigated. Chemicals that are present in upland soils and/or in-river sediments that are at or near identified groundwater plumes and seeps should be of particular focus in the groundwater investigation. Significantly more samples will be required to characterize groundwater inputs. Porewater should be analyzed in areas where contaminated groundwater discharges to the river.

Figures

Figure 2-4: Are all the changes positive changes in bathymetry (deposition) or are some of these changes negative changes due to dredging or scour? This figure would be more helpful if positive and negative changes were depicted with different colors.

Figure 2-6: Preliminary Conceptual Site Model for Ecological Risk Assessment, Groundwater/pore water is a separate and complete pathway for the benthic community. Direct contact to the Sculpin, Largescale sucker and Pacific lamprey ammocoete for PAHs and metals should be complete and evaluated.

Figure 3-1: The map showing outfalls and CSOs is very helpful. It would be more helpful if it showed the area (and facilities) that drain into each outfall.

Figure 3-2: What do the light blue polygons signify? How are the different from the green "no data" polygons?

Figures 4-1 and Tables 4-2: The figures and tables would be more useful if: a) Some comparison to sediment screening criteria was provided; b) Both level 1 and 2 data were included; and c) Subsurface data was included.

Figures 4-1a – 4-1k: These figures would be much more helpful if the data were screened against risk-based screening criteria, such and the TEC / PEC values or Oregon's draft sediment screening criteria.

Figure 4-4c: Recreational Beach Use Areas: Maps need to be updated based on latest information on the Swan Island side of the river. This area, marked "rip rap river beach" on the map, should be considered a recreational beach.

Figure 5-1: Preliminary Conceptual Site Model. On other figures, there is a notation indicating that "sediment" includes porewater. That notation does not occur on this figure. Porewater should be included with sediment, or added as a separate source.

Figure 5-3: Preliminary Conceptual Site Model for Ecological Risk Assessment. How could direct contact with surface water be a minor pathway for mink, when they swim and feed in water frequently?

Figure 5-4: This should be modified to reflect consensus of the human health subgroup.

Figure 5-4 - Change the Conceptual Site Model for Human Health to reflect the current consensus of the human health subgroup. Include fish consumption for transient residents as well as ingestion of water and dermal contact. It is likely that transients use the river for many of their basic needs (e.g., drinking water, bathing, eating). Also, for recreational beach users, include the fish consumption pathway in the conceptual model and in the quantitative evaluation of risk.

Figure 6-1: What is the difference between "What are the COPCs, pathways, and exposure scenarios that drive risk" box in Round 1, and the "Refine list of COPCs, pathways, receptors" box in Round 2? We note that there will be no new data collected between these steps to further inform a decision. What methods will be used to "Conduct Preliminary ERA?"

Figures 6-3 and 7-1- What methods will be used to "Conduct Round 1 Data Evaluation" and for the "Data Evaluation Report?" What criteria will be used to define "acceptable risks" in these reports? The Baseline Risk Assessment should not be used to identify "unacceptable risks" - this is done as a part of the RAO/PRG/FS process and is a risk management decision.

Tables

Table 3-1: There should be lines between the columns to indicate that this is really a series of lists and not a table; perhaps this would work better as a figure.

Table 3-2: Chemicals Associated with Selected Industries. This table is so general that it is not useful. The first column should list specific properties instead of general industries, and a third column should be added that lists the chemicals found in soils, groundwater, and wastewater during DEQ investigations and/or discharge monitoring.

Table 3-2: The following additions are recommended:

a. Add metals to Marine Construction/repairs
b. Add herbicides to Electric power substation
c. Add herbicides to Railroad switching

Table 4-7 - The units for the tissue summary data are given in ppb for some chemicals and ppm for others. Also, some results are given in wet weight and others in dry weight. Are these accurate? Also, some of the PCB congener data are in ppb? Is that accurate? It would be very useful if the units were consistent.

Table 4-8: Three of the columns have the same heading of 4,4'-DDD. The intended headings of the first three columns may have been 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT, judging from the footnote. This would be consistent with the reported total DDT values for the control and first three samples. However, the total DDT values for the last two samples (WR-VC-04 and WR-VC-05) are not consistent.

Table 5-1: Assessment endpoint for Birds, Osprey/Bald Eagle. The toxicity benchmark for the bald eagle should be the NOEL.

Fish, Chinook Salmon, prey and fish tissue. The toxicity benchmark for listed salmon species should be NOAEL.

Table 7-1: The preliminary RAOs refer to reducing risks to acceptable levels or ambient levels. The use of the term ambient is inappropriate.

Table 7-1: Summary of RAOs, Data Gaps. Two RAOs are missing from this table: #3, human health risk from surface water, and #6, fish and wildlife risk from surface water.

Table 7-1: Summary of RAOs, Data Gaps, and Sampling Locations, second row. Lipids will be measured in tissues of species consumed by humans. EPA supports measuring lipids because it will make the data more useful for eco risk purposes. But we wonder - how will lipid data be used in a human health risk assessment? The rate of seafood consumption, the rate of contaminant transfer between sediment and tissue, and the location of fishing areas are identified as data gaps, but there is no sampling planned to address these data gaps.

Table 7-1: Summary of RAOs, Data Gaps, and Sampling Locations, fourth row. Rate of prey consumption, home ranges of prey and target receptors, rate of contaminant transfer between sediment and receptors and prey, and "site-specific" no and low effect levels in tissue are all identified as data gaps in the middle column. No work is proposed to fill any of these data gaps in the third column.
Table 7-1: Summary of RAOs, Data Gaps, and Sampling Locations, fifth row. The volume of sediment requiring remediation is listed as a data gap in the middle column. How will this data gap be addressed with no subsurface sediment to show the vertical extent of contamination?

Table 7-1: Summary of RAOs, Data Gaps, and Sampling Locations, sixth row. The third column includes current measurements along multiple transects within the ISA, but this sampling is not mentioned elsewhere.

Table 7-1: Change sampling location language for eating fish to reflect latest sampling plan. Change "fish" to "aquatic organisms" or "biota." Eliminate "(or ambient levels)."

Table 7-2: Item 2: The first decision should be modified to read: Determine the effect of sediment transport on risk estimates. Add a decision related to the evaluation of remedial action alternatives (e.g., Determine the effect of sediment transport mechanisms on remedies involving the removal or capping of sediments).

Table 7-2: The DQO process for the Physical River System. In step 2, drop the last item, which is risk-based and is not a physical river system question.

Table 7-2: Item 4: Some aspects of the physical model may need to consider a large portion of the Willamette River watershed and influences of the Columbia River. The DQO process should consider the scale of the system - understanding sediment transport will be important not only harborwide but at individual localized sources of contamination.

Table 7-2: Item 5: The decision rules as written seem too rigid for a dynamic system where erosion and deposition may occur simultaneously. Moreover, it is likely that exposure to subsurface sediment is likely at various times and locations. The decision rule should be designed to determine the degree.
Table 7-2: The DQO process for the Physical River System. In step 5, it says "*If bed elevation losses over time are greater than the surface sediment sampling interval (0-15 cm), then evaluate*

subsurface sediment quality." The defining factor should not be the sediment sampling interval, but the depth to which organisms are exposed. There may also be risk associated with subsurface contamination.

Table 7-2: The DQO process for the Physical River System. In step 7 and elsewhere, the sediment cores should be included.

Table 7-2 - It is not clear how the current sampling of sediments (none at depth and limited in spatial area) will help answer the problem statement regarding the physical river system. The decision error for depth (plus or minus 6 inches) is too shallow and no decision error is given for spatial area. How big of a hot spot could be missed given the density of sampling for both historic and currently proposed sediment samples combined?

Table 7-3: General: As stated above, it is likely that exposure to subsurface sediment occurs. The DQO should consider subsurface sediments as part of the nature and extent of contamination determination.

Table 7-3: Item 2: The term "consistent" has virtually no meaning within this context. Better wording is: Determine the temporal and spatial variability of sediment contamination.

Table 7-3: The DQO process for nature and extent. In step one, three additional problems should be added: upland sources are not well understood, chemical distributions outside the ISA are unknown, and the influence of upstream sources is not well understood.

Table 7-3: The DQO process for nature and extent, step 2. "*Determine the nature and extent of contamination in surface sediment and water.*" Strike the word "surface" and add "and porewater." The second two elements are risk questions and do not belong in the DQO for nature and extent.

Table 7-3: The DQO process for nature and extent, step 3. Subsurface sediment and porewater should be included.

Table 7-3: The DQO process for nature and extent, step 4. "For sediment, bank area to bottom of channel to coincide with risk assessment exposure areas." Does this mean the risk assessments assume that there is no exposure to the channel sediments? That only the bank area and slope are contaminated?

Table 7-3: The DQO process for nature and extent, step 5. "Time-series chemistry data for each COC is within the same range of concentrations over time and triggers the same risk management decision." Samples collected at previously occupied sampling stations may show different chemistry results for a number of reasons, including sediment heterogeneity, laboratory bias, or a real change in chemistry. It is not clear how the source of variance will be established or how temporal differences in chemistry will affect the site assessment.

Table 7-3: The DQO process for nature and extent, step 6. "*There is no unacceptable risk to human health and ecological receptors from exposure to chemicals in sediment and/or water that is the*

result of historical and/or ongoing activities within the ISA." This a risk-based statement that does not belong in the DQO for nature and extent.

Table 7-3 - How will the "defined area" be determined when making decisions that a risk based threshold is exceeded? For sediments, how is "sufficient" sampling density defined to estimate spatial variability? What is the decision rule and how large of a hot spot area could be missed?

Table 7-3: Item 7: The sampling design may be optimized by focusing on areas of known or suspected contamination.

Table 7-4: General: The evaluation of groundwater discharging to the river should not be limited to VOCs. Pesticides, PAHs, metals, and compounds that may be transported due to cosolvency should also be investigated.

Table 7-4: Item 6: (changed from 7-3 to 7-4) The null hypothesis is focused solely on risk rather than nature and extent of contamination. It may be that nature and extent of contamination will have to be delineated before risk estimates are fully developed. Particularly, because risk based PRGs will not be developed until the risk assessment is underway.

Table 7-4: The DQO process for nature and extent, step 7. For both water and sediment sampling, collecting data near suspected sources (i.e., looking for hot spots) should be added.

Tables 7-5 through 7-10: The ISA is, by definition, an initial area of investigation. Expansion beyond the ISA may be necessary and has already been contemplated by extending the sampling area to RM 2 through 11. The DQO process must allow for expansion of the ISA based on the results of the investigation.

Table 7-5: DQO for groundwater risks. As discussed previously, the groundwater investigation should not be limited to VOCs. In step 4, the intermediate groundwater system should be included along with the shallow system, because these two layers meet near the edge of the river and both discharge to the river.

Table 7-5: DQO for eco risk evaluation. In step 3, "*toxicological literature and existing toxicity tests will be evaluated to determine potential toxicity and/or bioavailability.*" Conservative literature values are acceptable for a screening level assessment, but site-specific toxicity and bioavailability information will be needed to support a final cleanup decision. Step 5 refers to a "threshold value" for invertebrate toxicity in the event single contaminant data are unavailable; what is a threshold value and how would it be developed?

Table 7-5 - Define "reference areas" that will be used for invertebrate communities. When will data on habitat for amphibian and plant communities be available? How will it be factored into Round 1 sampling within the ISA and what data will be collected to do the "comparison with upstream risk levels?"

Table 7-6: DQO process for fish risk. In step 2, "*Are levels of contaminants in media in the ISA sufficient to cause adverse toxic effects or reproductive impairment ...*" Either drop the words "in media," or add "or prey items." As written, it is not clear that food chain impacts will be addressed. Step 4 discusses using historic and new data to evaluate the temporal scale of risk; we doubt whether there is enough historic tissue data to say anything meaningful about risk over time. From step 6, drop "*Compare upstream risk levels with ISA risk levels.*" As discussed elsewhere in our comments, this is an inappropriate use of background data.

Table 7-10 - Adequate quantitative fish consumption surveys are expensive and take several years to complete. Unless Respondents intend to conduct such a study, it is unlikely that the data that is gathered from "an additional quantitative consumption survey" which may be conducted "following the Round 1 Preliminary Risk Assessment to gather additional site-specific information regarding consumption rates" would be useful or appropriate for the site risk assessment.

Any decision rule should include reference to State of Oregon ARARs.

What is meant by a decision error of 0.5 for false positives and 0.1 for false negatives? How will this be used for defining unacceptable risk?

Field Sampling Plan

FSP General Comments

The plan was somewhat difficult to review because sampling for different purposes (nature and extent, eco risk, human health risk) were presented separately. The sample locations are pulled together on Figure 2-1, but it would also be helpful to have one table that lists all the sediment samples together, all the smallmouth bass samples together, etc. The summary table should also list the planned uses for each data point. The data should be used the maximum extent possible. For example, the beach composite sediment samples should be used for eco risk as well as human heath, and crayfish tissue collected for eco risk should be used as another line of evidence in the human health assessment. If this is not the plan, this should be made clear.

More thought could be put into ensuring the data obtained are as inter-related and supportive as possible. For example, it appears that at least some crayfish samples will be collected in areas where no sediment sample will be collected, even though sediment exposure may be a major factor in any crayfish contamination. It is assumed that the underlying basis for the sampling is to link contamination in tissues back to manageable sources, i.e., on-going surface or groundwater discharges or contaminated sediments.

There is no clear rationale for many of the study components, nor an explanation of how the data will be used. It is not clear, for example, how a simple survey of the benthic community will be used. Interpretation approaches, including the statistical methods for establishing spatial or temporal trends are not presented. The lack of a data interpretation plan makes it difficult for reviewers to judge the adequacy of the proposed testing.

Generally, for proposed sampling locations, there is a focus on collecting samples from known contaminated sites. Sites should also be selected in areas that are not necessarily highly contaminated but support habitat for a target species. Consideration of past and current sediment transportation rates as well as dredge/fill history, habitat use, historical data, bathymetry data and other river data provided should be fully considered prior to finalizing sampling locations. In general, there appears to be a lack of justification and coordination among the sampling locations in relation to known contaminated sediment locations and other data. A single river map that depicts and overlays as much data as possible would be helpful to help correlate data on a river-mile-by-river-mile basis. The analysis of the existing data also needs to consider physical changes to the river (deposition and erosion), including flood events, to determine if the data is still representative of site conditions. Given that most of the existing data was collected several years ago, it cannot simply be presumed that it all category 1 data is still usable data. The analysis should consider the results of recent bathymetric surveys, sediment profile imaging, and other work to determine data usability.

EPA is not confident that sufficient consideration has been given to the number, type and location of samples to ensure that the information being gathered is likely to fill the data gaps that exist regarding the type and extent of contamination. The rationale provided in the FSP is insufficient to allow us to evaluate this issue and there is no discussion in either the FSP or the

Work Plan regarding screening levels that will be used to evaluate the data once it has been collected.

EPA is concerned about statements, throughout the Field Sampling Plan and made verbally in the July 24th meeting with the Respondents, that indicate Round 1 may be the major sampling and analysis effort, and it will be used to eliminate potential chemicals of concern. This is not appropriate, and there is not enough background information and rationale to evaluate the overall proposed approach; for example, are there sufficient sediment samples to characterize all areas, or will additional information be gathered in Round 2? The purpose of the Round 1 sampling needs to be clarified and there needs to be agareement how the information gathered will be used. The Respondents should not waste resources on sampling and analysis without greater certainty that major questions regarding the site will be answered.

In addition, sediment samples need to be taken at depth in order to characterize the site; the mobility of the surface sediments means that samples taken this year may not be representative of conditions a year from now. Currently only 4 deep corings are proposed for sediment for the purpose of evaluating natural attenuation. Again, as we do not have access to future sampling plans, it is difficult to provide informed comments on the proposal for Round 1.

There clearly is disagreement currently regarding the use and identification of reference sites. Respondents need to document the purpose of reference sites clearly, and to describe why the locations chosen will provide the desired information.

Sampling Locations
The proposed sampling locations focus on collecting samples from known contaminated sites. Since one of the goals of the sampling is to determine the extent of the contamination, selection of additional sampling sites should also be based on ecological factors. These include factors such as habitat known to be used by a target species, past and current sediment transportation rates, dredge/fill history, and other river data . Although these sites are not necessarily highly contaminated, they will provide a more accurate picture of the extent as well as the nature of contaminants in Portland Harbor.

