Appendix F

Exceedances of Onondaga Lake Sediment Effect Concentrations and Probable Effect Concentrations
APPENDIX F. EXCEEDANCES OF ONONDAGA LAKE SEDIMENT EFFECT CONCENTRATIONS and PROBABLE EFFECT CONCENTRATIONS

This appendix provides figures comparing concentrations of contaminants detected in surface sediments collected in 1992 and 2000 with site-specific sediment effect concentrations (SECs) and probable effect concentrations (PECs). The 1992 sampling event examined samples taken from the upper 0 to 2 cm of the sediments throughout the lake. The 2000 sampling event concentrated on the more heavily contaminated areas (i.e., in the south basin and the Ninemile Creek delta area) within the lake, and examined samples from the upper 0 to 15 cm of the lake surface, which is considered to be the biologically active zone. Two sets of site-specific SECs were used in this comparison, based on:

- The effects range-low (ER-L) and effects range-median (ER-M) methodology developed by Long and Morgan (1990).
- The threshold effects levels (TEL) and probable effects levels (PEL) methodology developed by MacDonald et al. (1996).

The calculation of the SECs is based on the separation of the data into stations at which effects were observed and stations at which no effects were observed. The effects and no-effects stations were determined using Washington State's SEDQUAL program, as discussed in Chapter 9 of this BERA.

There are sets of effect and no-effect stations for each of the four toxicity test parameters from the 1992 survey (i.e., amphipod biomass and survival and chironomid biomass and survival). SECs were calculated for each of these sets of stations, but the results for the chironomid survival were selected for use in this appendix, because these values were the most conservative overall.

SECs from the 2000 data set were calculated for each of the six toxicity test parameters from the 2000 survey (i.e., amphipod biomass, survival, and reproduction and chironomid biomass, survival, and emergence) for comparison to the 1992 results (see Chapter 9), but were not used here because the number of data points and the spatial extent of the stations were far more limited. Figures F-1 through F-45 present the comparisons of the 1992 and 2000 data to the site-specific ER-Ls and ER-Ms. The ER-L is the 10th percentile of the concentration distribution of the effects data. The ER-M is the median of the concentration distribution for the effects data. Figures F-46 through F-91 present the comparisons of the data to the TELs and PELs. The TEL is the geometric mean of the 15th percentile of the concentration distribution for the effects data and the median of the distribution for the no-effects data. The PEL is the geometric mean of the ER-M and the 85th percentile of the concentration distribution for the no-effects data.

Consensus-based probable effect concentrations (PECs) for select contaminants in Onondaga Lake were developed following the methodology described in MacDonald et al. (2000) and Ingersoll et al. (2000) as the geometric mean of the site-specific SECs. Figures F-92 through F-137 present the comparisons of the data to the PECs.
The SECs and PECs shown in these figures for both organics and inorganics are presented on a dry-weight basis. More information about these SECs and PECs can be found in Chapters 9 and 10 of the BERA.

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LEGEND
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- One-half Detection Limit - Exceeds Criteria
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Legend:
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
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Note: Sum of dichlorobenzenes used as determining value.
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Legend:
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- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
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LEGEND
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- One-half Detection Limit - Exceeds Criteria

Note: Sum of trichlorobenzenes used as determining value.
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PEC value = 372.0 ppb
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PEC value = 16.4 ppb
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PEC value = 157.2 ppb
PEC value = 779.7 ppb

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Note: Only 4,4'-DDD was detected in the sediment.

LEGEND
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- One-half Detection Limit - Exceeds Criteria
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Legend:
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- One-half Detection Limit - Exceeds Criteria

TEL - 0.908 ppm
PEL - 1.42 ppm

0-2 cm (1992)
0-15 cm (2000)

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- One-half Detection Limit - Exceeds Criteria
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Comparison of Dibenzofuran Sediment Concentrations with the TEL and PEL
Figure F-77
Comparison of Fluoranthene Sediment Concentrations with the TEL and PEL
Figure F-78
Comparison of Fluorene Sediment Concentrations with the TEL and PEL
Figure F-79
Comparison of Hexachlorobenzene Sediment Concentrations with the TEL and PEL
Figure F-80
Comparison of Indeno(1,2,3-cd)pyrene Sediment Concentrations with the TEL and PEL
Figure F-81
Comparison of Naphthalene Sediment Concentrations with the TEL and PEL
Figure F-82
Comparison of Phenanthrene Sediment Concentrations with the TEL and PEL
Figure F-83
Comparison of Phenol Sediment Concentrations with the TEL and PEL
Figure F-84
Comparison of Pyrene Sediment Concentrations with the TEL and PEL
Figure F-85
Comparison of DDT and metabolites Sediment Concentrations with the TEL and PEL

Note: Only 4,4-DDD was detected in the sediment.
Figure F-86
Comparison of Chlordane Sediment Concentrations with the TEL and PEL
Figure F-87
Comparison of Aroclor-1016 Sediment Concentrations with the TELs and PELs
Figure F-88
Comparison of Aroclor-1248 Sediment Concentrations with the TEL and PEL
Figure F-89
Comparison of Aroclor-1254 Sediment Concentrations with the TEL and PEL
Figure F-90
Comparison of Aroclor-1260 Sediment Concentrations with the TEL and PEL
Figure F-91
Comparison of PCBs (Sum) Sediment Concentrations with the TEL and PEL

LEGEND
- Detected - Compounds Less Than Criteria
- Detected - Concentration Exceeds Criteria
- One-half Detection Limit - Less Than Criteria
- One-half Detection Limit - Exceeds Criteria

Note: Sum of Aroclors used as determining value.
Figure F-92  Locations of Antimony Exceedances of Consensus Based Probable Effect Concentrations
Figure F-93  Locations of Arsenic Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 2.4 ppm
Figure F-94 Locations of Cadmium Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 2.4 ppm

LEGEND

〇 No Exceedance
● Exceedance
Figure F-95  Locations of Chromium Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 50.3 ppm
Figure F-96 Locations of Copper Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 32.9 ppm

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LEGEND

○ No Exceedance
● Exceedance
PEC value = 34.5 ppm

Figure F-97  Locations of Lead Exceedances of Consensus Based Probable Effect Concentrations
Figure F-98  Locations of Manganese Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 278.3 ppm
Figure F-99 Locations of Mercury Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 2.2 ppm
PEC Value = 16.4 ppm

Figure F-100  Locations of Nickel Exceedances of Consensus Based Probable Effect Concentrations
Figure F-101 Locations of Selenium Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 0.6 ppm

LEGEND
○ No Exceedance
● Exceedance
Figure F-102 Locations of Silver Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 1.3 ppm
Figure F-103  Locations of Vanadium Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 5.6 ppm
Figure F-104 Locations of Zinc Exceedances of Consensus Based Probable Effect Concentrations

PEC value = 88.2 ppm