LWG Response to EPA *CSM Questions* dated April 14, 2006

EPA's December 2, 2005 Identification of Round 3 Data Gaps Memorandum identified data needs based on consideration of site-wide processes and sources of contamination as well as on an Area of Potential Concern (AOPC) basis. Although the scale, sources and relevant processes may be different from a site-wide and AOPC perspective, in both cases, we need an understanding of the relative inputs from different sources on both a concentration and mass basis to develop an effective remedy for the Portland Harbor site. To date, the focus of our investigation has been contaminated sediments. However, we have not yet developed a full understanding of the inter-relationships between sources of contamination, contaminated sediments, surface water contamination and tissue contamination. As a result, we need to ask and answer some basic questions and include this refined conceptual thinking in our CSM. Key questions that we should address are as follows:

- [1] What are the inputs?

All potential sources of contamination into the system on both a site-wide and AOPC basis should be identified. These include (but are not limited to) upstream loading, loading from stormwater, loading from groundwater, sediment resuspension, atmospheric deposition, loading from industrial discharge, loading from upland soil and river bank erosion.

Response: *The following terms are used in the response to the questions:*

Qualitative – The attributes of the analysis are not measurable. Attributes will generally be assigned a relative ranking, such as high, medium, or low.

Semi-Quantitative – Some of the attributes are measurable while others are not. This term also applies to general, non-site-specific data applied to simple models or calculations.

Quantitative – Most, if not all, attributes are measurable and can be applied directly to the analysis or through some modeling or calculation techniques.

LWG recognizes the need to identify current potential sources listed above by EPA. Current sources are of particular concern for the FS, which will address the issue or potential recontamination of sediment remediation due to ongoing sources. In addition, historical sources (described below) have also impacted sediments. Historical sources are less of a concern from an FS perspective, because they can no longer contribute to recontamination. The relative contributions of current and historical sources will be defined using historical and RI data. The degree and scale (harbor-wide/AOPC) of analysis to be conducted and the information that will be used in the comprehensive Round 2 and RI reports is described below and summarized in Table 1:

Upstream Loading - Upstream loading evaluations will be conducted on a harbor-wide scale. Upstream loading will be evaluated semi-quantitatively in the Round 2 report and in the RI. The semi-quantitative evaluation in the comprehensive Round 2 report will be based primarily on historical and Round 2 bedded sediment data collected upstream of the ISA and Round 2A surface water data collected at river mile (RM) 11. The evaluation in the RI will additionally include Round 3 surface water and sediment traps and Round 3 upstream/downstream sediment sampling and hydrodynamic/sediment transport analyses. It is anticipated that empirical surface water and sediment trap data will be quantitatively address upstream loading for typical water years, but will not capture extreme flow events. Eventually, this information will be used in the FS

to understand to what extent concerns for recontamination and the potential for Monitored Natural Recovery (MNR) are driven by upstream sources vs. sources within the study area. In addition, this information may be relevant to understanding and eventually EPA determining background conditions relevant to final PRGs.

Loading from Stormwater – Stormwater (and combined sewer outfalls) will be evaluated qualitatively in the Round 2 report and semi-quantitatively in the RI. The Round 2 evaluation will be largely based on simple models and the limited data available from general, individual, and MS4 stormwater permits and information generated through DEQ's Joint Source Control Strategy (JSCS) program for discharges into and immediately above the Study Area. LWG Round 3 surface water sampling will be designed to evaluate the impact of stormwater to lower Willamette River (LWR) surface water with sampling conducted during a low river flow/high stormwater flow event. Evaluations of loading from stormwater will be conducted on both an AOPC and harbor-wide scale. The FS will use this information to define where recontamination issues may be occurring, and to what extent they may be caused by stormwater sources. The FS will need to answer questions regarding whether recontamination is likely to occur, but does not need to definitively identify all the sources that may be contributing to that contamination. This latter step must be completed before remedial action can take place (usually during remedial design).

Loading from Groundwater – Initial quantitative estimates of chemical loading from upland groundwater to sediments, upland groundwater to transition zone water (TZW), and TZW to the surface water column will be presented in the Round 2 report for areas that were sampled in the Round 2 Groundwater Pathway Assessment; final groundwater loading estimates using Round 2 and Round 3 data will be presented in the RI. Loading resulting from flux of "clean" groundwater through "dirty" sediments in AOPCs where TZW concentrations are not sampled in the RI will be estimated semi-quantitatively using upland site information, in-river sediment chemistry, partitioning relationships, and groundwater flux estimates using Darcy's law or extrapolated from areas where fluxes were measured directly. Groundwater loading will be estimated on both an AOPC and harbor-wide scale. This information will be used in the FS in a manner similar to that described above for stormwater.