Anadromous Species
Although anadromous species present the complex issue of determining contaminant sources, these species are of great cultural and human health importance, and need to be addressed.

PCBs and Aroclors
The document should clearly define when analysis for Aroclors is appropriate, and when testing ought to be for PCB congeners. PCBs in the environment are different from Aroclors due to partitioning, transformation, and bioaccumulation.

Surface Water
The approach to surface water is unacceptable. Bioaccumulative chemicals present in surface water may accumulate in fish at concentrations that represent a risk to birds, wildlife or humans through fish consumption. As a result, better detection limits for bioaccumulative chemicals in

surface water are required. The use of lipid bags or high volume sampling devices is needed. Limiting water quality sampling to fall and winter will give an incomplete picture of water quality in the site. Water sampling should be added in the spring during runoff, which would give a more accurate picture of water quality changes related to the hydrological cycle. Also, water quality sampling should coincide with known fish migration periods when large numbers of anadromous fish will be in the ISA. Juvenile fall chinook salmon, for example, outmigrate in the Portland Harbor area between April and June. Similar considerations apply to surface sediment sampling.

Multiple Contaminants
The FSP does not address the combined impact of contaminants and their possible interactive effects in either the Ecological or Human Health Risk Assessments.

Cultural Artifacts
The FSP does not include a plan for handling any cultural artifacts that may be discovered or inadvertently uncovered during sampling activities, such as beach sediment sampling. The tribes have recommended that a protocol similar to the one Oregon DEQ is using for upland sites be adopted.

FSP Specific Comments

Section 1.1, Page 2: It appears that too much emphasis is being placed on the Risk Assessment process in Round 1, in lieu of developing a comprehensive site conceptual model (i.e., nature and extent of contamination and understanding of contaminant fate and transport in the system). It should be recognized that the RI cannot be complete until all potential sources have been identified and appropriate data collected to determine if they are or have contributed to the contamination in Portland Harbor. The primary objectives of Round 1 should include:

- Fully defining the nature and extent of contamination in all media (sediment, surface water, tissue, etc);
- Understanding the fate and transport of contaminants in the system;
- Evaluation and implementation of early source control actions.

Section 1.1, Page 3: "Subsurface Radioisotopes." Will anthropogenic lead sources interfere with the ^{210}Pb isotope analysis (e.g., is there reason to believe anthropogenic sources would unnaturally augment isotopic lead in the area)?

Section 1.1, Page 2: Water Column Chemistry: Is it common practice to collect a composite water sample in this manner? We are more familiar with grab samples for this type of environmental sampling.

Section 1.2, Page 3: Second paragraph in Section 1.2. Collection of juvenile salmonids for analytical chemistry should be conducted on the size class of salmonids that will have the longest residency in the lower Willamette River (i.e., most likely subyearlings) and during the time these fish will most likely be present. Sampling, as proposed, should not be conducted and the

sampling plan should be revised to collect salmon during the time of year that subyearlings have the longest exposure period in the harbor area.

Section 1.2, Page 4: Paragraph 2. This section indicates that reptiles will be excluded from the risk assessment if not found in the ISA. It is very likely that reptiles such as painted turtles and garter snakes use the lower Willamette River, and these animals are difficult to locate without extensive search efforts, so the risk assessment should include an evaluation of risk to reptiles.

Section 1.2, Page 4: If no amphibians and reptiles are found it may not be acceptable to exclude them. The survey was conducted in July, which is not a good time of year to be looking for evidence of amphibians. Ideally, an effort would be made to find eggs in the early spring, and then also an effort to find adults in the late spring and fall. Also, specific survey techniques exist for the state sensitive species such as the red-legged frog, which should have been utilized in this effort. The survey will likely be inconclusive, largely because it was too late in the year few frogs were still calling, and there did not appear to be a clear plan to look for other amphibians. This year's study should be considered a reconnaissance effort and the work should be repeated in the spring.

Section 2.1, Page 6: Sampling locations should also be selected based on the following objectives:

- Evaluating potential source areas (i.e., sample offshore of DEQ targeted sites to determine if current or historical sources have impacted sediment quality);
- Delineate local areas of contamination (i.e., principal threats or hot spots);
- Define the horizontal and vertical extent of contamination;
- Collect adequate data to understand contaminant fate and transport in the river system.

This will require the collection of additional sediment samples at areas of known or suspected contamination and the collection of subsurface samples. Sediment sample locations must take into consideration habitat use and bathymetry.

Section 2.1.1, Page 6: The field sampling plan outlines a number of factors that were considered in designing the sampling strategy. However, the results of this analysis is not provided in any detail. Furthermore, it is not possible to determine how the analysis led to the proposed sample locations.

Section 2.1.1, Page 7: Surface Sediment Chemistry.
Subsurface sediment samples should be included in Round 1. Corresponding information about dredge/fill history, bathymetry, and the historical change in sediment should be included for all sediment sample locations.

Section 2.1.1, Page 7: It is stated that sediments will be collected from each benthic zone that is present. However, the benthic zones identified are based on deposition/erosion only. Most sediments have the potential to support a benthic community, and therefore should be considered. Further assessment of the benthic community is required to focus sampling efforts.

Section 2.1.1, Page 8: 4th and 5th bullets: Not all samples proposed to be collected near source areas are planned to be analyzed for dioxin/furans. Samples need to be added near the BNSF railroad bridge to characterize Rhone Poulenc contamination. For TBT, more samples should added near current or historic marine operations (e.g., Mar Com Marine).

Section 2.1.1, Page 8: First paragraph under bulleted section. The primary objectives for Round 1 sampling include determining the nature and extent of contamination and to propose COPCs, yet subsurface sediment sampling will not be conducted. Subsurface sediment sampling needs to be done in Round 1 to determine the nature and extent of contamination, to assess risk of underlying sediment should it become exposed to the surface through erosional process, and to select COPCs.

Section 2.1.1, Page 8: Sample Types. As explained in our workplan comments, we are concerned about the lack of subsurface sampling in Round 1. The Respondents cannot simply assume that subsurface sediments do not pose a risk and will not pose a risk in the future, especially when considering the data which appears in Appendix E of the Work Plan.

Section 2.1.1, p. 8: Change the word "nearly" before "dioxin sources" to "nearby."

On this page and throughout this document, it is implied that for groundwater, VOCs are the only contaminants of concern. While the EPA and others used VOCs as an example in discussing the need to evaluate groundwater as a source and exposure point, there are other classes of contaminants in groundwater that are likely to be of concern. In the QAPP, the list of chemicals be analyzed in water is extensive and not limited to VOCs. Will these same chemicals be analyzed for in groundwater as well as surface water? Will the review of upland sources include a summary of groundwater data that includes all chemicals, not just VOCs?

Section 2.1.1, Page 9: The rationale for selecting the historical sampling stations to be resampled should be described. In addition, for each historical sample station proposed to be re-occupied, a discussion of each specific location relative to the bathymetric data is imperative.

Section 2.1.1, Page 9: Resampling of Historical Surface Sediment Sampling Stations. No discussion was found here or in later sections describing how difference among the new and previous results would be ascribed to lab bias versus temporal change versus heterogeneity. We assume that any differences will be ascribed to temporal changes (if the results from one or more COPC are consistently higher or lower among all samples) or heterogeneity (if the results vary randomly). However, if there is a method to objectively assign a source of the difference, it should be described.

Section 2.1.1, Page 9 - Thirteen of the historical sediment stations will only be analyzed for pesticides and PCBs. Tthe entire list of chemicals should be analyzed in these samples. As an alternative, the decision to limit analysis to the pesticides and PCBs should be made only after the resampling and analyses of the 17 "historical" sampling stations show that temporal changes have not occurred.

Section 2.1.2, Page 9: Ecological Risk Assessment
Reference area - More than one reference area and better criteria and justification is required for reference area selection.

Section 2.1.2, Page 9: Ecological Risk Assessment It is not clear that the selected reference area actually has the characteristics desired. The criteria used for selecting a reference site need to be more clearly defined along with an explanation of how a chosen site meets those criteria. In addition, more than one reference area needs to be selected to provide sufficient data for analysis of impacts from various sources of contaminants.

Section 2.1.2, Page 9: Ecological Risk Assessment, Sampling Location. The use of sediment data for an ecological risk exposure estimation is poorly described. For instance, why won't all of the nature and extent and human health samples be used in the ecological risk assessment? How will the exposure concentrations be calculated?

Section 2.1.2, Page 9: Sediment samples collocated with tissue samples should focus on PBTs. For example, TBT should be included as an analyte at the Mar Com site and PCDD/PCDF analysis should be include near Rhone Poulenc.

Very few sediment samples are being analyzed for dioxins and furans and none for dioxin-like PCBs. Sufficient sample volumes should be collected for all sediment samples in Round 1 so that samples may be analyzed for these chemicals in the future. This may require that the labs hold samples longer than the six months mentioned in the QAPP, especially because the data evaluation report is not expected to be available until about 9-10 months after sediments are sampled.

Section 2.1.2, Page 9: Discrete surface sediment samples are proposed for collection for use with ecoreceptors having small foraging areas. Composite samples (rather than discrete samples) should be taken in these areas to better characterize contaminant relationships between sediment and fish, such as sculpin, and characterize risk to ecoreceptors. Also, more sediment samples need to be collected.

Section 2.1.2, Page 9: Additional effort should be made to obtain QA/QC data from authors of category 2 data, and these data should be included in the decision-making process described in this section.

Section 2.1.2, Page 9: Dietary-concentration based toxicological data should be used, as well as dietary-dosed based toxicological data, for birds and mammals in the ERA. Also, dietary methods should not be the only methods relied on to assess uptake of PAHs. Exposure to PAHs should be assessed in fish directly as well, using techniques such as examining bile for metabolites of PAHs.

Section 2.1.2, Page 10: First paragraph. Additional information is needed describing how many surface sediment samples will be collected from nearshore areas for use in the ERA.

Section 2.1.2, Page 10: Sample Type: It should be noted that the standard chemical suite does not include PCDD/PCDF, VOC, TBT or PCB congener testing.

Section 2.1.3, Page 10: The beach present below the railroad bridge should be characterized to evaluate potential beach exposures either by recreational users or transients.

Section 2.1.4, Page 11: Oxidation/Reduction potential should be included as a natural attenuation parameter. In addition, radio isotope analyses can be used to evaluate depositional and erosional areas in addition to supporting the needs of the natural attenuation evaluation.

Section 2.2, Page 12: The rationale behind the water column investigation is unclear. The rationale for the transect approach, their location, the proposed sampling depth, and the sampling methodology should be provided.

Section 2.2, Page 12: The proposed grab water samples will not give enough information to characterize water quality in water entering, within, and exiting the ISA. A different type of water sampling is needed, especially if PCBs and other bioaccumulative are to be analyzed for, including high volume sampling or diffusion (e.g., lipid bag) sampling approaches.

Section 2.2.1, Page 12: All metals should be analyzed individually.

Section 2.2.2, Page 12: Dietary-concentration based toxicological data should be used, as well as dietary-dosed based toxicological data, for birds and mammals in the ERA. Also, it seems there is an insufficient number of water samples proposed for collection. Without additional samples, the results will not give information that can be used for the ERA or nature and extent determinations. Most hydrophobic contaminants will be below detection in the sampling as it is proposed, and other methods to evaluate water concentrations such as semi-permeable membrane devices (or collecting a much larger quantity of water per sample than the proposed one liter), should be used for evaluating hydrophobic contaminants.

Section 2.2.3, Page 13: Two locations for swimming were identified. Additional locations may be discovered during weekends or evenings with warm weather. One sample at each location may be insufficient to characterize conditions.

Section 2.3.1, Pages 14 to 18: Bulleted sections under target species: Estimated COPC dietary doses should be compared to both dietary-concentration based toxicological data as well as dietary-dose based toxicological data. Also, these sections indicate that only bioaccumulative compounds would be evaluated for direct impacts to the target species. Any compound that is measured in tissue needs to be evaluated for direct impacts to the target species (except for the benthic invertebrates, which will be analyzed as prey samples).

Section 2.3, Pages 14,16: Tissue Chemistry/Ecological Risk Assessment.
Regarding co-locating sampling stations for lamprey ammocoetes and sculpin, do sculpin eat lamprey ammocoetes? (See App.C ERA, page 26). Will lamprey avoid highly contaminated or high use areas for spawning? Can lamprey ammocoetes even survive in contaminated Harbor

sediments? Before assumptions are made from the current proposed sampling plan, the Respondents need to do some bioassay control studies that will determine if lamprey ammocoetes can survive in sediment with known levels of toxics found in Harbor sediments. Similar control studies should be done to determine if the ammocoetes are likely to experience adverse impacts as adults as a direct result of being exposed as ammocoetes. The study conducted in theWillamette River Newberg Pool may be a good starting point for a study design (*Characterization of Skeletal Deformities in Three Species of Juvenile Fish from the Willamette River Basin*, EVS Environmental Consultants, Inc., Feb. 11, 2000).

Section 2.3.1, Page 14: Benthic Invertebrates, 1st Bullet: Using data only from beach areas to determine exposure concentrations to birds is inappropriate. It should be clearly laid out why these areas were chosen. Birds have been observed foraging in less than ideal habitat along the river.

Section 2.3.1, Page 14: Under Benthic Invertebrates. Dietary-concentration based toxicological data should be used, as well as dietary-dosed based toxicological data, for evaluating contaminant risk to fish from eating benthic invertebrates. Also, under the second bullet, all COPCs (not just PAHs and metals) should be considered for comparison with the toxicological data.

Section 2.3.1, Page 15: First full paragraph: This section states that benthic invertebrate tissue samples will be collected from beaches to assess exposure to sandpipers, hooded mergansers, and fish that consume benthic invertebrates. It is currently unclear how these sample areas were selected. Collection of exposure data should be based on the organism habitat use value. Selection based on use of beaches by humans, or because the area is easily accessed by humans, is not appropriate for ecological receptors.

Section 2.3.1, Pages 15-16: Crayfish. Respondents propose to collect crayfish for the ERA and retain some tissue for the HHRA once more human consumption data is determined for crayfish. However, only those crayfish collected from areas in the ISA where harvest for consumption occurs will be analyzed for the HHRA. Will the ERA sampling locations be associated with suspected human collection areas so that there is some certainty that crayfish collected will meet these criteria for use in the HHRA? If crayfish sampling does occur, the samples shall be analyzed. Should Round 1 sampling sites for crayfish not happen to coincide with where people actually harvest crayfish, the plan should commit to collecting additional crayfish data. This is a drawback of expediting fieldwork without having all the necessary information about site use.

Section 2.3.1, Page 15: Crayfish. It is stated that samples were placed in the vicinity of known contaminated areas based on existing sediment chemistry and fish tissue data and proximate to potential upland sources based on DEQ upland investigations. Following this objective, samples should be added off GASCO and near the BNSF railroad bridge. Congener data on crayfish could benefit both the human health and ecological risk assessments.

Section 2.3.1, Page 15: "Crayfish." Under the third bullet, all COPCs (not just PAHs and metals) should be considered for comparison with the toxicological data.

Section 2.3.2: Pages.15 and 19 - Add smallmouth bass and crayfish to the list of target species for the human health risk assessment. Include information as appropriate for these species on how and where they will be collected.

It is not clear how data will be gathered to determine whether crayfish harvest is "significant" and where it occurs. Rather than spending time completing a task such as this, we recommend that all of the crayfish data be used for the human health evaluation. Additional discussion is needed on the numbers/locations of crayfish that will be analyzed for congeners as well as for dioxins and furans. (Also applies to Table 2-1)

Section 2.3.1: Add peamouth to list of ecological species to be sampled and include a write up explaining how data for this organism will be used.

Section 2.3.1, Page 16: First paragraph: This section states PCB congeners will only be evaluated in crayfish if significant human consumption is demonstrated. Dioxins, furans, and PCB congener concentrations need to be determined in crayfish to evaluate risks to ecological receptors, regardless of whether or not crayfish are important to for human consumption.

Section 2.3.1, Page 16: Under sculpin. First bullet: All COPCs (not just the bioaccumulative COPCs) should be considered for comparison with the toxicological data. Second bullet: All COPCs (not just PAHs and metals) should be considered for comparison with the toxicological data.

Section 2.3.1, Page 16: Sculpin. The middle bullet says that sculpin will be used to estimate concentrations of PAHs and metals in smallmouth bass diets. So PAHs and metals will be measured in sculpin. This data should be used as another line of evidence in determining the risk to sculpin.

