DOE/OR/01-1393/V3&D2

Remedial Investigation/Feasibility Study of the Clinch River/Poplar Creek Operable Unit

Volume 3. Risk Assessment Information

Appendixes E, F

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In response to regulators' requests, the D2 version has been reorganized. This volume differs significantly from Vol. 3 in the D1 version. Items in this volume may have appeared in a different volume in the D1 version or may be new. For a breakdown of the origin of the elements in this volume, please refer to page iii.

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Energy Systems Environmental Restoration Program

Remedial Investigation/Feasibility Study of the Clinch River/Poplar Creek Operable Unit

Volume 3. Risk Assessment Information

Appendixes E, F

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Environmental Restoration Activities
OAK RIDGE Y-12 PLANT
Oak Ridge, Tennessee 37831-8169
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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NOTE: The following chart shows the various elements in this volume of *Remedial Investigation/Feasibility Study of the Clinch River/Poplar Creek Operable Unit* (DOE/OR/01-1393/D2) and their correlation to elements in the previous version of this document (DOE/OR/01-1393/D1).

D2 elements	Corresponding D1 elements
Tables E1–E67	Tables E8–E74
Tables E35–E37	Revisions in these tables reflect recalculations.
Table F3.2	Revisions in this table reflects recalculations.
Table F3.3	New

CONTENTS
Volume 3

FIGURES vii

TABLES xii

ACRONYMS xvii

EXECUTIVE SUMMARY xxi

APPENDIX E: HUMAN HEALTH RISK ASSESSMENT DATA E-1
E1. TOXICITY INFORMATION E-99
E1.1 Inorganics E-99
E1.2 Organics E-108
E1.3 Radionuclides E-116
E2. UNCERTAINTY ANALYSIS: DESCRIPTION OF METHODS E-121
E2.1 Introduction E-121
E2.1.1 Background on USEPA Methods for Risk Assessment for Ingestion of Fish E-121
E2.1.2 Background for the Risk Assessment of the Dredging Scenario E-122
E2.2 Description of Parameter Uncertainty in the Fish Ingestion Pathway E-125
E2.2.1 Concentration in Fish E-126
E2.2.2 Exposure Factors Independent of the Contaminant Type E-128
E2.2.3 Radionuclide Specific Factors E-131
E2.2.4 Chemical Specific Factors E-133
E2.3 Description of Parameter Uncertainty in the Dredging Scenario E-136
E2.3.1 Concentration of Select Contaminants in Deep Sediment E-138
E2.3.2 Exposure Factors Independent of the Contaminant Type E-139
E2.3.3 Factors Dependent on Contaminant E-143
E2.4. References E-146

APPENDIX F: ECOLOGICAL RISK ASSESSMENT DATA F-1
F1. ECOTOXICOLOGICAL PROFILES F1-3
F1.1 INORGANIC CHEMICALS F1-3
F1.1.1 Aluminum F1-3
F1.1.2 Arsenic F1-5
F1.1.3 Barium F1-6
F1.1.4 Boron F1-7
F1.1.5 Cadmium F1-7
F1.1.6 Chromium F1-12
F1.1.7 Cobalt F1-16
F1.1.8 Copper F1-16
F1.1.9 Iron F1-19
F1.1.10 Lead F1-20
F1.1.11 Manganese F1-22
F1.1.12 Mercury F1-23
F1.1.13 Molybdenum F1-25

F1.1.14 Nickel F1-26
F1.1.15 Selenium F1-28
F1.1.16 Silver F1-29
F1.1.17 Thallium F1-29
F1.1.18 Uranium F1-30
F1.1.19 Vanadium F1-31
F1.1.20 Zinc F1-31
F1.2 ORGANIC CHEMICALS F1-36
F1.2.1 Acenaphthene F1-36
F1.2.2 Anthracene F1-37
F1.2.3 Benzo(a)anthracene F1-37
F1.2.4 Benzo(a)pyrene F1-37
F1.2.5 Bis(2-ethylhexyl)phthalate F1-37
F1.2.6 Carbon disulfide F1-38
F1.2.7 Chrysene F1-38
F1.2.8 4,4'-DDD F1-38
F1.2.9 DDT-Total F1-38
F1.2.10 Dibenz(a,h)anthracene F1-38
F1.2.11 Fluoranthene F1-39
F1.2.12 Fluorene F1-39
F1.2.13 2-Methylnaphthalene F1-39
F1.2.14 Naphthalene F1-39
F1.2.15 PCB-Total F1-39
F1.2.16 PCB-1248 ..... F1-41
F1.2.17 PCB-1254 ..... F1-41
F1.2.18 PCB-1260 ..... F1-41
F1.2.19 Phenanthrene F1-41
F1.2.20 Pyrene F1-42
REFERENCES F1-44
F2. FISH COMMUNITY F2-1
F3. BENTHIC MACROINVERTEBRATES F3-1
F4. PISCIVOROUS WILDLIFE F4-1
F5. INSECTIVOROUS WILDLIFE F5-1
F6. DREDGE SPOIL ECOLOGICAL RISKS F6-1
F7. RADIOLOGICAL RISKS F7-1
REFERENCES F7-9
F8. ANALYSIS OF FISH AND BENTHIC INVERTEBRATE COMMUNITIES F8-1
F8.1 FISH COMMUNITIES F8-3
F8.1.1 Data Sets F8-3
F8.1.2 Methods F8-3
F8.2 BENTHIC MACROINVERTEBRATES F8-27

FIGURES

F2.1 Empirical distribution functions for acute toxicity and chronic toxicity of cadmium to fish and invertebrates and individual measurements of cadmium in reaches for which potentially significant concentrations were reported. F2-117

F2.2 Empirical distribution functions for acute toxicity and chronic toxicity of copper to fish and invertebrates and individual measurements of copper in reaches for which potentially significant concentrations were reported. F2-118

F2.3 Empirical distribution functions for acute toxicity and chronic toxicity of inorganic mercury to fish and invertebrates and individual measurements of mercury in reaches for which potentially significant concentrations were reported. F2-119

F2.4 Empirical distribution functions for acute toxicity and chronic toxicity of nickel to fish and invertebrates and individual measurements of nickel in reaches for which potentially significant concentrations were reported. F2-120

F2.5 Empirical distribution functions for acute toxicity and chronic toxicity of PCBs to fish and invertebrates and individual measurements of PCBs in reaches for which potentially significant concentrations were reported. F2-121

F2.6 Empirical distribution functions for acute toxicity and chronic toxicity of silver to fish and invertebrates and individual measurements of silver in reaches for which potentially significant concentrations were reported. F2-122

F2.7 Empirical distribution functions for acute toxicity and chronic toxicity of zinc to fish and invertebrates and individual measurements of zinc in reaches for which potentially significant concentrations were reported. F2-123

F3.1 Empirical distribution functions for acute toxicity and chronic toxicity of cadmium to aquatic organisms and individual measurements of cadmium in reaches for which potentially significant concentrations were reported. F3-97

F3.2 Empirical distribution functions for acute toxicity and chronic toxicity of copper to aquatic organisms and individual measurements of copper in reaches for which potentially significant concentrations were reported. F3-98

F3.3 Empirical distribution functions for acute toxicity and chronic toxicity of mercury to aquatic organisms and individual measurements of mercury in reaches for which potentially significant concentrations were reported. F3-99

F3.4 Empirical distribution functions for acute toxicity and chronic toxicity of nickel to aquatic organisms and individual measurements of nickel in reaches for which potentially significant concentrations were reported. F3-100

F3.5 Empirical distribution functions for acute toxicity and chronic toxicity of zinc to aquatic organisms and individual measurements of zinc in reaches for which potentially significant concentrations were reported. F3-101

F3.6(a-b) Empirical distribution functions for sediment toxicity of arsenic to sediment-associated organisms and individual measurements of arsenic in sediments from the Clinch River and Poplar Creek System. F3-102

F3.6(c-d) Empirical distribution functions for sediment toxicity of arsenic to sediment-associated organisms and individual measurements of arsenic in sediments from the Clinch River and Poplar Creek System. F3-103

F3.7(a-b) Empirical distribution functions for sediment toxicity of cadmium to sediment-associated organisms and individual measurements of cadmium in sediments from the Clinch River and Poplar Creek System. F3-104

F3.7(c-d) Empirical distribution functions for sediment toxicity of cadmium to sediment-associated organisms and individual measurements of cadmium in sediments from the Clinch River and Poplar Creek System. F3-105
F3.8(a-b) Empirical distribution functions for sediment toxicity of chromium to sediment-associated organisms and individual measurements of chromium in sediments from the Clinch River and Poplar Creek System. F3-106
F3.8(c-d) Empirical distribution functions for sediment toxicity of chromium to sediment-associated organisms and individual measurements of chromium in sediments from the Clinch River and Poplar Creek System. F3-107
F3.9(a-b) Empirical distribution functions for sediment toxicity of copper to sediment-associated organisms and individual measurements of copper in sediments from the Clinch River and Poplar Creek System. F3-108
F3.9(c-d) Empirical distribution functions for sediment toxicity of copper to sediment-associated organisms and individual measurements of copper in sediments from the Clinch River and Poplar Creek System. F3-109
F3.10(a-b) Empirical distribution functions for sediment toxicity of lead to sediment-associated organisms and individual measurements of lead in sediments from the Clinch River and Poplar Creek System. F3-110
F3.10(c-d) Empirical distribution functions for sediment toxicity of lead to sediment-associated organisms and individual measurements of lead in sediments from the Clinch River and Poplar Creek System. F3-111
F3.11(a-b) Empirical distribution functions for sediment toxicity of mercury to sediment-associated organisms and individual measurements of mercury in sediments from the Clinch River and Poplar Creek System. F3-112
F3.11(c-d) Empirical distribution functions for sediment toxicity of mercury to sediment-associated organisms and individual measurements of mercury in sediments from the Clinch River and Poplar Creek System. F3-113
F3.12(a-b) Empirical distribution functions for sediment toxicity of nickel to sediment-associated organism and individual measurements of nickel in sediments from the Clinch River and Poplar Creek System. F3-114
F3.12(c-d) Empirical distribution functions for sediment toxicity of nickel to sediment-associated organisms and individual measurements of nickel in sediments from the Clinch River and Poplar Creek System. F3-115
F3.13(a-b) Empirical distribution functions for sediment toxicity of silver to sediment-associated organisms and individual measurements of silver in sediments from the Clinch River and Poplar Creek System. F3-116
F3.13(c-d) Empirical distribution functions for sediment toxicity of silver to sediment-associated organisms and individual measurements of silver in sediments from the Clinch River and Poplar Creek System. F3-117
F3.14(a-b) Empirical distribution functions for sediment toxicity of zinc to sediment-associated organisms and individual measurements of zinc in sediments from the Clinch River and Poplar Creek System. F3-118
F3.14(c-d) Empirical distribution functions for sediment toxicity of zinc to sediment-associated organisms and individual measurements of zinc in sediments from the Clinch River and Poplar Creek System. F3-119
F3.15(a-b) Empirical distribution functions for sediment toxicity of Total PAH to sediment-associated organisms and individual measurements of 2-methylnaphthalene in sediments from the Clinch River and Poplar Creek System. F3-120

F3.15(c-d) Empirical distribution functions for sediment toxicity of Total PAH to sediment-associated organisms and individual measurements of 2-methylnaphthalene in sediments from the Clinch River and Poplar Creek System. F3-121
F3.16(a-b) Empirical distribution functions for sediment toxicity of PCBs to sediment-associated organisms and individual measurements of PCBs in sediments from the Clinch River and Poplar Creek System. F3-122
F8.1 Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1991; grouped by drainage. F8-7
F8.2 Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1992; grouped by drainage. F8-9
F8.3 Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1993; grouped by drainage. F8-11
F8.4 Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1991; grouped by drainage. F8-13
F8.5 Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1992; grouped by drainage. F8-15
F8.6 Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1993; grouped by drainage. F8-17
F8.7 Canonical discriminant analysis of the fish communities sampled by gill netting in individual Tennessee Valley reservoirs. F8-19
F8.8 Canonical discriminant analysis of the fish communities sampled by electrofishing in individual Tennessee Valley reservoirs. F8-21
F8.9 Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1992. ..... F8-23
F8.10 Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1993. ..... F8-25
F8.11 Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1994. ..... F8-30
F8.12 Taxonomic richness (Mean $\pm$ SE) of benthic macroinvertebrates sampled for the Vitalsigns Program in individual reservoirs in 1992–1994. ..... F8-31
F8.13 Abundance (Mean $\pm$ SE) of benthic macroinvertebrates sampled for the Vitalsigns Program in individual reservoirs in 1992–1994. ..... F8-32
F8.14 Percentage (Mean $\pm$ SE) of benthic macroinvertebrate community represented by *Tubificidae* in individual reservoirs in 1992–1994. ..... F8-33
F8.15 Percentage (Mean $\pm$ SE) of benthic macroinvertebrate community represented by *Chironomidae* in individual reservoirs in 1992–1994. ..... F8-34
F8.16 Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Environmental Restoration Program in the Clinch River/ Poplar Creek system in 1994; grouped by location relative to Poplar Creek. F8-36

TABLES

E1 Ingestion of contaminants in drinking water E-3
E2 Inadvertent ingestion of sediment in near-shore pathway E-4
E3 Dermal contact with sediment in the near-shore pathway E-5
E4 Inhalation of resuspended sediment in the near-shore pathway E-6
E5 External exposure to radionuclides in sediment in the near-shore pathway E-7
E6 Permeability constants E-8
E7 Ingestion of contaminants in water while swimming E-10
E8 Dermal contact with water while swimming E-11
E9 Ingestion of fish E-12
E10 Ingestion of Canada Geese E-13
E11 Contaminant concentration in vegetables E-14
E12 Contaminant concentration in pasture forage E-16
E13 Contaminant concentration in beef E-18
E14 Contaminant concentration in milk E-19
E15 Inadvertent ingestion of sediment in the dredging pathway E-20
E16 Dermal contact with sediment in the dredging pathway E-21
E17 Inhalation of resuspended sediment in the dredging pathway E-22
E18 External exposure to radionuclides in sediment in the dredging pathway E-23
E19 Modeled concentration in milk, meat, and vegetables for the dredging pathways for the Clinch River and Poplar Creek E-24
E20 Ingestion of produce, meat, and milk in the dredging pathway E-31
E21 Inadvertent ingestion of irrigated soil E-32
E22 Dermal contact with soil in the irrigation pathway E-34
E23 Inhalation of resuspended soil in the irrigation pathway E-36
E24 External exposure to radionuclides in soil in the irrigation pathway E-38
E25 Modeled concentrations in soil, milk, meat, and vegetables for the irrigation pathways for surface water collected in the Clinch River E-39
E26 Modeled concentrations in soil, milk, meat, and vegetables for the irrigation pathways for surface water collected in Poplar Creek E-40
E27 Ingestion of produce, meat, and milk in the irrigation pathway E-42
E28 Log K_{ow} and transfer coefficients used in food chain models E-43
E29 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the drinking water ingestion pathway for the Clinch River E-46
E30 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult drinking water ingestion pathway for the Clinch River E-47
E31 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child drinking water ingestion pathway for the Clinch River E-48
E32 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the drinking water ingestion pathway for Poplar Creek E-49
E33 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the adult drinking water ingestion pathway for the Poplar Creek E-50
E34 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the child drinking water ingestion pathway for the Poplar Creek E-51
E35 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek E-52

E36 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek E-56
E37 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek E-57
E38 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult swimming pathways for Poplar Creek E-59
E39 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child swimming pathways for Poplar Creek E-60
E40 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the fish ingestion pathway for the Clinch River and Poplar Creek E-61
E41 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult fish ingestion pathway for the Clinch River and Poplar Creek E-64
E42 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child fish ingestion pathway for the Clinch River and Poplar Creek E-66
E43 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ for the waterfowl ingestion pathway E-69
E44 Chemicals with a hazard quotient (HQ) of >0.1 for the adult waterfowl ingestion pathway E-69
E45 Chemicals with a hazard quotient (HQ) of >0.1 for the child waterfowl ingestion pathway E-69
E46 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the irrigation pathways for the Clinch River E-70
E47 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult irrigation pathways for the Clinch River E-71
E48 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child irrigation pathways for the Clinch River E-72
E49 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the irrigation pathways for Poplar Creek E-73
E50 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult irrigation pathways for Poplar Creek E-74
E51 Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child irrigation pathways for Poplar Creek E-75
E52 Chemicals with an excess cancer risk (ECR) of $>10^{-6}$ and pathway totals for the dredging pathways for reach 1 and 7 of the Clinch River E-77
E53 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices (HIs) for the adult dredging pathways for reach 1 and 7 of the Clinch River E-79
E54 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices (HIs) for the child dredging pathways for reach 1 and 7 of the Clinch River E-80
E55 Chemicals with excess cancer risks (ECR) of $>10^{-6}$ and pathway totals for the dredging pathways for selected Clinch River and Poplar Creek subreaches E-81
E56 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the adult dredging pathways for selected subreaches of the Clinch River and Poplar Creek E-88
E57 Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the child dredging pathways for selected subreaches of the Clinch River and Poplar Creek E-92
E58 List of assumptions for the parameters used in the uncertainty analysis of the fish ingestion pathway E-125
E59 Summary statistics and estimates of uncertainty for radionuclide contaminant concentrations in largemouth bass of reach 2 ..... E-126

E60 Summary statistics and estimates of uncertainty for select non-carcinogenic contaminant concentrations (mg/kg) in fish where at least one measurement was above the detection limits E-127
E61 Summary statistics and estimates of uncertainty for select carcinogenic chemical contaminant concentrations (mg/kg) in fish where at least one measurement was above the detection limits E-128
E62 Summary information for the uncertainty in the parameters used to calculate daily intake E-130
E63 Dose conversion factors for the ingestion pathway and corresponding uncertainty factors for ^{137}Cs E-132
E64 List of assumptions for the parameters used in the uncertainty analysis of the dredging scenario E-138
E65 Summary statistics and estimates of uncertainty for ^{137}Cs concentrations in deep sediment E-139
E66 Summary statistics and estimates of uncertainty for inorganic mercury concentrations in deep sediment E-139
E67 Ranges of plant-to-soil concentration ratios and transfer coefficients to cow's milk and beef E-145

F1.1 Toxicity of aluminum to aquatic animals F1-4
F1.2 Aqueous concentrations of cadmium causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek F1-8
F1.3 Toxicity of chromium to aquatic animals F1-13
F1.4 Aqueous concentrations of copper causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek F1-17
F1.5 Toxicity of lead to aquatic animals F1-21
F1.6 Aqueous concentrations of mercuric chloride causing effects on freshwater aquatic biota F1-24
F1.7 Aqueous concentrations of nickel causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek F1-26
F1.8 Aqueous concentrations of silver causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek F1-30
F1.9 Aqueous concentrations of zinc causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek F1-32
F1.10 Aqueous concentrations of PCBs causing effects on freshwater aquatic biota F1-42
F1.11 Concentrations of PCB causing toxic effects in lipids and whole bodies of fish F1-43
F2.1 Mean and upper confidence bound (UCB) aqueous chemical concentrations in filtered (FLTR) and unfiltered (WHOL) samples, aqueous ecotoxicological benchmarks and their values for each chemical, and the quotients of UCBs/ benchmark values F2-3
F3.1 Median and maximum concentrations of the contaminants of potential ecological concern in whole sediment, sediment ecotoxicological benchmarks (BMK name) and their values (BMK value) for each chemical, and the quotients (HQ max) of maximum/BMK value F3-3
F3.2 Median and maximum concentrations of contaminants of potential ecological concern in pore water, aqueous ecotoxicological benchmarks (BMK name) and their values (BMK value) for each chemical, and the quotients (HQ max) of maximum/ BMK value F3-51

F3.3 Measured concentrations of reach 3 contaminants of ecological concern at sites with *H. azteca* toxicity tests and the determination of potential toxicity F3-93
F4.1 Life history parameters for osprey F4-3
F4.2 Life history parameters for great blue heron F4-4
F4.3 Life history parameters for mink F4-6
F4.4 Life history parameters for river otter F4-7
F4.5 Fillet-to-whole fish ratios for contaminants detected in fish from the Clinch River F4-8
F4.6 Product limit estimate 95% upper confidence bounds for contaminants in fish and water from Clinch River/Poplar Creek system, by subreach F4-9
F4.7 Exposure estimates for osprey in the Clinch River/Poplar Creek system F4-14
F4.8 Exposure estimates for great blue heron in the Clinch River/Poplar Creek system F4-19
F4.9 Exposure estimates for mink in the Clinch River/Poplar Creek system F4-24
F4.10 Exposure estimates for river otter in the Clinch River/Poplar Creek system F4-29
F4.11 Clinch River subreaches, endpoints, and contaminants where hazard quotients (HQs) >1 were observed and Monte Carlo simulations were performed F4-34
F4.12 Mean and standard errors for concentrations of contaminants of concern for piscivorous wildlife in water and fish from the Clinch River/Poplar Creek system F4-35
F4.13 Results of Monte Carlo simulation of piscivore contaminant exposure estimates in the Clinch River/Poplar Creek system F4-39
F4.14 Estimated NOAELs and LOAELs for osprey and great blue heron F4-42
F4.15 Estimated NOAELs and LOAELs for mink and river otter F4-44
F4.16 Water benchmarks for osprey, great blue heron, and mink F4-46
F4.17 Surface water concentrations and hazard assessment for mink, great blue heron, and osprey F4-48
F4.18 Comparison of Monte Carlo simulation of piscivore contaminant exposure estimates to literature-based NOAELs and LOAELs F4-61
F4.19 Summary of number of individuals of piscivore endpoint species estimated to be experiencing adverse effects within Clinch River/Poplar Creek subreaches F4-64
F4.20 Simulation of exposure of mink to mercury and PCBs in toxicity test diets F4-67
F5.1 Life history parameters for rough-winged swallows (*Stelgidopteryx serripennis*) F5-3
F5.2 Life history parameters for little brown bats (*Myotis lucifugus*) F5-4
F5.3 Contaminant concentrations found in mayflies used for Monte Carlo simulations F5-6
F5.4 Sediment to mayfly uptake factors for the Clinch River F5-7
F5.5 Average actual and estimated contaminant concentrations in Clinch River mayflies ... F5-8
F5.6 Estimated arsenic exposure and hazard assessment for rough-winged swallows F5-9
F5.7 Estimated lead exposure and hazard assessment for rough-winged swallows F5-11
F5.8 Estimated mercury concentrations and hazard assessment for rough-winged swallows F5-13
F5.9 Estimated PCB exposure and hazard assessment for rough-winged swallows F5-15
F5.10 Estimated zinc exposure and hazard assessment for rough-winged swallows F5-17
F5.11 Estimated arsenic exposure and hazard assessment for little brown and gray bats F5-19
F5.12 Estimated lead exposure and hazard assessment for little brown bats and gray bats ... F5-21
F5.13 Estimated mercury concentrations and hazard assessment in little brown and gray bats F5-23
F5.14 Estimated PCB exposure and hazard assessment for little brown and gray bats F5-25
F5.15 Estimated zinc exposure and hazard assessment for little brown and gray bats F5-27
F5.16 Subreach-contaminant exposure combinations where Monte Carlo simulations were performed F5-29
F5.17 Measured mercury concentrations in sediment and estimated concentrations in mayflies from Poplar Creek used in the Monte Carlo simulation F5-29
F5.18 Contaminant concentrations in surface water used in the Monte Carlo simulations ... F5-29

