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Title: **Integrating Lines of Evidence – Ecological Risk Assessment for the Portland Harbor Benthic Community**

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Abstract:

A draft baseline ecological risk assessment (BERA) for the Portland Harbor benthic community has been prepared to determine if deleterious ecological effects from exposure to uncontrolled releases of hazardous substances to the Willamette River may be occurring at the Study Area under current conditions. In this event, the BERA provides information to risk managers to support management decisions on how to protect ecological receptors.

Twenty-seven COCs (individual chemicals, sums, or totals) were identified for benthic invertebrates based on site-specific SQG, tissue TRV, and surface water TRV exceedances. Sediment profile imaging (SPI) data were examined to determine whether locations associated with sediment toxicity also tended to have a less mature benthic community structure than would be expected for the physical characteristics of the location. The SPI data analysis was used as corroborative evidence in the draft BERA. In over 90% of the images evaluated, the successional stage matched the expected community based on the physical regime, when slope was included as a habitat characteristic. Of the 31 cases where the community stage was not as might be predicted by the physical environment, 19 appear to be related to sediment toxicity. These qualitative results suggest that the benthic community is typical of a large river system that is predominantly influenced by physical processes. Impacts from sediment contamination appear to be limited to depositional areas that have received historical releases of contamination.

The potential for benthic risk was determined as follows. First, empirical sediment COC concentrations were mapped, then the chemical concentrations were interpolated, and the resulting estimated chemical concentrations were compared with SQGs to predict site-specific risk. Next, these sediment chemistry maps were used (with bioaccumulation models) to predict where organisms might accumulate COCs to concentrations above tissue TRVs. Areas where estimated sediment concentrations exceeded SQGs or where empirical or predicted tissue concentrations exceeded TRVs were identified as potential benthic risk areas (PBRAs). The certainty regarding predictions of benthic community risk within PBRAs containing sediment that underwent empirical toxicity testing was evaluated by examining the distribution of chemical concentrations in the non-toxic samples with the toxic samples. Differences or similarities were used to classify the certainty of the predicted risks as probable, uncertain, or unlikely. Empirical tissue residue data were mapped as points, allowing a visual assessment of concordance across LOEs. Water TRV exceedances were considered along with sediment SQG and tissue TRV exceedances; they were found to co-occur with areas of SQG exceedances. The spatial evaluation identified approximately 5% of the Study Area as posing potential unacceptable risk to the benthic community.