Section 2.3.1, Page 16: Under Pacific Lamprey ammocoetes: An evaluation of ammocoetes as a pathway to higher vertebrates eating the ammocoetes needs to be added to this section.

Section 2.3.1, Page 16: Pacific lamprey ammocoete. Tissue concentrations will be measured in ammocoetes for comparison to tissue-residue based toxicological data. Are there really tissue-based toxicological studies for lamprey?

Section 2.3.1, Pages 16, 55: Pacific Lamprey Ammocoetes. The Work Plan specifies collection of Pacific Lamprey ammocoetes. Will species identification of ammocoetes be possible and if other lamprey species are collected, will they be kept for analysis and used in the ERA and HHRA? The Work Plan lacks significant detail to understand how this lamprey data will actually be used. If Pacific lamprey ammocoetes are found in abundance in the lower Willamette River and tissue residues show significant uptake of harbor contaminants, and we know that tribal members consume returning adult lamprey at the Falls, how will this human health risk issue be addressed?

The Tribes continue to recommend to EPA that, in addition to lamprey ammocoetes, adult lamprey be collected and analyzed for site-related contaminants. There is a great concern and acknowledgement by tribal members that adult lamprey tissue may contain site-related toxic substances and may be posing a human health risk to tribal members who consume lamprey. It is important to understand where in the river system lamprey are being exposed to contaminants, at what life stage and for how long during each life stage lamprey are exposed and what levels of exposure impact the survival, growth and reproduction of the species at any life stage.

Interestingly, the lamprey life history is reverse that of salmon such that lamprey spend up to 7 years in freshwater and only 2-3 years in the ocean. In addition, little is really known about Pacific lamprey life history and a further investigation may indicate that adult lamprey over winter in the LWR prior to spawning the following summer, increasing their potential of exposure.

Section 2.3.1, Pages 17, 54: Juvenile Chinook Salmon
While we fully support collecting juvenile salmon, we believe that spring chinook, not fall chinook, should be the primary species for collection rather than an ncidental part of the juvenile fall chinook collection. Spring chinook are more likely to have longer residence times through the ISA and they are consumed by tribal members more than fall chinook collected from the Willamette River.

Generally how will multiple contaminants be addressed for both the ERA and the HHRA?

Section 2.3.1, Page 17: Juvenile Chinook Salmon: Based on meetings with the Respondents, the salmon should not be used to estimate doses to other organisms. The Peamouth should be used for this purpose.

Section 2.3.1, Page 17: Under juvenile chinook salmon: All COPCs found in salmon tissue need to be evaluated for comparison with tissue-residue based toxicological data and as a pathway to fish and piscivorus birds and mammals.

Section 2.3.1, Page 17: Tissue Chemistry, Juvenile Chinook Salmon.
The Nez Perce Tribe supports the collection of juvenile fall chinook salmon, but recommends that spring chinook also be collected. As noted in the Work Plan ecological risk assessment, spring runs spend one or more years in freshwater, while summer and winter runs only spend a few months. Thus, spring chinook are likely to have longer residence times through the ISA, and so more exposure to those contaminants. Spring chinook also have higher consumption rates by tribal members than fall chinook collected from the Willamette River.

The FSP does not include sampling of adult chinook. As with lamprey, it is essential that the impacts of contaminants on survival, growth, and reproduction for both juvenile and adult life stages be understood. Limiting sampling to juveniles again brings up the issue of how to translate those results into impacts on tribal members and others who consume adult chinook. The Nez Perce Tribe recommends that adult spring chinook be collected for future chemical analysis to complement the juvenile data.

Section 2.3.1, Page 17: Under largescale sucker and smallmouth bass: All COPCs found in fish tissue need to be evaluated for comparison with tissue-residue based toxicological data and as a pathway piscivorus birds and mammals.

Section 2.3.1, Page 17: Juvenile Chinook Salmon and Peamouth have been added to estimate diet concentration for smallmouth bass.

Section 2.3.1, Page 18: Reference Sampling Locations. The text says that reference sample locations are shown in Figure 2-4, but no reference stations are shown in Figure 2-4.

Section 2.3.1, Page 18: Reference sampling. In order to use reference sites for establishing baseline conditions in sediment and fish tissue (as proposed in the supplemental Reference Site information provided to the Trustees), a greater number of sites would need to be evaluated. The current reference site proposal is inadequate to establish baseline conditions.

Section 2.3.2, Page 18: Human Health Risk Assessment
Tribal members consume spring Chinook salmon and Pacific lamprey in significant quantities and the Tribes continue to recommend inclusion of these species in the HHRA. At the very least, the proposed juvenile salmon and lamprey ammocoete tissue residue data should be used to make better determinations about potential human health risks from consuming these species that utilize the Harbor.

We recognize that certain resident species are more likely to bioaccumulate certain site contaminants at higher levels than certain anadromous species. However, this may not always be the case for all contaminants and for all species, especially for sturgeon and lamprey. The Tribes have advised EPA that the only way that tribal members will be protected by cleanup goals established from data generated under the current Work Plan will be if: 1) resident species really do have higher levels of site contaminants in their tissue as compared to adult anadromous species; 2) human consumption rates and other assumptions used in the HHRA are protective of tribal consumption patterns and exposure scenarios.

Respondents have not provided any historical tissue residue data on anadromous species (namely, salmon, lamprey and sturgeon) that we can compare with the data on resident target species. Nor do Respondents have accurate information on tribal and non-tribal consumption rates.

Section 2.3.2, Page 19: Human Health Risk Assessment.
Because tribal members consume significant amounts of adult chinook salmon and Pacific lamprey, these species must be included in the HHRA. If this is not possible initially, the juvenile salmon and lamprey ammocoete tissue residue data should be used for more accurate determination of potential human health risks posed by consumption of these species in Portland Harbor.

Section 2.3.2, Page 20: Sampling Locations: It should be mentioned that smallmouth bass have home ranges closer to a mile as reported in season one of the ODFW and City of Portland study. Exposure to this fish may therefore have not occurred in the vicinity of capture.

Section 2.3.2, Pages 21,22 - All whole body samples are to be analyzed for dioxin-like PCBs. Please remove language from page 22 regarding analysis in only one of the triplicate samples.

Section 2.4 - Change "Figure 2-5" to "Figure 2-6".

Section 2.5, Page 23: Sampling Locations and Sample Type. The core-dating study should be given more thought. It is not clear how the Respondents will use these data except in some very general way, given the small number of core samples and the expected variations in sediment accumulation over time and space. No information was provided regarding how the areas to be sampled related to the general river behavior, local inputs from storm flows, or local sediment disturbance from dredging or other construction activities. In addition, segmentation should only be done on set intervals if there are no clear textural or color horizons in the core. Visually different sediments can be assumed to represent different and distinct temporal sedimentation events and should always be sampled separately. The plan calls for sediment cores to be 4 feet or 1.8 meters long. 1.8 meters is 6 feet. It is suggested that duplicate cores be collected and X-rayed. This procedure provides a simple but effective method for determining detailed textural changes in the cores.

Section 2.5, Page 23 and page 32: Subsurface Sediment Radioisotopes and Sediment Cores. When selecting these subsurface sampling locations, it is important to know if and when any dredging or placement of fill has occurred. The Workplan mentions that these areas have not been ecently dredged. How recent is ecent into the present? While dredging data is provided for two time intervals (1980-1991 and 1992-present) the last date noted is 2001. We have understood that all maintenance and other dredging would be closely monitored since the NPL listing and we need a better understanding of what has occurred between the time the site was listed and now as well as the months and days when dredging occurred. Target analytes for subsurface samples should include the full suite of COPCs, and not just metals.

Section 4.1.1, Page 31: Surface Sediment. The sediment sampling procedure should include the normal caution to ensure that samples with obvious differences in color, texture, odor, etc., be composited with other samples only with great consideration. This caution also applies to the beach sampling, where compositing is planned.

Section 4.1.1, Page 31: This section indicates 22 locations will be sampled to support the ERA, 14 of these samples will be at the 0 to 22-foot water depth, and 8 at the 0 to 5-foot water depth. This is an insufficient number of samples to represent the ecological receptors using nearshore areas. Further clarification is needed regarding sample types, objectives, and justification for the number of sediment samples selected.

Section 4.1.1, Page 32: Top of page. Why will some sediment samples be analyzed for only pesticides, PCBs and conventionals only? Why not analyze all samples for at least the standard

chemical suite? The proposal will greatly limit the utility of the samples and probably will not save much money.

Section 4.1.2, Page 32: How will the beach composite data be used? Will each composite be used as the exposure point concentration or will the data be used to develop a 95% UCL? How will the uncertainty that the concentration of an individual subsample may actually have a concentration that is N (number of subsamples) times the result of the composite result be addressed or incorporated in the Risk Assessment?

Section 4.1.4, Page 32: Water. It is not clear why high flow sampling is important. Water column concentrations would be expected to be highest during low flows because other sources are still active, e.g., groundwater, industrial and municipal waste discharges, and sediment releases, but the dilution capacity is lowest. It would seem more important to do a well-designed storm monitoring event. The Work Plan should consider that water column sampling be done with diffusion samplers or some other low-detection limit technique. Finally, where are the eleven nearshore stations of concern for human health or environmental risk and how were they selected?

Section 4.1.4, Page 32: The rationale for collection surface water samples at the surface should be described. How will the effects of water column mixing be evaluated (e.g., temperature or conductivity profiles)?

Section 4.2 - Although the sample ID will contain general information on the river mile that the sample is caught, it is our understanding that the GPS coordinates will be available in the sample log books. Is that correct?

Section 4.2, Page 34: Since most of the fish tissue samples will be collected by electro fishing, exact locations should be given. Rounding to the nearest whole mile will affect the evaluation of sediment and tissue contamination for species with small home ranges such as the smallmouth bass. This should be done for human health and ecological risk assessment purposes, even if the target area is large. This will give a good indication if representative samples were taken within the target area (and that they didn all come from one specific area), and will provide additional information on where the fish can be caught.

Section 5.6.2, Page 45: Beach Sediment
Sample sites for beach sediment should include visually obvious spots of contamination with a notation made of such.

Section 5.6.2, Page 45: One composite sample is planned for beach sections exceeding 2,000 feet. It would be better to collect an additional composite sample for distances over 2,000 feet. This would match the suggestions presented in the comments to Figure 2-1 below. In addition, the 250 or 500 sampling density seems a little large. A 100 or 200 sampling density seems more appropriate.

Section 5.6.3 - (Subsurface Sediment Cores) page 47-48, Figure 5-1 and Table 2-1. In the sectioning process, beryllium sample cores came out with 18 sections per core. These sections

will be analyzed for radioactive beryllium (^{7}Be). Table 2-1 indicates that there will be only 4 core samples for radiologic tests and each core will be analyzed for radiologic lead and beryllium. For consistency, it is recommended that the FSP (1)discuss the process that the beryllium sections will undergo after sectioning; (2) specify if the beryllium cores will be analyzed as homogenized composites just like lead or as individual samples (3) specify the radiologic test methods that will be used for beryllium and lead and (4) Table 2-1 should also indicate that the 4 core samples (lower half of lead core) may be analyzed for bulk metals (i.e., cadmium, copper and zinc).

Additional details on steps taken to minimize cross-contamination between samples should be included here as was done in the fish tissue sampling SOP.

Section 5.6.5, Page 51: Last paragraph. It is stated that clams will be shucked and the tissue included with the rest of the benthic tissue samples. Clams should be analyzed separately and not included with other benthic invertebrate tissues. Clam tissue may have different lipid concentrations and will homogenize differently than other invertebrate tissue, which would greatly influence intersample variation and make data interpretation difficult. Also, analyzing clams separately will better represent ecological receptors that feed more exclusively on clam tissue (such as sturgeon, birds, and some mammals).

Section 5.6.5 Page 51: Clam tissue collected as a part of the benthic sampling is to be homogenized along with the rest of the benthic tissue samples. This would eliminate the possibility of using clam tissue data for the human health risk assessment. What additional work will be done to determine that clams are not being consumed by people? The observation of piles of clam shells on some beaches suggest strongly that they are being consumed. Will analyses of clam tissue be done in Round 2? If clams are collected during Round 1, they should be analyzed and included in the risk assessment.

Section 5.6.5, Page 51: What water source will be used to screen the benthos samples? Also, the samples should not be frozen until they reach the lab and the clams are shucked.

Section 5.6.6, Page 52: Fish and Crayfish Chemistry: It is stated that fish and crayfish was initiated in early summer 2002 due to the seasonality of the salmonids and expected higher lipid content during the summer months The logic behind sampling when the lipid content is not expected to be high needs to be clear.

page 52: Change Table 5-2 to reflect latest Phase 1A Field SOP.

Page 57: Above the bullets on this page, HHRA should be changed to ERA. Crayfish should be included as a target species for human health.

Section 5.6.6, Pages 53-57: ERA Collection and Processing: While the target size, and specifications for compositing and handling are clear in the human health section (following this one), it is not clear for the ecological risk assessment. Specific details need to be added on compositing and processing.

Section 5.6.6: Pages. 53 through 56 - What is meant by "control area?" Is this the same as "reference" areas?

Pages 53 through 60 - Much of the language on these pages will need to be changed to reflect the latest Field SOP for Phase 1A.

Page 54 - Crayfish- the plan states that "the crayfish will not be depurated prior to analysis..." further discuss how the crayfish will be handled and processed for analyses.

Page 57 - Add peamouth and crayfish to the list of organisms to be sampled and briefly describe the sampling technique. Add the information specific to this organism in the subsequent sections as needed

Section 5.8.3 page 63 - add the inclusion of a temperature blank in each cooler shipped to the lab.

Section 5.9 page 65 - Other Field QC Samples - Trip blanks are different from holding blanks. Trip blanks are in the cooler throughout the whole trip to determine the VOC contaminants that can possibly be acquired while the samples are in transport. Holding blanks determine the VOC contaminants that can be acquired while the samples are in storage at the lab prior to analysis.

Section 6.1.3, p. 68: What is the basis for doing PCB congeners in a subset of whole body tissues analyzed for the human health risk assessment? What is the basis for the rationale presented regarding relative percent difference in PCB Aroclors and the need for PCB congener data? Is there a reference supporting this rationale? As discussed in out comment above (pages 21 and 22) it is our understanding that all whole body samples are to be analyzed for dioxin-like PCBs.

Section 6.1.3, Page 68: The presentation in the third paragraph is unclear regarding variation in Aroclor analysis triggering additional congener analyses. It appears that this is a method for limiting the number of replicate samples that need to be analyzed for the expensive congener analytes.

Figure 2-1, Proposed Sampling Locations: Although detailed discussions on the locations and number of samples are anticipated, some preliminary comments regarding sample locations supporting the human health risk assessment are provided below:

- There are large beach areas on the west bank of the river north of Multnomah Channel. This area is immediately downstream of the ISA, and appears to be an attractive area for beach use by private residents. I suggest two or more composite beach samples in this area. The area should be noted on Figure 2-5a.

- The length of beach at the south side of Multnomah Channel is considerable. A second composite sample should be collected in this area.

- Transient camps have been observed on the beach at the west end of the Railroad Bridge (RM 7). As suggested in past meetings, a composite beach sample should be collected here. The area should be noted on Figure 2-5b.

- The proposed sample from the east bank north of Swan Island Lagoon (RM 8) may be difficult to collect, and the area directly along the river does not appear to be suitable for human use. The Respondents should consider omitting this sample location.

- Because of the length of beach on the east side of the river at RM 9.5, a second composite beach sample should be considered. This area should be considered for recreational use (Figure 2-5c).

Figure 2-5a, b, and c: EPA evaluated site areas for beach use during a boat trip on June 27, 2002. Some recommendations for additional areas to include for the human health evaluation are listed below. Note that additional areas may be apparent during lower water periods later in the year.