F5.19 Estimated NOAELs and LOAELs for rough-winged swallows F5-30
F5.20 Estimated NOAELs and LOAELs for little brown bats and gray bats F5-31
F6.1 Life history parameters for the eastern cottontail (*Sylvilagus floridanus*) F6-3
F6.2 Chemical concentrations found in deep water sediment (future spoil material) within each subreach F6-4
F6.3 Deep water sediment concentrations within each subreach compared to background concentrations from reach 13 (a reference site) F6-29
F6.4 Total contaminant exposure and hazard quotients (HQs) for cottontail rabbits foraging on future spoils within each subreach F6-43
F6.5 Comparison of contaminant concentrations found in deep sediments (future spoil) in each Clinch River reach to screening benchmarks for toxicity to plants F6-59
F6.6 Estimated NOAELs and LOAELs for the eastern cottontail F6-63
F8.1 Assignment of fish sampling stations to river systems F8-4
F8.2 Species having high contributions to canonical variable values F8-26
F8.3 Invertebrate families having high (>0.3) correlations with canonical variables F8-35

ACRONYMS

ALT	alanine aminotransferase
ANC	American Nuclear Corporation
ANOVA	analysis of variance
ARARs	applicable or relevant and appropriate requirements
AWQC	ambient water quality criteria
BEDS	Biological Effects Database for Sediments
BEIAS	Biomedical and Environmental Information Analysis
BMAP	Biological Monitoring and Abatement Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CCC	chronic continuous criterion
CNF	Central Neutralization Facility
COC	chemical of concern
COPC	contaminant of potential concern
COPEC	contaminants of potential ecological concern
CR-ERP	Clinch River Environmental Restoration Program
CRM	Clinch River mile
CR/PC	Clinch River/Poplar Creek
CRRI	Clinch River Remedial Investigation
CV	chronic value
DNA	deoxyribonucleic acid
DOE	U.S. Department of Energy
DQO	data quality objective
ECR	excess cancer risk
EFPC	East Fork Poplar Creek
EMP	Environmental Monitoring Program
EPA	U.S. Environmental Protection Agency
EPT	ephemeroptera, plecotera, tricoptera
ER	Environmental Restoration
EROD	7-ethoxyresorufin O-deethylase
FDA	Food and Drug Administration
FFA	Federal Facility Agreement
GI	gastrointestinal
GSI	gonadal-somatic index
HAI	Health Assessment Index
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IAEA	International Atomic Energy Agency
i.p.	Intraperitoneal
IRIS	Integrated Risk Information System
LCL_{95}	95% lower confidence limit
LEL	lowest effect level
LET	linear energy transfer
LHS	Latin Hypercube Sampling
LOAEL	lowest-observed-adverse-effect level

LOEC	lowest-observed effective level
LSI	liver-somatic index
MCL	maximum contaminant level
msl	mean sea level
NAWQC	national ambient water quality criteria
NCRP	National Council on Radiation Protection
NOAEL	no-observed-adverse-effect level
NOEC	no-observed-effect concentration
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORREMP	Oak Ridge Reservation Enviornmental Monitoring Program
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OU	operable unit
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCM	Poplar Creek mile
PLE	product limit estimate
PNL	Pacific Northwest Laboratory
PORTS	Portsmouth Gaseous Diffusion Plant
q_1^*	carcinogenicity slope factor
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
RI/FS	remedial investigation/feasibility study
RGO	remedial goal option
ROD	Record of Decision
RME	reasonable maximum exposure
SAV	secondary acute value
s.c.	subcutaneous
SCV	secondary chronic value
SF	slope factor
SI	sensitivity index
SQAG	Sediment Quality Assessment Guideline
SQC	sediment quality criteria
SSNAEL	site-specific no apparent effects level
SWSA	solid waste storage area
T&E	threatened and endangered
TDEC	Tennessee Department of Environment and Conservation
TIE	toxicity evaluation and identification
TKN	total Kjeldahl nitrogen
TOC	total organic carbon
TRE	trivalent rare earths
TRM	Tennessee River mile
TU	toxic unit
TVA	Tennessee Valley Authority

TWRA	Tennessee Wildlife Resources Agency
UCB	upper confidence bound
UCL_{95}	95% upper confidence limit
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
VSI	visceral-somatic index
WBR	Watts Bar Reservoir
WOC	White Oak Creek
%GI	percent gastrointestinal absorption efficiency
ΣTU	

EXECUTIVE SUMMARY

This report presents the findings of an investigation into contamination of the Clinch River and Poplar Creek near the U.S. Department of Energy's (DOE's) Oak Ridge Reservation (ORR) in eastern Tennessee. For more than 50 years, various hazardous and radioactive substances have been released to the environment as a result of operations and waste management activities at the ORR. In 1989, the ORR was placed on the National Priorities List (NPL), established and maintained under the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Under CERCLA, NPL sites must be investigated to determine the nature and extent of contamination at the site, assess the risk to human health and the environment posed by the site, and, if necessary, identify feasible remedial alternatives that could be used to clean the site and reduce risk. To facilitate the overall environmental restoration effort at the ORR, CERCLA activities are being implemented individually as distinct operable units (OUs). This document is the combined Remedial Investigation and Feasibility Study Report for the Clinch River/Poplar Creek OU.

This report is organized into five volumes, the first of which presents the main text. Chapter 1 describes the regulatory setting, and Chapter 2 broadly portrays the environmental setting. Chapter 3 depicts the operational and release history of the site and characterizes in detail the nature and extent of contamination. Chapter 4 briefly identifies other regulatory requirements that are applicable or appropriate to the site. Chapters 5 and 6 assess the risk to human health and the environment, respectively. Chapter 7 explains the purpose and organization of the feasibility study. Chapter 8 defines remedial action objectives for the site; identifies pathways and contaminants of concern; and screens general response actions, potential remedial technologies, and process options. Chapter 9 develops remedial alternatives based on the remedial action objectives, the screened technologies, and representative process options. Chapter 10 analyzes, evaluates, and compares the remedial alternatives. Chapter 11 lists the references cited in the main text.

Volumes 2–5 consist of appendices that contain supporting data and information. Volume 2 characterizes the biota on the ORR (Appendix A) and summarizes data related to contaminant concentrations in water (Appendix B), in sediment (Appendix C), and in biota (Appendix D). Volume 3 presents information related to human health risk assessment (Appendix E) and ecological risk assessments (Appendix F). Volume 4 focusses on the feasibility study, detailing the selection of remedial process options and providing the basis for the cost estimates for each remedial alternative. Appendix I presents the applicable or relevant and appropriate requirements (ARARs), which help define the extent of the remedial response. Volume 5 is a compilation of data from individual studies that were conducted as part of the overall remedial investigation. As such, the volume addresses the quality assurance objectives for measuring the data (Appendix J), presents selected historical data (Appendix K), contains data from several discrete water characterization studies (Appendix L), provides data supporting the sediment characterization (Appendix M), and contains data related to several biota characterization studies (Appendix N).

BACKGROUND

The ORR is a 34,600-acre tract of land in Anderson and Roane counties, Tennessee. It is administered by DOE, and it houses three main facilities: the Oak Ridge Y-12 Plant, the K-25 Site (formerly known as the Oak Ridge Gaseous Diffusion Plant), and Oak Ridge National Laboratory (ORNL). Each facility was created in the early 1940s as part of the U.S. government's war effort. The K-25 Site was used for the large-scale production of enriched uranium until its shutdown in 1985. The Y-12 Plant had several missions, but it primarily manufactured nuclear weapons components; production there ended in 1992. ORNL was initially a pilot-scale plant for the production of plutonium, but its post-war mission has centered on nuclear reactor research and the production of radionuclides for use in medicine and science. In addition to these operations, each plant has housed large support operations, including maintenance shops; waste treatment, storage, and disposal areas; steam plants; storm and sewer drains; and infrastructure.

The Clinch River/Poplar Creek OU is located adjacent to the ORR and consists of the Clinch River and several tributary embayments in Melton Hill and Watts Bar reservoirs. Both reservoirs are large multipurpose impoundments created and maintained by the Tennessee Valley Authority. The OU extends from the upstream boundary of the ORR at Clinch River mile (CRM) 49 in Melton Hill Reservoir, downstream to the mouth of the Clinch River in Watts Bar Reservoir at Kingston. It also includes several embayments that extend up tributary streams, including the McCoy Branch embayment of Melton Hill Reservoir and the Poplar Creek embayment [up to Poplar Creek mile (PCM) 5.5] of Watts Bar Reservoir. Originally, the OU included all of Watts Bar Reservoir downstream of the confluence of the Clinch and Tennessee rivers, but this area was segregated into a new OU (the lower Watts Bar Reservoir OU) in 1994, and a CERCLA Record of Decision was reached in 1995. No action-based remedial alternatives were implemented in lower Watts Bar Reservoir. The OU is currently being monitored to ensure that exposure to contaminants remains low.

REMEDIAL INVESTIGATION

The remedial investigation had two primary objectives: (1) to characterize the nature and extent of contamination, and (2) to assess the baseline risk to human health and the environment. Under CERCLA, if site risks are too high, remedial action is generally warranted. This investigation was implemented in a phased approach. First, existing environmental data were used to develop a preliminary site model, which considered the known or suspected contaminant sources, the physical characteristics of the site, and the environmental fate of various contaminants. An initial round (Phase 1) of limited sampling of water, sediment, and fish was then conducted (in 1989) to confirm these historical data and to refine the site model. A much more extensive sampling effort (Phase 2) was conducted in 1994 to more definitively meet the objectives.

Nature and Extent of Contamination

Several contaminant sources were included in the site model. The waters of Poplar Creek were known to receive effluent from the Y-12 Plant (and the City of Oak Ridge) via East Fork Poplar Creek (EFPC), which enters the Poplar Creek at PCM 5.5. Large quantities of elemental mercury were released from the Y-12 Plant in the late 1950s, and small quantities currently continue to

escape from contaminated buildings, equipment, and soils. Increased levels of mercury, therefore, were predicted in water, sediment, and biota of Poplar Creek downstream of EFPC. (Contamination at the Y-12 Plant and contamination in the EFPC floodplain have been addressed separately in efforts at other ORR OUs). Other contaminants known to have been released from the Y-12 Plant include uranium, polychlorinated biphenyls (PCBs), and several metals. Poplar Creek also has historically received a variety of effluents from the K-25 Site, through which the creek flows. Numerous metals, uranium, PCBs, laboratory chemicals, and organic solvents are thought to have been released from the site. In addition, the downstream reaches of Poplar Creek formerly received coal ash from the K-770 steam plant at the K-25 Site, and sediment at this location was expected to contain elevated levels of several metals, particularly arsenic.

The contaminants of potential concern in the Clinch River below Melton Hill Dam are primarily man-made radionuclides, by-products of nuclear fission. Contaminants were released to the Clinch River via White Oak Creek, which enters at CRM 20.8. Studies in the 1960s demonstrated that water-soluble radionuclides were rapidly and greatly diluted upon entering the Clinch River and were quickly transported downstream, with little loss of contaminant mass (i.e., they remained in solution). However, those contaminants that adsorbed to particulate matter became bound to particles of suspended sediment and accumulated in areas of sediment deposition. Earlier studies indicated that the principal radionuclide of potential concern in Clinch River sediment at the beginning of this investigation was ^{137}Cs, which is strongly particle-associated and has a relatively long (30-year) half-life. Because peak releases of ^{137}Cs from ORNL occurred at the same time as peak releases of mercury from the Y-12 Plant, peak concentrations of each were known to co-occur in the lower Clinch River, buried under several inches of cleaner sediment. Although one would have expected sediment in the Clinch River below White Oak Creek to contain the highest levels of ^{137}Cs and other radionuclides, there was actually very little sediment in this portion of the river, most having been scoured and transported downstream by the periodic high-volume releases of water from Melton Hill Dam, located approximately 2 miles upstream.

Current contaminant releases from ORNL are much lower than those of the 1950s and 1960s and are largely due to leaching or runoff from waste disposal areas. Most of these areas are no longer in use and are themselves the focus of environmental restoration efforts at ORNL.

Fly ash from the Y-12 steam plant was formerly disposed of in a settling pond located near the headwaters of McCoy Branch on Chestnut Ridge. As a result, several contaminants associated with coal ash, particularly arsenic, were known to be present at elevated levels in surface water and sediment in the McCoy Branch embayment of Melton Hill Reservoir. Because the embayment is bisected by a road built on fill material, conditions were expected to be worse in the upper embayment, whose water had limited mixing (via a culvert) with waters of the lower embayment and the main reservoir.

In addition to these ORR-specific concerns, it was known that fish collected on and near the reservation contained more PCBs than fish found at most upstream reference areas. PCBs had been used at each of the three facilities. The ORR as a whole has likely been a source of PCBs to the environment. However, PCBs have been widely used in transformers and in industrial operations, and numerous potential sources exist throughout eastern Tennessee. The identification of sources is difficult because PCBs bioaccumulate in fish and other organisms to much greater levels than in

water or sediment, where they are largely undetected. The extent to which the ORR had contributed to the problem was unclear.

The knowledge of these site conditions was used to guide the remedial investigation. Much of the sampling focused on Poplar Creek, where the combination of multiple sources and site conditions (e.g., areas of significant sedimentation, less water volume than in the Clinch River) were expected to result in some of the highest levels of contamination. Sampling in the Clinch River focused on fish and sediment, media in which contaminants tend to accumulate. Sediment sampling was limited in the Clinch River between Melton Hill Dam and Poplar Creek because sediment was scarce there.

The results of the site characterization phase of the remedial investigation were consistent with the site model. The nature and extent of contamination were evaluated by identifying those study reaches in which levels of any contaminant in water, sediment, or biota were elevated in comparison with levels in upstream reference reaches. The nature and extent of contamination are described as follows.

- **Arsenic in surface water and sediment of upper McCoy Branch Embayment.** Average concentrations of arsenic (4.1 μg/L) in surface water exceeded the state of Tennessee's recreation-based Ambient Water Quality Criterion. This criterion is designed to protect persons who regularly consume fish taken from a particular body of water. In sediment, elevated levels of arsenic, vanadium, and boron were found throughout McCoy Branch Embayment, but concentrations were highest in the upper embayment.

- **Radionuclide levels in water, sediment, and biota of the Clinch River downstream of White Oak Creek.** Average gross alpha and gross beta levels and mean activities of ^{90}Sr and ^{3}H in surface water were a factor of ten higher than reference values. These data were extremely variable, probably as a result of the extreme variability in flow below Melton Hill Dam. A conservative evaluation of the radionuclide concentrations indicated that, even immediately below White Oak Creek, the state's Ambient Water Quality Criterion for protection of domestic supplies was not exceeded.

  Levels of ^{137}Cs were elevated in Clinch River sediment below the mouth of White Oak Creek. This radionuclide has a strong affinity for particles, particularly the clay minerals that make up a significant portion of Clinch River sediment. However, the discharge of water from Melton Hill Dam resulted in the scouring of most of the sediment from this portion of the river, creating larger inventories of ^{137}Cs in the lower Clinch River, where sedimentation is greater.

  Bluegill sunfish and largemouth bass collected in 1989 from the Clinch River near the mouth of White Oak Creek contained ^{137}Cs at levels 100 times that of fish from upstream reference areas. Catfish were found to have levels approximately ten times that of reference areas. Although elevated, these levels do not pose a significant risk to persons or wildlife consuming these fish, so radionuclide analysis was discontinued after the initial round of sampling.

- **Mercury in surface water, sediment, and biota of Poplar Creek downstream of East Fork Poplar Creek.** Average mercury concentrations in surface water, sediment, and biota were significantly elevated in Poplar Creek downstream of EFPC in comparison with average values

upstream of EFPC. Elevated concentrations (up to 0.19 μg/L) measured in Poplar Creek surface water below EFPC and in the Clinch River downstream of Poplar Creek exceed the state's Continuous Concentration Criterion (0.012 μg/L). This criterion is designed to protect aquatic life from chronic exposure to mercury. Although also elevated above reference values, mean mercury levels in fish did not exceed the Federal Drug Administration's action level (1.0 mg/kg) in any species sampled. Several individual largemouth bass, however, had mercury levels that exceeded this value. Increased body burdens of mercury were also found in benthic organisms living in Poplar Creek, in heron eggs and chicks from a rookery near Poplar Creek, and in laboratory mink fed a diet high in fish from Poplar Creek. A decreasing gradient of biological effects, as measured by a suite of physiological and physical indices, was found to extend from upper Poplar Creek downstream through the Clinch River. This gradient in effects can be roughly correlated with a decreasing gradient in fish body burdens of mercury and PCBs in the downstream direction.

- **Metals and radionuclides in the sediment of Poplar Creek.** In addition to mercury, contaminants in Poplar Creek sediment that were elevated above reference levels were silver, arsenic, boron, cadmium, copper, chromium, nickel, vanadium, ^{238}U, ^{235}U, ^{234}U, ^{99}Tc, ^{137}Cs, and ^{60}Co. PCBs (Aroclor 1254), rarely detected in sediment anywhere in the system, were detected in Poplar Creek. As with mercury, concentrations of copper, cadmium, and chromium increased immediately below EFPC and likely represented releases from the Y-12 Plant. Concentrations of silver, nickel, ^{99}Tc, and the uranium isotopes were elevated below K-25 discharge points, and copper and chromium concentrations in this area were substantially increased above the already elevated levels found below EFPC. Increased levels of arsenic, vanadium, and boron were found in lower Poplar Creek and were associated with an area where the disposal of coal ash from the K-770 steam plant historically took place. The increased levels of ^{137}Cs and ^{60}Co were restricted to the last mile of Poplar Creek and are thought to be caused by backflow from the Clinch River, which regularly takes place as a result of reservoir operations.

- **PCBs in fish of Poplar Creek and the Clinch River.** Mean PCB levels in largemouth bass were highest in Poplar Creek. Although no bass were available from the reference reach of Poplar Creek, concentrations were still greater than at most other study and reference sites.

  Mean concentrations of PCBs in catfish were highest in Phase 1 samples collected from the White Oak Creek Embayment (now part of a separate OU) and in fish from the Clinch River immediately downstream. Levels were significantly increased over those in Melton Hill and Norris Reservoir catfish. Mean concentrations in catfish from Poplar Creek below the confluence with EFPC were greater than those in catfish from above the confluence. Mean total PCB concentrations in largemouth bass did not exceed the FDA action level (2.0 mg/kg) at any location. The mean concentration in catfish did not exceed this action level at any location (except at the White Oak Creek Embayment). However, individual fish from the Clinch River and Poplar Creek had concentrations that exceeded this level.

  The PCBs detected in fish flesh were almost exclusively Aroclor 1254 and Aroclor 1260. An analysis of individual PCB congeners in catfish did not reveal any patterns that could explain additional sources of PCB contamination.

Risk Assessment

The data used to characterize the nature and extent of contamination were also used to meet the second objective of the remedial investigation, risk assessment. The baseline risk assessment contained in this report consists of a human health risk assessment and an ecological risk assessment.

Risk to human health was evaluated for seven exposure scenarios, each of which contained one or more pathways through which exposure actually occurs. The seven scenarios were (1) the use of surface water as an untreated drinking water source, (2) the consumption of fish, (3) the use of the reservoir shoreline during winter drawdown, (4) swimming, (5) the hunting and consumption of waterfowl that frequent the ORR, (6) the dredging and subsequent land disposal of sediment, and (7) the use of surface water for irrigation. In each scenario, risk from carcinogens was assessed by assuming a 30-year exposure duration, and risk from noncarcinogens was assessed by assuming a 6-year exposure period. Under CERCLA, media whose pathways result in either a cumulative excess cancer risk of 1.0E-04 or a Hazard Quotient of 1.0 (a measure of noncarcinogenic exposure) generally warrant remedial action at the site.

The human health risk assessment evaluated the risk from each contaminant for which sufficient data existed to obtain a representative concentration. Therefore, the human health risk assessment identified certain analytes whose presence did not appear to be the result of the ORR operations. Because these contaminants might have contributed significantly to overall risk, they generally were included in the risk assessment.

Thirty-five potential contaminants of concern were identified in Clinch River and Poplar Creek water, sediment, and fish. The majority of contaminants were found in deep sediment, and the greatest risks were identified through the agricultural pathways. Of the contaminants identified, only 2 in water, 7 in fish, and 19 in sediment were clearly site-related.

Eight contaminants of concern, all noncarcinogens, were identified in surface water in the OU. Five were identified in the drinking water scenario; the non-site-related analyte manganese drove the risk in all reaches except in upper McCoy Branch, where arsenic contributed most of the risk. Seven contaminants of concern were identified in the irrigation scenario, and two were identified in the swimming scenario (Poplar Creek only). The two contaminants identified in the swimming scenario (Di-n-octylphthalate and Aroclor 1254, also identified in the irrigation scenario) were detected infrequently and therefore might not be contaminants of concern. In general, the number of contaminants of concern in each scenario was greatest in Poplar Creek and least in McCoy Branch.

Seven contaminants of concern were identified in the shoreline-use scenario, which was based on contaminant concentrations in near-shore sediment only. No such data were collected for McCoy Branch embayment; therefore, assessment of this scenario was not conducted for the area. Noncarcinogenic risk was common throughout near-shore areas along both the Clinch River and Poplar Creek, and it was driven almost exclusively by manganese via inhalation of resuspended sediment. A significant (<1.0E-04) excess cancer risk existed in one subreach of Poplar Creek, primarily because of chromium exposure via the inhalation pathway.

Eleven contaminants of concern were found in fish. Most of the contaminants were organic compounds (PCBs and pesticide residues) and were found in catfish and largemouth bass from both the Clinch River and Poplar Creek. The excess cancer risk from the consumption of catfish exceeded 1.0E-03 in all study reaches, primarily as a result of Aroclor 1260. The excess cancer risk from the ingestion of largemouth bass was generally equal to or less than one half of that from the ingestion of catfish. Arsenic and Aroclor 1260 were the primary contributors to carcinogenic risk from the ingestion of largemouth bass. Several radionuclides were also identified as carcinogenic contaminants of concern, but they generally contributed only a small portion of the total risk. The exception was ^{137}Cs, which contributed a significant portion of the risk associated with the ingestion of largemouth bass from the Clinch River immediately below the mouth of White Oak Creek. Contaminants of concern that were important noncarcinogens included mercury, Aroclor 1254, and chlordane in one or more species in Poplar Creek and the Clinch River.

In the dredging scenario, 31 contaminants of concern were identified in sediment. This scenario assessed the risk from contaminant exposure that would occur if dredge spoil were placed on land where it was accessible to humans. Several direct exposure pathways were evaluated, as were several agricultural scenarios in which contaminant concentrations in produce, milk, and beef were modeled from sediment contaminant concentrations.

Of the direct pathways, external exposure to gamma-emitting radionuclides in spoil from throughout most of the Clinch River (including Melton Hill Reservoir) and at the mouth of Poplar Creek would result in an excess cancer risk greater than 1.0E-04. At all locations downstream of White Oak Creek, the primary contributor to risk via external exposure was ^{137}Cs. In Melton Hill Reservoir, the risk was primarily due to ^{60}Co from a non-DOE source (now closed) on Braden Branch. In all reaches for which data were available, manganese in spoil posed the greatest risk to adults and children via the inhalation of resuspended sediment. Barium similarly posed ubiquitous risk but generally only to children. In addition to this noncarcinogenic risk, the inhalation of resuspended spoil from lower Poplar Creek would result in an excess cancer risk of 2.1E-04, primarily due to arsenic and chromium. Finally, the incidental ingestion of arsenic and mercury in spoil from lower Poplar Creek would be potentially harmful to children.

