5.0 IN-RIVER DISTRIBUTION OF CONTAMINATION

This section presents information on the distribution of contamination in the river environment based on data collected through July 19, 2010 and focuses on the in-river contaminant distribution in- and immediately adjacent to the Study Area, as well as up- and down-river of the Study Area. Section 5.1 presents the criteria for selection of contaminants for discussion and use in the RI; Section 5.2 discusses the in-river distribution of contaminants in bedded sediments; Section 5.3 discusses mobile sediment (as measured in sediment traps); Section 5.4 discusses the in-river distribution of contaminants in surface water; Section 5.5 discusses the distribution of contaminants in transition zone water and groundwater seeps; and Section 5.6 discusses the distribution of contaminants in biota.

The discussions in the following subsections focus on distribution of contamination as orders of magnitude of detected values (e.g., <1, 1-10, 10-100, 100-1,000, etc.). Depending on the medium examined, the discussion of contaminant distribution is supported by a variety of tabular and graphical materials: 1) maps showing the extent of each contaminants distribution, 2) summary statistics tables, 3) scatter-plot graphs depicting chemical concentrations by river mile, and 4) histogram plots for comparing values. The summary statistics tables present frequency of detection, minimum, maximum, mean, median, and 95th percentile, and the station locations of the maximum values. Summary statistics are calculated using only detected values only as well as combined detect and nondetect values. These statistics have been compiled separately for the RI Study Area reach (RM 1.9–11.8), exclusive of the Multnomah Channel), the downtown reach (RM 11.8-15.3), the upriver reach (RM 15.3-28.4) and the down-river reach (RM 0-1.9) [refer to Map 5.0-1]. Summary statistics for sediments include both point samples and beach composite samples to provide a general understanding of contaminant concentration distributions.

Where specific sample results are cited in the text (i.e., the concentration of a sample, median and 95th percentile values) qualifiers and descriptors associated with that result are also cited, with one exception. The descriptor "T" is not cited as it generally indicates that the result was mathematically derived through summing multiple results (e.g., total PCB congeners equal the sum of the PCB congener results). The "T" descriptor may also indicate that a result is an average of multiple results for a single analyte (e.g., field replicates) or that a result was selected for reporting in preference to other available results (e.g., for parameters reported by multiple methods). The descriptor "A" indicates a total value is based on an incomplete number of analytes (e.g., seven of the nine PCB Aroclors) and is cited with the results.

Similarly, the following laboratory qualifiers are also cited with the results:

J – The associated numerical value is an estimated quantity.

N – Presumptive evidence of presence of organic compound; identification of the compound is not definitive. The N qualifier is used in combination with the J qualifier.

U – The material was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.

In certain cases, concentrations of closely-related analytes were added together to create a group sum. When calculating group concentrations for this in-river contaminant distribution evaluation, a value of zero was used for non-detected concentrations on an individual sample basis. 2,3,7,8- TCDD TEQ values for dioxin-like PCB congeners and PCDD/Fs were calculated using WHO 2005 TEFs for mammals[1] (Van den Berg et al. 2006). Benzo(a)pyrene equivalent (BaPEq) values used to represent carcinogenic PAHs (cPAHs) were calculated using PEFs provided in EPA (1993). Tables in Appendix D1.6 present the constituent concentrations used in each group sum. Further information on summing methods is provided in Appendix A.

5.1 SELECTION OF INDICATOR CONTAMINANTS

Contaminants of interest (COIs) are contaminants expected to be present at a site based on a review of site information. Numerous chemical parameters were identified for the Study Area from the site assessment and were subsequently analyzed and detected in sampled various media. Summary statistics for all COIs are presented by media for each river reach in Appendix D. Table 5.1-1 presents the COIs detected in the various media (sediment, water and biota) of the river.

Commented [Int1]: We cannot replicate the EPA's Table 5.1-1 and will be submitting a revised version soon with some comments.

Commented [KK2R1]: Integral final table 5.1-1 is acceptable.

Due to the large number of COIs detected at the site in various media, the RI will focus on a subset of the contaminants - designated as indicator contaminants - to facilitate a clear and practical presentation of the distribution of contamination in the Study Area. It should be noted that additional contaminants beyond the indicator contaminants presented in this section are present at the site at concentrations that may pose unacceptable risk to human health and the environment, and by limiting the discussion of contaminants in this section in no way limits the contaminants that will be considered in the FS or cleanup decisions made by EPA.

Indicator contaminants were identified using a screening process (Table 5.1-2) that first compared the detected COIs at the site (Table 5.1-1) with those contaminants posing unacceptable risk to human health and the environment and then considered the following factors:

Commented [Int3]: Based on LWG risk assessor review and EPA/LWG discussions in early July, proposed revisions to EPA Table 5.1-2 are included with these RLSO text files.

Commented [KK4R3]: Outstanding issue for BERA screen on TCDD TEQ and monobutyltin. All others resolved.

Commented [KK5R3]: TCDD Eq TEQ is same as total dioxin/furan TEQ. The LWG can provide clarification to this. Monobutyltin was initially identified as a contaminant in earlier versions of the BERA; thus, the reason the LWG included it in the RI report. A footnote should be added to state this, but that it was not a contaminant because TRVs were not available to assess the toxicity effects.

- Frequency of detection—Contaminants (pesticides) with a frequency of detection less than 20 percent were not selected.

[1] The World Health Organization (WHO) has provided a list of 12 dioxin-like congeners: PCB-77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189.

- Cross media comparisons—Contaminants that would allow comparisons across media were selected.
- Co-location of contaminants—Several contaminants were selected to represent other contaminants due to co-location of the contaminants (for example, arsenic, chromium, copper and zinc were selected to represent other metals).
- Widespread sources – Certain other contaminants with widespread sources in the harbor (e.g., metals, PAHs, and PCBs) were selected.
- Grouped contaminants – Some contaminants were grouped as one contaminant Contaminants that were grouped include PCBs, PCDD/Fs, DDx, and PAHs.
- Low exceedance of risk – Several contaminants did not contribute significantly to risk estimates (HQ<10 or risk at 10^{-6}) and were not selected.

The first screen identified 35 contaminants in the Study Area. An additional screen identified a subset of 13 indicator contaminants, which are the focus of further discussion in the main text of the RI. Although not discussed further in the main RI report, summary statistic tables, maps and figures by media are presented in Appendix D for the 21 contaminants that were not identified as indicator contaminants.

Table 5.1-2 identifies the 13 indicator contaminants selected by this process for further discussion in the RI. Contaminants that were screened due to co-location were based either on one form of a contaminant representing another or on a correlation plot of the rank and location of the data sets. The basis for each contaminant screening due to co-location is presented in Table 5.1-3 and Figures 5.1-1 through 5.1-5.

Commented [Int6]: Please provide the new Table 5.1-3 and new plots for LWG review.

Commented [KK7R6]: Table and plots provided.

Commented [A8]: These are the new correlation plots.

Data presentations identical to those provided in the following sections are also provided for physical parameters and other COIs in Appendix D; however, there is no discussion or interpretation of the information.