Sediment Resuspension – Sediment Resuspension will be evaluated qualitatively in the Round 2 report and semi-quantitatively in the RI. Information available for evaluation in the comprehensive Round 2 report data includes the initial (Phase 1) hydrodynamic modeling results, Round 2A surface water sampling results, and bathymetric surveys. In addition to Round 2 information, data used for the RI will incorporate the Round 2 hydromodel data needs sampling and testing results (e.g., Sedflume) Round 3 sediment trap results, Round 3 surface water sampling, Round 3 upstream/downstream sediment sampling, and the Phase 2 hydrodynamic modeling results. Evaluation of sediment resuspension will be conducted on both an AOPC and harbor-wide scale. This information will be used in the FS to determine the relative contribution of sediment resuspension to water column and tissue concentrations. The resuspension contribution to these concentrations will be recognized in the FS as part of the overall sediment contribution to tissue risks that can be addressed through sediment remediation. This may result in refinements of final sediment PRGs to recognize that portion of the risks that can be remediated through sediment actions. This information will also be used in the FS to understand the relative proportion of recontamination potential that can be reduced or eliminated through in-river sediment actions.

Atmospheric Deposition – Atmospheric Deposition will be evaluated semi-quantitatively in both the Round 2 report and RI at a harbor-wide scale. The evaluation will be based in information in the public literature and simple modeling. This information will be used in the FS consistent with

the approach described for stormwater above.

Upland Soil and River Bank Erosion – These sources will be evaluated semi-quantitatively at some AOPCs and qualitatively at others for both the Round 2 report and the RI. The harbor-wide contribution will be qualitative. Information from these sources will be obtained from upland site reports (DEQ JSCS). This information will be used in the FS consistent the approach described for stormwater above.

Industrial Discharges – Industrial discharge permits for discharges to the LWR and immediately upstream will be reviewed to provide an estimate of loading to the LWR to evaluate recontamination potential and to evaluate historic load to sediment not attributable to current sources. The qualitative/quantitative nature of the estimates will depend on the information provided in the permits and discharge monitoring reports. The comprehensive Round 2 report will provide an inventory of the permitted discharges. Quantitative data will be assembled to the extent possible and evaluated with Round 2 surface water data for the RI report. This information will be used in the FS consistent with the approach described for stormwater above.

Historic Releases – Due to the long history of industrial and shipping activities in the harbor and adjacent uplands, not all contaminated sediment measured in the RI is attributable to current sources. Historical sources include abandoned or relocated wastewater and stormwater outfalls, overwater operations resulting in spills and releases, and upland operations that either directly discharged wastes to the river or indirectly resulted in releases through groundwater and stormwater transport, erosion of contaminated river banks, and in-water placement of contaminated fill. These sources will be identified and evaluated qualitatively in both the comprehensive Round 2 report and RI. Information sources will include upland site summaries, historical facility records, historical harbor records, sediment data, and upland environmental media. To the extent possible, the evaluation will consist of inventorying historical sources, identifying areas affected, and a qualitative estimate of the relative magnitude of releases. As noted above, historical sources are not relevant to the FS evaluations of recontamination and MNR. However, the FS will evaluate the extent to which these historical sources have caused sediment contamination that may have ongoing impacts to the river via resuspension of historically deposited sediments (see resuspension above).

Presentations on the above sources will be provided in following sections of the comprehensive Round 2 report:

> *Section 5 - Identification of Sources. This section will identify sources from upland sites in a tabular and river mile map format. Updated site summaries will be provided in an appendix to the report. Updated tables and figures summarizing upstream sources, permits, and land use (originally presented in the programmatic work plan) also will be provided in this section.*
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> *Section 7 - Overview of Fate and Transport Processes. Fate and transport process in the LWR will be reviewed in this section and include quantifiable information for the processes.*
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> *Section 11 - Conceptual Site Model. Sources and their contribution to the LWR will be discussed in Section 11.1 (harbor-wide) and Section 11.2 (AOPCs) as indicated above.*

- [2] What data are available to estimate the contribution of the various contaminant sources?

The surface water data the LWG has collected (& is continuing to collect) & their proposed sediment traps & coring (radioisotope sampling) should provide additional data on what has been & what is coming into the Study Area and may be used to develop initial loading estimates from upstream sources. Other data collection efforts that may be used to estimate the contribution of contaminant sources include transition zone water and upland soil, stormwater and groundwater data. Efforts should be made to identify the universe of data available to estimate the contribution of other sources of contamination.

Response: *A summary of primary data sources available to estimate the contribution of sources of contamination is summarized in Table 1.*

- [3] What are the relative contributions of the various sources?

What are the major contamination inputs on a mass basis into the study area -- stormwater, wastewater, study area sediments, groundwater and inputs from upstream? This will require a scaling exercise to identify the relative importance of these inputs for producing tissue loads and fish and risk in general? What is the single largest source? What are the relative magnitudes of the other sources? What is the relative significance of flux of clean groundwater through dirty sediment at various locations to other sources of contamination?