In the three agricultural pathways evaluated under the dredging scenario, the milk and meat ingestion pathways showed the most carcinogenic potential. Evaluation of the majority of the reaches for which data were available indicated that the ingestion of milk and beef produced with vegetation grown on dredge spoil would result in an excess cancer risk greater than 1.0E-04 and that many reaches had risk values an order of magnitude greater. The contaminants responsible for the majority of this risk were members of a class of ubiquitous contaminants known as polycyclic aromatic hydrocarbons. In particular, benzo(a)pyrene and dibenz(a,h)anthracene drove this risk. In addition, in those reaches where it was detected, Aroclor 1260 contributed significantly to the risk. By contrast, the excess cancer risk in vegetables was generally lower, exceeding the 1.0 E-04 threshold in only two locations; in these locations the risk was driven by different analytes than in the other two pathways. In Poplar Creek adjacent to the K-25 Site, ^{99}Tc was the primary contributor to risk, although nine other analytes at this location were also of concern. At one location in the Clinch River, the organic analyte N-nitroso-di-n-propylamine was identified as a contaminant of concern but was detected in only one of three samples from that reach.

Evaluation of every subreach for which there were data indicated that one or more of the agricultural pathways posed an unacceptable risk under the dredging scenario. Fourteen noncarcinogenic contaminants of concern were identified. Risk in the milk and meat pathways was frequently driven by mercury and Aroclor 1254. Risk in the vegetable ingestion pathway was frequently driven by manganese, except in the Poplar Creek subreaches, where mercury was the concern.

The ecological baseline risk assessment estimated the ecological risk due to contaminants in the Clinch River/Poplar Creek OU. Seven assessment endpoints were evaluated during the assessment: (1) reduced species richness or abundance or the increased frequency of gross pathologies in fish; (2) reduced species richness or abundance of benthic macroinvertebrate communities; (3) reduced abundance or production of piscivorous wildlife populations; (4) reduced abundance or production of flying insectivorous wildlife populations; (5) reduced production in terrestrial plant communities; (6) reduced abundance or production of terrestrial wildlife populations; and (7) reduced viability of any individuals of a threatened or endangered species. For each endpoint, the reduction in the parameter was required to be 20% or more and to be the result of toxicity.

Three lines of evidence were used in the ecological risk assessment. First, the site and media-specific contaminant data used in the site characterization were evaluated against a series of benchmark values (e.g., the no-observed-effects level) to determine whether concentrations were great enough to cause adverse effects. Second, site-specific toxicity data were used to determine whether these levels were actually causing a toxic effect at a particular site. Finally, site-specific biological survey data (species richness and abundance) were used to help assess whether any toxicity was actually having an impact at the population or community level. When all lines of evidence were not available for each of the endpoints, risk assessment was usually based on contaminant data alone. The assessment for the fish endpoint used data on fish pathologies and fecundity as a fourth line of evidence.

The fish community in Poplar Creek was found to be at significant risk from episodically high concentrations of several metals (copper, mercury, nickel, and silver). Toxicity to fish was assessed by using several test protocols and organisms. Poplar Creek water was toxic to Japanese medaka and redbreast sunfish embryos, but not to fathead minnows or *Ceriodaphnia*. The fish community of Poplar Creek exhibited decreased species richness and abundance in comparison with a reference site with similar habitat (Bull Run Creek embayment of Melton Hill Reservoir). The results of the ecological risk assessment for fish indicated that, while individual fish were probably suffering some physiological impacts immediately below WOC, the fish community was not being significantly impacted in the Clinch River. In McCoy Branch, adverse impacts could not be ruled out, but data were unavailable for some of the lines of evidence (data on fish community, pathology, and fecundity).

The benthic macroinvertebrate community of Poplar Creek was identified as being at significant risk from several metals (arsenic, mercury, nickel, and silver) and PCBs in surface sediment. The benthic community contained fewer species and had less abundance of organisms than the communities at other sites. The toxicity data did not reveal consistently toxic effects, but in at least one test from each site a toxic response was observed in test organisms of at least one species. The benthic communities of the Clinch River and the McCoy Branch embayment were found not to be significantly impacted by contaminants.

Risks to piscivorous wildlife were assessed by using two avian species (great blue heron and osprey) and two mammalian species (mink and river otter). Two lines of evidence, biomonitoring data and contaminant data in whole fish, were available for assessing risk to heron and osprey. Partly because of their wide foraging behavior, osprey were found to be not at risk from contaminants even though mercury levels in Poplar Creek fish exceeded benchmark values. Although the data indicated that individual heron feeding exclusively in certain portions of Poplar Creek might be at risk, the local populations of the avian species were not expected to be impacted. This conclusion was supported by surveys of the reproductive success of osprey and great blue heron in Poplar Creek: the surveys found high reproduction and no increase in deformities. Mink were not identified as being at risk from contaminants in either Poplar Creek or the Clinch River. However, individual river otter feeding in Poplar Creek near the mouth of EFPC would be expected to have a significant risk of impaired reproduction. Although river otter do not currently exist within the OU, they have recently been reintroduced into east Tennessee, and the natural expansion of their range is expected to lead to their re-establishment on the ORR. Because the otter is a state threatened species, impacts to individual otter would be considered significant.

The risk to insectivorous wildlife was assessed by using one avian species, the rough-winged swallow, and two mammalian species, the gray and little brown bats. In each case, only one line of evidence (contaminant concentrations in benthic insects) was available for the assessment. These data indicate that a colony of rough-winged swallows feeding in Poplar Creek near the mouth of EFPC could suffer impaired reproductive potential as a result of mercury exposure, but the magnitude of the effects could not be evaluated. Populations of neither species of bat were found to be at risk. Although mercury concentrations in Poplar Creek were high enough to put individual bats at risk if they were to forage exclusively within this area, the foraging range of bats is great enough that this possibility is unlikely.

The ecological risk assessment for terrestrial wildlife was based on a dredging scenario much like that used in the human health risk assessment. The assessment examined risk both to the plant community that would develop on dredge spoil and to a herbivorous mammal (eastern cottontail) foraging there. A single line of evidence (contaminant concentrations in sediment) was available for use in the assessment. In the sediment of one or more study reaches, 12 metals were found at concentrations that exceeded benchmarks indicative of plant toxicity. The greatest number of metals were found in lower Poplar Creek, which contained arsenic, boron, cadmium, chromium, mercury, nickel, selenium, uranium, and vanadium. Benchmark numbers for plants were not available for a large number (i.e., 37) of the organic compounds; therefore, these analytes could not be evaluated. Populations of cottontails foraging on future spoil from lower Poplar Creek or from the Clinch River immediately downstream of Poplar Creek would be at significant risk of impaired reproduction due to levels of mercury and cadmium. A number of other analytes from these (and most other) reaches might pose a risk to individual cottontails foraging on future spoil; however, population-level effects from these contaminants would not be expected.

Ecological risk from radiation exposure was assessed separately. Risks to many of the same endpoint species were assessed, including a benthic organism (a mayfly), epibenthic (bottom-dwelling) fish, piscivorous wildlife (great blue heron), and a terrestrial herbivore (eastern cottontail). The assessment used the contaminant data for radionuclides to calculate the total radiation dose to these organisms. The DOE limit of 1.0 rad/day was used to assess acceptable exposures for most organisms; the International Atomic Energy Agency's recommended limit of 0.1 rad/day for

terrestrial organisms was used to assess exposure for cottontail rabbits. None of the calculated doses approached the appropriate benchmarks above; thus, the radiological contaminants in the various environmental media of the OU did not pose a significant ecological risk.

Based on the findings of the site characterization and risk assessments, a number of pathway and media-specific remedial goal options (RGOs) were developed for individual analytes, which represent concentrations corresponding to an ARAR or to an acceptable human health or ecological risk level. RGOs were developed only for those reaches containing one or more environmental media that exceeded one of the criteria and thus indicated the potential need for remedial action in that reach. In almost every reach studied, RGOs were developed for one or more analytes for each of the three media evaluated.

FEASIBILITY STUDY

On the basis of the remedial investigation, a feasibility study was conducted to identify remedial alternatives that would be effective in reducing contaminant concentrations or reducing or eliminating exposure and that could be feasibly implemented. The overall approach taken in the feasibility study was to focus on remedies for site-related contaminants as identified in the site characterization. Therefore, remedies were not evaluated for those reaches in which risk was primarily the result of non-site-related contaminants (e.g., manganese-driven risks in surface sediment or in water). In addition, no remedies were evaluated for surface water contaminants. Remediation of surface water is best effected at the source of the contamination, which in each case is primarily in upstream OUs. Moreover, remediation of the large volumes of flowing water is not practical. The use of institutional controls is the only remedy considered for limiting human exposure to fish. Therefore, active remedies evaluated in the feasibility study focus on site-related contaminants of concern in sediment.

Four alternatives are evaluated in the feasibility study. Alternative 1, the no-action alternative, is required by CERCLA to be evaluated. As the name implies, this alternative would be easily implemented at no cost (except for limited monitoring activities). However, the risk assessments indicate that the no-action alternative would not be protective of human health or the environment.

Alternative 2 consists of the use of only institutional controls and advisories to reduce exposure to contaminants in fish and sediment. Although not empowered under CERCLA, the state of Tennessee, the Tennessee Valley Authority, and the U.S. Army Corps of Engineers each have separate regulatory authority to regulate activities that could result in the disturbance of sediment in the Clinch River and Poplar Creek. Each of these agencies is party to an interagency agreement with DOE that requires the multiagency review, on a case-by-case basis, of all permit applications that propose activities with the potential to disturb sediment. The state of Tennessee currently issues fish consumption advisories warning the public to avoid or limit consumption of certain species of fish in which contaminant levels are unacceptably high. Currently, the state warns against the consumption of catfish from Melton Hill Reservoir and recommends limiting the consumption of catfish and sauger from the Clinch River below Melton Hill Dam. In both cases, the advisory is based on total PCB levels. The overall cost of implementing alternative 2, including future monitoring and administrative costs, is estimated to be $3.4M annually.

Alternative 3 incorporates the institutional controls described in alternative 2 and in addition proposes the combined containment and removal of contaminated sediment from Poplar Creek. As noted earlier, the near-shore area (bottom elevation >733 ft msl) of Poplar Creek adjacent to the K-25 Site contained elevated levels of chromium that could result in an excess cancer risk greater than 1.0E-04 via the inhalation pathway. Peak concentrations were found over an estimated 99,200-ft^2 area. Containment of contaminants in this area with a geotextile membrane and riprap would cost approximately $5.5M to implement. In addition, the presence of several contaminants in the sediment of Poplar Creek posed a risk to benthic organisms. Seven separate locations in Poplar Creek would be remediated, through the use of a combination of sediment containment technologies in the near-shore areas (bottom elevation >733 ft msl) and sediment removal technologies in deep water areas (bottom elevation <733 ft msl). A total area of 388,800 ft^2 is proposed for containment, and a total of 179,250 yd^3 for removal (the top 3 ft of sediment), at a total cost of $109.6M. Removal of the deep sediment would also address the potential for future risks to human health and the environment in the dredging scenario.

Alternative 4 also incorporates the institutional controls of alternative 2, but in addition it proposes the removal of contaminated sediment from Poplar Creek. The near-shore area of Poplar Creek that is adjacent to the K-25 Site and that poses an excess risk to human health would require the removal and safe disposal of approximately 12,800 yd^3 of sediment at a cost of approximately $9.5M. Removal of those sediments in Poplar Creek that pose an ecological risk would require the removal and safe disposal of approximately 226,500 yd^3 of sediment, at a cost of approximately $123.5M. Because benthic habitat extends bank-to-bank, addressing the existing ecological risk by removing sediment would also address both the existing human health risk in the near-shore scenario and the potential for future human health risk and ecological risk in the dredging scenario.

Appendix E

HUMAN HEALTH RISK ASSESSMENT DATA

Table E1. Ingestion of contaminants in drinking water

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CW \times IR \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CW \times IR \times EF \times ED$$

Parameter Explanation

Parameter			Value used	Explanation/source
CW	=	Concentration in water	Chemical-specific (mg/L or pCi/L)	95% UCL on the mean
IR	=	Ingestion rate	1.0 L/day 2.0 L/day	Child rate (EFH, EPA 1989) Adult rate (OSWER Directive, EPA 1991a)
EF	=	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED	=	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW	=	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT	=	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (EPA 1989b; EPA 1991a)

Table E2. Inadvertent ingestion of sediment in near-shore pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times IR \times FI \times EF \times CF \times ET \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CS \times IR \times FI \times EF \times CF \times ET \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in near-shore sediments	Chemical-specific (mg/kg, pCi/g, dry wt)	95% UCL on the mean
IR =	Ingestion rate	0.0002 kg/day or 0.2 g/day	Child (OSWER Directive, EPA 1991a)
		0.0001 kg/day or 0.1 g/day	Adult (OSWER Directive, EPA 1991a)
FI =	Fraction ingested	1 (unitless)	Maximum value; equivalent to 100%
EF =	Exposure frequency	175 days/year	Based on the average time near-shore sediments are known to be available for exposure.
ET =	Exposure time exposed to the near-shore sediments	8 hours/day	Estimated; hours per day an individual is
CF =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
ED =	Exposure duration	6 years	Child exposure (RAGS, EPA 1989b)
		30 years	Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg	Child (OSWER Directive, EPA 1991a)
		70 kg	Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED	Averaging time for non-carcinogens
		365 days/year × 70 years	Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E3. Dermal contact with sediment in the near-shore pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times AF \times ABS \times SA \times ET \times CF \times EF \times ED}{BW \times AT}$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in near-shore sediment	Chemical-specific (mg/kg, dry wt)	Concentration listed in Appendix E
AF =	Adherence factor	0.01 kg/m^2	Unit-adjusted adherence factor for soil 1.0 mg/cm^2 (10^{-6} kg/mg x 10^4 cm^2/m^2) (EPA 1992b)
ABS =	Absorption factor	0.001 (unitless) 0.01 (unitless)	Equivalent to 0.1% for inorganics and 1.0% for organics (EPA 1992b)
SA =	Available surface area	0.2295 m^2/day 0.57 m^2/day	(0.918 m^2/day)(0.25), children (2.28 m^2/day)(0.25), adults 25% of the 95th percentile total body surface area (represents summer exposure) (DEA, EPA 1992a)
EF =	Exposure frequency	175 days/year	Equilvalent to 350 days/year · 0.5; six months exposure per year
ET =	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to near-shore sediment
CF =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E4. Inhalation of resuspended sediment in the near-shore pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CA \times IR \times ET \times EF \times ED$$

Where,

$$CA\left(\frac{mg}{m^3}, \frac{pCi}{m^3}\right) = CS \times r_e \times \rho$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CA =	Concentration in air	Chemical-specific (mg/m^3, pCi/m^3)	Concentration calculated as above
CS =	Concentration in sediment	Chemical specific (mg/kg, pCi/g, dry wt)	Measured values listed in Appendix E
r_e =	Soil resuspension constant	2.0E-10 (unitless)	Till & Meyer, 1983
ρ =	Soil density	1600 kg/m^3	Till & Meyer, 1983
IR =	Air inhalation rate	2.0 m^3/hour 2.1 m^3/hour	Moderate child rate (EFH, EPA 1989a) Moderate adult rate (EFH, EPA 1989a)
ET =	Exposure time	8 hours/day	Estimated; fraction of day an individual is exposed to near-shore sediment
EF =	Exposure frequency	175 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens

Table E5. External exposure to radionuclides in sediment in the near-shore pathway

$$Dose_{near-shore}\left(\frac{pCi \cdot yr}{g}\right) = CS \times \left(\frac{1 - e^{-\lambda_i ED}}{\lambda_i}\right) \times ET \times CF_1 \times EF \times CF_2$$

Parameter Explanation

Parameter			Value used	Explanation/source
CS	=	Concentration in near-shore sediment	Radionuclide-specific (pCi/g, dry wt)	95% UCL on the mean
λ_i	=	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
TR	=	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
ED	=	Exposure duration	30 years	Adult exposure (RAGS, EPA 1989b)
ET	=	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to near-shore sediment
CF_1	=	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF	=	Exposure frequency	175 days/year	Estimated; based on the number of days per year near-shore sediments are exposed
CF_2	=	Conversion factor	1 year/365 days	Necessary to convert to appropriate units

Table E6. Permeability constants

Chemical	Permeability Constant (m/hour)
2-Butanone	5.0E-05
4,4'-DDD	2.8E-03
4,4'-DDE	2.4E-03
4,4'-DDT	4.3E-03
Acetone	5.7E-06
Aldrin	1.6E-05
Antimony	1.0E-05
Arsenic	1.0E-05
Barium	1.0E-05
Benzo(a)anthracene	8.1E-03
Benzo(a)pyrene	1.2E-02
Benzo(b)fluoranthene	1.2E-02
Benzo(ghi)perylene	4.3E-02
Benzo(k)fluoranthene	4.0E-02
Beryllium	1.0E-05
Bis(2-ethylhexyl)phthalate	1.7E-02
Boron	1.0E-05
Butylbenzylphthalate	7.3E-04
Cadmium	1.0E-05
Carbon disulfide	5.0E-03
Chlordane, total	5.2E-04
Chloroform	1.3E-03
Chromium	1.0E-05
Chrysene	8.1E-03
Copper	1.0E-05
Di-n-butylphthalate	3.3E-04
Di-n-octylphthlate	2.7E-01
Diethylphthlate	4.8E-05
Fluoranthene	3.6E-03

Table E6 (continued)

Chemical	Permeability Constant (m/hour)
Indeno(1,2,3-cd)pyrene	1.9E-02
Lead	1.0E-05
Manganese	1.0E-05
Mercury	1.0E-05
Molybdenum	1.0E-05
Naphthalene	6.9E-04
Nitrate	1.0E-05
Phenanthrene	2.7E-03
Pyrene	6.7E-03
Selenium	1.0E-05
Silver	1.0E-05
Toluene	1.0E-02
Trichloroethene	2.3E-03
Vanadium	1.0E-05
Zinc	1.0E-05

Table E7. Ingestion of contaminants in water while swimming

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CW \times IR \times ET \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CW \times IR \times ET \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CW =	Concentration in water	Chemical-specific (mg/L or pCi/L)	95% UCL on the mean
IR =	Intake rate	0.05 L/h	Children and adult (RAGS, EPA 1989b)
ET =	Exposure time	2.6 h/day	National average for swimming (RAGS, EPA 1989b)
EF =	Exposure frequency	45 days/year	USEPA Region IV Guidance, (EPA 1991b)
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (EPA 1989a; EPA 1991a)

Table E8. Dermal contact with water while swimming

$$Dermal\ \ Dose\ \ Rate_{\ noncarcinogens}\left(\frac{mg}{kg \cdot day}\right) = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CW =	Concentration in water	Chemical-specific (mg/L)	95% UCL on mean
SA =	Available surface area	0.918 m^2 2.28 m^2	95th percentile total body surface area of a child and adult, respectively (DEA, EPA 1992)
PC =	Permeability constant	Chemical-specific (m/h)	DEA, EPA 1992
ET =	Exposure time	2.6 h/day	National average for swimming (RAGS, EPA 1989b)
EF =	Exposure frequency	45 days/year	USEPA Region IV Guidance (EPA 1991b)
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
CF =	Conversion factor	10^3 L/m^3	Volumetric conversion: 1000 L = 1 m^3
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E9. Ingestion of fish

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CF \times IR \times FI \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CF \times IR \times FI \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CF =	Concentration in fish fillets (by species)	Chemical-specific (mg/kg, pCi/g)	95% UCL or maximum value
IR =	Fish ingestion rate	0.030 kg/day or 30 g/day 0.054 kg/day or 54 g/day	Child, ages 3-6 (Yang & Nelson 1986) Adult (OSWER Directive EPA 1991a)
FI =	Fraction ingested from local source	1 (unitless)	Maximum value; equivalent to 100%
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E10. Ingestion of Canada Geese

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CG \times IR \times FI \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CG \times IR \times FI \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CG =	Concentration in goose breast tissue	Chemical-specific (mg/kg, pCi/g)	95% UCL or maximum value
IR =	Ingestion rate		
	Adult	0.130 kg/day or 130 g	Best professional judgement
	Child	0.065 kg/day or 65 g	Best professional judgement
FI =	Fraction ingested from local source	1 (unitless)	Maximum value; equivalent to 100%
EF =	Exposure frequency	14 days/year	Best professional judgement
ED =	Exposure duration	6 years	Child exposure (RAGS, EPA 1989b)
		30 years	Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg	Child (OSWER Directive, EPA 1991a)
		70 kg	Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED	Averaging time for non-carcinogens
		365 days/year × 70 years	Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E11. Contaminant concentration in vegetables

Concentration in irrigated soil [a]:

$$CS_{irrigated} = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_B t_b})}{P \lambda_B}$$

Concentration in Vegetables [b]:

$$CV = (CW)(I_r)\left[\frac{f_R}{Y_v}\frac{(1 - e^{-\lambda_E t_v})}{\lambda_E}\right] + (CS)(B_{v_{wet}}) + (CS)(r_c)(\rho)(d)\left[\frac{f_R}{Y_v}\frac{(1 - e^{-\lambda_E t_v})}{\lambda_E}\right]$$

where

Parameter Explanation

Parameter		Value used	Explanation/Source
CS =	Concentration in soil	Chemical-specific (pCi/g or mg/kg)	Measured value for dredging scenario Calculated value for irrigation (see above)
CW =	Concentration in water	Chemical-specific (pCi/L or mg/L)	Measured values listed in Appendix E.
I_r =	irrigation rate	1321.3 L/m^2-year or 3.62 L/m^2-day	Personal communication with the Roane County Agricultural Extension Agent
F =	fraction of the year crops are irrigated	0.25 (unitless)	Based on 3 months per year
λ_B =	Loss rate from decay and harvesting/leaching	Calculated (1/year)	$\lambda_B = \lambda_i + \lambda_{HL}$ (NCRP 1984)
λ_i =	radioactive decay	Calculated (1/year or 1/day)	$\lambda_i = 0.693/TR$ (NCRP 1984)
λ_{HL} =	Removal rate for harvesting/leaching	9.9E-03/year	(2.7E-05/day)(365 days/year) NCRP 1984
TR =	Radioactive half-life	Radionuclide-specific	BEIAS (IRIS/HEAST databases)
t_b =	time of long-term build up in the soil	30 years	NCRP 1984
P =	areal density for the effective root zone (15 cm depth)	240 kg/m^2	Till & Meyer 1983
CV =	Concentration in vegetables	pCi/kg or mg/kg	Calculated as above

Table E11 (continued)

Parameter Explanation

Parameter		Value used	Explanation/Source
f_R	= Interception fraction	0.25 (unitless)	fraction of deposited contaminant intercepted and retained by edible portion of crop (RAPS 1987)
Y_v	= Standing crop biomass (edible portion of vegetation)	2 kg/m^2	RAPS 1987
λ_E	= Effective decay constant for removal of contaminant deposited on vegetation	Calculated (1/day)	$\lambda_E = \lambda_i + (0.693/t_w)$
t_w	= Weathering half-life	14 days	the time required for one-half of the originally deposited contaminant to be lost from vegetation (RAPS 1987)
t_v	= Time period vegetables are exposed to above-ground contamination	60 days	RAPS 1987
$B_{v\text{-wet}}$	= Plant to soil concentration ratio (wet weight)	Calculated	$B_{v\text{-wet}} = B_{v\text{-organics}} \times 0.25$ (conversion factor from dry wt to wet wt)
$B_{v\text{-organics}}$	= Plant to soil concentration ratio (dry weight) contaminants	Unitless	Table E.35, NCRP, 1989 (commentary 3)
r_c	= soil resuspension constant	2.0E-10	NCRP 1984
ρ	= soil density	1600 kg/m^3	NCRP 1984
d	= deposition velocity	1000 m/day	RAPS 1987

[a] Based on IAEA, *Generic Models and Parameters for Assessing the Environmental Transfer of Radionuclides from Routine Releases*, Safety Series No. 57, International Atomic Energy Agency, Vienna, 1982.
[b] Based on *Remedial Actions Priority Systems (RAPS) Mathematical Formulations*, August 1987, DOE/RL/87-06.