- River Miles 2-3, west side of river: Residences are located along this stretch of the river. Possibly as a Round 2 activity, sediments samples from beaches in this area could be collected and evaluated using a residential scenario.
- River Miles 3-4, west side of river: A transient scenario that is more conservative that what's been proposed should be evaluated for this area. A make-shift dwelling was observed during our boat trip adjacent to the PGE-Harborton Substation property. Further upstream from the dwelling the beach seemed amenable to transient or recreational beach use.
- River Miles 3-4, east side of river: A dockside workers scenario may be appropriate along the Schnitzer property.
- River Miles 4-5, west side of river: In the area currently designated for evaluation using the dockside worker scenario, it appears that recreational beach use is possible depending on access. We observed a beach chair along the river in this stretch on June 27, 2002.
- River Miles 6-7, east side of river: Possibly expand the existing recreational beach use area depending upon water level and access at the time of sampling, near City of Portland water lab and Crawford Street Corp.
- River Miles 7-7.5, west side of river: A transient scenario should be considered along this side of the river, adjacent to the Wacker and Atofina properties. Transients have been observed in this area by DEQ staff.
- River Miles 9-10, east side of river: The area that is currently designated for transient use may be more appropriately evaluated as a recreational beach use area. Additional observations made during the field work would be useful to understanding how this area is used. We observed many access points to the river along this stretch of beach.

Table 2-1 and Table 2-2: Summary of Round 1 Sampling
There appears to be discrepancies in this table and what is described in the Work Plan text, appendices, etc. For example, the ERA, page 61, states that tributyltin will be measured in the tissue of crayfish but this is not depicted in the summary table. VOCs are described in the Work Plan (page 89) as part of the groundwater investigation but VOCs are not noted on the summary table for surface water analysis.

Table 2-1: Revise this table per our discussions on changes to the fish collection strategy on June 26, 2002. Also see previous comment regarding analyses of crayfish for dioxins and furans and dioxin-like PCBs (page 15 and 19).

Sample water log form in Appendix A indicates that temperature, dissolved oxygen and conductivity will be recorded during sample collection. The plan should state if these parameters will be taken and recorded in the field. The methods that will be used should also be specified.

Table 6-1: Are PAHs considered a part of the SVOC analysis? SVOC is mentioned throughout the document, but in the table PAHs appear separate. As mentioned in the comment on the Quality Assurance Project Plan, all PAHs should be analyzed by EPA Method 8270 C SIM in order to achieve the required detection limits. However, PAHs may be analyzed by the standard 8270 method as long a follow-up analysis by the 8270 SIM method is also performed as necessary to achieve the required detection limits.

Table 6-2, Water Analytes: Why are some water analytes considered NA, such as DDD, DDE, and DDT?

Table 6-3, Tissue Analytes: Dioxins and furans and butyltins are footnoted as not being analyzed in Round 1 tissue samples. The human health samples have proposed tissue samples for these dioxin/ furans, and eco has some proposed TBT samples.

Table 6-3, Tissue Analytes and Methodology: As discussed in the June 26, 2002 meeting, footnote 2 states incorrectly that dioxin analyses will not be performed during Round 1.

Comments specific to field procedures

- Sample labels: why not just use the top and bottom horizon depth in the subsection code, rather than the letters a proposed? It would seem more explicit and less prone to confusion.

- Positioning: How will the sampling position be maintained during multiple grabs?

- A minimum grab penetration should be included as a requirement. Also, with a minimum grab penetration, the maximum number of grabs that would be required to meet the volume requirements can be calculated, rather than using the apparently subjective estimate of four grabs. Similarly, why is the benthos tissue collection to be subjectively limited even if the necessary data are not collected?

- The overlying water must be removed from the grab prior to removing the sediments. The procedure should be described.

- For simplicity, the VOCs should just be collected from the first acceptable grab. The sampling procedure provides sufficient randomization.

- The rationale and discussion of the Atterburg limit sampling should be moved to

Sections 2 and 4 to be consistent with the other discussions.

- The plan should provide more detailed discussion of the procedures to be employed in generating the field blanks and replicates. The numbers of samples are known. The numbers of blanks should be specified, not just referred to as about percentages. Similarly, replicate and field blank locations should be specified.

- What will be the source of site and potable water used to rinse the equipment? Will the water used for sieving the benthos samples be filtered?

- We do not understand the rationale behind varying the composite ranges for the beach sampling. It is not obvious that exposure by either humans or wildlife to parcels of beach increases with the length of the beach. In addition, if the issue is limiting the number of samples, increasing the number of subsamples can be done without increasing the number of composites.

- We are not sure it is a problem, but we are concerned about measuring TSS in the water samples in the lab after preservative has been added. Most studies we have been involved with measured TSS in the field.

- Why are the butyltins and VOCs included in the standard water analyte list, Table 6-2, if they will not be measured?

FSP Figure 2-1. The legend for this figure indicates that sediment will be measured at every Benthos (tissue) station and Benthos (Tissue/Chemistry) station.. This is a very good idea but it is not discussed elsewhere.

Appendix B: Increase the number of beach samples as recommended in the comment on Figure 2-5.

Appendices

Appendix A

Section 1.0, Page 1: Habitat restoration could be folded into Portland Harbor clean-up activities, but the RI doesn't contemplate the collection of such data. As a result, it is premature to discuss habitat restoration in any detail within the FS Work Plan.

Section 3.2, Page 7: Although not strictly treatability studies, evaluation of the physical parameters of the sediment will be necessary to evaluate dredging or excavation techniques that may be used to remove contaminated sediments from Portland Harbor.

Attachment A, Section 2.2, *(changed from 2.1)* Page 3: River water must be considered in the FS Work Plan. River water was identified as a complete and significant exposure pathway to be evaluated in the ecological risk assessment Work Plan (See Figure 2-6).

Attachment A, Section 2.3.2, Page 4: Subsistence and Tribal fishing scenarios must be listed. These do not fall under the human recreational exposure pathway.

Attachment A, Section 2.4, Page 6: As stated previously, it is premature to discuss issues related to Natural Resource Damage Assessment restoration at this time.

Attachment A, Section 2.5, Pages 7 and 8: It is inappropriate to limit preliminary remedial action objectives to "ambient levels" as defined in this section. The FS must consider protective or natural occurring background. It may be determined that it is infeasible to remediate to concentrations that are below anthropogenic background. However, it is premature to make that determination at this time. In addition, the term "Promote" is inappropriate in the CERCLA context. The FS must consider the implementability of actions within the context of an industrial harbor and a dynamic river system.

Attachment A, Section 3.6, Page 12: Sediment removal and disposal options should include hazardous waste determinations and potential evaluation of land ban restrictions.

Attachment A, Section 4.3, Page 15: Evaluation of potential future natural attenuation should include evidence of past or current natural attenuation.

Attachment A, Section 5.0, Page 22: Table 2: TMDLs should be included as an ARAR.

Attachment D, Section 2.1, Page 5: Another step in evaluating natural attenuation could be to identify contaminants that are not suitable for natural attenuation (e.g., PBTs), and eliminate those areas from further consideration.

Attachment D, Section 5.0, Page 14: Most mass movement occurs during infrequent storm/flood events. Remedies should take this into account. For example, sediment caps should withstand these more intense erosional periods.

Appendix B

General Comments

This technical memorandum is not an objective analysis of potential early action sites. All it clearly demonstrates is the parties' unwillingness to perform early actions.

Specific Comments

Section 2.3.1, Page 7: Criterion 2, "River Sources." Basically, this criterion says that if a site could be re-contaminated from in-river sources, it should not be cleaned up. Is there enough information to determine whether re-contamination is likely? If not, this is a significant data gap that should be clearly addressed in the sampling plan.

Section 2.3.1, Page 8: Table 1, checklist decision factor 9. The text here says that the decision to proceed with an early action must be made using existing information. Necessary information can and should be collected during Round 1. Developing sufficient information to make early action decisions should be identified as a Round 1 data gap.

Section 3.1.1, Page 11: Evaluation Areas. The areas evaluated were limited by the navigation boundaries. Why? Do Respondents assert that contamination from upland facilities cannot move into the navigation channel?

Section 3.1.2, Page 17: Likelihood of Exposure. "*Fish are the only likely food to be contaminated in the river.*" Not true; people eat crayfish as well.

Section 3.2, Page 18: Results of Evaluation. "*Most of the evaluation areas have unconfirmed potential upland sources nearby and/or upstream.*" It may not be necessary to achieve source control before early actions, especially if the purpose of the early action is to remove a mass of highly contaminated material. Early actions need not be final actions. Early actions could be performed to remove large in-water sources now once the RI is complete and risk-based cleanup levels have been determined.

Section 3.3, Page 21: We disagree with the conclusions presented in the early action technical memorandum. There are numerous candidate areas for early actions such as Atofina and GASCO. This technical memorandum is not an objective analysis of potential early action areas.

Appendix C

General Comments

The ERA indicates in most places that the risks to fish will be assessed using comparisons to tissue residue TRVs, with the addition that non-accumulating COPCs, specifically PAHs and most metals, would be assessed using dietary-dose TRVs. However, given the limitations of the TRV data available, both dietary-dose TRVs and tissue residue TRVs should be developed for all COPCs if possible, and used in a weight-of-evidence discussion of risks.

The modeling to be used to estimate dietary doses for fish (or other wildlife) is not presented. The most limited reading of the proposed approach is that the crayfish tissue concentrations will be the only measure of COPC concentrations in fish feeding. But it is not clear how such an approach would or could be extended to areas where the prey biota were not sampled. More-or-less standard Gobas-type models are available and should be used, using literature and best professional judgment to parameterize the model for data not directly measured.

There is no discussion of how exposure concentrations will be developed, considering the locations where samples are collected, collection frequency, and home ranges. The approach indicates that either 95% UCL or spatial weighting would be used, but limited details are presented about what data would be assigned to the exposure field for each specific measured or potential receptor species. At other sites, the sediment data have been used to develop an overall exposure field using krieging or simple spatial weighting using such procedures as Thiesen polygons, then overlaying the biota ranges on this field to estimate exposure conditions. However, it is difficult to apply these approaches to large river systems such as the Willamette. Because of dynamic flows, river sedimentation is known to be very complex in space and time. Most of the proposed new sediment samples proposed for Round 1 are hundreds of meters apart. This coverage seems very limited to provide reasonable exposure estimates, particularly since there are limited data to estimate the heterogeneity in most of the river sediments.

The document does not addresses the cumulative effects of multiple contaminants nor the possibility of threshold effects.

Specific Comments

Section 1.1, Page 2: Top of page. The text here contradicts the bullets on the preceding page. The text on page 2 says that a baseline risk assessment won't be prepared until after Round 2. Respondents should clarify which is correct, and explain how the Round 1 data will be used to define the Round 2 sampling needs. The text sometimes refers to a baseline ERA after Round 1, but in other places calls it a "Data Evaluation Report" or a "screening level risk assessment." The word used to describe the report that will be written following Round 1 and more importantly, the purpose of it, should be clear and consistent throughout the document.

Section 1.7, Page 5: Deliverables: It is stated that round 1 data will be analyzed in an "ERA Tier 1 or screening level analysis." The objectives of this exercise should be clearly stated.
Section 2.1.1, Page 8: Bulleted text: It is stated that the assessment endpoints were selected based on several criteria including "consistency with ecological management goals for the site." This is not appropriate given there is not agreement with Respondents' current management goal.

Section 2.1.1, Page 8: Assessment Endpoints, Benthic Invertebrates: It is stated that the benthic invertebrates will be assessed as a community. This could mean that certain populations may not be protected (usually the most sensitive) because the "community" or one aspect of the community may be okay. This may not be appropriate if there are certain "keystone species" on which certain organisms depend on. This may include aquatic insects for salmonids, or clams as an important resource. These organisms may need to be assessed separately.

Section 2.1.1, Page 11: Top of page. "Fish, birds, mammals, amphibians, and reptiles will be evaluated at the population level." What does this mean? EPA guidance says that cleanups should be protective of "local" populations of animals. How will Respondents define a population for the purposes of the risk assessment?

Section 2.1.2, Page 11: Testable Hypotheses. Is their ecosystem function impaired? An example of such impairment is a decrease in the ability of plants to uptake nutrients.

Section 2.1.2, Page 11: Assessment Endpoints. The assessment endpoints refer to "concentrations in media in the ISA." Will this allow for the assessment of food chain impacts? If not, it should say "in media or prey items." Also, the assessment should be focused on the ISA, but not limited to it.

Section 2.1.3.3, Page 13: Measures of Ecosystem and Receptor Characteristics, 2nd Paragraph: It will be difficult to separate out effects of chemicals and effects of physical stressors (temp, oxygen, etc.) on receptors in the risk estimates.

Section 2.3.1, Page 16: Top of page. Why doesn't Table 2-1 include the 16 Dames and Moore stations, the Hjort study, or the Ward studies?

Section 2.3.1.2, Pages 17-20: Epibenthic Community Structure and Function. The descriptions of the various taxa appear to be a mix of information from site-specific data and the literature. It should be noted that this information does not, in all cases, present an accurate representation of the community. The Amphipoda section is a generic description of this organism. The section does not mention the amphipod Corophium salmonis, an important food item for juvenile salmonids that is found in the lower Willamette River. The description of amphipod habitat (from Pennak 1978) does not characterize that of *C. salmonis*, which is often found in water deeper than 1 meter. The description of habitat of Decapoda (crayfish seldom found in depths greater than 1 meter) may not represent the habitat used by crayfish in the Willamette River.

Section 2.3.1.2, Page 18: Ephemeroptera: Burrowing mayflies should be added to this description.

Section 2.3.1.2, Page 19: 1st Paragraph, Crayfish: Crayfish can be found in deeper waters (greater than 1 meter). As a result, habitat greater than 1 meter should be considered in the eco evaluation.

Section 2.3.1.2, Page 20: 3rd Paragraph, Clams: Clams are found in the river system and are important as a resource both to ecological receptors and possibly human health. These organisms may also be important indicators of PAH accumulation, and therefore should be sampled separately.

Section 2.3.2.3, Pages 28-31: Carnivores (salmonid). It should be noted that the discussion and conclusions regarding residence time for juvenile salmonids is based on preliminary data. Because of minimum size limitations associated with the weight of the transmitter tag, radio telemetry studies are limited to observations of larger juveniles. The studies do not represent the residence timing of smaller subyearling fish. Studies conducted with subyearling fall chinook salmon (peak migration past Willamette Falls in May and June) do not represent subyearling chinook that are found in the river in February through April. Recent studies (North et al. 2002) have shown that juvenile salmonids are present in the lower Willamette River during all months of the year, and that a variety of age classes, with varying life history characteristics and residence times are present.

Section 2.3.2.3, Page 30. Regarding the discrepancy on out-migrant counts, what entity did the counts at Willamette Falls and Clackamas hydroelectric dam and what was the reason for the count discrepancy by North et al 2002?

Section 2.3.2.3, Page 31. What are the salmon lifestages known to occur in the lower Willamette River (LWR)? What are the known out migration times for adult salmon? Also, the description of migration time from RM 3.5 – RM 18.5 presumably refers to downstream migration and is a typo (RM 3.5-1.8?).

Section 2.5, Page 41: Bullets. Were lipid content and the propensity to bioaccumulate contaminants considered? How about existing tissue data?

Section 2.5.2.1, Page 43: Omnivores/herbivores. It is assumed that early life stages of largescale sucker and white sturgeon are likely to be present in the ISA. Juvenile fishes are often more susceptible to contaminants than adults. How does this risk assessment, with its focus on tissue toxicity reference values, address the risk to juvenile fishes?

Section 2.5.2.2, Pages 44-45: Carnivores. In addition to the sculpin (not instead of), the peamouth (Mylochelius caurinus) should be collected as a representative of this group. This resident fish is common in the Willamette River, is primarily insectivorous, and feeds across a

wider range of habitats than the sculpin. This issue was discussed, and an agreement reached to include peamouth as an additional species, at a June 26, 2002 meeting with Respondents.

Section 2.5.2.2, Page 44: Carnivores. We suggest that spring chinook rather than or in addition to fall chinook be the selected representative salmon species for the ERA since spring chinook spend more time in freshwater.

Section 2.5.2.2, Page 45: (changed from p. 35) First full paragraph. "A particular species of sculpin as (sic) not chosen because they are difficult to distinguish and are similarly exposed." Several species of sculpin are found within the proposed sampling areas (mottled sculpin, prickly sculpin, and reticulate sculpin). We do not know how chemical residues might vary among species, but having differing amounts of multiple species in composite samples will likely increase the variability among sites.

Section 2.5.2.3, Pages 45-46: Piscivores. The fact that the northern pikeminnow has a bounty on it is irrelevant to its potential selection as a representative of this guild. Northern pikeminnow should be included as an additional (not instead of) piscivorous fish. Pikeminnow have a larger range, integrate food items over a larger area, and are more strictly piscivorous (above a certain size) than smallouth bass. This issue was discussed, and an agreement reached to include northern pikeminnow as an additional species, at a June 26, 2002 meeting with Respondents.