Response: *The relative contribution of the sources will be addressed with fate and transport analysis. The fate and transport analysis will be qualitative to semi-quantitative in the Round 2 report and semi-quantitative for most sources in the RI. The relative contribution of all sources may not be necessary at AOPCs where the driving source/pathway is apparent. The FS will address this issue based on the semi-quantitative information from the RI. Where ever possible the relative contribution of various external sources to issues of recontamination and MNR will be identified in either a general or specific way. The sources that are expected to be most quantifiable through information collected for the RI/FS or through expected progress of upland source control activities led by DEQ are upstream sources (through the upstream sampling of sediments, sediment traps, and water column) and sediment resuspension sources (through hydrodynamic modeling and associated data collection, sediment traps, and water column sampling). Various other upland in-study-area sources may only be quantifiable in a general or grouped fashion.*

Fate and transport will be addressed in Section 7 of the comprehensive Round 2 report and this information will be brought into the harbor-wide and AOPC CSMs in Section 11.

- [4] What additional data do we need and when is it needed?

The goal of upland source control is to identify, evaluate, & control all significant upland sources of contamination. However, it is unlikely that likely that all sources of contamination will be completed at the time of the ROD. As a result, mass loading information from upland sources will be required.

Response: *LWG agrees that estimates of ongoing mass loading from upland and upstream sources will likely be needed to evaluate recontamination potential for many AOPCs/SMAs. Depending on the progress of source control and the degree to which the efficacy of presumed source control actions can be accurately predicted, the recontamination evaluations of individual sources could take place either before or after the ROD, On an AOPC basis, such data relating to recontamination potential as is necessary for remedy selection will be provided in the FS. As noted above, the FS will need to identify the likelihood of recontamination after remediation but*

will not need to identify all the specific sources or contributions to that recontamination potential., Additional data needs will be assessed and presented in the comprehensive Round 2 report. Mass loading information from upland and upstream sources that is available at the conclusion of Round 3 will be used by the LWG in the FS to assess recontamination. Mass loading from sediment resuspension will also be quantifiable through the measurements noted above. The LWG assumes a portion of the mass loading information and status on upland source controls will be provided through the JSCS implementation prior to completion of Remedial Design.

- [5] What are the key processes that control the distribution of contamination that is present within the site or as it enters the site?

How do these processes and resulting distribution of contamination control how exposure to various receptors occur? This analysis should take place on a contaminant class basis and consider both dissolved and particulate fractions.

Response: *The processes and resulting distribution of contamination is primarily a fate and transport evaluation exercise combined with risk analysis of receptor exposure. Fate and transport analysis will be qualitative to semi-quantitative in the Round 2 report and semi-quantitative for most sources in the RI. Analysis of exposure to receptors on a contaminant/receptor pair basis is outlined in the Ecological Framework.*

Fate and transport will be addressed in Section 7 and risk will be address in Section 8 and 9 of the comprehensive Round 2 report. This information will be brought into the harbor-wide and AOPC CSMs in Section 11. Fate and transport processes will be described in the FS as a part of the determination of recontamination and MNR potential using the data described above and in Table 1.

Table 1. Data Sources and Reporting

Potential Sources	Data Sources	Reporting and Assessment Comp. Round 2	 RI/FS
Upstream	Historical and R2 Upstream Sediment Data R2A Surface Water R3 Upstream/Downstream Sampling R3 Sediment Traps R3 Surface Water Hydro modeling	Semi-quantitative	Quantitative for typical flows, semi-quantitative for extreme flows
Stormwater	Facility specific data collected through DEQ JSCS DEQ General and Individual permits City CSO Program MS4 permits MS4 Source Control Storm Water Pollution Control Plans (SWPCPs) Site Summaries R2/R3 Surface Water	Qualitative	Semi-quantitative
Groundwater	DEQ JSCS Site Summaries R2 TZW Sampling R3 TZW Sampling	Semi-quantitative at some sites, Qualitative at others	Quantitative at some sites, Qualitative at others
Sediment Resuspension	Hydro modeling Bathymetric Surveys SedFlume, TSS, Settling Rate Measurements R2 Sediment Cores R3 Sediment Traps R3 Surface Water R3 Upstream/Downstream Sampling	Qualitative	Semi-quantitative
Atmospheric Deposition	Public Literature	Semi-quantitative	Semi-quantitative
Industrial Discharge	NPDES Permits and Discharge Monitoring Reports Site Summaries R2/R3 Surface Water	Semi-quantitative at some sites, Qualitative at others	Quantitative at some sites, Qualitative at others
Upland Soil and River Bank Erosion	DEQ JSCS Site Summaries	Semi-quantitative at some sites, Qualitative at others	Semi-quantitative at some sites, Qualitative at others
Historic Releases	Site Summaries Historical Facility Records Historical Harbor Records Sediment Data Upland Environmental Media Data.	Qualitative	Qualitative