Table E12. Contaminant concentration in pasture forage

Concentration in irrigated soil [a]:

$$CS_{irrigated} = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_B t_b})}{P \lambda_B}$$

Concentration in pasture forage [b]:

$$CP = (CW)(I_r)\left[\frac{f_R}{Y_p}\frac{(1 - e^{-\lambda_B t_p})}{\lambda_B}\right] + (CS)(B_{v_{dry}}) + (CS)(r_e)(\rho)(d)\left[\frac{f_R}{Y_p}\frac{(1 - e^{-\lambda_B t_p})}{\lambda_B}\right]$$

where

Parameter Explanation

	Parameter	Value used	Explanation/Source
CS =	Concentration in soil	Chemical-specific (pCi/g or mg/kg)	Measured value for dredging scenario Calculated value for irrigation (see above)
CW =	Concentration in water	Chemical-specific (pCi/L or mg/L)	Measured values listed in Table E.1 or E.2.
I_r =	irrigation rate	1321.3 L/m^2-year or 3.62 L/m^2-day	Personal communication with the Roane County Agricultural Extension Agent
F =	fraction of the year crops are irrigated	0.25 (unitless)	Based on 3 months per year
λ_B =	Loss rate from decay and harvesting/leaching	Calculated (1/year)	$\lambda_B = \lambda_i + \lambda_{HL}$ (NCRP 1984)
λ_i =	radioactive decay	Calculated (1/year or 1/day)	$\lambda_i = 0.693/TR$ (NCRP 1984)
λ_{HL} =	Removal rate for harvesting/leaching	9.9E-03/year	(2.7E-05/day)(365 days/year) NCRP 1984
TR =	Radioactive half-life	Radionuclide-specific	BEIAS (IRIS/HEAST databases)
t_b =	time of long-term build up in the soil	30 years	NCRP 1984
P =	areal density for the effective root zone (15 cm depth)	240 kg/m^2	Till & Meyer 1983
CP =	Concentration in pasture forage	pCi/kg or mg/kg	Calculated as above

Table E12 (continued)

Parameter Explanation

Parameter		Value used	Explanation/Source
f_R	= Interception fraction	0.25 (unitless)	fraction of deposited contaminant intercepted and retained by edible portion of crop (RAPS 1987)
Y_p	= Standing crop biomass (edible portion of vegetation)	0.47 kg/m^2	Till and Meyer 1983
λ_E	= Effective decay constant for removal of contaminant deposited on vegetation	Calculated (1/day)	$\lambda_E = \lambda_i + (0.693/t_w)$
t_w	= Weathering half-life	14 days	the time required for one-half of the originally deposited contaminant to be lost from vegetation (RAPS 1987)
t_p	= Time period pasture is exposed to above-ground contamination	30 days	NCRP Commentary No. 3 1989
$B_{v\text{-}dry}$	= Pasture forage to soil concentration ratio for radionuclides and inorganic contaminants (wet weight)	Unitless	See Table E.35.
$B_{v\text{-}organics}$	= Vegetable to soil concentration ratio for organic contaminants (dry weight)	Unitless	See Table E.35.
r_c	= soil resuspension constant	2.0E-10	NCRP 1984
ρ	= soil density	1600 kg/m^3	NCRP 1984
d	= deposition velocity	1000 m/day	RAPS 1987

[a] Based on IAEA, *Generic Models and Parameters for Assessing the Environmental Transfer of Radionuclides from Routine Releases*, Safety Series No. 57, International Atomic Energy Agency, Vienna, 1982.
[b] Based on *Remedial Actions Priority Systems (RAPS) Mathematical Formulations*, August 1987, DOE/RL/87-06.

Table E13. Contaminant concentration in beef

Concentration in beef[a]:

$$CB = F_b [(CP \times Q_p) + (CS_1 \times Q_s) + (CW \times Q_w)]$$

where

CB	=	concentration in beef	mg/kg, pCi/g	Calculated as above.
F_b	=	transfer coefficient of contaminant in vegetation to contaminant in beef	day/kg	$\log F_b = -7.6 + \log K_{ow}$ (for organics) Elemental F_b = NCRP 1989 (Table E.x)
CP	=	contaminant concentration in pasture forage	mg/kg, pCi/g	Calculated as in Table E.20.
Q_p	=	quantity of dry forage ingested per day by beef cattle	7.2 kg/day	IAEA, 1993
CS_1	=	contaminant concentration in dry soil	mg/kg, pCi/g	Measured
CS_2	=	contaminant concentration in dry soil as the result of irrigation	mg/kg, pCi/g	Calculated
Q_s	=	quantity of dry soil ingested per day by beef cattle	0.72 kg/day	IAEA, 1993
CW	=	contaminant concentration in water	mg/L, pCi/L	Measured; see Table E.1 or E.2.
Q_w	=	quantity of water ingested per day by beef cattle	20 L/day	IAEA, 1993

[a] Based on NCRP, *Screening Techniques for Determining Compliance with Environmental Standards*, National Council on Radiation Protection and Measurements, NCRP Commentary No. 3, Revision of January 1989.

Table E14. Contaminant concentration in milk

Concentration in milk [a]:

$$CM = F_m[(CP \times Q_p) + (CS_1 \times Q_s) + (CW \times Q_w)]$$

where

CM =	concentration in milk	mg/L or pCi/L	Calculated as above.
F_m =	transfer coefficient of contaminant in vegetation to contaminant in milk	day/L	$\log F_m = -8.1 + \log K_{ow}$, (for organics) Elemental = NCRP, 1989
CP =	contaminant concentration in pasture forage	mg/kg or pCi/g	Calculated; see Table E.20.
Q_p =	quantity of dry forage ingested per day by dairy cattle	16.1 kg/day	IAEA, 1993
CS_1 =	contaminant concentration in dry soil	mg/kg, pCi/g	Measured
CS_2 =	contaminant concentration in dry soil as the result of irrigation	mg/kg, pCi/g	Calculated
Q_s =	quantity of dry soil ingested per day by dairy cattle	1.61 kg/day	IAEA, 1993
CW =	contaminant concentration in water	mg/L, pCi/L	Measured
Q_w =	quantity of water ingested per day by dairy cattle	50 L/day	IAEA, 1993

[a] Based on NCRP, *Screening Techniques for Determining Compliance with Environmental Standards*, National Council on Radiation Protection and Measurements, NCRP Commentary No. 3, Revision of January 1989.

Table E15. Inadvertent ingestion of sediment in the dredging pathway

$$Intake_{\ noncarcinogens}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times IR \times FI \times ET \times CF \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CS \times IR \times FI \times ET \times CF \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in dredged sediments	Chemical-specific (mg/kg, pCi/g, dry wt)	95% UCL on the mean
IR =	Ingestion rate	0.0002 kg/day or 0.2 g/day	Child (OSWER Directive, EPA 1991a)
		0.0001 kg/day or 0.1 g/day	Adult (OSWER Directive, EPA 1991a)
FI =	Fraction ingested	1 (unitless)	Maximum value; equivalent to 100%
ET =	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to dredged sediment
CF =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years	Child exposure (RAGS, EPA 1989b)
		30 years	Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg	Child (OSWER Directive, EPA 1991a)
		70 kg	Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED	Averaging time for non-carcinogens
		365 days/year × 70 years	Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E16. Dermal contact with sediment in the dredging pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times AF \times ABS \times SA \times ET \times CF \times EF \times ED}{BW \times AT}$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in dredged sediment	Chemical-specific (mg/kg, dry wt)	Concentration listed in Appendix E
AF =	Adherence factor	0.01 kg/m^2	Unit-adjusted adherence factor for soil 1.0 mg/cm^2 (10^{-6} kg/mg x 10^4 cm^2/m^2) (EPA 1992b)
ABS =	Absorption factor	0.001 (unitless) 0.01 (unitless)	Equivalent to 0.1% for inorganics and 1.0% for organics (EPA 1992b)
SA =	Available surface area		25% of the 95th percentile total body surface area (DEA, EPA 1992a)
	Children Adults	0.2295 m^2/day 0.57 m^2/day	(0.918 m^2/day)(0.25), children (2.28 m^2/day)(0.25), adults
ET =	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to dredged sediment
CF =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E17. Inhalation of resuspended sediment in the dredging pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CA \times IR \times ET \times EF \times ED$$

Where,

$$CA\left(\frac{mg}{m^3}, \frac{pCi}{m^3}\right) = CS \times r_c \times \rho$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CA =	Concentration in air	Chemical-specific (mg/m^3, pCi/m^3)	Concentration calculated as above
CS =	Concentration in dredged sediment	Chemical specific (mg/kg, pCi/g, dry wt)	Measured values listed in Appendix E
r_c =	Soil resuspension constant	2.0E-10 (unitless)	Till & Meyer 1983
ρ =	Soil density	1600 (kg/m^3)	Till & Meyer 1983
IR =	Air inhalation rate	2.0 m^3/hour 2.1 m^3/hour	Moderate child rate (EFH, EPA 1989a) Moderate adult rate (EFH, EPA 1989a)
ET =	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to dredged sediment
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens

Table E18. External exposure to radionuclides in sediment in the dredging pathway

$$Dose_{dredging}\left(\frac{pCi \cdot yr}{g}\right) = CS \times \left(\frac{1 - e^{-\lambda_b ED}}{\lambda_b}\right) \times EF \times CF_1 \times ET \times CF_2$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in dredged sediment	Radionuclide-specific (pCi/g, dry wt)	95% UCL on the mean
λ_b =	Loss rate from decay and harvesting/leaching	Calculated value (1/years)	$\lambda_b = \lambda_i + \lambda_{HL}$ (NCRP 1989)
λ_i =	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
λ_{HL} =	Removal rate for harvesting/leaching	9.9E-03 (1/year)	(2.7E-05/day)(365 days/year) NCRP 1989
TR =	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
ED =	Exposure duration	30 years	Adult exposure (RAGS, EPA 1989b)
ET =	Exposure frequency	8 hours/day	Estimated; hours per day an individual is exposed to dredged sediment
CF_1 =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
CF_2 =	Conversion factor	1 year/365 days	Necessary to convert to appropriate units

Table E19. Modeled concentrations in milk, meat, and vegetables for the dredging pathways for the Clinch River and Poplar Creek

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
1	Inorganic	Arsenic	1.1E-03	1.7E-02	1.3E-02
1	Inorganic	Beryllium	2.7E-06	4.8E-04	7.1E-04
1	Inorganic	Cadmium	1.6E-03	2.9E-04	7.4E-03
1	Inorganic	Chromium	3.6E-04	1.4E-01	6.4E-02
1	Inorganic	Mercury	3.8E-04	3.6E-03	9.4E-03
1	Inorganic	Nickel	9.2E-01	1.3E-01	3.1E-01
1	Inorganic	Selenium	2.3E-02	1.0E-01	1.8E-02
1	Inorganic	Zinc	9.9E+00	4.4E+01	1.2E+01
1	Organic	4,4'-DDD	3.7E-03	5.3E-03	2.0E-03
1	Organic	4,4'-DDT	1.2E-02	1.8E-02	1.1E-03
1	Organic	Benzo(a)anthracene	5.7E-03	8.1E-03	4.7E-03
1	Organic	Benzo(k)fluoranthene	7.5E-02	1.1E-01	1.5E-03
1	Radionuclide	Cesium-137	1.8E+01	4.9E-02	1.0E-02
1	Radionuclide	Cobalt-60	8.7E-01	5.5E-04	4.8E-02
7	Inorganic	Arsenic	2.7E-03	4.0E-02	3.0E-02
7	Inorganic	Barium	1.4E-01	3.0E-02	5.2E-01
7	Inorganic	Beryllium	4.0E-06	7.2E-04	1.1E-03
7	Inorganic	Chromium	6.7E-04	2.7E-01	1.2E-01
7	Inorganic	Manganese	3.8E-01	2.9E+00	1.6E+02
7	Inorganic	Mercury	4.3E-04	4.1E-03	1.1E-02
7	Inorganic	Nickel	1.2E+00	1.7E-01	3.9E-01
7	Inorganic	Selenium	1.2E-01	5.4E-01	9.5E-02
7	Inorganic	Vanadium	7.1E-02	7.3E-02	4.7E-02
7	Inorganic	Zinc	7.1E+00	3.2E+01	8.9E+00
7	Organic	Benzo(a)anthracene	1.6E-03	2.3E-03	1.3E-03
7	Organic	Benzo(a)pyrene	1.2E-02	1.6E-02	2.3E-03
7	Organic	Benzo(b)fluoranthene	9.6E-04	1.4E-03	1.8E-04
7	Organic	Indeno(1,2,3-cd)pyrene	2.1E-03	3.0E-03	9.3E-05
7	Radionuclide	Cesium-137	8.4E+00	2.3E-02	4.7E-03
7	Radionuclide	Strontium-90	3.9E+01	5.6E-02	1.6E-01

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
2.04	Inorganic	Arsenic	9.8E-04	1.5E-02	1.1E-02
2.04	Inorganic	Barium	1.1E-01	2.5E-02	4.3E-01
2.04	Inorganic	Beryllium	2.6E-06	4.6E-04	6.9E-04
2.04	Inorganic	Chromium	2.9E-04	1.2E-01	5.2E-02
2.04	Inorganic	Manganese	1.1E+00	8.1E+00	4.5E+02
2.04	Inorganic	Mercury	6.9E-04	6.5E-03	1.7E-02
2.04	Inorganic	Nickel	6.1E-01	8.8E-02	2.0E-01
2.04	Inorganic	Selenium	7.9E-02	3.6E-01	6.3E-02
2.04	Inorganic	Vanadium	3.4E-02	3.4E-02	2.2E-02
2.04	Inorganic	Zinc	5.5E+00	2.4E+01	6.8E+00
2.04	Organic	Benzo(a)anthracene	3.6E-03	5.1E-03	3.0E-03
2.04	Organic	Benzo(a)pyrene	9.0E-03	1.3E-02	1.8E-03
2.04	Organic	Benzo(b)fluoranthene	3.1E-03	4.3E-03	5.6E-04
2.04	Organic	Benzo(k)fluoranthene	4.8E-02	6.7E-02	9.3E-04
2.04	Organic	Indeno(1,2,3-cd)pyrene	9.4E-03	1.3E-02	4.1E-04
2.04	Organic	Pentachlorophenol	2.7E-02	3.8E-02	1.2E-02
2.04	Radionuclide	Cesium-137	4.1E+02	1.1E+00	2.3E-01
2.04	Radionuclide	Cobalt-60	2.8E-02	1.8E-05	1.5E-03
2.04	Radionuclide	Strontium-90	6.1E+01	8.7E-02	2.5E-01
2.04	Radionuclide	Uranium-234	9.1E-01	3.5E-04	1.7E-03
2.04	Radionuclide	Uranium-238	8.5E-01	4.2E-04	1.7E-03
3.01	Inorganic	Arsenic	1.3E-04	2.0E-03	1.5E-03
3.01	Inorganic	Barium	5.2E-02	1.1E-02	1.9E-01
3.01	Inorganic	Beryllium	1.7E-06	3.1E-04	4.6E-04
3.01	Inorganic	Chromium	1.9E-04	7.5E-02	3.4E-02
3.01	Inorganic	Manganese	7.7E-02	5.8E-01	3.2E+01
3.01	Inorganic	Nickel	4.1E-01	5.9E-02	1.4E-01
3.01	Inorganic	Vanadium	1.8E-02	1.8E-02	1.2E-02
3.01	Inorganic	Zinc	2.3E+00	1.0E+01	2.8E+00
3.01	Organic	Benzo(b)fluoranthene	3.1E-03	4.4E-03	5.8E-04
3.02	Inorganic	Arsenic	5.1E-04	7.6E-03	5.8E-03

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
3.02	Inorganic	Barium	9.7E-02	2.1E-02	3.6E-01
3.02	Inorganic	Beryllium	2.6E-06	4.6E-04	6.8E-04
3.02	Inorganic	Cadmium	2.1E-03	3.7E-04	9.3E-03
3.02	Inorganic	Chromium	4.4E-04	1.8E-01	7.9E-02
3.02	Inorganic	Manganese	2.6E-01	1.9E+00	1.1E+02
3.02	Inorganic	Mercury	1.2E-02	1.2E-01	3.1E-01
3.02	Inorganic	Nickel	2.1E+00	3.0E-01	7.0E-01
3.02	Inorganic	Selenium	1.1E-02	4.9E-02	8.6E-03
3.02	Inorganic	Vanadium	3.7E-02	3.8E-02	2.4E-02
3.02	Inorganic	Zinc	9.5E+00	4.2E+01	1.2E+01
3.02	Organic	Benzo(a)anthracene	6.7E-03	9.4E-03	5.5E-03
3.02	Organic	Benzo(a)pyrene	9.6E-03	1.4E-02	1.9E-03
3.02	Organic	Benzo(b)fluoranthene	1.7E-02	2.4E-02	3.1E-03
3.02	Organic	Benzo(k)fluoranthene	3.9E-02	5.5E-02	7.5E-04
3.02	Organic	Dibenz(a,h)anthracene	3.9E-02	5.5E-02	7.6E-04
3.02	Organic	Indeno(1,2,3-cd)pyrene	1.8E-02	2.6E-02	8.0E-04
3.02	Organic	PCB-1248	3.4E-03	4.9E-03	2.1E-03
3.02	Organic	PCB-1254	1.2E-02	1.6E-02	2.9E-03
3.02	Organic	PCB-1260	1.5E-01	2.1E-01	1.2E-03
3.02	Radionuclide	Cesium-137	4.8E+00	1.3E-02	2.7E-03
3.02	Radionuclide	Cobalt-60	2.2E-02	1.4E-05	1.2E-03
3.02	Radionuclide	Strontium-90	4.8E+01	6.9E-02	2.0E-01
3.02	Radionuclide	Technetium-99	6.0E+02	1.9E-01	6.5E+01
3.02	Radionuclide	Uranium-234	7.5E+00	2.9E-03	1.4E-02
3.02	Radionuclide	Uranium-235	3.6E-01	1.8E-04	7.3E-04
3.02	Radionuclide	Uranium-238	4.8E+00	2.4E-03	9.7E-03
3.03	Inorganic	Arsenic	5.3E-04	7.9E-03	6.0E-03
3.03	Inorganic	Barium	1.1E-01	2.3E-02	3.9E-01
3.03	Inorganic	Beryllium	3.1E-06	5.5E-04	8.2E-04
3.03	Inorganic	Cadmium	7.5E-03	1.3E-03	3.4E-02
3.03	Inorganic	Chromium	8.0E-04	3.2E-01	1.4E-01

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
3.03	Inorganic	Manganese	1.7E-01	1.3E+00	7.0E+01
3.03	Inorganic	Mercury	2.0E-02	1.9E-01	5.0E-01
3.03	Inorganic	Nickel	2.5E+00	3.6E-01	8.3E-01
3.03	Inorganic	Silver	8.1E-04	2.2E-02	1.7E-01
3.03	Inorganic	Vanadium	3.6E-02	3.7E-02	2.3E-02
3.03	Inorganic	Zinc	1.3E+01	5.8E+01	1.6E+01
3.03	Organic	Benzo(a)anthracene	1.7E-03	2.4E-03	1.4E-03
3.03	Organic	Benzo(a)pyrene	2.9E-03	4.1E-03	5.8E-04
3.03	Organic	Benzo(b)fluoranthene	5.5E-03	7.8E-03	1.0E-03
3.03	Organic	Benzo(k)fluoranthene	6.4E-03	9.0E-03	1.2E-04
3.03	Organic	Dibenz(a,h)anthracene	3.4E-03	4.8E-03	6.6E-05
3.03	Organic	Indeno(1,2,3-cd)pyrene	8.6E-03	1.2E-02	3.7E-04
3.03	Radionuclide	Cesium-137	2.3E+01	6.2E-02	1.3E-02
3.03	Radionuclide	Uranium-234	2.4E+00	9.0E-04	4.4E-03
3.03	Radionuclide	Uranium-238	1.4E+00	6.9E-04	2.9E-03
3.04	Inorganic	Arsenic	9.4E-03	1.4E-01	1.1E-01
3.04	Inorganic	Barium	2.5E-01	5.4E-02	9.5E-01
3.04	Inorganic	Beryllium	5.6E-06	1.0E-03	1.5E-03
3.04	Inorganic	Boron	4.2E-01	5.6E-02	1.3E+00
3.04	Inorganic	Cadmium	1.3E-02	2.3E-03	5.7E-02
3.04	Inorganic	Chromium	7.1E-04	2.9E-01	1.3E-01
3.04	Inorganic	Manganese	1.8E-01	1.3E+00	7.4E+01
3.04	Inorganic	Mercury	7.8E-02	7.4E-01	1.9E+00
3.04	Inorganic	Nickel	2.0E+00	2.9E-01	6.7E-01
3.04	Inorganic	Selenium	5.1E-02	2.3E-01	4.1E-02
3.04	Inorganic	Vanadium	9.9E-02	1.0E-01	6.5E-02
3.04	Inorganic	Zinc	9.4E+00	4.2E+01	1.2E+01
3.04	Organic	4-Methylphenol	9.6E-06	1.4E-05	2.1E-01
3.04	Organic	Benzo(a)anthracene	1.2E-03	1.7E-03	9.9E-04
3.04	Organic	Benzo(a)pyrene	4.1E-03	5.7E-03	8.1E-04
3.04	Organic	Benzo(b)fluoranthene	4.6E-03	6.4E-03	8.4E-04

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
3.04	Organic	Benzo(k)fluoranthene	2.4E-02	3.4E-02	4.7E-04
3.04	Organic	Dibenz(a,h)anthracene	2.4E-02	3.4E-02	4.7E-04
3.04	Organic	Indeno(1,2,3-cd)pyrene	1.3E-02	1.8E-02	5.7E-04
3.04	Organic	PCB-1248	5.8E-04	8.2E-04	3.4E-04
3.04	Organic	PCB-1254	2.8E-03	4.0E-03	7.1E-04
3.04	Organic	PCB-1260	2.4E-02	3.4E-02	1.9E-04
3.04	Radionuclide	Cesium-137	1.5E+02	4.2E-01	8.5E-02
3.04	Radionuclide	Cobalt-60	2.8E-02	1.8E-05	1.5E-03
3.04	Radionuclide	Technetium-99	4.3E+01	1.4E-02	4.7E+00
3.04	Radionuclide	Uranium-234	4.1E+00	1.6E-03	7.7E-03
3.04	Radionuclide	Uranium-235	2.5E-01	1.2E-04	5.1E-04
3.04	Radionuclide	Uranium-238	3.5E+00	1.7E-03	7.0E-03
4.01	Inorganic	Arsenic	1.0E-03	1.5E-02	1.1E-02
4.01	Inorganic	Barium	6.9E-02	1.5E-02	2.6E-01
4.01	Inorganic	Beryllium	2.6E-06	4.6E-04	6.8E-04
4.01	Inorganic	Cadmium	1.5E-03	2.6E-04	6.5E-03
4.01	Inorganic	Chromium	3.3E-04	1.3E-01	6.0E-02
4.01	Inorganic	Manganese	2.0E-01	1.5E+00	8.5E+01
4.01	Inorganic	Mercury	3.7E-02	3.5E-01	9.2E-01
4.01	Inorganic	Nickel	7.7E-01	1.1E-01	2.6E-01
4.01	Inorganic	Selenium	1.2E-02	5.6E-02	9.8E-03
4.01	Inorganic	Silver	4.4E-04	1.2E-02	9.1E-02
4.01	Inorganic	Vanadium	2.7E-02	2.7E-02	1.7E-02
4.01	Inorganic	Zinc	5.3E+00	2.4E+01	6.6E+00
4.01	Organic	Benzo(a)anthracene	3.6E-03	5.1E-03	3.0E-03
4.01	Organic	Benzo(a)pyrene	9.2E-03	1.3E-02	1.8E-03
4.01	Organic	Benzo(b)fluoranthene	9.7E-03	1.4E-02	1.8E-03
4.01	Organic	Benzo(k)fluoranthene	4.7E-02	6.7E-02	9.2E-04
4.01	Organic	Dibenz(a,h)anthracene	4.7E-02	6.7E-02	9.2E-04
4.01	Organic	Indeno(1,2,3-cd)pyrene	2.6E-02	3.7E-02	1.1E-03
4.01	Organic	N-Nitroso-di-n-propylamine	9.4E-06	1.3E-05	7.9E-01