Section 2.5.2.4, Page 46: Detritivores – Lamprey – It is assumed that lamprey are likely to be less exposed to ISA contaminants than the "maximum residence in fresh water." Depending on the "maximum residence in fresh water," this may or may not be true. Lamprey ammocoetes, despite moving "progressively downstream" as they mature, remain in freshwater for up to 7 years. Sculpin, a targeted ERA species, lives 4-7 years, crayfish live 2 years. In addition, lamprey also have a very high lipid content as compared resident species.

Section 2.5.2.4, Page 46: Detritivores. No mention is made of adult lamprey, which migrate through the ISA on their spawning migration. Has information on their transit time through the ISA, area of occurrence, habitat preferences, etc., been evaluated and does this information indicate that there is no risk? If not, information should be sought on the habits of this life history phase, and toxicity data from the Great Lakes lamprey control programs should be reviewed to assess the potential for risk from contaminants occurring in the ISA to adult Pacific lamprey.

Section 2.5.3.1, Page 47: Omnivores/Herbivores. Although members of this group may not be as exposed to contaminants as others groups, they are exposed and could be more sensitive or biomagnify chemicals at a greater rate. Also, the document fails to acknowledge that these species drink water, and so that water is an exposure pathway.

Section 2.5.3.3, Page 48: Piscivores- Birds- Given that Osprey are migratory birds, spending only several months feeding in the ISA, how will Respondents address this bird's body burden of

contaminants relative to uptake from food sources outside the ISA? And how could this allocation methodology be applied to Anadromous fish? The Belted Kingfisher and the Pelagic cormorant are described as a "confirmatory species." What does this mean and how will "confirmatory" data be used in the ERA?

Section 2.5.4, Page 49: Mammals. The document states that river otters are less sensitive than mink to contaminants, but there is no evidence given to support this. The fact that mink are sensitive to PCBs, while a good criterion for mink, does not preclude otters also being sensitive. In addition, PCBs are only one contaminant. Another consideration is that since river otters spend a lot of time in the water, it seems that their exposure is greater.

Section 2.6, Page 50: Potential Exposure Pathways. The paucity of data regarding some of the potential exposure routes warrants consideration of additional designations: "incomplete and of unknown significance," and "complete and of unknown significance," which would lead to more data evaluation and potential investigations in Round 2 sampling. This would be in keeping with the intent of a risk assessment, as stated on Page 72 of the Round 1 Work Plan, volume 1: "The first tier is often conservative and broad in scope to ensure no potential pathways, COPCs, or potential receptors are prematurely eliminated from the analysis."

Section 2.6, Page 50: Potential Exposure Pathways. Some elaboration should be provided on what is intended for "complete and minor" and "complete and uncertain" pathways. Exposure via pathways determined to be complete and minor is considered to be minimal. What does it mean that they will not be evaluated explicitly in the data evaluation? How will the uncertainty assessment be factored into the determination of risk?

Section 2.6, Page 50: Potential Exposure Pathways. We are concerned that "complete and minor" pathways will not be evaluated explicitly in the data evaluation. Even though a path may be minor when compared to other pathways, it may still have impact. This approach also ignores cumulative impacts of multiple chemicals and threshold effects.

Section 2.6.1.1, Page 50: Benthic Invertebrate Community. Along with direct dermal exposure to the particulate phase and ingestion, pore water represents a significant source of exposure for sediment dwelling organisms. Section 4.1, Chemical Distributions in Sediment, in Volume 1 of the Work Plan, states "For some analytes, sediment pore water is the preferred media." How will bulk sediment chemistry evaluate pore water contact? Will bulk sediment chemistry reflect concentrations of volatile organic compounds and some metals, that do not partition into sediments?

Section 2.6.1.1, Page 51: Top of page. The text here does not match Figure 2-6. The text describes benthic infauna exposure to groundwater to be complete and uncertain, but it is filled in as complete and evaluated on the figure. A similar error occurs for the direct exposure of crayfish to sediment.

Section 2.6.1.2, Pages 51-52: Sculpin, Largescale Sucker, and Lamprey: It is stated for these species that "sufficient toxicological data are not available to assess risk via the direct sediment pathway for polycyclic aromatic hydrocarbons (PAHs) and metals, and therefore the pathway for these chemicals is complete and uncertain" (will not be evaluated). This is not appropriate, as direct contact with sediment contaminated with metals and PAHs may be a significant uptake pathway.

Section 2.6.1.2, Page 51: 1st Paragraph, Crayfish. It is stated that absorption of chemicals from sediments through the carapace of crayfish is likely to be minor and will not be evaluated. Is there enough data to support this?

Section 2.6.1.2, Page 51: Smallmouth Bass. Sediment ingestion may not be a minor pathway for this species. They feed on crayfish which live in the sediment, and often reside in burrows.

Section 2.6.1.2, Page 51: Piscivore - smallmouth bass. Are data available to substantiate the determination that sediment ingestion is a minor pathway? A comparison of the determination of the significance of sediment ingestion for smallmouth bass, piscivorous birds (Page 62) , and mink (Page 63), is interesting. All three species consume similar prey items, yet sediment ingestion is considered a complete pathway of exposure for piscivorous birds and mink, but not for smallmouth bass. This is a candidate for an "incomplete and of unknown significance" designation. Information could be developed during the Round 2 investigation to address this pathway.

Section 2.6.1.2, Page 51: Carnivore - sculpin. It is not clear how pathways determined to be complete and uncertain will be evaluated ("...will not be evaluated explicitly in the data evaluation."). The direct sediment pathway, which may be an important exposure pathway to sculpin, is determined to be complete and uncertain for PAHs and metals because of insufficient toxicological data. Does this imply that there is sufficient data to evaluate this pathway for other chemicals? This is another candidate for a separate designation of "complete and of unknown significance." Additional information could be developed during the Round 2 investigation to address this pathway.

Section 2.6.1.2, Pages 51-52: Carnivore - juvenile chinook salmon. Juvenile salmonid stomach content analysis in Puget Sound estuaries indicates that they ingest sediments. Sampling has shown PAH concentrations in juvenile salmonid stomachs in the hundreds of parts per million. These concentrations are higher than those found in prey items consumed, indicating that these fish may be ingesting sediment or tar balls that may be on the sediment surface. Sediment is also ingested through the gut content of prey items. This is a candidate for an "incomplete and of unknown significance" designation, rather than "complete and minor." Additional information could be developed during the Round 2 investigation to address this pathway.

Section 2.6.1.2, Page 52: Omnivore/herbivore - largescale sucker. Please refer to the comment on sculpin, above, with regard to the potential effects of PAHs and metals through the direct

sediment pathway. This is another candidate for a separate designation of "complete and of unknown significance." Additional information could be developed during the Round 2 investigation to assess this pathway.

Section 2.6.1.2, Page 52: Detritivore - Pacific lamprey ammocoetes. Please refer to the comment on largescale sucker, above, with regard to the effects of PAHs and metals through the direct sediment pathway. This is another candidate for a separate designation of "complete and of unknown significance." Additional information could be developed during the Round 2 investigation to assess this pathway.

Section 2.6.2.1, Page 53: Spotted Sandpiper. Surface water contact and ingestion are considered complete and minor pathways, and will be not evaluated. This may not be appropriate, given that this organism may be ingesting surface water while feeding in sediments.

Sections 2.6.1.2-2.6.1.3, Pages 51-53: We disagree with the assumption that juvenile chinook salmon, small mouth bass and mink do not come in direct contact with sediment and that ingestion of sediment is a complete but minor pathway. The ingestion of sediment should be considered "complete and evaluated" according to Respondents' exposure pathway designations. Simply because a pathway may be minor when compared to other pathways does not justify a "null exposure" conclusion. This reasoning ignores the cumulative impacts from multiple exposures to the same chemical and multiple exposures to multiple chemicals.

Section 2.6.2.2, Page 53: Mammals. The pathway designation in the text does not agree with the pathway designation in Figure 2-6. Also, how can direct exposure to water be insignificant for a mink? Mink swim and feed in the river.

Section 2.6.2.2, Page 53: Mammals. We disagree with the assumption that mammals do not come into direct contact with sediment. Information on ingestion of sediment should be included and discussed for mink or other mammals prior to eliminating this pathway.

Section 2.6.2.2, Page 53: Mink. The surface water pathway (contact and ingestion) is eliminated for this organism. Information on this pathway should be included and discussed prior to eliminating this pathway.

Section 3.4, Page 55: Tissue Data. It is stated that uncertainties are associated with QA/QC in all tissue studies. These uncertainties should be described.

Section 3.6, Pages 55-56: Summary. The text only explains what data currently exists, and offers no insights into how existing data influence the Work Plan.

Section 4.1, Page 57: Target Analyte Selection and List Development. This section should include a discussion of how the historic data was used (if it was) to select the target analyte list for Round 1.

Section 4.1, Page 57: Target Analytes. It is stated that only category 1 data was used to determine target analytes for sediment. Category 2 data should be uses as well; anything detected in previously sediments above screening levels should be included as a target analyte.

Section 4.1, Page 57: Target Analyte Selection and List Development. The process described in the document for selecting the target analytes and the COPCs gives insufficient detail. It is not clear how historical data will be used, and no justification is given for the 1990 cutoff date for data.

Section 4.2, Page 58: COPC Selection Process. The document states that, "the Round 1 data will be combined with the existing sediment data [but that] existing tissue and surface water data will not be used due to QA/QC concerns to identify specific COPCs for each receptor." How will the data be "combined" and then how will this "combined" data be used in the COPC selection process? If existing tissue and surface water data are not used, will the Round 1 tissue data really be enough to develop a COPC list for each receptor? We believe the Round 1 tissue data, as proposed, will, by itself, be insufficient data from which to select COPCs for receptors. How and what criteria will be used to "further evaluate and refine" the COPCs for each receptor in the "data evaluation and baseline risk assessment?" The selection process is not well defined and appears to result in the elimination of COPCs without adequate justification.

Section 4.2, Page 58: COPC Selection Process: It is stated that "analytes for which no toxicological values are obtained will not be retained as COPCs". This is not appropriate. All COIs that are detected without toxicological information should be retained as COPCs. COPCs should be selected based on the concentration of an individual COI concentration, and also on a multiple contaminant basis for one media (i.e. sediment). Also, contaminants detected in multiple media (e.g. both surface water and sediment) should be screened against benchmarks accounting for exposure that could occur in both media.

Section 4.2.1, Page 58: Benthic invertebrates. Are the TECs to be used as conservative effects-based sediment concentrations from Ingersoll et al. (2001)? Additional information should provided on how screening values will be determined for chemicals that do not have a published TEC. More information should be provided on how "appropriate toxicity values" will be determined for analytes that do not have corresponding AWQC values. It is recommended that this value be determined based on the lowest reported effect level, used with an application of a safety factor of ten to protect sensitive species. This comment also applies to the following sections where AWQCs will be used in the selection of COPCs. Also, sediment concentrations that exceed bioaccumulation-based sediment quality guidelines (PCBs, organochlorine pesticides, PCDDs, PCDFs) should be included as COPCs (NYSDEC 1999).

Section 4.2.1, Page 58: Benthic Invertebrates. If there is no TEC, what would be the other "conservative benthic screening value" that would be used?

Section 4.2.1 and 4.3.1, Pages 58 and 61: It is stated that to determine COPCs for the site, sediment concentrations will be compared to conservative effects-based sediment benchmarks, which will be TECs (threshold effects concentrations). However, to determine which organisms are potentially exposed to COPCs, sediment data will be compared to PECs (probable effect concentrations). Since the objective of this screen is to "identify the chemicals whose concentrations exceed sediment quality guidelines and to define the areas where exceedances occur", the PEC is an inappropriately high value to screen against. This process could screen out areas below the PEC where effects are occurring. The TEC should be used for exposure screening.

Section 4.2.2, Pages 58-59: Fish. The COPC list should be the same for all fish, so that if an analyte shows up as a concern for one fish via any pathway, it is evaluated for all fish. As with benthic invertebrates, sediment concentrations that exceed bioaccumulation-based sediment quality guidelines (PCBs, organochlorine pesticides, PCDDs, PCDFs) should be included as COPCs (NYSDEC 1999).

Section 4.2.3, Page 59: Wildlife. Typographical error in fourth line; change Section 4.2.3 to 4.3.3.

Section 4.2.3, Page 59: Wildlife. Note: The document states that "methods for calculating doses for wildlife receptors are presented in detail in Section 4.2.3," which is this section.

Sections 4.2.4 and 4.2.5, Page 59: Amphibians and Reptiles and Plants. What are the proposed methodologies for the amphibian and reptile and plant reconnaissance surveys? If these resources are of concern, how will they be included when considering them as dietary pathways for higher organisms in the ERA?

Section 4.3, Pages 59-60: Characterization of Exposure. The first full paragraph on page 60 discusses the determination of exposure areas based on the home ranges of foraging areas of the receptor. What information is available with which to determine the foraging areas or range for juvenile salmonids in the lower Willamette River? This is of special concern for subyearling chinook salmon occurring in late winter and early spring, which may be part of the threatened Upper Willamette chinook ESU. These fish may occur in specific habitat types and reside in the lower Willamette River for several months. Because of the lack of information and the threatened status of this species, it should be treated as having a localized home range, and the maximum concentration used for exposure.

Section 4.3, Page 60: Characterization of Exposure
It seems that this approach is based on very assumptive variables, which, if not developed accurately, would greatly influence the proposed approach for characterizing exposure. The document states that, "the exposure point concentration will be the 95% UCL of all the data for a specific media within the ISA." Does "all" the data include historical data or only Round 1 data? Also, Equation 1 was not in the document.

Section 4.3, Page 60: Characterization of Exposure. There are no references given for this approach, and so it is not clear if it is a scientifically accepted approach or simply one derived for Portland Harbor. The data that will be used for the calculations is also unclear. It seems that the assumptions made and the choice of data to be used will greatly influence the outcome. The characterization of exposure needs to be more clearly defined before it would be acceptable. Equation 1 was not in the document.

Section 4.3, Page 60: 2nd Paragraph, Benthic COPC Distributions: It is useful to map the areas that exceed sediment benchmarks, but is unclear how risk will be characterized using this approach to "evaluate the proportion of habitats or areas of concern that have exceedances of benchmarks". This appears to be getting into establishing what is an appropriate area over which to have benthic exceedances, or defining a benthic "population". This area is likely to be very small, if it exists at all. Also, the document proposes to use PECs to map these areas, which is inappropriate.

Section 4.3.1, Page 61: Benthic invertebrates. "Sediment data will be compared to sediment quality benchmarks, such as the PECs, as a function of spatial distribution, magnitude, and frequency of exceedance." EPA does not support the use of PECs in this manner. PECs are concentrations above which adverse effects are likely to occur. The TECs would be appropriate for screening and identifying areas of potential concern. Areas with concentrations between the TEC and PEC should undergo further evaluation, such as bioassays, to determine risk.

Section 4.3.1, Page 61: Benthic invertebrates. "Crayfish tissue residue concentrations will be used to integrate the sediment, water, and dietary exposure to chemicals." There is some variability in the levels to which different macroinvertebrates bioaccumulate and bioconcentrate contaminants due to differences in the uptake and elimination kinetics between species. If there are data indicating that crayfish tissue residues are representative of the macroinvertebrate community, and that crayfish tissue residues will provide information to allow an assessment of the risk to this community, it should be presented. If this information is not available, additional species/communities should be analyzed. Other sections of the Work Plan indicate that benthic invertebrate grabs will be collected. Is the text here wrong?

Mollusks are one of the more sensitive taxa to TBT due to their high rate of uptake and limited ability to metabolize it. If there is information indicating that crayfish TBT tissue residues are sufficiently representative to assess the risk to mollusks, it should be presented. If this information is not available, Corbicula sp. or some other mollusk should be collected and analyzed. Meador et al. (1997) reported TBT BSAF values for three marine invertebrates ranging from 0.4 to 4.6 in laboratory exposures. Where do crayfish fall in the range of macroinverbrate bioaccumulation potential? Also, the EPA citation (1999) is wrong and the Meador citation is not included in the reference list.

Section 4.3.1, Page 61: TRVs. If no TRV exists for a given organism, the COPCs still need to be included as COPCs for tissue.

