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LOWER WILLAMETTE GROUP

PORTLAND HARBOR RI/FS

PROCESS FOR DERIVATION OF PRELIMINARY REMEDIATION GOALS (PRG) TECHNICAL MEMORANDUM

EPA REVIEW DRAFT

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1.0 INTRODUCTION

The Programmatic Work Plan of the Remedial Investigation and Feasibility Study (RI/FS) for the Portland Harbor Superfund Site (Site) requires development of a Technical Memorandum describing the process for derivation of Preliminary Remediation Goals (PRGs). This document provides an overview of this proposed process within the context of the overall RI/FS.

2.0 PRGs AND THE RI/FS PROCESS

PRGs are defined by Superfund guidance as medium-specific (e.g., water, sediment) chemical concentrations that attain the Remedial Action Objectives (RAOs) for the project (EPA 1988). PRGs are used to identify the types, locations, areas, and volumes of matrices that require remediation. These matrices, areas, and volumes then become the focus of remedial alternative evaluations conducted in the FS. Consequently, PRGs generally need to be developed in the early stages of the FS process.

EPA Guidance (1988) recognizes that, if developed initially, PRGs are to be "…re-evaluated as site characterization and information from the baseline risk assessment become available" and that final goals "…should be determined on the basis of the results of the baseline risk assessment…" Further, the stated use of PRGs in the same guidance is "…to permit a range of treatment and containment alternatives to be developed." Thus, the guidance indicates that PRGs should be built upon the results of the RA and used in the development of remedial alternatives (i.e., the FS).

Section 7.3.1 of the project Statement of Work (SOW) requires the development of PRGs, but the timing of PRG development and the intended use of PRGs in the RI process are not specified in the SOW. During negotiations on the RI/FS Programmatic Work Plan, EPA requested early derivation of initial PRGs to help identify data gaps following Round 2 and focus Round 3 sampling. This was envisioned as one part, but not the only aspect of, the Round 2 data gaps analysis.

The LWG proposes a revised approach under which initial PRGs will not be developed and used in the Round 2 data gap analysis. Instead the data gaps analysis will rely on Round 2 results coupled with preliminary human health and ecological risk evaluation results to define and focus Round 3 efforts. Under this approach, the LWG will develop a comprehensive data gaps analysis process that will be described in a technical memorandum for EPA review and approval before initiating Round 2 data evaluation and Round 3 scoping.

On this basis, the LWG recommends the following process as a logical and efficient means to meet the intent of the SOW for the development and refinement of PRGs at the beginning of the FS process:

- Conduct RI and RA (just prior to the FS)
- Refine and Document RAOs (including PRGs)
- Identify areas and volumes for consideration in the FS
- Remedial Alternatives Development, Screening, and Evaluation
- FS Reporting.

The LWG further recommends that the draft PRGs would be first presented in the "Refine and Document RAOs" Technical Memorandum that will be initiated near the completion of the RI and RA. For clarity, the LWG proposes revising the title of this technical memorandum to explicitly include the term "PRGs". Using the above general approach, and the most recent RI/FS project schedule, the following sequence of submittals to EPA are proposed:

- Initial Food Web Modeling Results Report
- Background Technical Memorandum
- Updated Food Web Modeling Results Report
- Draft RI and RA
- Draft Final Food Web Model Results Report
- Refined RAOs and Draft PRGs Tech. Memo (including review and incorporation of ARAR-based PRGs)
- Summary of Remedial Alternatives Screening
- Detailed Analysis of Remedial Alternatives
- Draft FS Report.

The current project schedule contains anticipated dates for these submittals, but the exact submittal dates are dependent upon multiple preceding activities and submittals. If EPA approves the above sequence of activities, a revised schedule will be developed with specific anticipated submittal dates linked to relevant precedent tasks. Because they are related to PRG development (as discussed more below), the food web model documents, background technical memorandum, and the ARAR-based PRG review are presented in the above list of submittals.

The remainder of this document briefly describes how PRGs will be developed and used within the context of this overall RI/FS information flow.