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
4.01	Organic	PCB-1254	6.3E-03	8.9E-03	1.6E-03
4.01	Organic	PCB-1260	3.9E-01	5.6E-01	3.1E-03
4.01	Organic	Pentachlorophenol	2.7E-02	3.8E-02	1.1E-02
4.01	Radionuclide	Cesium-137	4.4E+02	1.2E+00	2.5E-01
4.01	Radionuclide	Cobalt-60	1.9E-02	1.2E-05	1.0E-03
4.02	Inorganic	Arsenic	1.1E-03	1.7E-02	1.3E-02
4.02	Inorganic	Barium	9.3E-02	2.0E-02	3.5E-01
4.02	Inorganic	Beryllium	2.2E-06	4.0E-04	5.9E-04
4.02	Inorganic	Chromium	2.6E-04	1.0E-01	4.7E-02
4.02	Inorganic	Manganese	1.6E-01	1.2E+00	6.7E+01
4.02	Inorganic	Mercury	1.0E-03	9.9E-03	2.6E-02
4.02	Inorganic	Nickel	5.2E-01	7.6E-02	1.8E-01
4.02	Inorganic	Vanadium	2.0E-02	2.1E-02	1.3E-02
4.02	Inorganic	Zinc	3.8E+00	1.7E+01	4.7E+00
4.02	Radionuclide	Cesium-137	7.7E+00	2.1E-02	4.3E-03
4.03	Inorganic	Arsenic	7.9E-04	1.2E-02	9.0E-03
4.03	Inorganic	Barium	1.1E-01	2.4E-02	4.2E-01
4.03	Inorganic	Beryllium	3.6E-06	6.4E-04	9.6E-04
4.03	Inorganic	Cadmium	1.3E-03	2.4E-04	6.1E-03
4.03	Inorganic	Chromium	6.7E-04	2.7E-01	1.2E-01
4.03	Inorganic	Manganese	3.8E-01	2.8E+00	1.6E+02
4.03	Inorganic	Mercury	1.1E-02	1.0E-01	2.7E-01
4.03	Inorganic	Nickel	1.6E+00	2.3E-01	5.3E-01
4.03	Inorganic	Selenium	3.1E-02	1.4E-01	2.4E-02
4.03	Inorganic	Vanadium	4.5E-02	4.7E-02	3.0E-02
4.03	Inorganic	Zinc	9.3E+00	4.1E+01	1.2E+01
4.03	Organic	Benzo(a)anthracene	8.0E-04	1.1E-03	6.6E-04
4.03	Organic	Benzo(a)pyrene	8.9E-03	1.3E-02	1.8E-03
4.03	Organic	Benzo(b)fluoranthene	3.4E-03	4.8E-03	6.3E-04
4.03	Organic	Dibenz(a,h)anthracene	2.5E-02	3.6E-02	4.9E-04
4.03	Organic	Indeno(1,2,3-cd)pyrene	4.7E-03	6.7E-03	2.0E-04

Table E19 (continued)

Reach	Chemical type	Chemical	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
4.03	Organic	PCB-1254	1.0E-03	1.4E-03	2.5E-04
4.03	Organic	PCB-1260	6.5E-03	9.2E-03	5.1E-05
4.03	Radionuclide	Cesium-137	3.5E+02	9.5E-01	1.9E-01
4.03	Radionuclide	Cobalt-60	5.9E-02	3.8E-05	3.3E-03
4.04	Inorganic	Arsenic	1.0E-03	1.5E-02	1.2E-02
4.04	Inorganic	Barium	1.2E-01	2.6E-02	4.5E-01
4.04	Inorganic	Beryllium	4.1E-06	7.3E-04	1.1E-03
4.04	Inorganic	Cadmium	1.6E-03	2.9E-04	7.4E-03
4.04	Inorganic	Chromium	4.7E-04	1.9E-01	8.5E-02
4.04	Inorganic	Manganese	4.0E-01	3.0E+00	1.7E+02
4.04	Inorganic	Mercury	9.3E-03	8.9E-02	2.3E-01
4.04	Inorganic	Nickel	1.4E+00	2.0E-01	4.7E-01
4.04	Inorganic	Selenium	2.7E-02	1.2E-01	2.2E-02
4.04	Inorganic	Vanadium	4.8E-02	4.9E-02	3.1E-02
4.04	Inorganic	Zinc	1.1E+01	5.1E+01	1.4E+01
4.04	Organic	Benzo(a)anthracene	2.2E-03	3.1E-03	1.8E-03
4.04	Organic	Benzo(a)pyrene	1.9E-02	2.7E-02	3.7E-03
4.04	Organic	Benzo(b)fluoranthene	3.0E-03	4.3E-03	5.5E-04
4.04	Organic	Dibenz(a,h)anthracene	3.3E-01	4.7E-01	6.5E-03
4.04	Organic	Indeno(1,2,3-cd)pyrene	5.1E-02	7.2E-02	2.2E-03
4.04	Organic	PCB-1254	1.5E-02	2.2E-02	3.8E-03
4.04	Radionuclide	Cesium-137	2.4E+02	6.5E-01	1.3E-01
4.04	Radionuclide	Cobalt-60	3.4E-02	2.2E-05	1.9E-03
4.04	Radionuclide	Strontium-90	1.6E+01	2.2E-02	6.5E-02
4.04	Radionuclide	Uranium-234	1.5E+00	5.7E-04	2.8E-03
4.04	Radionuclide	Uranium-238	1.3E+00	6.4E-04	2.6E-03

Table E20. Ingestion of produce, meat, and milk in the dredging pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CP \times IR \times FI \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CP \times IR \times FI \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CP =	Concentration in produce (vegetables and meat) (milk)	Calculated value (mg/kg, pCi/g, wet wt) (mg/L, pCi/L)	Modeled values based on equation outlined in Table E.19.
IR =	Produce ingestion rate	0.2 kg/day	Vegetables, children and adults (Exposure Factors Handbook, EPA 1989)
		0.1 kg/day	Meat, children and adults (Exposure Factors Handbook, EPA 1989)
		1.0 L/day	Milk, children (based on water ingestion, OSWER Directive, EPA 1991a)
		0.5 L/day	Milk, adults (ICRP 23, 1975)
FI =	Fraction ingested	0.4 (unitless)	Vegetables, reasonable worst case
		0.75 (unitless)	Beef and Milk, reasonable worst case (OSWER Directive, EPA 1991a)
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years	Child exposure (RAGS, EPA 1989b)
		30 years	Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg	Child (OSWER Directive, EPA 1991a)
		70 kg	Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED	Averaging time for non-carcinogens
		365 days/year × 70 years	Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E21. Inadvertent ingestion of irrigated soil

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times IR \times FI \times ET \times CF \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CS \times IR \times FI \times ET \times CF \times EF \times ED$$

Where,

$$CS_{\ irrigated}\left(\frac{mg}{kg}, \frac{pCi}{g}\right) = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_B t_b})}{P\,\lambda_B}$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CS =	Concentration in irrigated soil	Calculated value (mg/kg, pCi/g, dry wt)	Modeled value, as above
CW =	Concentration in water	Contaminant-specific (mg/L, pCi/L)	95% UCL on the mean
I_r =	Rate of irrigation	1321.3 L/m²-year	(3.62 L/m²/day) (365 days/year) Roane County Extension Agent
F =	Fraction of the year irrigation occurs	0.25 (unitless)	Based on 3 months/year
λ_B =	Loss rate from decay and harvesting/leaching	Calculated value (1/years)	$\lambda_B = \lambda_i + \lambda_{HL}$ (NCRP 1989)
λ_i =	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
TR =	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
λ_{HL} =	Removal rate for harvesting/leaching	9.9E-03 (1/year)	(2.7E-05/day)(365 days/year) NCRP 1989
t_b =	Time of long-term build up in irrigated soil	30 years	NCRP 1989
P =	Areal density for effective root zone (15-cm depth)	240 kg/m²	Till & Meyer 1983

Table E21 (continued)

Parameter Explanation (continued)

Parameter			Value used	Explanation/source
IR	=	Soil ingestion rate	0.0002 kg/day, or 0.2 g/day 0.0001 kg/day, or 0.1 g/day	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
FI	=	Fraction ingested	1 (unitless)	Maximum value; equivalent to 100%
ET	=	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to irrigated soil
CF	=	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF	=	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED	=	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW	=	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT	=	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E22. Dermal contact with soil in the irrigation pathway

$$CS_{irrigated}\left(\frac{mg}{kg}\right) = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_B t_b})}{P\,\lambda_B}$$

$$Intake_{nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CS \times AF \times ABS \times SA \times ET \times CF \times EF \times ED}{BW \times AT}$$

Parameter Explanation

Parameter			Value used	Explanation/source
CS	=	Concentration in irrigated soil	Contaminant-specific (mg/kg, dry wt)	Calculated as specified above
CW	=	Concentration in surface water	Contaminant-specific (mg/L)	95% UCL on the mean
I_r	=	Rate of irrigation	1321.3 L/m²-year	(3.62 L/m²-day)(365 days/year) Roane County Extension Agent
F	=	Fraction of the year irrigation occurs	0.25 (unitless)	Based on 3 months/year
λ_b	=	Loss rate from decay and harvesting/leaching	Calculated value (1/years)	$\lambda_b = \lambda_i + \lambda_{HL}$ (NCRP 1989)
λ_i	=	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
λ_{HL}	=	Removal rate for harvesting/leaching	9.9E-03 (1/year)	(2.7E-05/day)(365 days/year) NCRP 1989
TR	=	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
t_b	=	time of long-term build up in irrigated soil	30 years	NCRP 1989
P	=	areal density for effective root zone (15 cm depth)	240 kg/m²	Till & Meyer, 1983
AF	=	Adherence factor	0.01 kg/m²	Unit-adjusted adherence factor for soil 1.0 mg/cm² (10^{-6} kg/mg x 10^4 cm²/m²) (EPA 1992b)

Table E22 (continued)

Parameter Explanation

Parameter		Value used	Explanation/source
ABS =	Absorption factor	0.001 (unitless) 0.01 (unitless)	Equivalent to 0.1% for inorganics and 1.0% for organics (EPA 1992b)
SA =	Available surface area	0.2295 m^2/day 0.57 m^2/day	(0.918 m^2/day)(0.25), children (2.28 m^2/day)(0.25), adults 25% of the 95th percentile total body surface area (DEA, EPA 1992a)
ET =	Exposure time	8 hours/day	Estimated; fraction of a day an individual is exposed to irrigated soil
CF =	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E23. Inhalation of resuspended soil in the irrigation pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CA \times IR \times ET \times EF \times ED$$

$$Where, \quad CA\left(\frac{mg}{m^3}, \frac{pCi}{m^3}\right) = CS \times r_c \times \rho$$

$$Where, \quad CS_{irrigated} = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_B t_b})}{P\,\lambda_B}$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CA =	Concentration in air	Chemical-specific (mg/m^3, pCi/m^3)	Concentration calculated as above
CS =	Concentration in irrigated soil	Chemical specific (mg/kg, pCi/g, dry wt)	Measured values listed in Appendix E
r_c =	Soil resuspension	2.0E-10 (unitless)	Till & Meyer 1983
ρ =	Soil density	1600 (kg/m^3)	Till & Meyer 1983
CW =	Concentration in surface water	Contaminant-specific (mg/L, pCi/L)	95% UCL on the mean
I_r =	Rate of irrigation	1321.3 L/m^2-year	(3.62 L/m^2-day)(365 days/year) Roane County Extension Agent
F =	Fraction of the year irrigation occurs	0.25 (unitless)	Based on 3 months/year
λ_b =	Loss rate from decay and harvesting/leaching	Calculated value (1/years)	$\lambda_b = \lambda_i + \lambda_{HL}$ (NCRP 1989)
λ_i =	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
λ_{HL} =	Removal rate for harvesting/leaching	9.9E-03 (1/year)	(2.7E-05/day)(365 days/year) NCRP 1989

Table E23 (continued)

Parameter Explanation

Parameter			Value used	Explanation/source
TR	=	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
t_b	=	time of long-term build in the soil	30 years	NCRP 1989
P	=	areal density for effective root zone (15 cm depth)	240 kg/m^2 or 240,000 g/m^2	Till & Meyer 1983
IR	=	Air inhalation rate	2.0 m^3/hour 2.1 m^3/hour	Moderate child rate (EFH, EPA 1989a) Moderate adult rate (EFH, EPA 1989a)
ET	=	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to irrigated soil
EF	=	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED	=	Exposure duration	6 years 30 years	Child exposure (RAGS, EPA 1989b) Adult exposure (RAGS, EPA 1989b)
BW	=	Body weight	15 kg 70 kg	Child (OSWER Directive, EPA 1991a) Adult (OSWER Directive, EPA 1991a)
AT	=	Averaging time	365 days/year × ED 365 days/year × 70 years	Averaging time for non-carcinogens Averaging time for carcinogens

Table E24. External exposure to radionuclides in soil in the irrigation pathway

$$CS_{irrigated} = \frac{(CW)(I_r)(F)(1 - e^{-\lambda_b t_b})}{P\,\lambda_b}$$

$$Dose_{irrigated}\left(\frac{pCi \cdot yr}{g}\right) = CS \times ET \times CF_1 \times EF \times CF_2 \times ED$$

Parameter Explanation

Parameter			Value used	Explanation/source
CS	=	Concentration in irrigated soil	Radionuclide-specific (pCi/g, dry wt)	Calculated as specified above
CW	=	Concentration in surface water	Contaminant-specific (pCi/L)	95% UCL on the mean
I_r	=	Rate of irrigation	1321.3 L/m^2-year	(3.62 L/m^2-day)(365 days/year) Roane County Extension Agent
F	=	Fraction of the year irrigation occurs	0.25 (unitless)	Based on 3 months/year
λ_b	=	Loss rate from decay and harvesting/leaching	Calculated value (1/years)	$\lambda_b = \lambda_i + \lambda_{HL}$ (NCRP 1989)
λ_i	=	Radioactive decay constant	Calculated value (1/years)	$\lambda_i = 0.693/TR$ (NCRP 1989)
λ_{HL}	=	Removal rate for harvesting/leaching	9.9E-03 (1/year)	(2.7E-05/day)(365 days/year) NCRP 1989
TR	=	Radioactive half-life	Radionuclide-specific (years)	BEIAS (IRIS/HEAST databases)
t_b	=	time of long-term build up in irrigated soil	30 years	NCRP 1989
P	=	areal density for effective root zone (15 cm)	240 kg/m^2 or	Till & Meyer 1983
ED	=	Exposure duration	30 years	Adult exposure (RAGS, EPA 1989b)
ET	=	Exposure time	8 hours/day	Estimated; hours per day an individual is exposed to irrigated soil
CF_1	=	Conversion factor	1 day/24 hours	Necessary to convert to appropriate units
EF	=	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
CF_2	=	Conversion factor	1 year/365 days	Necessary to convert to appropriate units

Table E25. Modeled concentrations in soil, milk, meat, and vegetables for the irrigation pathways for surface water collected in the Clinch River

Reach	Chemical type	Chemical	Concentration in Soil (pCi/g, mg/kg)	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
1	Inorganic	Arsenic	4.3E-02	4.3E-05	6.3E-04	1.0E-02
1	Inorganic	Nitrate	1.8E+02	6.1E+02	8.2E+02	3.8E+02
1	Radionuclide	Cobalt-60	3.7E+01	1.5E-01	9.5E-05	3.4E-02
1	Radionuclide	Strontium-90	2.8E+01	2.1E+00	3.0E-03	1.2E-02
2	Inorganic	Nickel	1.5E-01	4.2E-02	6.0E-03	3.8E-02
2	Inorganic	Nitrate	1.2E+02	4.1E+02	5.5E+02	2.5E+02
2	Organic	Acetone	5.0E-01	2.0E-06	2.8E-06	6.8E+00
2	Radionuclide	Cesium-137	3.2E+01	6.0E+00	1.6E-02	1.1E-02
2	Radionuclide	Strontium-90	2.2E+02	1.7E+01	2.4E-02	9.2E-02
2	Radionuclide	Tritium	1.5E+05	4.3E+03	4.3E+00	4.3E+00
4	Inorganic	Antimony	5.9E-02	2.5E-05	1.7E-05	1.4E-02
4	Inorganic	Arsenic	4.4E-02	4.4E-05	6.5E-04	1.1E-02
4	Inorganic	Nitrate	1.6E+02	5.4E+02	7.2E+02	3.3E+02
4	Radionuclide	Cesium-137	4.7E+01	8.9E+00	2.4E-02	1.6E-02
4	Radionuclide	Cobalt-60	4.8E+01	2.0E-01	1.2E-04	4.4E-02
4	Radionuclide	Strontium-90	5.0E+01	3.8E+00	5.4E-03	2.1E-02
4	Radionuclide	Uranium - radioactive	7.6E+01	5.2E-01	2.5E-04	1.8E-02
7	Inorganic	Arsenic	8.4E-02	8.3E-05	1.2E-03	2.0E-02
7	Inorganic	Nickel	1.4E-01	3.9E-02	5.6E-03	3.6E-02
7	Radionuclide	Strontium-90	5.5E+01	4.2E+00	6.0E-03	2.3E-02

Table E26. Modeled concentrations in soil, milk, meat, and vegetables for the irrigation pathways for surface water collected in Poplar Creek

Reach	Chemical type	Chemical	Concentration in Soil (pCi/g, mg/kg)	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
3.01	Inorganic	Antimony	5.1E-02	2.1E-05	1.5E-05	1.2E-02
3.01	Inorganic	Manganese	3.2E+00	2.2E-03	1.7E-02	1.1E+00
3.01	Inorganic	Nickel	1.7E-01	4.7E-02	6.7E-03	4.3E-02
3.01	Organic	PCB-1254	1.0E-02	1.5E-03	2.1E-03	2.6E-03
3.01	Radionuclide	Strontium-90	5.7E+01	4.4E+00	6.2E-03	2.3E-02
3.02	Inorganic	Antimony	6.8E-02	2.8E-05	2.0E-05	1.7E-02
3.02	Inorganic	Arsenic	1.1E-01	1.1E-04	1.6E-03	2.6E-02
3.02	Inorganic	Boron	2.4E+00	1.2E-01	1.6E-02	6.6E-01
3.02	Inorganic	Manganese	3.2E+00	2.2E-03	1.6E-02	1.1E+00
3.02	Inorganic	Nickel	1.5E-01	4.2E-02	6.0E-03	3.8E-02
3.02	Organic	Di-n-octylphthlate	3.6E-01	7.5E+01	1.0E+02	8.7E-02
3.02	Radionuclide	Strontium-90	3.9E+01	3.0E+00	4.2E-03	1.6E-02
3.03	Inorganic	Arsenic	5.2E-02	5.2E-05	7.7E-04	1.3E-02
3.03	Inorganic	Manganese	3.2E+00	2.2E-03	1.6E-02	1.1E+00
3.03	Inorganic	Nickel	1.5E-01	4.2E-02	6.0E-03	3.9E-02
3.03	Inorganic	Nitrate	1.8E+02	6.2E+02	8.3E+02	3.8E+02
3.03	Organic	Acetone	4.6E-01	1.9E-06	2.6E-06	6.3E+00
3.03	Radionuclide	Cesium-137	3.9E+01	7.4E+00	2.0E-02	1.3E-02
3.03	Radionuclide	Strontium-90	6.3E+01	4.9E+00	6.9E-03	2.6E-02
3.04	Inorganic	Antimony	6.2E-02	2.6E-05	1.9E-05	1.5E-02

Table E26 (continued)

Reach	Chemical type	Chemical	Concentration in Soil (pCi/g, mg/kg)	Concentration in Milk (pCi/L, mg/L)	Concentration in Meat (pCi/g, mg/kg)	Concentration in Vegetables (pCi/g, mg/kg)
3.04	Inorganic	Arsenic	4.3E-02	4.3E-05	6.3E-04	1.0E-02
3.04	Inorganic	Manganese	3.2E+00	2.2E-03	1.6E-02	1.1E+00
3.04	Inorganic	Molybdenum	1.8E-01	5.5E-03	1.4E-03	4.8E-02
3.04	Inorganic	Nickel	1.5E-01	4.2E-02	6.1E-03	3.9E-02
3.04	Organic	PCB-1254	7.5E-03	1.1E-03	1.5E-03	1.9E-03
3.04	Radionuclide	Strontium-90	4.3E+02	3.3E+01	4.7E-02	1.8E-01

Table E27. Ingestion of produce, meat, and milk in the irrigation pathway

$$Intake_{\ nonradionuclides}\left(\frac{mg}{kg \cdot day}\right) = \frac{CP \times IR \times FI \times EF \times ED}{BW \times AT}$$

$$Intake_{\ radionuclides}(pCi) = CP \times IR \times FI \times EF \times ED$$

Parameter Explanation

	Parameter	Value used	Explanation/source
CP =	Concentration in produce (vegetables and meat) (milk)	Calculated value (mg/kg, pCi/kg, wet wt) (mg/L, pCi/L)	Modeled values based on the equations outlined in Tables E.19. to E.22.
IR =	Produce ingestion rate	0.2 kg/day	Vegetables, children and adults (Exposure Factors Handbook, EPA 1989)
		0.1 kg/day	Meat, children and adults (Exposure Factors Handbook, EPA 1989)
		1.0 L/day	Milk, children (based on water ingestion, OSWER Directive, EPA 1991a)
		0.5 L/day	Milk, adults (ICRP 23, 1975)
FI =	Fraction ingested	0.4 (unitless)	Vegetables, reasonable worst case
		0.75 (unitless)	Beef and Milk, reasonable worst case (OSWER Directive, EPA 1991a)
EF =	Exposure frequency	350 days/year	OSWER Directive, EPA 1991a
ED =	Exposure duration	6 years	Child exposure (RAGS, EPA 1989b)
		30 years	Adult exposure (RAGS, EPA 1989b)
BW =	Body weight	15 kg	Child (OSWER Directive, EPA 1991a)
		70 kg	Adult (OSWER Directive, EPA 1991a)
AT =	Averaging time	365 days/year × ED	Averaging time for non-carcinogens
		365 days/year × 70 years	Averaging time for carcinogens (RAGS, EPA 1989b; EPA 1991a)