Section 4.3.1, Page 61: TBT Evaluation. It is stated that the effects of TBT on the benthic community will be conducted using crayfish only. There may be other important benthic receptors for which TBT needs to be evaluated, such as clams. Also, pore water should be evaluated for the effects of TBT on the benthic community.

Section 4.3.1, Page 61: Benthic Invertebrates, Groundwater. It is stated that the effects of groundwater exposure by benthic invertebrates will not be evaluated in Round 1. Therefore, contaminants should not be screened out for this pathway until it is evaluated in Round 2.

Section 4.3.1, Page 61: Benthic Invertebrates. The document states that, "Measured crayfish tissue residue concentrations will be used to integrate the sediment, water, and dietary exposure to chemicals." How will this information be "integrated?"

Section 4.3.2, Page 61: Fish. BSAF (biota-sediment accumulation factor) needs to be addressed in the Work Plan with an explanation of why it will and how it will be calculated or an explanation of why it will not be calculated. On an editorial note, the document references section 4.1.3 as the section discussion COPC selection for fish. The section is actually 4.2.2 and we refer the reader back to our comments on section 4.2.2 as being applicable to the approach described here in section 4.3.2.

Section 4.3.2, Page 61: Fish. It is stated that chemical concentrations in whole body tissues of the representative species for each feeding guild will be analyzed to determine exposure concentrations. If there are more than one species for a given guild, tissue concentrations should be estimated for both.

Section 4.3.2, Pages 61-62: Fish. What information will be used to determine the area from which to determine the spatially weighted average for the surface water exposure assessment? How will this be determined for species for which there is limited information on residence time of area of occurrence (e.g. juvenile salmonids)?

For the dietary approach for COPCs that are metabolized or otherwise regulated by fish, how will the approximation of the COPC concentration in a representative prey species be done? Will it be an area weighted average, specific habitat area weighted average, community type average, etc.? What "representative prey species" will be used in the dietary pathway for piscivores and will PAHs be measured in the prey species? We are skeptical about the dietary TRV approach for PAHs. We are not aware of any directly applicable toxicity studies. If an appropriate dietary TRV cannot be found, another approach may be needed to assess risk to fish from PAHs.

Section 4.3.2, Page 62: Fish: Estimating dietary exposure is mentioned here, but according to the Round 1A Work Plan, PAHs will be analyzed in fish tissue as well. A dietary approach and a tissue approach should be used together.

Section 4.3.3, Page 63: 1st Paragraph: It is stated that foraging ranges, daily food consumption rates, and body weights will be obtained from EPA's Wildlife Exposure Factors Handbook (EPA 1993). There may be local information that should be used to make sure the assessment is realistic and appropriate for this site. This may include the Oregon Department of Fish and Wildlife, USFWS, and other local resources and local references such as "Atlas of Oregon Wildlife", Csuti et al., 1997, which has distribution, habitat and natural history information.

Section 4.3.3, Page 64: 1st Paragraph: The Peamouth should also be considered as a prey item for the hooded merganser.

Section 4.3.3, Page 64: 3rd Paragraph, Mink: It is stated that sediment from likely mink habitat areas will be used in the exposure estimate. Do we have enough information to distinguish "mink habitat". If so, this information should be presented. Also, Figure 2-3 a-b shows mink foraging throughout the ISA, so perhaps habitat areas are not appropriate.

Section 4.4.2, Page 66: Benthic Invertebrates: It is stated that potential adverse effects will be determined based on a comparison of COPCs in sediment to PECs (Probably Effects Concentrations). A screening step to determine benthic effects should be conservative, and should include a TEC (Threshold Effects Concentration) instead of a PEC. Below the TEC, adverse effects in benthic species are not frequently expected, and therefore is a more appropriate benchmark to use for determining areas where adverse effects could occur.

Section 4.4.2, Page 66: Benthic Invertebrates. PECs or TECs (see comment on page 61, above) will be used to determine potential adverse effects to aquatic invertebrates. How will the potential effect of contaminant mixtures be evaluated? A measure such as mean PEC quotients should be considered as a means of quantifying the chemical composition of sediments that contain mixtures of environmental contaminants (US EPA 2000). U.S. EPA (2000) and Ingersoll et al. (2001) found sediments with chemical characteristics exhibiting mean PEC-Qs equal to or greater than 0.7 showed an incidence of toxicity greater than 50% for the amphipod *Hyalella azteca*in 28- to 42-day tests. Predictions of toxicity should be validated by running laboratory toxicity tests.

Information should be presented on how a comparison of tissue levels in crayfish to tissue residue effects levels in decapods will appropriately assess adverse effects to aquatic invertebrates.

Section 4.4.3, Page 66: Fish. For juvenile salmon, only the survival and growth (not reproductive) measures of effect will be looked at because they don't reproduce in the ISA and early life stages are not likely to be present for long periods of time. This may not be appropriate, since exposures early on may have an effect on reproduction. This section also states that "a tissue residue approach will be used for chemicals that bioaccumulate (such as PCBs and mercury) because tissue residues incorporate all exposure pathways, and

bioavailability is explicitly considered." These chemicals should also be evaluated for direct toxicity, and not just toxicity resulting from tissue residues.

Section 4.4.3, Page 66: Fish. The document states that "juvenile chinook salmon ... do not reproduce in the LWR and early life stages are not likely to be present in the LWR for significant periods of time ... adults of these species accumulate the majority of their chemical tissue residues outside of the LWR so maternal transfer of chemicals to eggs is not likely to be reflective of the LWR." Are these statements known to be true? No references are given and only one reference is given elsewhere in the document. Sufficient data must be collected to determine these facts since they are important for the effects analysis.

Section 4.4.3, Pages 66 – 68: Fish. How will lipid content be taken into account with COPCs such as PCBs? The higher the lipid content, the higher the resistance to lipophilic toxicants, because the compounds are associated with the lipid and not available to cause toxicity. This is especially significant with regard to evaluating potential effects on juvenile salmonids, which exhibit variable lipid contents related to their origin (hatchery vs. wild), time of year (abundant vs. sparse food supply), physiological state (smolting vs. non-smolting), etc. (Meador et al. 2002). This emphasizes the importance of ensuring that juvenile salmonids collected for tissue analysis are sampled at the appropriate time of year, are of the appropriate stock, and appropriate life stage. Whole body lipid levels should be determined and used in conjunction with the evaluation of tissue levels of lipophilic contaminants.

Survival, growth, and reproduction are emphasized in the selection of studies used to determine TRVs. How will studies related to sublethal effects, such as increased incidence of deformities, fin erosion, altered organ morphology, DNA damage, lesions, tumors, immunosuppression, etc., be factored in? These effects, which are indicators of impaired fish health, can result in increased mortality, reduced growth, and impaired reproduction.

"Separate TRVs will be selected for COPC concentrations in water and diet or whole-body tissue residues for each representative species." This sounds good, but there may not be sufficient data to develop different TRVs for each species. Also, TRVs should be developed water, diet, and whole-body tissue residues, if sufficient data are available for all three lines of evidence.

Section 4.4.3, Page 66: Characterization of Effects - Fish. Regarding the preference of studies for juvenile chinook and Pacific lamprey, the document states that, "closely related species will be given preference ... after which all fish will be given equal preference." We suggest that additional criteria be applied to the preferential treatment of toxicity studies such as similarities in lipid content, chemical sensitivity, feeding patterns, habitat, etc. that will result in the highest degree of certainty that the extrapolated data corresponds to dynamics known about chinook and lamprey.

Section 4.4.3, Page 67: Bullets. Some of these requirements are quite restrictive, and if they are strictly applied as a set, it may be hard to come up with TRVs. Bullet two, using only studies with single chemical exposures, will preclude the use of field-collected data. Most of the studies looking at the dietary effects of metals on fish are from the Clark Fork, and used field-collected prey items or laboratory-prepared food that contained a mixture of metals. The fourth bullet, requiring biological effects "directly related to the endpoints of survival, growth, or reproduction" is somewhat unclear. Would reduced ability to capture prey or sense predators be considered effects on survival? We think they should. These two bullets could be used to rank or weight studies for inclusion in the TRV determination, but they should not be used to eliminate otherwise appropriate studies.

Section 4.4.3, Page 68: LOEC and NOEC discussion. Additional criteria should be applied to the selection of TRVs based on the lowest relevant LOEC and the highest relevant NOEC. A LOEC is the lowest concentration tested where adverse effects are observed. Several contaminants have relatively few studies, and the lowest reported LOECs may be an LC50 (benzene) or an LR98 (lethal body residue) (dieldrin). Selection of a TRV based on values such as these would underestimate the potential adverse effects to receptor species. This is significant in that the null hypotheses (Table 5-1) are that the dietary or tissue concentrations do not exceed peer-reviewed literature-based LOEC for survival, growth, or reproduction. An uncertainty factor should be applied to studies where the lowest tested dose caused significant adverse effects. Also, the literature contains few studies related to reproduction, and effects are generally expressed as reduced fecundity, reproductive success, egg hatch, etc. How will TRVs address potential effects on larval or other juvenile life stages of fishes?

Section 4.4.4, Page 69: Wildlife, Last paragraph in section: It is stated that "the lowest relevant LOAEL and highest relevant NOAEL will be selected as TRVs for use in the data evaluation." For the selected range, the highest NOAEL may not be appropriate, and may be higher that a LOAEL from a different study. A range needs to be presented that considers the lowest NOAEL.

Section 4.5, Page 70: Identification of Ecosystem and Receptor Characteristics. The document states that "impacts of these factors on the receptor population will be assessed to determine whether they will influence the exposure of receptor populations." More detail is needed here. This analysis could be important for cumulative impacts of multiple chemicals and threshold effects.

Section 4.5, Page 70: Ecosystem and Receptor Characteristics: It is stated that "the impacts of these factors (exotic fish, mammal, amphibian, and plant species in the LWR altering habitat structure, increasing competition for food and habitat, and increasing predation) on the receptor populations will be assessed to determine whether they will influence the exposure of receptor populations." How is this going to be used in the risk assessment? It will be difficult to distinguish between these effects or use these other factors to diminish the significance of chemical effects.

Section 4.5, Page 70: Ecosystem and Receptor Characteristics. The text here lists other factors that can effect the exposure of a receptor to COPCs, such as habitat alterations. We understand that the lower Willamette is a highly altered environment, and that the physical system is stressful for fish. However, some of the factors listed could be caused the very chemicals the Work Plan is supposed to assess. Increased predation can be caused by chemical-induced neurological damage that impairs the ability of fish to sense predators, and slows reaction time. PCBs have been shown to cause reduced immune function in fish, making them more susceptible to pathogens. Problems caused by chemicals should not be acscribed to "other factors." Also, how will these other factors be used in the risk assessment? In the uncertainty analysis, or in a more quantitative fashion?

Section 4.6.2, Page 71: Risk Description: It is outlined that a weight of evidence approach will be used to estimate the likelihood of adverse effects from all potential pathways. Risk should be calculated for each media independently, and they quantitatively combined to show an overall risk from multiple pathways.

Section 5.1, Pages 74-75: *Proposed Work, Assessment Endpoint No. 1: survival, growth, and reproduction of aquatic invertebrates.* Pore water represents a significant source of chemical exposure to sediment associated organisms. Evaluation of the concentrations of contaminants in pore water should be included in the proposed work. Toxicity testing (survival and growth of relevant organisms) with whole sediment, pore water, and sediment elutriates should be included to identify conditions that may adversely affect benthic organisms.

Section 5.1, Page 74: *Assessment Endpoint No.1, Aquatic Invertebrates, bullet c:* It is stated that "crayfish and shellfish will be collected and chemically analyzed to identify potential risks to shellfish and crayfish." In order to support this assessment endpoint, risk estimates for shellfish and crayfish need to be analyzed and calculated separately as populations (not as a part of the "benthic community." This is not outlined in the Work Plan.

Section 5.1, Page 75: *Assessment Endpoint No.1, Aquatic Invertebrates, bullet f.* The sampling proposed for round 1 is not extensive enough to "identify potentially complete pathways to groundwater." This should be an objective of a more complete sampling event, possibly in round 2.

Section 5.1, Page 75: Proposed Work, Assessment Endpoint No. 2: survival, growth, and reproduction of fish. Sublethal effects that are indicators of fish health should be evaluated, including incidence of deformities, fin erosion, altered organ morphology, DNA damage, lesions, tumors, etc. How will information from the proposed work be used to evaluate the potential effects of COPCs on larval and other juvenile life stages of fishes? Benthic community samples should be analyzed for the full suite of contaminants, not just PAHs and metals, if sufficient tissue volume can be obtained. This data will be very helpful when / if we decide to do more formal food-web modeling.

Section 5.1, Page 75: *Assessment Endpoint No. 2, Fish, Bullets b and c.* It is not clear how sediment samples collected in round 1 will be used to identify potential adverse effects using the dietary pathway. The proposed sampling does not include an evaluation of the effects of direct sediment exposure for PAHs and metals, major contaminants that need to be assessed in this pathway. It appears that instead, the plan attempts to use tissue concentrations of the benthic community to get at dietary exposure of these contaminants to fish. This is not appropriate, and is missing a major route of exposure.

Section 5.1, Page 75: Assessment Endpoint No. 3, Birds.: It is stated that potential adverse effects to birds will be determined in "selected foraging areas". Justification for the selection of specific areas needs to be made, as birds have been observed foraging in less that desirable habitat within the ISA. This should include actual local information on sightings and information on where birds forage within the ISA. By limiting the assessment to preconceived "foraging areas" the assessment may be missing key areas of exposure.

Section 5.1, Page 75: *Assessment Endpoint No. 4, Mammals.* The one mammal outlined as a receptor for the ISA, has had surface water eliminated as being evaluated in round 1 assessment (stated here as being used to determine adverse effects to mammals).

Section 5.1, Page 76: When the risk assessment is completed, then what? The process described here will generate a list of hazard quotients. What's missing is any sense of how the hazard quotients will be interpreted, combined, and analyzed to characterize the overall ecological risks.

Figure 1-1, Portland Harbor Tiered Process: This figure, as well as language throughout the Work Plan has concentrated on identifying "risk drivers" and then concentrating on this "risk drivers" in subsequent rounds. Although it is important to identify the major pathways, this emphasis may be inappropriate since several risk pathways may add up to an overall unacceptable risk. These pathways could potentially need further evaluation. This figure is perhaps a look at the proposed overall framework for the eco assessment in Portland Harbor, which is missing from the text. More expansion on sampling that is to take place in future rounds, and how Round 1 fits into this picture is needed.

Figure 1-1: It is interesting that "bioavailability testing" is listed as a Post Round 2 activity. We think it should be addressed earlier, and that addressing it will require the collection of site-specific data not currently slated for collection.

Figure 2-4: Referenced to show the timing of salmonid migration through the LWR is, as noted in the footnote, an estimate based on limited information on the Columbia and Willamette rivers. The timing of juvenile outmigration should be updated based on more recent studies (i.e. North et al. 2002 and data from subsequent rounds of this ongoing study when available).

Figure 2-6: Preliminary Conceptual Site Model for Ecological Risk. The figure should be modified as follows:

Add two new designations:

- Incomplete and of unknown significance, and 2) Complete and of unknown significance.
- The smallmouth bass sediment ingestion exposure route should be from incomplete and of unknown significance.
- The chinook salmon sediment ingestion exposure route should be incomplete and of unknown significance.
- The sculpin, largescale sucker, and Pacific lamprey ammocoete sediment direct contact exposure route designation for metals and PAHs should be complete and of unknown significance.

Figure 2-6, Preliminary Conceptual Site Model For Ecological Risk Assessment.

- Pore water should be separated out from sediment, as exposure to aquatic organisms may be different, especially in contaminated groundwater flux areas. [Groundwater > pore water > surface water]. Pore water exposure should be separate and complete for the benthic community.
- Direct contact to surface water should be revised for mink, sandpiper, and hooded merganser (to be complete and evaluated).
- Sediment ingestions should be complete and evaluated for the smallmouth bass.
- For direct contact to the Sculpin, Largescale sucker, and Pacific lamprey ammocoete for PAHs and metals should be complete and evaluated.

Table 2-3: (changed from 2-5) Fish Home Ranges. This should be revised to reflect a more accurate assessment of the North et al. study for the smallmouth bass home range – not the largest reported. The same should be done for the northern pikeminnow.