3.0 PRG DEVELOPMENT OVERVIEW

PRGs will be developed for both ecological receptors and human health for the pathways described in Section 7.3.1 of the SOW that are found to pose unacceptable risks in the Baseline RA. In summary, the SOW requires the PRG development process to consider:

- Potential Ecological Risks
  - Protection of survival, growth, and reproduction of benthic invertebrates
  - Protection of survival, growth, and reproduction of piscivorus wildlife receptors
  - Protection of survival, growth, and reproduction of resident and migratory fish
- Potential Human Health Risks
  - Protection of human health from consumption of aquatic organisms
  - Protection of human health from direct contact with sediment, surface water, and groundwater

PRGs will be developed consistent with these SOW requirements based on the results of the ecological and human health risk assessments. An overview of the PRG process for ecological receptors and human health is presented in the following two subsections. Following that, additional data analysis procedures (e.g., food web modeling, background assessment, and ARARs review) that will contribute to the overall development of PRGs are also presented.

3.1 ECOLOGICAL PRG PROCESS

PRGs will be developed for primary exposure media (e.g., sediments, water) identified as contributing to risk in the Baseline Ecological Risk Assessment (BERA) for each receptor, if risks are found for that receptor. The receptors that will be considered for PRG development based on the results of the BERA are:

- Benthic Organisms
- Fish
- Birds
- Mammals

PRGs will be developed for chemicals of concerns (COCs) (i.e., those chemicals that are found to result in unacceptable risks) in primary exposure media (e.g., sediments and water) through direct exposure or indirect exposure. The BERA will identify risk-based concentrations (RBCs) for those receptor/COC pairs that result in unacceptable risks. The relationship between RBCs and PRGs is dependant on whether the exposure pathway resulting in unacceptable risk is direct or indirect. For direct pathways, such as direct exposure to sediment and water, the PRG will be the same as the RBC (and/or consistent with background conditions as discussed in Section 3.4). For indirect pathways, such as risks resulting from the trophic transfer of COCs through the food chain, the PRG in sediments or water will be based on a back calculation of the concentration of the COC in tissue (i.e., the tissue RBC) to the appropriate media using modeled relationships (e.g., BSAFs or food web models) as described in the SOW.

Maps depicting areas of exceedance of PRGs for each receptor and medium (e.g., sediments and water) will be prepared as GIS overlays. This information will be used to develop maps of areas posing risks for each applicable receptor. These will be used as one set of overlays (along with other factors described in the Programmatic Work Plan) in the development of Sediment Management Areas (SMAs) for protection of ecological receptors. This mapping will help identify which SMAs exceed any combination of the PRGs. Use of SMAs in the FS process is described in the Programmatic Work Plan.

3.2 HUMAN HEALTH PRG PROCESS

Human health PRGs will be developed at the completion of the Baseline Human Health Risk Assessment (BHHRA). Human health PRGs will only be developed for those chemicals and exposure media that are found to pose unacceptable risks. The pathways that will be evaluated in the BHHRA are:

- Consumption of aquatic organisms
- Direct contact with beach and in-water sediment
- Direct contact with surface water
- Direct contact with groundwater

PRGs for protection of human health from consumption of aquatic organisms will be developed through use of acceptable tissue concentrations and the food web model. Chemical-specific acceptable tissue concentrations will be calculated using the exposure factors for fish consumption presented in Appendix C of the Programmatic Work Plan and approved toxicity factors. These acceptable tissue

concentrations will then be used as inputs to the food web model. The food web model will be used to develop PRGs for media found to contribute significantly to tissue concentrations. These PRGs will be used for protection of the fish consumption exposure pathway.

PRGs for protection of human health from direct contact with sediment, surface water, and groundwater will be calculated using the exposure factors presented in Appendix C of the Programmatic Work Plan or in the Exposure Factors Interim Deliverable and approved toxicity factors.

The human health PRGs will be compiled by exposure medium for those media and chemicals that are found to result in unacceptable risks. The uncertainties associated with the PRGs will also be discussed. These will be used as one set of overlays (along with other factors described in the Programmatic Work Plan) in the development of SMAs for protection of human health pathways. As described for the ecological PRG process, PRG exceedances by SMA will be used in the FS process as described in the Programmatic Work Plan.