Table E28. Log K_{ow} and transfer coefficients used in food chain models

Chemical	Log Kow	Meat Transfer Coefficient	Milk Transfer Coefficient	Pasture Transfer Coefficient	Vegetable Transfer Coefficient
Acenaphthene	4.33E+00	2.51E-04	7.94E-05	1.89E-01	4.72E-02
Acenaphthylene					
Acetone	-2.40E-01	1.46E-08	4.61E-09	5.31E+01	1.33E+01
Aldrin	3.01E+00	8.51E-02	2.40E-02	3.34E-02	8.36E-03
Aluminum					
Am-241		4.00E-05	1.50E-06	4.00E-03	1.00E-03
Anthracene	4.45E+00	7.08E-04	2.24E-04	1.04E-01	2.59E-02
Antimony (metallic)		4.00E-05	2.50E-05	5.00E-02	1.00E-02
Aroclor 1254	6.03E+00	5.25E-02	1.12E-02	1.25E-02	3.12E-03
Aroclor-1248	5.76E+00	1.44E-02	4.57E-03	1.82E-02	4.54E-03
Aroclor-1260	7.15E+00	3.54E-01	1.12E-01	2.86E-03	7.14E-04
Arsenic, Inorganic		2.00E-03	6.00E-05	6.00E-03	1.50E-03
Barium		2.30E-04	4.80E-04	1.00E-01	1.00E-02
Be-7		1.00E-03	9.00E-07	1.50E-03	3.75E-04
Benz[a]anthracene	5.66E+00	1.00E-02	3.16E-03	2.25E-02	5.61E-03
Benzo[a]pyrene	6.10E+00	2.89E-02	9.13E-03	1.22E-02	3.04E-03
Benzo[b]fluoranthene	6.12E+00	2.89E-02	9.13E-03	1.22E-02	3.04E-03
Benzo[g,h,i]perylene	6.58E+00				
Benzo[k]fluoranthene	6.84E+00	2.89E-02	9.13E-03	1.22E-02	3.04E-03
Benzoic Acid	1.87E+00	1.86E-06	5.89E-07	3.22E+00	8.04E-01
Beryllium		8.00E-04	2.00E-06	1.88E-03	4.70E-04
Bis(2-ethylhexyl)phthalate	4.89E+00	1.03E-07	3.26E-08	1.71E+01	4.28E+00
Boron And Borates Only		8.00E-04	2.70E-03	4.80E-01	1.20E-01
Butyl Benzyl Phthlate	4.91E+00				
Cadmium (Diet)		4.00E-04	1.00E-03	1.50E-01	3.75E-02
Carbazole	3.76E+00	1.45E-04	4.57E-05	2.60E-01	6.50E-02
Carbon Disulfide	2.24E+00	2.51E-06	7.94E-07	2.70E+00	6.76E-01
Chlordane, Total	5.54E+00	7.41E-03	3.72E-04	6.68E-02	1.67E-02
Chloroform	1.97E+00	2.34E-06	7.41E-07	2.81E+00	7.04E-01
Chromium		9.00E-03	1.00E-05	4.00E-02	1.00E-02
Chrysene	5.66E+00	1.02E-02	3.23E-03	2.22E-02	5.54E-03

Table E28 (continued)

Chemical	Log Kow	Meat Transfer Coefficient	Milk Transfer Coefficient	Pasture Transfer Coefficient	Vegetable Transfer Coefficient
Cm-248		4.00E-05	1.50E-06	4.00E-03	1.00E-03
Co-60		1.00E-04	7.00E-05	4.00E-01	3.00E-02
Cobalt					
Copper		9.00E-03	1.50E-03	2.50E-01	6.25E-02
Cresol, p-	1.94E+00	2.14E-06	6.76E-07	2.97E+00	7.42E-01
Cs-137+D		5.12E-02	8.38E-03	2.00E-01	4.00E-02
Curium 243/244		4.00E-05	1.50E-06	4.00E-03	1.00E-03
Curium 245/246		4.00E-05	1.50E-06	4.00E-03	1.00E-03
DDD	5.80E+00	1.26E-02	3.02E-03	1.01E-02	2.53E-03
DDE	5.69E+00	4.90E-02	9.55E-03	3.48E-03	8.71E-04
DDT	6.36E+00	2.82E-02	1.07E-02	1.02E-02	2.56E-03
Dibenz[a,h]anthracene	6.84E+00	1.02E-02	3.23E-03	2.22E-02	5.54E-03
Dibutyl Phthalate	4.90E+00	1.00E-02	3.18E-03	2.24E-02	5.60E-03
Diethyl Phthalate	2.47E+00	7.23E-06	2.29E-06	1.47E+00	3.67E-01
Fluoranthene	4.95E+00	1.99E-03	6.31E-04	5.70E-02	1.43E-02
Fluorene	4.38E+00	3.97E-04	1.26E-04	1.45E-01	3.62E-02
H-3		0.00	1.50E-02	0.00	0.00
Heptachlor	4.27E+00	1.55E-02	3.24E-03	1.11E-01	2.77E-02
Indeno[1,2,3-cd]pyrene	6.58E+00	7.94E-02	2.51E-02	6.78E-03	1.70E-03
Iron					
K-40		1.80E-02	7.20E-03	3.00E+00	3.00E-01
Lead And Compounds		4.00E-04	2.50E-04	3.20E-03	8.00E-04
Magnesium					
Manganese (Diet)		5.00E-04	3.00E-05	3.00E+00	4.00E-01
Mercury, Inorganic		1.00E-02	4.70E-04	1.00E+00	3.00E-01
Methoxychlor	4.40E+00	5.02E-04	1.48E-04	1.26E-01	3.16E-02
Methyl Ethyl Ketone	2.75E-01	4.72E-08	1.49E-08	2.69E+01	6.72E+00
Methyl Mercury					
Molybdenum		1.00E-03	1.70E-03	4.00E-01	1.00E-01
Naphthalene	3.30E+00	4.27E-05	2.00E-04	5.26E-01	1.31E-01
Naphthalene, 2-Methyl					

Table E28 (continued)

Chemical	Log Kow	Meat Transfer Coefficient	Milk Transfer Coefficient	Pasture Transfer Coefficient	Vegetable Transfer Coefficient
Nickel Soluble Salts		5.20E-03	1.60E-02	2.00E-01	5.00E-02
Nitrate		7.50E-02	2.50E-02	3.00E+01	7.50E+00
Nitrophenol, 4-					
Octyl Phthalate, di-N-	9.20E+00	1.86E+02	5.89E+01	7.64E-05	1.91E-05
Pentachlorophenol	5.86E+00	2.51E-03	7.94E-04	4.99E-02	1.25E-02
Phenanthrene	4.57E+00	7.23E-04	2.29E-04	1.02E-01	2.56E-02
Phenol	1.46E+00	7.23E-07	2.29E-07	5.55E+00	1.39E+00
Plutonium-239/240		1.80E-05	1.10E-06	1.00E-03	5.00E-04
Pu-238		1.80E-05	1.10E-06	1.00E-03	5.00E-04
Pyrene	4.88E+00	5.25E-03	1.66E-03	3.26E-02	8.15E-03
Selenium		1.00E-01	1.00E-02	5.00E-01	1.00E-01
Silver		3.00E-03	5.00E-05	1.00E+00	2.00E-01
Sr-90+D		9.00E-03	2.82E-03	4.01E+00	3.02E-01
Sulfate					
Tc-99		1.00E-04	1.40E-04	4.00E-01	5.00E+00
Thallium					
Toluene	2.73E+00	1.35E-05	4.27E-06	1.02E+00	2.56E-01
Trichloroethylene	2.42E+00	6.03E-06	1.91E-06	1.63E+00	4.08E-01
U-234		3.40E-04	4.00E-04	1.00E-02	2.00E-03
U-235+D		4.40E-04	4.05E-04	1.10E-02	2.50E-03
Uranium					
Uranium-238		4.50E-04	4.10E-04	1.13E-02	2.56E-03
Vanadium, Metallic		2.30E-03	1.00E-03	5.20E-03	1.30E-03
Zinc (Metallic)		1.00E-01	1.00E-02	1.00E+00	4.00E-01

Table E29. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the drinking water ingestion pathway for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR
1	Inorganic	Arsenic	1.2E-03	2.1E-05
1	Radionuclide	Cobalt-60	3.9E+00	1.5E-06
1	Radionuclide	Uranium - radioactive	1.2E+00	1.5E-06
1	Radionuclide	Strontium-90	1.1E+00	1.3E-06
1	Radionuclide	Tritium	6.7E+02	1.0E-06
1			Pathway Total	2.6E-05
2	Radionuclide	Tritium	8.5E+03	1.3E-05
2	Radionuclide	Strontium-90	8.6E+00	1.0E-05
2			Pathway Total	2.3E-05
4	Inorganic	Arsenic	1.2E-03	2.2E-05
4	Radionuclide	Uranium - radioactive	2.1E+00	2.8E-06
4	Radionuclide	Strontium-90	1.9E+00	2.3E-06
4	Radionuclide	Cobalt-60	5.0E+00	2.0E-06
4	Radionuclide	Cesium-137	1.8E+00	1.2E-06
4			Pathway Total	3.0E-05
7.01	Inorganic	Arsenic	5.2E-03	9.3E-05
7.01			Pathway Total	9.3E-05
7.02	Inorganic	Arsenic	1.3E-03	2.3E-05
7.02	Radionuclide	Strontium-90	2.4E+00	2.9E-06
7.02			Pathway Total	2.6E-05

Table E30. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult drinking water ingestion pathway for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Adult Ingestion HQ
1	Inorganic	Manganese	6.3E-02	3.4E-01
1	Inorganic	Arsenic	1.2E-03	1.1E-01
1			Hazard Index	4.5E-01
2	Inorganic	Manganese	7.0E-02	3.8E-01
2			Hazard Index	3.8E-01
4	Inorganic	Manganese	5.9E-02	3.2E-01
4	Inorganic	Arsenic	1.2E-03	1.1E-01
4	Inorganic	Antimony	1.6E-03	1.1E-01
4			Hazard Index	5.5E-01
7.01	Inorganic	Manganese	5.7E-02	3.1E-01
7.01	Inorganic	Arsenic	5.2E-03	4.7E-01
7.01			Hazard Index	7.8E-01
7.02	Inorganic	Manganese	7.7E-02	4.2E-01
7.02	Inorganic	Arsenic	1.3E-03	1.2E-01
7.02			Hazard Index	5.4E-01

Table E31. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child drinking water ingestion pathway for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Child Ingestion HQ
1	Inorganic	Manganese	6.3E-02	8.0E-01
1	Inorganic	Arsenic	1.2E-03	2.6E-01
1	Inorganic	Nitrate	5.0E+00	2.0E-01
1			Hazard Index	1.3E+00
2	Inorganic	Manganese	7.0E-02	9.0E-01
2	Inorganic	Nitrate	3.4E+00	1.3E-01
2			Hazard Index	1.0E+00
4	Inorganic	Manganese	5.9E-02	7.5E-01
4	Inorganic	Arsenic	1.2E-03	2.6E-01
4	Inorganic	Antimony	1.6E-03	2.6E-01
4	Inorganic	Nitrate	4.4E+00	1.7E-01
4			Hazard Index	1.5E+00
7.01	Inorganic	Manganese	5.7E-02	7.2E-01
7.01	Inorganic	Arsenic	5.2E-03	1.1E+00
7.01			Hazard Index	1.8E+00
7.02	Inorganic	Manganese	7.7E-02	9.8E-01
7.02	Inorganic	Arsenic	1.3E-03	2.8E-01
7.02			Hazard Index	1.3E+00

Table E32. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the drinking water ingestion pathway for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR
3.01	Radionuclide	Tritium	1.9E+03	2.8E-06
3.01	Radionuclide	Strontium-90	2.2E+00	2.6E-06
3.01			Pathway Total	5.4E-06
3.02	Inorganic	Arsenic	3.0E-03	5.3E-05
3.02	Radionuclide	Strontium-90	1.5E+00	1.8E-06
3.02	Radionuclide	Tritium	8.2E+02	1.2E-06
3.02			Pathway Total	5.6E-05
3.03	Inorganic	Arsenic	1.5E-03	2.6E-05
3.03	Organic	Bis(2-ethylhexyl)phthalate	1.0E-02	1.6E-06
3.03	Radionuclide	Strontium-90	2.4E+00	2.9E-06
3.03	Radionuclide	Uranium - radioactive	1.7E+00	2.3E-06
3.03	Radionuclide	Uranium-234	1.9E+00	1.7E-06
3.03	Radionuclide	Tritium	8.8E+02	1.3E-06
3.03			Pathway Total	3.5E-05
3.04	Inorganic	Arsenic	1.2E-03	2.1E-05
3.04	Radionuclide	Strontium-90	1.7E+01	1.9E-05
3.04			Pathway Total	4.1E-05

Table E33. Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the adult drinking water ingestion pathway for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration	Adult Ingestion HQ
3.01	Inorganic	Manganese	9.1E-02	5.0E-01
3.01	Organic	PCB-1254	2.9E-04	4.0E-01
3.01			Hazard Index	9.0E-01
3.02	Inorganic	Manganese	8.9E-02	4.9E-01
3.02	Inorganic	Arsenic	3.E-03	2.7E-01
3.02	Inorganic	Antimony	1.9E-03	1.3E-01
3.02			Hazard Index	8.9E-01
3.03	Inorganic	Manganese	8.9E-02	4.9E-01
3.03	Inorganic	Arsenic	1.5E-03	1.3E-01
3.03			Hazard Index	6.2E-01
3.04	Inorganic	Manganese	8.9E-02	4.9E-01
3.04	Inorganic	Antimony	1.7E-03	1.2E-01
3.04	Inorganic	Arsenic	1.2E-03	1.1E-01
3.04	Organic	PCB-1254	2.1E-04	2.9E-01
3.04			Hazard Index	1.0E+00

Table E34. Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the child drinking water ingestion pathway for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration	Child Ingestion HQ
3.01	Inorganic	Manganese	9.1E-02	1.2E+00
3.01	Inorganic	Antimony	1.4E-03	2.3E-01
3.01	Organic	PCB-1254	2.9E-04	9.3E-01
3.01			Hazard Index	2.3E+00
3.02	Inorganic	Manganese	8.9E-02	1.1E+00
3.02	Inorganic	Arsenic	3.E-03	6.4E-01
3.02	Inorganic	Antimony	1.9E-03	3.0E-01
3.02			Hazard Index	2.1E+00
3.03	Inorganic	Manganese	8.9E-02	1.1E+00
3.03	Inorganic	Arsenic	1.5E-03	3.1E-01
3.03	Inorganic	Nitrate	5.1E+00	2.0E-01
3.03			Hazard Index	1.7E+00
3.04	Inorganic	Manganese	8.9E-02	1.1E+00
3.04	Inorganic	Antimony	1.7E-03	2.8E-01
3.04	Inorganic	Arsenic	1.2E-03	2.6E-01
3.04	Organic	PCB-1254	2.1E-04	6.7E-01
3.04			Hazard Index	2.3E+00

Table E35. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal Contact ECR	Total ECR Across Pathways
2.04	Inorganic	Chromium	2.1E+01		1.3E-05			1.3E-05
2.04	Inorganic	Arsenic	6.2E+00	9.1E-07	4.9E-06			5.8E-06
2.04	Inorganic	Beryllium	1.3E+00	5.4E-07	1.7E-07		3.1E-06	3.8E-06
2.04	Radionuclide	Potassium-40	1.4E+01	3.0E-08	2.9E-09	4.1E-05		4.1E-05
2.04	Radionuclide	Cesium-137	3.5E+00	1.9E-08	1.9E-09	2.5E-05		2.5E-05
2.04			Pathway Total	1.5E-06	1.8E-05	6.6E-05	3.1E-06	8.9E-05
3.01	Inorganic	Chromium	2.1E+01		1.3E-05			1.3E-05
3.01	Inorganic	Arsenic	4.1E+00	6.0E-07	3.2E-06			3.8E-06
3.01	Inorganic	Beryllium	7.0E-01	2.9E-07	9.3E-08		1.7E-06	2.1E-06
3.01			Pathway Total	9.0E-07	1.7E-05		1.7E-06	1.9E-05
3.02	Inorganic	Chromium	1.6E+02		1.0E-04			1.0E-04
3.02	Inorganic	Arsenic	1.3E+01	1.9E-06	1.0E-05			1.2E-05
3.02	Inorganic	Beryllium	9.2E-01	3.9E-07	1.2E-07		2.2E-06	2.7E-06
3.02	Radionuclide	Uranium-238	4.1E+01	4.4E-07	1.4E-05	1.0E-05		2.5E-05
3.02	Radionuclide	Uranium-234	5.9E+01	4.6E-07	2.3E-05	6.0E-09		2.4E-05
3.02	Radionuclide	Cesium-137	1.2E+00	6.7E-09	6.6E-10	8.8E-06		8.8E-06
3.02	Radionuclide	Uranium-235	3.1E+00	2.5E-08	1.1E-06	3.9E-06		5.0E-06

Table E35 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal Contact ECR	Total ECR Across Pathways
3.02	Radionuclide	Cobalt-60	1.6E-01	5.4E-10	3.2E-10	1.9E-06		1.9E-06
3.02			Pathway Total	3.2E-06	1.5E-04	2.5E-05	2.2E-06	1.8E-04
3.03	Inorganic	Chromium	6.7E+01		4.3E-05			4.3E-05
3.03	Inorganic	Arsenic	6.2E+00	9.2E-07	4.9E-06			5.8E-06
3.03	Inorganic	Beryllium	7.3E-01	3.1E-07	9.7E-08		1.7E-06	2.2E-06
3.03	Radionuclide	Cesium-137	1.7E+00	9.3E-09	9.1E-10	1.2E-05		1.2E-05
3.03	Radionuclide	Uranium-238	6.0E+00	6.5E-08	2.1E-06	1.5E-06		3.7E-06
3.03	Radionuclide	Uranium-234	7.9E+00	6.1E-08	3.1E-06	8.1E-10		3.2E-06
3.03			Pathway Total	1.4E-06	5.4E-05	1.4E-05	1.7E-06	7.0E-05
3.04	Inorganic	Arsenic	1.2E+01	1.8E-06	9.7E-06			1.1E-05
3.04	Inorganic	Chromium	5.6E+01		3.6E-05			3.6E-05
3.04	Inorganic	Beryllium	8.3E-01	3.4E-07	1.1E-07		2.0E-06	2.4E-06
3.04	Radionuclide	Cesium-137	5.1E+00	2.8E-08	2.7E-09	3.6E-05		3.6E-05
3.04	Radionuclide	Uranium-238	2.2E+00	2.4E-08	7.5E-07	5.5E-07		1.3E-06
3.04	Radionuclide	Uranium-234	2.9E+00	2.3E-08	1.1E-06	3.0E-10		1.2E-06
3.04	Radionuclide	Cobalt-60	1.9E-01	6.4E-10	3.8E-10	2.3E-06		2.3E-06
3.04			Pathway Total	2.2E-06	4.8E-05	3.9E-05	2.0E-06	9.1E-05

Table E35 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal Contact ECR	Total ECR Across Pathways
4.01	Inorganic	Chromium	1.9E+01		1.3E-05			1.3E-05
4.01	Inorganic	Arsenic	4.9E+00	7.1E-07	3.8E-06			4.5E-06
4.01	Inorganic	Beryllium	7.0E-01	2.9E-07	9.3E-08		1.7E-06	2.1E-06
4.01	Radionuclide	Cesium-137	5.9E+00	3.3E-08	3.2E-09	4.3E-05		4.3E-05
4.01	Radionuclide	Potassium-40	1.1E+01	2.4E-08	2.3E-09	3.2E-05		3.2E-05
4.01			Pathway Total	1.1E-06	1.6E-05	7.4E-05	1.7E-06	9.3E-05
4.02	Inorganic	Chromium	1.9E+01		1.2E-05			1.2E-05
4.02	Inorganic	Arsenic	4.9E+00	7.2E-07	3.8E-06			4.6E-06
4.02	Inorganic	Beryllium	7.0E-01	3.0E-07	9.3E-08		1.7E-06	2.1E-06
4.02	Radionuclide	Potassium-40	1.7E+01	3.6E-08	3.5E-09	4.9E-05		4.9E-05
4.02	Radionuclide	Cesium-137	5.0E+00	2.7E-08	2.7E-09	3.6E-05		3.6E-05
4.02	Radionuclide	Cobalt-60	1.4E-01	4.6E-10	2.7E-10	1.6E-06		1.6E-06
4.02			Pathway Total	1.1E-06	1.6E-05	8.6E-05	1.7E-06	1.1E-04
4.03	Inorganic	Chromium	3.5E+01		2.3E-05			2.3E-05
4.03	Inorganic	Arsenic	1.1E+01	1.6E-06	8.8E-06			1.0E-05
4.03	Inorganic	Beryllium	7.1E-01	3.0E-07	9.4E-08		1.7E-06	2.1E-06
4.03	Radionuclide	Cesium-137	4.0E+00	2.2E-08	2.2E-09	2.9E-05		2.9E-05

Table E35 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal Contact ECR	Total ECR Across Pathways
4.03			Pathway Total	2.0E-06	3.2E-05	2.9E-05	1.7E-06	6.5E-05
4.04	Radionuclide	Cesium-137	2.7E+00	1.5E-08	1.4E-09	1.9E-05		1.9E-05
4.04			Pathway Total	1.5E-08	1.4E-09	1.9E-05		1.9E-05

Table E36. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Ingestion HQ	Inhalation HQ	Dermal Contact HQ	Total HQ Across Pathways
2.04	Inorganic	Manganese	1.9E+03	3.1E-03	5.0E+00	4.5E-03	5.0E+00
2.04			Hazard Index	3.1E-03	5.0E+00	4.5E-03	5.0E+00
3.01	Inorganic	Manganese	3.8E+02	6.3E-04	9.9E-01	8.9E-04	9.9E-01
3.01			Hazard Index	6.3E-04	9.9E-01	8.9E-04	9.9E-01
3.02	Inorganic	Manganese	7.2E+02	1.2E-03	1.9E+00	1.7E-03	1.9E+00
3.02			Hazard Index	1.2E-03	1.9E+00	1.7E-03	1.9E+00
3.03	Inorganic	Manganese	9.2E+02	1.5E-03	2.4E+00	2.1E-03	2.4E+00
3.03			Hazard Index	1.5E-03	2.4E+00	2.1E-03	2.4E+00
3.04	Inorganic	Manganese	6.6E+02	1.1E-03	1.7E+00	1.5E-03	1.7E+00
3.04			Hazard Index	1.1E-03	1.7E+00	1.5E-03	1.7E+00
4.01	Inorganic	Manganese	6.9E+02	1.1E-03	1.8E+00	1.6E-03	1.8E+00
4.01			Hazard Index	1.1E-03	1.8E+00	1.6E-03	1.8E+00
4.02	Inorganic	Manganese	9.2E+02	1.5E-03	2.4E+00	2.1E-03	2.4E+00
4.02			Hazard Index	1.5E-03	2.4E+00	2.1E-03	2.4E+00
4.03	Inorganic	Manganese	1.5E+03	2.4E-03	3.9E+00	3.5E-03	3.9E+00
4.03			Hazard Index	2.4E-03	3.9E+00	3.5E-03	3.9E+00