Does this mean that it is impossible for a black crappie to have a home range smaller than 2 miles? (which is not likely).

Table 2-8: Species of Special Interest Within The ISA: The Columbia spire snail is listed as SOC (species of special concern) status within the ISA. This is a federal status. Special consideration should be given to determine if this snail is found within the ISA and where. This also applies to the Columbia tern and the reptiles / amphibians on the list.

Table 2-8: Add the Chinook salmon Upper Willamette ESU as a threatened species. Also, a key at the bottom to define "SV," "SU" and other acronyms would be helpful.

Table 3-3: Sediment Surveys Within the ISA, Usability Column. A large quantity of the studies were considered "category 2 data." More description should be provided on why certain data was excluded. If it is a matter of obtaining the appropriate reports, perhaps more effort needs to be made to obtain the documentation instead of potentially ignoring valuable data. Although the category 2 may not be useable for the risk assessment, it is likely suitable for identifying contaminants and areas of concern.

Table 4-1: Secondary stressors that may receptor populations in the LWR. Although this table is described in the text as examples of secondary stressors, it is incomplete.

Table 5-1: It appears there was a printing or formatting error – the Null Hypotheses column in incomplete for several rows.

Table 5-1: Assessment Endpoint for Birds, Osprey/Bald Eagle. It is stated that the null hypothesis is "the exposure dose does not exceed a peer-reviewed literature-based LOEC for survival, growth, or reproduction". The toxicological benchmark should be the NOAEL for the bald eagle, as well as the osprey if it is being used to represent eagle, because the eagle is a listed species.

Other birds: Ingestion of contaminated prey is listed as the linkage between assessment endpoint and measures. This should also include direct sediment and surface water exposure. This also includes the evaluation of exposures to PAHs and metals.

Table 5-1: Fish, Chinook Salmon, prey and fish tissue: For PAHs and metals and tissue concentrations it is stated that the hypothesis is that "the dietary concentration does not exceed a peer-reviewed literature-based LOEC for survival or growth." The benchmark should be a NOAEL for listed species.

Attachment 1, Section 1.0, Page 1: Ecotoxicological Profiles, Introduction. "The historical dataset for the ISA was evaluated in order to identify the classes of compounds that have been previously measured in the sediment, tissues, and surface water ...." It is not clear how, if at all, the historical data was used in the selection of COPCs. Overall, this is a good write-up. It identifies behavioral effects, immune system response effects and other effects that should be addressed in the risk assessment.

Appendix D

General Comments

Pregnant and lactating women and their offspring are a unique subgroup of concern. Some contaminants that may be present in fish or other contaminated media within Portland Harbor may accumulate in breast milk or be transferred to unborn children. Methods for quantitative assessment of these exposures are emerging, and should be considered for at least some contaminants by Respondents.

Also, note that some comments below present a range of values (e.g., ingestion rates for fish consumption). We have included a variety of values rather than recommend a specific value at this time because discussion on some exposure factors are ongoing and we want Respondents to be aware of the range of values under consideration.

Specific Comments

Section 1.0, page 1: The text states "this document is intended to facilitate discussions...." This statement implies that the approach presented in the Work Plan is "soft" and subject to modification pending comments. We would have rather seen a document that encompassed discussions conducted to date between the EPA and its partners and Respondents. Instead, this document reiterates approaches that have not been acceptable to EPA and its partners.

Round 1 sampling, as proposed in the Work Plan, is a very initial and limited aspect of the RI/FS (focused on the ISA) and should not be considered "the most significant data-gathering event of the RI/FS" nor should it be characterized as "focusing on the nature and extent of chemicals in sediment ... in the lower Willamette River." The focus appears to be on the ISA and does not fully address CERCLA's statutory scope of *where site contaminants may have become located.*

Generally, the Yakama Nation remains concerned about Respondents' repeated expectations for this Round 1 sampling/investigation effort and the lack of any description or data criteria that would or would not instigate a Round 2 sampling effort.

Pages 1-3, Section 1.1 HHRA Objectives and Section 1.2 HHRA Approach: The HHRA objectives and scope need to address not only risks associated with the ISA but also risks associated with *where site contaminants may have become located* and pose human health risks. Regarding biota consumed by humans, we object to limiting the HHRA to those species caught in the ISA. Rather, reality dictates that Respondents must determine whether or not species caught and consumed outside the ISA are contaminated with site related contaminants due that species' use of the LWR as habitat and are consequently posing a human health risk to people who eat those species.

We appreciate the direction of the logic that certain resident species are more likely to bioaccumulate certain site contaminants at higher levels than certain anadromous species. The only way that tribal members will be protected by cleanup goals established from data generated under the current Work Plan will be if: 1) resident species really do have higher levels of all site contaminants (which drive risks) in their tissue as compared to adult Anadromous species and; 2) human consumption rates and other assumptions used in the HHRA are protective of tribal subsistence consumption patterns and exposure scenarios.

Respondents do not currently know what accurate consumption rates are for tribal and non-tribal members consuming resident or anadromous species. We do not have good site-specific data on tribal consumption of Willamette River spring chinook and Pacific lamprey. Nor do we really know with absolute certainty that tribal members do not consume River Lamprey or other lamprey species. (Representatives of Kennedy Jenks accompanied Yakama Nation tribal members during the lamprey collection on July 22, 2002, but the attending biologists examined only 4-5 lampreys out of over 200 collected by tribal members).

Section 1.2, page 2: While site-specific data is preferable to default assumptions in risk assessment, it must be of sufficient quality so that it accurately represents potential exposures at a site. In the case of some of the fish consumption data proposed for use in the baseline HHRA, there are questions about how well that data represents potential consumption patterns within the ISA.

Some level of evaluation will need to be done with the data collected in Round 1. It is unclear from the RI/FS Work Plan if Respondents are proposing a risk screening against "risk-based screening levels" or a "human health risk assessment" as mentioned in this section using the assumptions in Appendix D. The level of evaluation and the methods to be used must be decided in subsequent meetings with EPA and its partners and Respondents.

Section 2.3 - Identification of COPCs

Section 2.3.1 Sediments

Comparison With Background (Section 2.3.1.1, page 6): EPA recently issued guidance on dealing with background in the Superfund process (Role of Background in the CERCLA Cleanup Program, April 26, 2002, OSWER 9285.6-07P). This policy "recommends a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization. Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished. COPCs that have both release-related and background-related sources should be included in the risk assessment. When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization. In summary:

(1) The COPCs retained in the quantitative risk assessment should include those hazardous substances, pollutants, and contaminants with concentrations that exceed risk-based screening levels.

(2) The Risk Characterization should include a discussion of elevated background concentrations of COPCs and their contribution to site risks.

(3) Naturally occurring elements that are not CERCLA hazardous substances, pollutants, and contaminants, but exceed risk-based screening levels should be discussed in the risk characterization."

Any comparisons with "background" for sediments and other media must follow this guidance/policy.

This section refers to Table 1 which contains background screening levels and risk based

screening levels for "naturally occurring":

(1) A column showing baseline concentrations of "naturally occurring" chemicals which are those used for screening in the DEQ Portland Harbor Sediment Management Plan. EPA would like more information on the derivation of these numbers before agreeing to use them as baseline concentrations.

(2) A column showing the Region 9 PRGs for industrial soil to be used as risk based screening values for sediment. These are based on exposure assumptions that address only direct contact at industrial sites. They are not conservative enough for direct contact for the beach use scenarios, especially those involving children and transients. The Region 9 PRGs for residential scenarios should be used instead. If any of these chemicals have the potential to bioaccumulate in the food chain, sediment PRGs that are based upon bioaccumulation should be used for the fish ingestion pathway.

(3) DEQ's draft Sediment Evaluation Guidance, external review draft (July 31, 2002) includes a table showing background concentrations of inorganic chemicals in sediment (Table 3-4).

Frequency of Detection - Section 2.3.1.2, page 6: EPA does not agree with the use of frequency of detection as a criterion for limiting the number of COPCs selected for quantitative evaluation in the risk assessment. EPA expressed this opinion at several face-to-face meetings with Respondents and their contractors and also expressed this comment in writing related to the Preliminary Planning, Scoping, and Problem Formulation Document. The site is heterogeneous in nature and the location of potential sources may result in relatively isolated "hot spots" of certain contaminants. The frequency of detection assessment should be removed as a contaminant screening step. The text and Figures 1 and 2 should be revised accordingly.

Comparison with Risk-Based Concentrations -

Section 2.3.1.3, page 6, also twice on page 8: "Phenanthracene" should probably be changed to "phenanthrene."

As discussed above, the Region 9 PRGs for industrial soil are not conservative enough for some of the beach exposures that will be evaluated -the residential PRGs should be used instead. EPA Region 10 recommends that a hazard quotient of 0.1 be used for screening noncarcinogens to be protective of "cumulative effects that could occur when multiple noncarcinogenic hazardous constituents with similar toxic endpoints are present." (EPA 1998) In addition, these industrial PRGs do not take into account the potential for bioaccumulation and movement through the food chain. Additional PRGs (such as those developed by ODEQ) should be used for screening of bioaccumulative chemicals in sediment. Thus, the residential PRGs should be used to screen out chemicals in beach sediments where direct contact with sediments by people are possible and screening values which account for bioaccumulation through the food chain should be used to screen chemicals in deeper sediments (where contact with people is unlikely). Chemicals failing

either of these PRGs should be retained as COPCs.

Section 2.2.2 -Surface Water

Frequency of Detection -Section 2.3.2.1, page 7: See comment above regarding frequency of detection less than 5%. For surface water, an isolated detection in a near shore area may indicate the presence of groundwater inputs from an upland source; therefore, FOD < 5% should not be used to screen out contaminants.

Comparison with Risk Based Concentrations- Section 2.3.2.2, page 7: The Region 9 PRGs for tap water are based on ingestion and inhalation of volatiles emitted from the tap; dermal contact while bathing is not included. As noted above, a hazard quotient of 0.1 should be used for screening noncarcinogens. To screen for bioaccumulation of contaminants in water into biota, USEPA's Water Quality Criteria for the Protection of Human Health from Fish Consumption and ODEQ's Water Quality Standards should be included as PRGs.

Section 2.3.3 - Tissue

Section 2.3.3, page 8: The human health screening values presented in Table 2 do not include all the possible COPCs that may be identified in fish tissue. To determine that detection limits are adequate for protection of human health and also to screen the complete list of COPCs, additional HHSVs should be included in Table 2 or developed when tissue data are available.

Referring back to the Analytical Concentration Goals document, Table C-4 and C-5 (submitted to EPA April 1, 2002) from which the HHSVs were derived, we have some concerns about the values proposed. For cancer endpoints, we recommend that the exposure duration be 70 years rather than 30 years. For non-cancer endpoints, we recommend that the fish ingestion rate be at least 389 grams per day (gpd) rather than 77.95 gpd and that the exposure duration be 70 years rather than 6 years. These recommended values would provide a more conservative and protective approach to developing human health screening values for cancer and non-cancer endpoints.

Page 9 Section 3.0 Exposure Assessment
The first sentence reads, "The objectives of the exposure assessment will be to identify potential exposure pathways to individuals who may come in contact with COPCs at the site." The scope of the objective should be expanded to include COPCs at the site or *where site contaminants may have become located.* Recognizing that the RI has not yet fully identified the nature and extent of where site contaminants may have become located, it is important to recognize in the Work Plan that human health exposures and subsequent health risks may extend beyond human contact with only the ISA.

The document lists four primary tasks of an exposure assessment according to EPA guidance. The second task is to, "Identify relevant exposure pathways for human populations by which

potentially exposed populations may contact environmental media containing chemicals." We believe consumption of lamprey and adult spring chinook by tribal members is a relevant pathway that needs to be addressed.

Section 3.1, page 10: The combination of exposures for an individual through different receptor categories should be addressed quantatively for those combinations which are considered reasonable (i.e., recreational beach user and recreational fisher). The risks associated with these receptors should be summed to show what the risk would be for an individual who engages in both types of activities.

Section 3.1.1, page 10: The first sentence states, "The Site encompasses approximately six miles of the lower Willamette River." Here and in all other references in the Work Plan, it should be clear that the ISA, not the "site" encompasses this six-mile stretch. This language is misleading and inaccurate and should be changed in every instance.

Section 3.1.1, page 11- Regarding groundwater, it seems the analysis of human exposure is too simplified. The document states, "If groundwater seeps are located within human use areas above the low-water mark, then potential contact with groundwater is possible. However, if seeps are not located within human use areas or if discharge occurs below the river surface, then an exposure point does not exist and the pathway is therefore incomplete [requiring no further investigation]." Why would groundwater seeps below the high-water mark not also be of concern? Contaminated groundwater released above or below the river's surface can come in contact with humans immediately at the point of seepage as well as downriver due to the downstream flow of contaminated groundwater into a human use area. Certain contaminants that enter the river via groundwater may also contaminate sediments regardless of the release occurring above the low-water mark or below the high-water mark. All receptors can become exposed to contaminated groundwater released into the environment regardless of the exact proximity to the seepage point.

Section 3.2.2.1, page 13: It is possible that dockside workers may consume fish as either Native Americans or non-tribal consumers

Section 3.2.3.3, page 14: We do not agree that a transient's exposure to water would be minimal. Direct contact with and ingestion of surface water may be a complete and significant exposure pathway for transient residents. Someone who lives adjacent to the river may have no other source of water for drinking, bathing, and cooking; therefore, it is possible that this exposure pathway could be important for this receptor group. The text, Table 3, and Figure 4 should be modified to include these exposure pathways.

DHS has some major concerns with the potential exposure of the transient population to contaminated drinking water from the Willamette River. Our rationale for including this population is that transients, who may not have reliable access to treated water, will likely obtain some drinking water from the Willamette River (and potentially, upland surface water sources).

In addition, river water may serve as the primary means of bathing for transients. These exposure pathways should be included in a quantitative assessment of risk to transients.

Section 3.2.4, page 14: Care must be taken in selection of beach areas to be assessed for recreational use. If beach areas are limited to a few areas as indicated on Figure 3, then conclusions that this scenario is protective of other exposures/areas within the ISA cannot be made. We are concerned that there may be less obvious areas that are used by people for beach use for which data will not be collected. Following the EPA boat trip on June 27, 2002, EPA recommends that additional beach areas be sampled. These areas are provided in the comments on the Field Sampling Plan.

Section 3.2.4.1, page 15: Recreational beach users also may consume fish as either Native Americans or non-tribal consumers.

Section 3.2.4.3, page 15 and 3.2.5.3, page 20: It does not make sense that because river water concentrations are expected to be varied, that most risk is likely associated with sediments rather than water. Risk is dependent upon concentration, exposure, and dose. Therefore, the relative risk associated with surface water contact should not be discounted until data are collected.

Section 3.2.5, page 15: Based on information collected by Respondents' contractors and presented in Appendix A (Conversation Log), it appears that a recreational fisher *does* exist within the ISA. Please revise text. Also, the assessment of recreational fishers also should include exposures to children.

Page 16: We do not agree with the statement that "Estimates for recreational and Native American fishers are likely to provide conservative estimates of potential fish consumption". Recreational fishers fish for pleasure and do not necessarily rely on the River for a major portion of their protein source. Native Americans likely rely on the River as a major source of protein but many may be eating anadromous species which are likely to be less contaminated than resident fish. The non-tribal consumption fisher (who relies on self-caught resident fish as a major protein source) is the receptor with the potential for the highest exposures and risks. It is this group that may be using the River to provide the majority of the protein in their diet as well as catching resident species.

Section 3.2.5.1, Consumption of Fish, page 17-19: The analysis for receptors that consume fish and shellfish needs to be expanded beyond fish and shellfish "caught within the site" and beyond fishers who "catch fish within the site." First, the word "site" should be replaced with "ISA." A more accurate and realistic description of receptors should also include those who fish outside the ISA and who catch and eat fish that are likely to be contaminated with ISA-related chemicals (i.e., those fish that may be exposed to COPCs within the ISA but that are otherwise caught outside the ISA).

The home ranges of small mouth bass and black crappie, "are too large to determine exactly where exposure to COPCs may have occurred." How will the HHRA address this problem for resident species for the HHRA?

Tribal members consume spring Chinook salmon and Pacific lamprey in significant quantities and these species need to be investigated for the HHRA. At the very least, the proposed juvenile salmon and lamprey ammocoete tissue residue data should be used to make better determinations about potential human health risks from consuming these species that utilize the Harbor.