3.3 FOOD WEB MODEL

For COCs in tissue, PRGs for primary exposure media (e.g., sediments and water) will be developed by relating acceptable tissue concentrations back to water and/or sediments in a quantitative fashion through use of a food web model. A preliminary list of potential food web models, including objectives for the use of these models, was presented to EPA in the food web model *Technical Memorandum: Evaluating Steady-State Aquatic Food Web Models for the Portland Harbor Superfund Site*. Development and use of the food web model will be presented in a series of reports following multiple iterations of data analysis. The following reports are planned:

- Initial Food Web Modeling Results Report – which will incorporate sediment and surface water data collected during 2004
- Updated Food Web Modeling Results Report – which will include sediment, surface water, and groundwater data collected in 2005
- Draft Final Food Web Model Results Report – which will incorporate all additional data collected after 2005.

3.4 BACKGROUND CONDITIONS

Another important aspect to the determination of final PRGs will be the contribution of background concentrations in the various media to risks at the Site.

The Programmatic Work Plan specifies that background conditions and levels will be considered in the refinement of RAOs and development of associated PRGs. Consistent with EPA guidance, such as the EPA memorandum on the "Role of Background in CERCLA Cleanup Program" (2002), final PRGs may be set at background concentrations that are either naturally-occurring or anthropogenic.

Background levels will be developed for appropriate media (e.g., water, sediment) following the methods that will be described in the technical memorandum entitled *Approach to Determining Background for the Portland Harbor Superfund Site/Process for Delineating Upstream and Downstream Extent of Contamination.* This memorandum is due to EPA in mid-2005. The project schedule calls for negotiation and approval of the final version of this memorandum in time to allow background data collection as a part of the Round 3 sampling effort.

3.5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Preliminary potential ARARs presented in the Programmatic Work Plan will be reviewed for those ARARs that contain or reference medium-specific chemical criteria or guidelines. This includes consideration of "nationally-developed and/or regionally developed numerical sediment guidelines" as specifically required by the SOW. These values will be compiled by chemical and matrix, and information on the source of these values (in terms of the original scientific study generating the value) will be reviewed. The compiled ARAR values will be compared to site specific risk-based PRGs.

Where there is both an ARAR-based and site-specific risk-based value, the site-specific risk-based value will be used to define the PRG used in the FS. Where no site-specific risk-based value can be reliably developed and an ARAR-based value is available, then the ARAR-based value will be evaluated for applicability to this system using information from the original source studies. Where applicable, an ARAR-based PRG will be developed for use in the FS.

4.0 SUMMARY OF PRGS FOR THE FS PROCESS

The previous section provides an overview of the development of site-specific PRGs that will feed into the first steps of the FS process. This section summarizes the process of integrating the PRGs into the FS process.

Preliminary RAOs were developed and presented in the Programmatic Work Plan. These preliminary RAOs are relatively broad statements of goals for the remediation that will be refined at the start of the FS process in conjunction with development of draft PRGs. The refined RAOs will continue to be broadly defined statements of goals for the overall remedial alternatives or combination of alternatives. However, they will be linked to specific PRGs, which will be the media-specific concentrations that meet the refined RAOs.

As noted above, the refined RAOs and draft PRGs will be presented in the *Refined RAOs and Draft PRGs Technical Memorandum.* Once the draft PRGs in this memorandum are approved by EPA, the final PRGs will then be used to define remediation areas that will be assessed in the FS process. This memorandum will also describe how the results of the RI, ecological RA, and human health RA were compiled into a set of site-specific risk-based PRGs. In addition, the memorandum will present the review of ARARs (as discussed in Section 3.5) that may be applicable where site-specific risk-based PRGs are not available.

5.0 REFERENCES

EPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final. (OWSER Directive 9355.3-01). EPA/540/G-89/004. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

EPA. 2002. Transmittal of Policy Statement: "Role of Background in the CERCLA Cleanup Program." OSWER 9285.6-07P. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.