Table E37. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child near-shore sediment pathways for selected subreaches of the Clinch River and Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Ingestion HQ	Inhalation HQ	Dermal Contact HQ	Total HQ Across Pathways
2.04	Inorganic	Manganese	1.9E+03	2.9E-02	2.2E+01	8.4E-03	2.2E+01
2.04	Inorganic	Barium	1.9E+02	5.8E-03	2.2E-01	9.6E-04	2.3E-01
2.04			Hazard Index	3.5E-02	2.2E+01	9.4E-03	2.2E+01
3.01	Inorganic	Manganese	3.8E+02	5.8E-03	4.4E+00	1.7E-03	4.4E+00
3.01	Inorganic	Barium	8.6E+01	2.6E-03	9.9E-02	4.3E-04	1.0E-01
3.01			Hazard Index	8.5E-03	4.5E+00	2.1E-03	4.5E+00
3.02	Inorganic	Manganese	7.2E+02	1.1E-02	8.3E+00	3.2E-03	8.3E+00
3.02	Inorganic	Mercury	3.2E+01	2.3E-01	6.2E-02	3.8E-07	2.9E-01
3.02	Inorganic	Barium	1.6E+02	4.8E-03	1.8E-01	7.8E-04	1.8E-01
3.02	Inorganic	Chromium	1.6E+02	6.9E-02		4.0E-02	1.1E-01
3.02			Hazard Index	3.1E-01	8.5E+00	4.3E-02	8.9E+00
3.03	Inorganic	Manganese	9.2E+02	1.4E-02	1.1E+01	4.0E-03	1.1E+01
3.03	Inorganic	Barium	9.7E+01	3.0E-03	1.1E-01	4.9E-04	1.1E-01
3.03			Hazard Index	1.7E-02	1.1E+01	4.5E-03	1.1E+01
3.04	Inorganic	Manganese	6.6E+02	1.0E-02	7.5E+00	2.9E-03	7.5E+00
3.04	Inorganic	Mercury	5.3E+01	3.8E-01	1.0E-01	6.1E-07	4.8E-01
3.04	Inorganic	Barium	1.1E+02	3.4E-03	1.3E-01	5.6E-04	1.3E-01

Table E37 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Ingestion HQ	Inhalation HQ	Dermal Contact HQ	Total HQ Across Pathways
3.04			Hazard Index	3.9E-01	7.7E+00	3.5E-03	8.1E+00
4.01	Inorganic	Manganese	6.9E+02	1.1E-02	7.9E+00	3.0E-03	7.9E+00
4.01			Hazard Index	1.1E-02	7.9E+00	3.0E-03	7.9E+00
4.02	Inorganic	Manganese	9.2E+02	1.4E-02	1.1E+01	4.0E-03	1.1E+01
4.02			Hazard Index	1.4E-02	1.1E+01	4.0E-03	1.1E+01
4.03	Inorganic	Manganese	1.5E+03	2.3E-02	1.7E+01	6.6E-03	1.7E+01
4.03	Inorganic	Barium	8.7E+01	2.6E-03	9.9E-02	4.3E-04	1.0E-01
4.03			Hazard Index	2.6E-02	1.7E+01	7.0E-03	1.7E+01

Table E38. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult swimming pathways for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/L)	Incidental Ingestion HQ	Dermal Contact HQ	Total HQ Across Pathways
3.01	Organic	PCB-1254	2.9E-04	3.3E-03	6.1E-01	
3.01			Pathway Total	3.3E-03	6.1E-01	6.1E-01
3.02	Organic	Di-n-octylphthlate	1.0E-02	1.1E-04	1.6E+00	
3.02			Pathway Total	1.1E-04	1.6E+00	1.6E+00
3.04	Organic	PCB-1254	2.1E-04	2.4E-03	4.4E-01	
3.04			Pathway Total	2.4E-03	4.4E-01	4.5E-01

Table E39. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child swimming pathways for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/L)	Incidental Ingestion HQ	Dermal Contact HQ	Total HQ Across Pathways
3.01	Inorganic	Manganese	9.1E-02	1.9E-02	8.9E-02	
3.01	Organic	PCB-1254	2.9E-04	1.5E-02	1.1E+00	
3.01			Hazard Index	3.5E-02	1.2E+00	1.3E+00
3.02	Inorganic	Manganese	8.9E-02	1.9E-02	8.7E-02	
3.02	Organic	Di-n-octylphthlate	1.0E-02	5.3E-04	2.9E+00	
3.02			Hazard Index	1.9E-02	3.0E+00	3.0E+00
3.03	Inorganic	Manganese	8.9E-02	1.9E-02	8.8E-02	
3.03			Hazard Index	1.9E-02	8.8E-02	1.1E-01
3.04	Inorganic	Manganese	8.9E-02	1.9E-02	8.7E-02	
3.04	Organic	PCB-1254	2.1E-04	1.1E-02	8.3E-01	
3.04			Hazard Index	3.0E-02	9.2E-01	9.5E-01

Table E40. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the fish ingestion pathway for the Clinch River and Poplar Creek

Reach	Species	Chemical Type	Chemical	Representative concentration (mg/kg, pCi/g)	Ingestion ECR
1	Bluegill	Inorganic	Arsenic	7.2E-02	3.4E-05
1	Bluegill	Inorganic	Beryllium	6.0E-03	8.2E-06
1	Bluegill			Pathway Total	4.2E-05
1	Catfish	Organic	PCB-1260	3.7E-01	9.0E-04
1	Catfish	Organic	Chlordane, total	3.4E-01	1.4E-04
1	Catfish	Organic	4,4'-DDE	8.5E-02	9.1E-06
1	Catfish	Radionuclide	Cesium-137	8.1E-02	1.5E-06
1	Catfish			Pathway Total	1.0E-03
1	LargeMouth Bass	Inorganic	Arsenic	1.8E-01	8.6E-05
1	LargeMouth Bass			Pathway Total	8.6E-05
2	Bluegill	Inorganic	Arsenic	3.0E-02	1.4E-05
2	Bluegill	Inorganic	Beryllium	2.3E-03	3.2E-06
2	Bluegill	Radionuclide	Cesium-137	2.9E+00	5.3E-05
2	Bluegill			Pathway Total	7.0E-05
2	Catfish	Organic	PCB-1260	1.1E+00	2.8E-03
2	Catfish	Organic	Chlordane, total	2.1E-01	8.6E-05
2	Catfish	Organic	4,4'-DDE	1.3E-02	1.4E-06
2	Catfish	Radionuclide	Cesium-137	1.1E+00	1.9E-05
2	Catfish	Radionuclide	Strontium-90	5.4E-01	1.7E-05
2	Catfish			Pathway Total	2.9E-03
2	LargeMouth Bass	Inorganic	Arsenic	2.9E-01	1.4E-04
2	LargeMouth Bass	Inorganic	Beryllium	2.2E-03	3.0E-06
2	LargeMouth Bass	Organic	PCB-1260	1.9E-01	4.7E-04
2	LargeMouth Bass	Organic	Chlordane, total	7.2E-02	3.0E-05
2	LargeMouth Bass	Radionuclide	Cesium-137	8.2E+00	1.5E-04
2	LargeMouth Bass			Pathway Total	7.8E-04
2	Striped/hybrid Bass	Organic	PCB-1260	4.3E-01	1.1E-03

Table E40 (continued)

Reach	Species	Chemical Type	Chemical	Representative concentration (mg/kg, pCi/g)	Ingestion ECR
2	Striped/hybrid Bass	Organic	Chlordane, total	1.5E-01	6.0E-05
2	Striped/hybrid Bass			Pathway Total	1.1E-03
3	Bluegill	Inorganic	Arsenic	7.4E-02	3.5E-05
3	Bluegill	Inorganic	Beryllium	4.3E-03	5.9E-06
3	Bluegill	Radionuclide	Cesium-137	7.6E-02	1.4E-06
3	Bluegill			Pathway Total	4.2E-05
3	Catfish	Organic	PCB-1260	7.9E-01	1.9E-03
3	Catfish	Organic	Chlordane, total	9.4E-02	3.9E-05
3	Catfish	Radionuclide	Strontium-90	3.2E-01	1.0E-05
3	Catfish	Radionuclide	Cesium-137	6.8E-02	1.2E-06
3	Catfish			Pathway Total	2.0E-03
3	LargeMouth Bass	Inorganic	Arsenic	2.0E-01	9.6E-05
3	LargeMouth Bass	Inorganic	Beryllium	3.6E-03	4.9E-06
3	LargeMouth Bass	Organic	PCB-1260	3.8E-01	9.2E-04
3	LargeMouth Bass	Organic	Chlordane, total	7.9E-02	3.2E-05
3	LargeMouth Bass	Radionuclide	Cesium-137	1.0E-01	1.9E-06
3	LargeMouth Bass			Pathway Total	1.1E-03
4	Bluegill	Inorganic	Arsenic	5.5E-02	2.6E-05
4	Bluegill	Inorganic	Beryllium	2.4E-03	3.2E-06
4	Bluegill	Organic	PCB-1260	2.2E-01	5.4E-04
4	Bluegill	Organic	Chlordane, total	5.7E-02	2.3E-05
4	Bluegill	Radionuclide	Cesium-137	1.6E-01	2.8E-06
4	Bluegill			Pathway Total	1.0E-03
4	Catfish	Inorganic	Arsenic	3.7E-02	1.8E-05
4	Catfish	Inorganic	Beryllium	2.7E-03	3.7E-06
4	Catfish	Organic	PCB-1260	8.7E-01	2.1E-03
4	Catfish	Organic	Chlordane, total	1.3E-01	5.4E-05
4	Catfish	Organic	4,4'-DDT	2.0E-01	2.2E-05

Table E40 (continued)

Reach	Species	Chemical Type	Chemical	Representative concentration (mg/kg, pCi/g)	Ingestion ECR
4	Catfish	Organic	Aldrin	1.3E-03	6.9E-06
4	Catfish	Organic	4,4'-DDE	2.6E-02	2.8E-06
4	Catfish	Radionuclide	Strontium-90	3.0E-01	9.4E-06
4	Catfish	Radionuclide	Cesium-137	6.8E-02	1.2E-06
4	Catfish			Pathway Total	2.3E-03
4	LargeMouth Bass	Inorganic	Arsenic	2.4E-01	1.1E-04
4	LargeMouth Bass	Organic	PCB-1260	2.4E-01	5.9E-04
4	LargeMouth Bass	Organic	Chlordane, total	7.3E-02	3.0E-05
4	LargeMouth Bass	Radionuclide	Cesium-137	1.2E-01	2.1E-06
4	LargeMouth Bass			Pathway Total	7.3E-04
4	Striped/hybrid Bass	Organic	PCB-1260	7.6E-01	1.9E-03
4	Striped/hybrid Bass	Organic	Chlordane, total	1.1E-01	4.5E-05
4	Striped/hybrid Bass			Pathway Total	1.9E-03

Table E41. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult fish ingestion pathway for the Clinch River and Poplar Creek

Reach	Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Adult Ingestion HQ
1	Bluegill	Inorganic	Arsenic	7.2E-02	1.8E-01
1	Bluegill	Inorganic	Selenium	9.2E-01	1.4E-01
1	Bluegill	Inorganic	Mercury	4.4E-02	1.1E-01
1	Bluegill			Hazard Index	4.2E-01
1	Catfish	Organic	Chlordane, total	3.4E-01	4.2E+00
1	Catfish	Organic	PCB-1254	1.1E-01	4.2E+00
1	Catfish			Hazard Index	8.4E+00
1	LargeMouth Bass	Inorganic	Arsenic	1.8E-01	4.4E-01
1	LargeMouth Bass	Inorganic	Mercury	7.4E-02	1.8E-01
1	LargeMouth Bass	Inorganic	Selenium	1.1E+00	1.6E-01
1	LargeMouth Bass			Hazard Index	7.9E-01
2	Bluegill	Inorganic	Mercury	8.9E-02	2.2E-01
2	Bluegill			Hazard Index	2.2E-01
2	Catfish	Organic	PCB-1254	6.4E-01	2.4E+01
2	Catfish	Organic	Chlordane, total	2.1E-01	2.6E+00
2	Catfish			Hazard Index	2.6E+01
2	LargeMouth Bass	Inorganic	Arsenic	2.9E-01	7.2E-01
2	LargeMouth Bass	Inorganic	Mercury	2.9E-01	7.1E-01
2	LargeMouth Bass	Organic	PCB-1254	1.8E-01	6.8E+00
2	LargeMouth Bass	Organic	Chlordane, total	7.2E-02	8.8E-01
2	LargeMouth Bass			Hazard Index	9.1E+00
2	Striped/hybrid Bass	Organic	PCB-1254	6.1E-01	2.3E+01
2	Striped/hybrid Bass	Organic	Chlordane, total	1.5E-01	1.8E+00
2	Striped/hybrid Bass			Hazard Index	2.4E+01
3	Bluegill	Inorganic	Mercury	4.4E-01	1.1E+00
3	Bluegill	Inorganic	Arsenic	7.4E-02	1.8E-01
3	Bluegill			Hazard Index	1.3E+00

Table E41 (continued)

Reach	Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Adult Ingestion HQ
3	Catfish	Organic	PCB-1254	3.7E-01	1.4E+01
3	Catfish	Organic	Chlordane, total	9.4E-02	1.2E+00
3	Catfish			Hazard Index	1.5E+01
3	LargeMouth Bass	Inorganic	Mercury	7.3E-01	1.8E+00
3	LargeMouth Bass	Inorganic	Arsenic	2.0E-01	5.0E-01
3	LargeMouth Bass	Organic	PCB-1254	3.7E-01	1.4E+01
3	LargeMouth Bass	Organic	Chlordane, total	7.9E-02	9.7E-01
3	LargeMouth Bass			Hazard Index	1.7E+01
4	Bluegill	Inorganic	Mercury	1.9E-01	4.7E-01
4	Bluegill	Inorganic	Arsenic	5.5E-02	1.4E-01
4	Bluegill	Organic	PCB-1254	2.0E-01	7.4E+00
4	Bluegill	Organic	Chlordane, total	5.7E-02	7.0E-01
4	Bluegill			Hazard Index	8.7E+00
4	Catfish	Inorganic	Mercury	2.9E-01	7.3E-01
4	Catfish	Organic	PCB-1254	5.4E-01	2.0E+01
4	Catfish	Organic	Chlordane, total	1.3E-01	1.6E+00
4	Catfish	Organic	4,4'-DDT	2.0E-01	3.0E-01
4	Catfish			Hazard Index	2.3E+01
4	LargeMouth Bass	Inorganic	Mercury	3.3E-01	8.1E-01
4	LargeMouth Bass	Inorganic	Arsenic	2.4E-01	5.9E-01
4	LargeMouth Bass	Organic	PCB-1254	2.2E-01	8.1E+00
4	LargeMouth Bass	Organic	Chlordane, total	7.3E-02	9.0E-01
4	LargeMouth Bass			Hazard Index	1.0E+01
4	Striped/hybrid Bass	Organic	PCB-1254	4.9E-01	1.8E+01
4	Striped/hybrid Bass	Organic	Chlordane, total	1.1E-01	1.3E+00
4	Striped/hybrid Bass			Hazard Index	2.0E+01

Table E42. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child fish ingestion pathway for the Clinch River and Poplar Creek

Reach	Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Child Ingestion HQ
1	Bluegill	Inorganic	Arsenic	7.2E-02	4.6E-01
1	Bluegill	Inorganic	Selenium	9.2E-01	3.5E-01
1	Bluegill	Inorganic	Mercury	4.4E-02	2.8E-01
1	Bluegill			Hazard Index	1.1E+00
1	Catfish	Organic	Chlordane, total	3.4E-01	1.1E+01
1	Catfish	Organic	PCB-1254	1.1E-01	1.1E+01
1	Catfish			Hazard Index	2.2E+01
1	LargeMouth Bass	Inorganic	Arsenic	1.8E-01	1.2E+00
1	LargeMouth Bass	Inorganic	Mercury	7.4E-02	4.7E-01
1	LargeMouth Bass	Inorganic	Selenium	1.1E+00	4.2E-01
1	LargeMouth Bass			Hazard Index	2.0E+00
2	Bluegill	Inorganic	Mercury	8.9E-02	5.7E-01
2	Bluegill	Inorganic	Selenium	5.1E-01	2.0E-01
2	Bluegill	Inorganic	Arsenic	3.0E-02	1.9E-01
2	Bluegill			Hazard Index	9.6E-01
2	Catfish	Organic	PCB-1254	6.4E-01	6.1E+01
2	Catfish	Organic	Chlordane, total	2.1E-01	6.7E+00
2	Catfish			Hazard Index	6.8E+01
2	LargeMouth Bass	Inorganic	Arsenic	2.9E-01	1.9E+00
2	LargeMouth Bass	Inorganic	Mercury	2.9E-01	1.8E+00
2	LargeMouth Bass	Inorganic	Selenium	4.3E-01	1.7E-01
2	LargeMouth Bass	Organic	PCB-1254	1.8E-01	1.8E+01
2	LargeMouth Bass	Organic	Chlordane, total	7.2E-02	2.3E+00
2	LargeMouth Bass			Hazard Index	2.4E+01
2	Striped/hybrid Bass	Organic	PCB-1254	6.1E-01	5.9E+01
2	Striped/hybrid Bass	Organic	Chlordane, total	1.5E-01	4.7E+00
2	Striped/hybrid Bass			Hazard Index	6.3E+01

Table E42 (continued)

Reach	Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Child Ingestion HQ
3	Bluegill	Inorganic	Mercury	4.4E-01	2.8E+00
3	Bluegill	Inorganic	Arsenic	7.4E-02	4.7E-01
3	Bluegill	Inorganic	Selenium	3.5E-01	1.3E-01
3	Bluegill			Hazard Index	3.4E+00
3	Catfish	Organic	PCB-1254	3.7E-01	3.5E+01
3	Catfish	Organic	Chlordane, total	9.4E-02	3.0E+00
3	Catfish			Hazard Index	3.8E+01
3	LargeMouth Bass	Inorganic	Mercury	7.3E-01	4.7E+00
3	LargeMouth Bass	Inorganic	Arsenic	2.0E-01	1.3E+00
3	LargeMouth Bass	Inorganic	Selenium	3.0E-01	1.2E-01
3	LargeMouth Bass	Organic	PCB-1254	3.7E-01	3.5E+01
3	LargeMouth Bass	Organic	Chlordane, total	7.9E-02	2.5E+00
3	LargeMouth Bass			Hazard Index	4.4E+01
4	Bluegill	Inorganic	Mercury	1.9E-01	1.2E+00
4	Bluegill	Inorganic	Arsenic	5.5E-02	3.5E-01
4	Bluegill	Inorganic	Selenium	5.1E-01	2.0E-01
4	Bluegill	Organic	PCB-1254	2.0E-01	1.9E+01
4	Bluegill	Organic	Chlordane, total	5.7E-02	1.8E+00
4	Bluegill			Hazard Index	2.3E+01
4	Catfish	Inorganic	Mercury	2.9E-01	1.9E+00
4	Catfish	Inorganic	Arsenic	3.7E-02	2.4E-01
4	Catfish	Organic	PCB-1254	5.4E-01	5.2E+01
4	Catfish	Organic	Chlordane, total	1.3E-01	4.2E+00
4	Catfish	Organic	4,4'-DDT	2.0E-01	7.7E-01
4	Catfish			Hazard Index	5.9E+01
4	LargeMouth Bass	Inorganic	Mercury	3.3E-01	2.1E+00
4	LargeMouth Bass	Inorganic	Arsenic	2.4E-01	1.5E+00
4	LargeMouth Bass	Inorganic	Selenium	4.2E-01	1.6E-01

Table E42 (continued)

Reach	Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Child Ingestion HQ
4	LargeMouth Bass	Organic	PCB-1254	2.2E-01	2.1E+01
4	LargeMouth Bass	Organic	Chlordane, total	7.3E-02	2.3E+00
4	LargeMouth Bass			Hazard Index	2.7E+01
4	Striped/hybrid Bass	Organic	PCB-1254	4.9E-01	4.7E+01
4	Striped/hybrid Bass	Organic	Chlordane, total	1.1E-01	3.5E+00
4	Striped/hybrid Bass			Hazard Index	5.1E+01

Table E43. Chemicals with an excess cancer risk (ECR) of >10^{-6} for the waterfowl ingestion pathway

Species	Chemical Type	Chemical	Representative Concentration (pCi/g)	Ingestion ECR
Canadian Goose	Radionuclide	Plutonium-238	1.5E-01	2.4E-06
Canadian Goose			Pathway Total	2.4E-06

Table E44. Chemicals with a hazard quotient (HQ) of >0.1 for the adult waterfowl ingestion pathway

Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Ingestion HQ
Canadian Goose	Inorganic	Selenium	1.7E+01	2.4E-01
Canadian Goose			Hazard Index	2.4E-01

Table E45. Chemicals with a hazard quotient (HQ) of >0.1 for the child waterfowl ingestion pathway

Species	Chemical Type	Chemical	Representative Concentration (mg/kg)	Ingestion HQ
Canadian Goose	Inorganic	Selenium	1.7E+01	5.7E-01
Canadian Goose			Hazard Index	5.7E-01

Table E46. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the irrigation pathways for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Soil Ingestion ECR	Inhalation of Resuspended Soil ECR	External Exposure ECR	Ingestion of Milk ECR	Ingestion of Meat ECR	Ingestion of Leafy Vegetables ECR	Total ECR Across Pathways
1	Inorganic	Arsenic	4.3E-02	1.3E-08	6.8E-08		1.4E-07	4.2E-07	7.4E-06	
1	Radionuclide	Cobalt-60	3.7E-02	2.5E-10	1.4E-10	3.5E-06	1.1E-08	1.4E-09	5.4E-07	
1	Radionuclide	Strontium-90	2.8E-02	5.5E-10	1.1E-10		4.7E-07	1.3E-07	5.4E-07	
1			Pathway Total	1.3E-08	6.8E-08	3.5E-06	6.3E-07	5.5E-07	8.4E-06	1.3E-05
2	Radionuclide	Strontium-90	2.2E-01	4.4E-09	8.7E-10		3.8E-06	1.1E-06	4.3E-06	
2	Radionuclide	Cesium-137	3.2E-02	3.5E-10	3.4E-11	6.4E-07	7.5E-07	4.1E-07	2.9E-07	
2	Radionuclide	Tritium	1.5E+02	3.8E-09	8.3E-10		1.2E-06	2.4E-07	2.6E-07	
2			Pathway Total	8.5E-09	1.7E-09	6.4E-07	5.7E-06	1.7E-06	4.9E-06	1.3E-05
4	Inorganic	Arsenic	4.4E-02	1.3E-08	7.0E-08		1.5E-07	4.3E-07	7.6E-06	
4	Radionuclide	Cobalt-60	4.8E-02	3.2E-10	1.9E-10	4.5E-06	1.5E-08	1.8E-09	7.0E-07	
4	Radionuclide	Cesium-137	4.7E-02	5.2E-10	5.1E-11	9.4E-07	1.1E-06	6.0E-07	4.2E-07	
4	Radionuclide	Strontium-90	5.0E-02	9.8E-10	2.0E-10		8.4E-07	2.4E-07	9.7E-07	
4	Radionuclide	Uranium - radioactive	7.6E-02	1.6E-09	5.3E-08	3.8E-08	1.3E-07	1.2E-08	9.6E-07	
4			Pathway Total	1.6E-08	1.2E-07	5.5E-06	2.2E-06	1.3E-06	1.1E-05	2.0E-05
7	Inorganic	Arsenic	8.4E-02	2.5E-08	1.3E-07		2.8E-07	8.1E-07	1.4E-05	
7	Radionuclide	Strontium-90	5.5E-02	1.1E-09	2.2E-10		9.3E-07	2.6E-07	1.1E-06	
7			Pathway Total	2.6E-08	1.3E-07		1.2E-06	1.1E-06	1.5E-05	1.8E-05