Regarding the exclusion of Anadromous species and sturgeon from the HHRA, we recognize that certain resident species may be more likely to bioaccumulate certain site contaminants at higher levels than certain Anadromous or "semi-anadromous" species. In sum, the only way that tribal members will be protected by cleanup goals established from data generated under the proposed Work Plan and HHRA assumptions will be if: 1) resident species really do have higher levels of site contaminants, especially those that may drive health risks, in their tissue as compared to adult Anadromous species consumed by people and; 2) human fish/shellfish consumption rates and other assumptions used in the HHRA are protective of tribal consumption patterns and exposure scenarios.

Specifically related to the 1% concentration comment (O'Neill et al., 1998): due to the lack of comprehensive studies and the limited amount of data available on bioaccumulation of various fish species, the 1% chemical concentration restriction should not apply. For example, only one study is cited by Respondents and other data are needed before such a broad discussion can be applied to juvenile uptake exposures. Also, this study examined only PCBs, which have different uptake and fate/transport mechanisms compared with other contaminants. Finally, this study used a mathematical model to estimate 1% adult uptake. Has this model been validated? Is it applicable to Portland Harbor?

Page 18 – Resident Fish and Shellfish -Criteria used for selection of target species
The criteria listed for target species for the HHRA include: significant human consumption, limited home range, potential for bioaccumulation, predators and bottom-feeders and relative abundant species. Page 19 states that these criteria were "combined" to select the initial target species. How were they combined and what priority was each criterion given?

For example, the document notes that significant human consumption is considered by EPA guidance to be the most important criteria for selecting target species. Appendix A of the Work Plan consists of Conversation Logs conducted by Kennedy/Jenks Consultants with several local fishing groups. The discussions obviously focused on resident species (because Respondents pre-determined that Anadromous species would not be addressed) but it is important to note that every conversation log identified the extensive nature of salmon fishing in the LWR by local fishers, with one individual (Mr. Ralph Steele) describing salmon fishing as the largest recreational fishery. How much salmon is caught and consumed by these local fishers? What are the predominant species consumed by Asian and Euro-American fishers and what fish parts do

they typically consume, other than the fillet? The conversation log with Mr. Bud Hartman notes that, "Several local populations (Asian and Euro Americans) fish for and consume just about any fish in the River. Some of these populations probably use the River as much or more than the local anglers."

How do the interviewees know what the most caught species are? Do people report their catch to these individuals? Are they on the river observing? Do the interviewees also fish for salmon? Do they know how much salmon is caught from the LWR? Do they know how much sturgeon is caught from the LWR? While it is generally recognized that tribal members collect lamprey from Willamette Falls, do other groups catch lamprey for consumption?

In sum, while these informal and limited discussions are helpful, they should not be the sole basis for identifying target species significantly consumed by humans for use in the HHRA.

Page 19 – Potential for Bioaccumulation. Table 5 shows a summary of limited tissue data from studies that were limited in the types of chemicals analyzed for in each species (i.e., not all COPCs or bioaccumulative compounds were analyzed for in every species) and this information should not be the only basis for determining whether one species bioaccumulates more of a certain contaminant than another species. Other factors such as specie's lipid content, age, sex, predator-prey relationships and feeding habits should be considered as well since these factors also contribute to a specie's potential to bioaccumulate contaminants.

Section 3.2.5.2, page 19: More discussion is needed regarding the elimination of dermal exposure and ingestion of sediments for fishers. We do not necessarily agree that these pathways are "minimal" or "insignificant." Children should be included as a receptor in the assessment of recreational fishers. Due to elevated hand-to-mouth activity and presence of children on beach sites and banks, a quantitative assessment of sediment ingestion should be included in the HHRA.

Section 3.4.1.1, page 21: How will data be collected to evaluate risks to dockside workers? Will a single composite sample be used to represent the exposure concentration for each industrial facility where this scenario is possible?

Section 3.4.1.2, page 21: EPA does not agree with the proposed approach for evaluating exposure point concentrations for transient residents. Shanties and other rough dwellings have been observed in upland areas adjacent to the site indicating that people may "camp" in the same area for a while. EPA recommends that exposures to transient residents be considered over smaller areas, possibly also including some recreational beach areas to evaluate exposures that occur over a long period in a smaller area.

Section 3.4.1.3, page 21: Remove the word "highly" from the 3rd sentence in this section. If a person lives close to a given beach area or prefers one beach area over others, it is likely that they may spend most of their time visiting a particular beach.

Section 3.4.2 - We are concerned about both the sampling design for surface water and how the data will be used. Surface water is of concern to human health because it may result in exposure to humans who are swimming in the River (ingestion or dermal exposure). In addition, humans may be exposed to pollutants in water as a result of bioaccumulation into fish which are then consumed. The detection levels that are used for analyses of water should be low enough to deal with both types of exposure. For the fish consumption pathway, this assumes that detection limits would be as close as possible to the WQC or OR WQS which is not the case in the RI/FS QAPP. In addition to detection limit concerns, it is not clear that a one-time sampling event will provide much useful information. More discussion is needed to try to make the collection of surface water as useful as possible.

Section 3.4.3, page 22: Additional detail needs to be provided to illustrate how composite samples collected from different areas for different organisms will be used to assess risk to individuals who consume fish from the ISA. If EPA's recommended approach is adopted (i.e., to use whole body fish samples for dioxins/furans and dioxin-like PCB congeners), then whole body samples should be used for these contaminants for all potential fish consumers.

Section 3.5.1 and Table 21: Chemical-specific absorption factors have been provided for several compounds consistent with current EPA dermal guidance; however, additional discussion of how to handle chemicals for which specific values are not available should be presented.

Section 3.5.1.2, page 24: The rationale provided (e.g., based on temperature above 32 degrees for every day of the month) for using 6 months per year for transient residents is weak. It is possible that transients may reside in the site vicinity even during cold weather months and for longer than 6 months. It is not appropriate to assume that transients "move throughout the Site and are not anticipated to remain in the Site for an extended period of time." During successive ATSDR site visits, the same transient camp was spotted over a long time interval. As many people tend to be habit-forming, it is reasonable to assume that some transients may return to familiar sites. The assumption should be that transients remain in an area that they prefer for periods of up to 365 days/year for a minimum of 2 years.

Section 3.5.1.3, pages 25, 26 and Tables 10 and 12: The use of 12 days/year as the exposure frequency for water contact for recreational beach users seems low, especially given that they are assumed to contact sediment for 94 days/year. Children frequently swim at Willamette Cove. Other beach and intensive use areas may be used as well. Perhaps surface water contact could be assumed for a greater number of days per year (e.g., 5 days/week during summer months) but for a shorter exposure time per day.

Section 3.5.1.4, page 27: EPA does not believe that sufficient data is available for a site-specific market basket approach for estimating risk. While a market basket approach can be useful in providing an example of how a multiple species diet can impact risk, there is little information on the species and amounts of fish consumed by the tribes using the Willamette River (especially the Siletz and Grande Ronde) nor on the levels of contaminants in all of the species that may be

consumed. And it is unlikely that such data will be available any time soon since a market basket survey in support of the risk assessment is not planned. Therefore, the market basket approach should not be proposed at this time.

Section 3.5.1.4, page 28, and Tables 15 and 16: EPA and its partners have commented to Respondents and its contractors that a longer exposure duration than 30 years (i.e., 70 years) should be used for the Native American consumption scenario. In addition, an exposure frequency of 365 days per year should be used for all of the populations that are assessed. Fish is often taken home and frozen for future use. And more importantly, 365 days per year should be used because fish consumption studies provide data in grams per day and/or in grams per kg per day, assuming daily consumption.

As discussed in the opening statement to these comments, many parts of Appendix D do not appear to reflect the numerous ad hoc and more formal meetings that we have participated in over the past several months. In many cases, we have provided specific comments on previous deliverables that were not incorporated into this Work Plan. This is especially true for the ingestion rates that are given in Appendix D for all of the populations. All of these ingestion rates are lower than those recommended to Respondents by EPA, ODEQ, and the trustees in the ad hoc meetings. In addition, we are not in agreement with some of the references/studies cited in support of ingestion rates in Appendix D and/or in the selection of ingestion rates using the data from these studies.

The entire discussion of the Native American fish consumption scenario is NOT conservative and ignores *all of the points* that EPA and the Trustees have made. Ingestion rates, exposure duration, types of fish consumed are all unacceptable. A higher consumption rate should be used to assess Native American consumption. The following discussion includes a variety of recommendations; one approach for the risk assessment is to present ranges of ingestion rates for the various receptor groups.

Rates as high as 885 grams of fish per day for Native Americans in the Pacific Northwest have been documented recently (Harper *et al*, 2002). The point has been made to Respondents that a lifetime exposure duration should be used for the Native American consumption scenario. Moreover, a market-basket type of approach at the site without collection of site-specific information is inappropriate; for example, Lamprey are included as 7% of total fish consumption, but no information regarding fish tissue levels in adult lamprey will be collected.

We recommend that the exposure duration for fish consumption for adult tribal members be changed from 30 years to 70 years. According to CRITFC's 1994 study, most Yakama Nation tribal members regularly consume fish throughout their lives and begin eating fish at a very early age, often by the time they are 1-2 years old. Also, some ingestion rates for children are based on a longer than 6-year exposure; if this is the case, then the exposure duration should match the period for which the ingestion rate is calculated (e.g., 15 years for some data sets). Because tribal members fish year-round and engage in fishing practices that expose the arms and often the torso

as well as the legs and hands to water and sediment, we recommend that the skin surface area for dermal exposure be increased and that the duration be increased from 6 months to 12 months.

For fish consumption, we recommend, to assure that protective and conservative assumptions are used until site-specific data is obtained, that a fish consumption rate of at least 389 gpd be used to estimate fish consumption for adult tribal members. 389 gpd represents the 99th percentile from CRITFC's 1994 fish consumption survey.

Section 3.5.2.1, page 31: We do not agree with the assumption that 5.3% of total arsenic is inorganic arsenic in resident fish. The data base for the Willamette (as well as for the lower Columbia River) on percent inorganic arsenic is very limited and show wide ranges even within the same species. In addition, the uncertainties in lab analyses and in the toxicity of DMA. argue for the assumption, at a minimum, of 10% inorganic arsenic for resident species.

Section 4.0, general: This section does not contain any discussion of how toxicity values for dermal exposures will be developed. Because dermal toxicity values are not available for most contaminants, route-to-route extrapolation may be required. Additional discussion of dermal toxicity assessment should be included in Section 4.

Section 4.1, page 33: A new version of HEAST is being developed. In addition, there are NCEA values available that may not be included in the Region 9 tables. EPA can assist Respondents with the compilation of toxicity values from the newest version of HEAST and from NCEA.

Section 4.4, page 36 and 37: Also, table 22 includes footnotes which are not defined.

There is not enough detail in this section to be able to tell if we agree or disagree with the manner in which non-detects are to be handled. For example, it is not clear what is meant by a "sample". Is it all composites caught in an area, all composites of a species, etc?. We recommend that some decision rules on how to deal with non-detected data for all analytes be discussed and agreed to by Respondents, EPA, ODEQ and the trustees. This should be done before any manipulation of the raw data is started.

The ATSDR publishes non-cancer health guidelines that include 2,3,7,8-TCDD. In addition, a weight-of-evidence toxicological review should be conducted on any contaminant that may pose a risk to human health, regardless of whether an agency approved methodology exists or not.

Section 5.2, page 39: Calculated cancer risks will be compared to the EPA acceptable risk range of 1×10^{-6} to 1×10^{-4}. In addition, calculated excess cancer risks from individual carcinogens should be compared with the acceptable risk level of 1×10^{-6} stated in DEQ rule.

Section 5.3, page 39: Will cancer risks and hazard indices associated with contact with sediment and surface water outside of the ISA be determined? No discussion or other supporting information (i.e., figures) has been provided to describe where and how a reference location for

sediment contact would be evaluated. A figure showing the sediment reference location upstream of the Clackamas river should be provided. Also, a discussion in the text of the types of activities and land uses associated with this location should be presented to support the selection of this as a reference site for sediment.

In order to make a statistically valid comparison of concentrations (and thus risks) associated with the site and in the reference area, sufficient reference area data should be collected so that a statistical analysis of the difference in the two populations can be assessed.

Oregon rule specifies that consideration of background levels in the risk assessment only applies to naturally-occurring chemicals (primarily limited to inorganics). Separation of Site-related risks from risks associated with chemicals from anthropogenic sources unrelated to the Site is a risk management decision. This decision should not be part of the risk assessment process.

Figures 1 and 2 - See previous comments on "detection frequency", "baseline" and "naturally occurring." What does "wide spatial distribution" mean? It is confusing and possibly incomplete to have two "No" directions from the "Detection Frequency >5%" decision box. For instance, if the right side decision pathway is followed, a site chemical would be excluded if the detection limit was less than the concentration goal. However, this conclusion may not be appropriate if there is not wide spatial distribution (left decision pathway).

Figure 4 - Recreational beach users should include swimmers, so the surface water ingestion and dermal absorption routes should be evaluated. Transients and recreational beach users may also be fishers; transients likely also use the river as a source of water for drinking and cooking and for bathing. These additional pathways as well as those discussed previously should be included in Table 3.

Table 1: The EPA Region 9 PRGs stated are for industrial soil. For the beach areas, it is more appropriate to screen using residential soil PRGs.

Table 3: Recreational fisher consumption of resident fish in the ISA should consider child exposure in addition to adult exposure. Adult fishers could bring caught fish home for family use, so fish tissue consumption by children could occur independent of catching fish. If there are child recreational fishers, dermal contact with surface water should be considered. In addition, transients may not have unintentional and infrequent contact with surface water. There may be instances where they have intentionally use surface water for basic needs (i.e., drinking water).

Tables 7 through 20: Central tendency exposure values should be presented in addition to reasonable maximum values.

Table 7: It is not appropriate to apply the DF factor to incidental ingestion of sediment.

Table 8: More appropriate values for transient exposure are 365 days/year for 2 years.

Table 10: An exposure frequency of 12 days/year for beach users is too low. A more reasonable value is 90 days/year for nearby residents who may visit the local beach on a daily basis during the summer.

Table 13: An exposure frequency of 52 days/year for recreational fishers appears low. A more reasonable maximum value is 104 days/year.

Table 14: The fish ingestion rate of 17.5 g/day is low. A more appropriate value is 78 g/day (90th percentile for Pacific Northwest recreational anglers).

Table 19: The fish ingestion rate of 74.4 g/day is low. A more appropriate value is 170 g/day (95th percentile for Native American populations, which may be similar to non-tribal exposure rates).

Table 22: The source of the TEF values should be specified.

References:

EPA, January 1998, Interim Final Guidance: Developing Risk-Based Cleanup Levels at Resource Conservation and Recovery Act Sites in Region 10, Office of Waste and Chemicals Management, Seattle, Washington.

Harper, Barbara L., Brian Flett, Stuart Harris, Corn Abeyeta, and Fred Kirschner, 2002, "The Spokane Tribe's Multipathway Subsistence Exposure Scenario and Screening Level RME," *Risk Analysis*, Vol. 22, No. 3, pp. 513 - 525.

Appendix E

General Comments

Some text to describe what these graphs tell the reviewer, and how this information will be used in the assessment would be helpful. What is the zero point in these graphs? Is this an estimation of the sediment volume above bedrock, or are all the changes relative to the sediment volume in 1990? We don't have any sense of what 150,000 cy of sediment means – over a mile of river bottom, is this a few inches, a few feet? Is the change uniform over the reach? Without some interpretative text, all we get from this appendix is that periods of accretion followed by periods of erosion are normal for the Willamette, that this effect is more pronounced in some sections of the river than in others, and that the 1996 flood brought a lot of new sediment into the lower river.

Appendix G

General Comments

There is not enough detail presented in this appendix for EPA to approve the category 1 and category 2 designations. Attachment 1 lists the reason for a category 2 designation for some studies / chemicals, but for many, the only comment is "category 2." For example, the U.S. Moorings 1994 data is all category 2, except for the chlorinated dioxins and furans. Why? Also, detection limits do not appear to have had any effect of the category 1 / category 2 designation. Moreover, usability of data should consider factors such as physical changes in the river to determine if data is still representative of site conditions.

Appendix H

General Comments

Data generated in Round 1 and subsequent rounds should be delivered in Query Manager format, and tables that clearly show the new data and any other changes should be provided.