



PORTLAND HARBOR RI

APPENDIX G
BASELINE ECOLOGICAL RISK ASSESSMENT
ATTACHMENT 18
FUTURE RISK ESTIMATES

DRAFT

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August 19, 2009

Prepared for
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LIST OF MAPS

Map 1-1. Future Risks to the Benthic Community

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1.0 FUTURE RISK ESTIMATES

In the comments to the *Comprehensive Round 2 Site Characterization Summary and Data Gaps Analysis Report* (Integral et al. 2007), the US Environmental Protection Agency (EPA) agreed that the risk assessments should be based on exposure to and toxicity of surface sediments (EPA 2008). However, they also stated that risks associated with subsurface sediment should be evaluated in areas subject to erosion below the depth of the surface interval (30 cm). In subsequent negotiations, the Lower Willamette Group (LWG) and EPA managers verbally agreed to include a future erosion event scenario in the baseline ecological risk assessment (BERA) that examined only short-term duration exposures, specifically direct toxicity to benthic invertebrates.

1.1 METHODOLOGY

As part of the fate and transport modeling in the draft remedial investigation (RI), estimates were made of the maximum erosion that might occur under the 100-year flood scenario. Predicted areas and depth of erosion and accretion (including no change) were mapped as maximum bed changes relative to recent bathymetry (Map 3.4-7 in the draft RI). The locations of the sediment chemistry samples used to estimate benthic invertebrate risks were overlaid on the maximum bed change map. Where risk samples fell within erosional areas, the predicted erosion depth was used to estimate the new surface chemistry at that sampling location (i.e., no spatial extrapolation was conducted). The new surface chemistry was represented by the volume-weighted average of the 15-cm interval from existing core data starting at the “new” surface elevation. Where erosion was not predicted (due to accretion, no change, or loss < 30 cm), the current surface chemistry was retained to represent future surface sediment quality.

The estimated future surface sediment concentrations for benthic invertebrate chemicals of potential concern (COPCs) were compared to the site-specific sediment quality guidelines (SQGs), selected high and low generic SQGs, and the mean quotients. The following risk classifications were used:

- Current and future conditions – no unacceptable risk
- Current and future conditions – unacceptable risk
- Current condition – unacceptable risk; future condition – no unacceptable risk
- Current condition – no unacceptable risk; future condition – unacceptable risk

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1.2 RESULTS

The future sediment risk dataset included chemistry data for the BERA COPCs up to 151 locations based on the site-specific SQGs. Erosion at 30 locations was not predicted to exceed the current surface interval of 30 cm used to characterize risks; thus the risk classification did not change. The low site-specific SQGs were not exceeded at 34% of the remaining locations, indicating that those locations would pose no unacceptable risk even under screening-level assumptions. Forty-one locations were identified as having adverse effects on benthic invertebrates based on the occurrence of one or more high SQG exceedances. The maximum number of SQG exceedances at any one location was six.

At locations with erosional changes > 30 cm, chemicals that exceeded the site-specific high SQGs included three total PAHs, benzyl alcohol, carbazole, total PCBs, delta-HCH, dieldrin, and endrin, endrin ketone, and total DDx (sum of all six DDT isomers [(2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT and 4,4'-DDT)]) (Table 1-1).

Table 1-1. Chemical Exceedances of the Site-Specific SQGs

Chemical	Number of Exceedances
Metals	
Cadmium	0
Copper	0
Mercury	0
Silver	0
PAHs	
Total benzofluoranthenes	2
Total HPAHs	2
Total LPAHs	14
SVOCs	
Benzyl alcohol	8
Carbazole	6
Phenols	
Phenol	5
PCBs	
Total PCBs	3
Pesticides	
delta-Hexachlorocyclohexane	5
Dieldrin	1
Endrin	1
Endrin ketone	2

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Table 1-1. Chemical Exceedances of the Site-Specific SQGs

Chemical	Number of Exceedances
Total DDx	5
Conventionals	
Ammonia	23
Sulfides	4

DDD – dichlorodiphenyldichloroethane

DDE – dichlorodiphenyldichloroethylene

DDT – dichlorodiphenyltrichloroethane

HPAH – high-molecular-weight polycyclic aromatic hydrocarbon

LPAH – low-molecular-weight polycyclic aromatic hydrocarbon

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SQG – sediment quality guideline

SVOC – semivolatile organic compound

Total DDx - sum of all six DDT isomers (2,4'-DDD; 4,4'-DDD; 2,4'-DDE; 4,4'-DDE; 2,4'-DDT; and 4,4'-DDT)

Map 1-1 presents the erosional areas and compares future risk estimates with the risk estimates presented in Section 6.6. Because chemical analysis was often not performed on surface sediments from core samples, the comparison was based on the natural neighbor extrapolations for the site-specific SQGs. The conditions of the majority of locations (approximately 83%) did not change with regard to predicting unacceptable risk to the benthic community. Of the remaining locations, approximately 5% changed from adverse effects to no adverse effects and approximately 12% changed from no adverse effects to adverse effects under the future conditions.

There is little overall difference under the future condition because only 17% of the river bed was predicted to erode to depths greater than the interval used to estimate risks to benthic invertebrates in the BERA. All but one location anticipated to erode was characterized as sand, which is less contaminated than fine-grained sediments. In addition, most predicted erosional areas are associated with the navigational channel or channel shoulders.

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2.0 REFERENCES

EPA. 2008. EPA letter and attachments dated January 15, 2009 to Lower Willamette Group (from E. Blischke and C. Humphrey to J. McKenna and R. Wyatt) regarding Portland Harbor RI/FS: comments on Comprehensive Round 2 Site Characterization and Data Gaps Analysis Report US Environmental Protection Agency Region 10, Oregon Operations Office, Portland, OR.

Integral, Windward, Kennedy/Jenks, Anchor. 2007. Portland Harbor RI/FS: Comprehensive round 2 site characterization summary and data gaps analysis report, plus addenda. IC07-0004. Prepared for Lower Willamette Group. Integral Consulting, Inc., Mercer Island, WA; Windward Environmental LLC, Seattle, WA; Kennedy/Jenks Consultants, Portland, OR; Anchor Environmental, LLC, Portland, OR.

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