Table E47. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult irrigation pathways for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Soil Ingestion HQ	Inhalation of Resuspended Soil HQ	Dermal Contact HQ	Ingestion of Milk HQ	Ingestion of Meat HQ	Ingestion of Leafy Vegetables HQ	Total HI Across Pathways
1	Inorganic	Nitrate	1.8E+02	5.1E-05		2.9E-06	2.0E+00	5.3E-01	2.6E-01	
1			Hazard Index	5.1E-05		2.9E-06	2.0E+00	5.3E-01	2.6E-01	2.8E+00
2	Inorganic	Nitrate	1.2E+02	3.4E-05		1.9E-06	1.3E+00	3.5E-01	1.7E-01	
2			Hazard Index	3.4E-05		1.9E-06	1.3E+00	3.5E-01	1.7E-01	1.8E+00
4	Inorganic	Nitrate	1.6E+02	4.5E-05		2.5E-06	1.7E+00	4.6E-01	2.3E-01	
4			Hazard Index	4.5E-05		2.5E-06	1.7E+00	4.6E-01	2.3E-01	2.4E+00

Table E48. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child irrigation pathways for the Clinch River

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Soil Ingestion HQ	Inhalation of Resuspended Soil HQ	Dermal Contact HQ	Ingestion of Milk HQ	Ingestion of Meat HQ	Ingestion of Leafy Vegetables HQ	Total HI Across Pathways
1	Inorganic	Nitrate	1.8E+02	4.8E-04		5.5E-06	1.8E+01	2.5E+00	1.2E+00	
1	Inorganic	Arsenic	4.3E-02	6.1E-04		1.7E-05	6.8E-03	1.0E-02	1.8E-01	
1			Hazard Index	1.1E-03		2.3E-05	1.8E+01	2.5E+00	1.4E+00	2.2E+01
2	Inorganic	Nitrate	1.2E+02	3.2E-04		3.7E-06	1.2E+01	1.7E+00	8.1E-01	
2	Inorganic	Nickel	1.5E-01	3.2E-05		1.4E-06	1.0E-01	1.4E-03	9.8E-03	
2	Organic	Acetone	5.0E-01	2.1E-05		2.9E-06	9.6E-07	1.4E-07	3.5E-01	
2			Hazard Index	3.7E-04		8.0E-06	1.2E+01	1.7E+00	1.2E+00	1.5E+01
4	Inorganic	Nitrate	1.6E+02	4.2E-04		4.8E-06	1.6E+01	2.2E+00	1.1E+00	
4	Inorganic	Arsenic	4.4E-02	6.3E-04		1.8E-05	7.1E-03	1.0E-02	1.8E-01	
4	Inorganic	Antimony	5.9E-02	6.3E-04		3.6E-04	3.0E-03	2.1E-04	1.8E-01	
4			Hazard Index	1.7E-03		3.8E-04	1.6E+01	2.2E+00	1.4E+00	2.0E+01
7	Inorganic	Arsenic	8.4E-02	1.2E-03		3.3E-05	1.3E-02	2.0E-02	3.5E-01	
7	Inorganic	Nickel	1.4E-01	3.0E-05		1.3E-06	9.4E-02	1.3E-03	9.2E-03	
7			Hazard Index	1.2E-03		3.5E-05	1.1E-01	2.1E-02	3.6E-01	4.9E-01

Table E49. Chemicals with an excess cancer risk (ECR) of >10^{-6} and pathway totals for the irrigation pathways for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (pCi/g, mg/kg)	Soil Ingestion ECR	Inhalation of Resuspended Soil ECR	External Exposure ECR	Ingestion of Milk ECR	Ingestion of Meat ECR	Ingestion of Leafy Vegetables	Total ECR Across Pathways
3.01	Radionuclide	Strontium-90	5.7E-02	1.1E-09	2.2E-10		9.6E-07	2.7E-07	1.1E-06	
3.01			Pathway Total	1.1E-09	2.2E-10	0.00	9.6E-07	2.7E-07	1.1E-06	2.3E-06
3.02	Inorganic	Arsenic	1.1E-01	3.1E-08	1.7E-07		3.5E-07	1.0E-06	1.8E-05	
3.02	Radionuclide	Strontium-90	3.9E-02	7.6E-10	1.5E-10		6.5E-07	1.8E-07	7.5E-07	
3.02			Pathway Total	3.2E-08	1.7E-07	0.00	1.0E-06	1.2E-06	1.9E-05	2.2E-05
3.03	Inorganic	Arsenic	5.2E-02	1.5E-08	8.2E-08		1.7E-07	5.1E-07	8.9E-06	
3.03	Radionuclide	Strontium-90	6.3E-02	1.2E-09	2.5E-10		1.1E-06	3.0E-07	1.2E-06	
3.03	Radionuclide	Cesium-137	3.9E-02	4.3E-10	4.2E-11	7.8E-07	9.2E-07	5.0E-07	3.5E-07	
3.03			Pathway Total	1.7E-08	8.2E-08	7.8E-07	2.2E-06	1.3E-06	1.1E-05	1.5E-05
3.04	Inorganic	Arsenic	4.3E-02	1.3E-08	6.8E-08		1.4E-07	4.2E-07	7.4E-06	
3.04	Radionuclide	Strontium-90	4.3E-01	8.4E-09	1.7E-09		7.2E-06	2.0E-06	8.3E-06	
3.04			Pathway Total	2.1E-08	6.9E-08	0.00	7.4E-06	2.5E-06	1.6E-05	2.6E-05

Table E50. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the adult irrigation pathways for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Soil Ingestion HQ	Inhalation of Resuspended Soil HQ	Dermal Contact HQ	Ingestion of Milk HQ	Ingestion of Meat HQ	Ingestion of Leafy Vegetables HQ	Total HI Across Pathways
3.01	Organic	PCB-1254	1.0E-02	2.4E-04		1.5E-04	3.8E-01	1.1E-01	1.4E-01	
3.01			Hazard Index	2.4E-04	0.00	1.5E-04	3.8E-01	1.1E-01	1.4E-01	6.3E-01
3.02	Inorganic	Arsenic	1.1E-01	1.6E-04		2.3E-05	1.8E-03	5.4E-03	9.5E-02	
3.02	Organic	Di-n-octylphthlate	3.6E-01	8.2E-06		5.2E-06	1.9E+01	5.4E+00	4.8E-03	
3.02			Hazard Index	1.7E-04	0.00	2.8E-05	1.9E+01	5.4E+00	1.0E-01	2.5E+01
3.03	Inorganic	Nitrate	1.8E+02	5.2E-05		3.0E-06	2.0E+00	5.4E-01	2.6E-01	
3.03			Hazard Index	5.2E-05	0.00	3.0E-06	2.0E+00	5.4E-01	2.6E-01	2.8E+00
3.04	Organic	PCB-1254	7.5E-03	1.7E-04		1.1E-04	2.8E-01	7.7E-02	1.0E-01	
3.04			Hazard Index	1.7E-04	0.00	1.1E-04	2.8E-01	7.7E-02	1.0E-01	4.5E-01

Table E51. Chemicals with a hazard quotient (HQ) of >0.1 and hazard indices for the child irrigation pathways for Poplar Creek

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Soil Ingestion HQ	Inhalation of Resuspended Soil HQ	Dermal Contact HQ	Ingestion of Milk HQ	Ingestion of Meat HQ	Ingestion of Leafy Vegetables HQ	Total HI Across Pathways
3.01	Inorganic	Antimony	5.1E-02	5.4E-04		3.1E-04	2.6E-03	1.8E-04	1.6E-01	
3.01	Inorganic	Nickel	1.7E-01	3.6E-05		1.5E-06	1.1E-01	1.6E-03	1.1E-02	
3.01	Inorganic	Manganese	3.2E+00	9.9E-05	7.4E-02	2.8E-05	7.7E-04	5.7E-04	4.1E-02	
3.01	Organic	PCB-1254	1.0E-02	2.2E-03		2.8E-04	3.6E+00	5.0E-01	6.5E-01	
3.01			Hazard Index	2.9E-03	7.4E-02	6.2E-04	3.7E+00	5.0E-01	8.6E-01	5.1E+00
3.02	Inorganic	Arsenic	1.1E-01	1.5E-03		4.3E-05	1.7E-02	2.5E-02	4.5E-01	
3.02	Inorganic	Antimony	6.8E-02	7.2E-04		4.2E-04	3.4E-03	2.4E-04	2.1E-01	
3.02	Inorganic	Manganese	3.2E+00	9.6E-05	7.3E-02	2.8E-05	7.5E-04	5.6E-04	4.0E-02	
3.02	Inorganic	Nickel	1.5E-01	3.2E-05		1.4E-06	1.0E-01	1.4E-03	9.8E-03	
3.02	Inorganic	Boron	2.4E+00	1.1E-04	1.4E-04	1.5E-06	6.5E-02	8.5E-04	3.8E-02	
3.02	Organic	Di-n-octylphthlate	3.6E-01	7.6E-05		9.7E-06	1.8E+02	2.5E+01	2.2E-02	
3.02			Hazard Index	2.6E-03	7.3E-02	5.0E-04	1.8E+02	2.5E+01	7.7E-01	2.1E+02
3.03	Inorganic	Nitrate	1.8E+02	4.8E-04		5.5E-06	1.9E+01	2.5E+00	1.2E+00	
3.03	Inorganic	Arsenic	5.2E-02	7.4E-04		2.1E-05	8.3E-03	1.2E-02	2.2E-01	
3.03	Inorganic	Manganese	3.2E+00	9.7E-05	7.3E-02	2.8E-05	7.6E-04	5.6E-04	4.0E-02	
3.03	Inorganic	Nickel	1.5E-01	3.2E-05		1.4E-06	1.0E-01	1.4E-03	9.8E-03	
3.03	Organic	Acetone	4.6E-01	2.0E-05		2.7E-06	8.9E-07	1.3E-07	3.2E-01	
3.03			Hazard Index	1.4E-03	7.3E-02	5.8E-05	1.9E+01	2.5E+00	1.8E+00	2.3E+01
3.04	Inorganic	Antimony	6.2E-02	6.7E-04		3.8E-04	3.1E-03	2.2E-04	2.0E-01	
3.04	Inorganic	Arsenic	4.3E-02	6.1E-04		1.7E-05	6.8E-03	1.0E-02	1.8E-01	
3.04	Inorganic	Manganese	3.2E+00	9.7E-05	7.3E-02	2.8E-05	7.5E-04	5.6E-04	4.0E-02	

Table E51 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg)	Soil Ingestion HQ	Inhalation of Resuspended Soil HQ	Dermal Contact HQ	Ingestion of Milk HQ	Ingestion of Meat HQ	Ingestion of Leafy Vegetables HQ	Total HI Across Pathways
3.04	Inorganic	Nickel	1.5E-01	3.2E-05		1.4E-06	1.0E-01	1.5E-03	9.9E-03	
3.04	Inorganic	Molybdenum	1.8E-01	1.5E-04		4.6E-06	5.3E-02	1.4E-03	4.9E-02	
3.04	Organic	PCB-1254	7.5E-03	1.6E-03		2.0E-04	2.6E+00	3.6E-01	4.7E-01	
3.04			Hazard Index	3.2E-03	7.3E-02	6.4E-04	2.7E+00	3.7E-01	9.5E-01	4.1E+00

Table E52. Chemicals with excess cancer risks (ECR) of $>10^{-6}$ and pathway totals for the dredging pathways for reach 1 and 7 of the Clinch River

Reach	Chemical Type	Chemical	Representative concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal ECR	Ingestion of Milk ECR	Ingestion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
1	Inorganic	Arsenic	1.1E+01	3.2E-06	1.7E-05			3.7E-06	1.1E-05	8.9E-06	4.4E-05
1	Inorganic	Chromium	2.0E+01		2.5E-05						2.5E-05
1	Inorganic	Beryllium	8.1E-01	6.8E-07	2.1E-07		3.9E-06	2.5E-08	9.1E-07	1.4E-06	7.1E-06
1	Organic	Benzo(k)fluoranthene	7.9E-01	1.1E-08			2.1E-08	1.2E-05	3.4E-06	5.0E-08	1.6E-05
1	Organic	Benzo(a)anthracene	7.9E-01	1.1E-07			2.1E-07	9.1E-06	2.6E-06	1.6E-06	1.4E-05
1	Organic	4,4'-DDT	3.8E-01	2.6E-08	4.1E-09		2.1E-08	9.4E-06	2.6E-06	1.7E-07	1.2E-05
1	Organic	4,4'-DDD	3.8E-01	1.8E-08			1.5E-08	2.0E-06	5.6E-07	2.2E-07	2.8E-06
1	Radionuclide	Cobalt-60	5.8E+00	3.8E-08	2.2E-08	1.3E-04		6.4E-08	8.2E-09	7.6E-07	1.3E-04
1	Radionuclide	Cesium-137	9.3E-01	1.0E-08	1.0E-09	1.2E-05		2.2E-06	1.2E-06	2.7E-07	1.6E-05
1			Pathway Total	4.1E-06	4.3E-05	1.4E-04	4.1E-06	3.8E-05	2.2E-05	1.3E-05	2.6E-04
7	Inorganic	Arsenic	2.7E+01	7.8E-06	4.2E-05			8.8E-06	2.6E-05	2.1E-05	1.1E-04
7	Inorganic	Chromium	3.7E+01		4.8E-05						4.8E-05
7	Inorganic	Beryllium	1.2E+00	1.0E-06	3.2E-07		5.8E-06	3.8E-08	1.4E-06	2.2E-06	1.1E-05
7	Organic	Benzo(a)pyrene	6.3E-01	9.0E-07			1.6E-06	1.9E-04	5.2E-05	7.8E-06	2.5E-04
7	Organic	Indeno(1,2,3-cd)pyrene	4.1E-02	5.8E-09			1.1E-08	3.4E-06	9.8E-07	3.2E-08	4.5E-06
7	Organic	Benzo(a)anthracene	2.2E-01	3.2E-08			5.9E-08	2.6E-06	7.4E-07	4.6E-07	3.9E-06
7	Organic	Benzo(b)fluoranthene	4.9E-02	7.0E-09			1.3E-08	1.5E-06	4.3E-07	6.0E-08	2.0E-06

Table E52 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External Exposure ECR	Dermal ECR	Ingestion of Milk ECR	Ingestion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
7	Radionuclide	Strontium-90	2.1E+00	4.2E-08	8.4E-09			8.6E-06	2.5E-06	7.6E-06	1.9E-05
7	Radionuclide	Cesium-137	4.4E-01	4.8E-09	4.7E-10	5.6E-06		1.0E-06	5.7E-07	1.3E-07	7.3E-06
7			Pathway Total	9.8E-06	9.0E-05	5.6E-06	7.5E-06	2.1E-04	8.5E-05	4.0E-05	4.5E-04

Table E53. Chemicals with a hazard quotient (HQ) >0.1 and hazard indices (HIs) for the adult dredging pathways for reach 1 and 7 of the Clinch River

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Ingestion of Milk HQ	Adult Ingestion of Meat HQ	Adult Ingestion of Vegetables HQ	Total HIs Across Pathways
1	Inorganic	Zinc	1.2E+02	1.9E-04		5.3E-05	1.7E-01	1.5E-01	4.5E-02	3.7E-01
1	Inorganic	Nickel	2.3E+01	5.3E-04		1.1E-04	2.4E-01	6.8E-03	1.7E-02	2.6E-01
1	Inorganic	Arsenic	1.1E+01	1.7E-02		2.3E-03	1.9E-02	5.7E-02	4.6E-02	1.4E-01
1	Organic	4,4'-DDT	3.8E-01	3.5E-04		2.9E-04	1.3E-01	3.6E-02	2.4E-03	1.7E-01
1			Hazard Index	1.8E-02		2.8E-03	5.5E-01	2.5E-01	1.1E-01	9.3E-01
7	Inorganic	Manganese	1.6E+03	5.1E-03	8.1E+00	7.3E-03	1.4E-02	2.1E-02	1.2E+00	9.4E+00
7	Inorganic	Arsenic	2.7E+01	4.0E-02		5.6E-03	4.6E-02	1.4E-01	1.1E-01	3.4E-01
7	Inorganic	Nickel	3.0E+01	6.8E-04		1.4E-04	3.0E-01	8.7E-03	2.2E-02	3.3E-01
7	Inorganic	Zinc	8.8E+01	1.3E-04		3.8E-05	1.2E-01	1.1E-01	3.2E-02	2.6E-01
7	Inorganic	Selenium	3.7E+00	3.4E-04		4.4E-05	1.2E-01	1.1E-01	2.1E-02	2.5E-01
7	Inorganic	Barium	1.6E+02	1.0E-03	8.2E-02	8.4E-04	1.0E-02	4.4E-04	8.1E-03	1.0E-01
7			Hazard Index	4.8E-02	8.2E+00	1.4E-02	6.2E-01	3.9E-01	1.4E+00	1.1E+01

Table E54. Chemicals with a hazard quotient (HQ) >0.1 and hazard indices (HIs) for the child dredging pathways for reach 1 and 7 of the Clinch River

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
1	Inorganic	Zinc	1.2E+02	1.7E-03		1.0E-04	1.6E+00	7.1E-01	2.1E-01	2.5E+00
1	Inorganic	Nickel	2.3E+01	5.0E-03		2.1E-04	2.2E+00	3.2E-02	7.9E-02	2.3E+00
1	Inorganic	Arsenic	1.1E+01	1.6E-01		4.4E-03	1.8E-01	2.6E-01	2.1E-01	8.2E-01
1	Inorganic	Selenium	6.9E-01	5.9E-04		1.5E-05	2.2E-01	9.7E-02	1.8E-02	3.3E-01
1	Inorganic	Mercury	1.2E-01	1.8E-03	4.7E-04	2.9E-09	6.0E-02	5.7E-02	1.6E-01	2.8E-01
1	Inorganic	Chromium	2.0E+01	1.7E-02		9.6E-03	3.4E-03	1.4E-01	6.6E-02	2.3E-01
1	Inorganic	Cadmium	7.3E-01	3.1E-03		3.6E-03	7.9E-02	1.4E-03	3.8E-02	1.2E-01
1	Organic	4,4'-DDT	3.8E-01	3.3E-03		5.4E-04	1.2E+00	1.7E-01	1.1E-02	1.4E+00
1			Hazard Index	1.9E-01	4.7E-04	1.8E-02	5.5E+00	1.5E+00	8.0E-01	8.0E+00
7	Inorganic	Manganese	1.6E+03	4.8E-02	3.6E+01	1.4E-02	1.3E-01	9.8E-02	5.8E+00	4.2E+01
7	Inorganic	Nickel	3.0E+01	6.3E-03		2.7E-04	2.8E+00	4.1E-02	1.0E-01	3.0E+00
7	Inorganic	Arsenic	2.7E+01	3.8E-01		1.1E-02	4.3E-01	6.4E-01	5.2E-01	2.0E+00
7	Inorganic	Zinc	8.8E+01	1.3E-03		7.2E-05	1.1E+00	5.1E-01	1.5E-01	1.8E+00
7	Inorganic	Selenium	3.7E+00	3.1E-03		8.2E-05	1.2E+00	5.2E-01	9.7E-02	1.8E+00
7	Inorganic	Vanadium	4.3E+01	2.6E-02		3.0E-02	4.9E-01	5.0E-02	3.4E-02	6.3E-01
7	Inorganic	Barium	1.6E+02	9.7E-03	3.6E-01	1.6E-03	9.5E-02	2.0E-03	3.8E-02	5.1E-01
7	Inorganic	Chromium	3.7E+01	3.1E-02		1.8E-02	6.4E-03	2.6E-01	1.2E-01	4.4E-01
7	Inorganic	Mercury	1.4E-01	2.0E-03	5.4E-04	3.3E-09	6.9E-02	6.6E-02	1.8E-01	3.2E-01
7			Hazard Index	5.0E-01	3.7E+01	7.4E-02	6.3E+00	2.2E+00	7.1E+00	5.3E+01

Table E55. Chemicals with excess cancer risks (ECR) of $>10^{-6}$ and pathway totals for the dredging pathways for selected Clinch River and Poplar Creek subreaches

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
2.04	Inorganic	Arsenic	9.7E+00	2.9E-06	1.5E-05			3.2E-06	9.6E-06	7.8E-06	3.9E-05
2.04	Inorganic	Chromium	1.6E+01		2.1E-05						2.1E-05
2.04	Inorganic	Beryllium	7.8E-01	6.6E-07	2.1E-07		3.7E-06	2.5E-08	8.8E-07	1.4E-06	6.9E-06
2.04	Organic	Benzo(a)pyrene	4.9E-01	7.0E-07			1.3E-06	1.4E-04	4.1E-05	6.1E-06	1.9E-04
2.04	Organic	Indeno(1,2,3-cd)pyrene	1.8E-01	2.5E-08			4.7E-08	1.5E-05	4.3E-06	1.4E-07	2.0E-05
2.04	Organic	Benzo(k)fluoranthene	5.0E-01	7.2E-09			1.3E-08	7.7E-06	2.2E-06	3.2E-08	9.9E-06
2.04	Organic	Pentachlorophenol	2.4E+00	5.7E-08			3.3E-08	7.1E-06	2.0E-06	6.5E-07	9.8E-06
2.04	Organic	Benzo(a)anthracene	5.0E-01	7.2E-08			1.3E-07	5.8E-06	1.6E-06	1.0E-06	8.7E-06
2.04	Organic	Benzo(b)fluoranthene	1.6E-01	2.3E-08			4.2E-08	4.9E-06	1.4E-06	1.9E-07	6.6E-06
2.04	Radionuclide	Cesium-137	2.1E+01	2.4E-07	2.3E-08	2.7E-04		5.1E-05	2.8E-05	6.1E-06	3.6E-04
2.04	Radionuclide	Strontium-90	3.3E+00	6.5E-08	1.3E-08			1.3E-05	3.8E-06	1.2E-05	2.9E-05
2.04	Radionuclide	Cobalt-60	1.8E-01	1.2E-09	7.2E-10	4.0E-06		2.1E-09	2.6E-10	2.4E-08	4.0E-06
2.04	Radionuclide	Uranium-238	1.2E+00	2.7E-08	8.6E-07	5.3E-07		2.1E-07	2.0E-08	9.0E-08	1.7E-06
2.04	Radionuclide	Uranium-234	1.4E+00	2.1E-08	1.1E-06	2.4E-10		1.6E-07	1.2E-08	6.4E-08	1.3E-06
2.04		Pathway Total		4.7E-06	3.8E-05	2.8E-04	5.3E-06	2.5E-04	9.5E-05	3.6E-05	7.1E-04
3.01	Inorganic	Chromium	1.0E+01		1.3E-05						1.3E-05
3.01	Inorganic	Arsenic	1.3E+00	3.8E-07	2.1E-06			4.4E-07	1.3E-06	1.1E-06	5.2E-06

Table E55 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
3.01	Inorganic	Beryllium	5.3E-01	4.4E-07	1.4E-07		2.5E-06	1.7E-08	5.9E-07	9.4E-07	4.6E-06
3.01	Organic	Benzo(b)fluoranthene	1.6E-01	2.3E-08			4.3E-08	5.0E-06	1.4E-06	2.0E-07	6.7E-06
3.01			Pathway Total	8.5E-07	1.5E-05	0.0E+00	2.6E-06	5.5E-06	3.3E-06	2.2E-06	3.0E-05
3.02	Inorganic	Chromium	2.4E+01		3.1E-05						3.1E-05
3.02	Inorganic	Arsenic	5.0E+00	1.5E-06	8.0E-06			1.7E-06	5.0E-06	4.1E-06	2.0E-05
3.02	Inorganic	Beryllium	7.7E-01	6.5E-07	2.1E-07		3.7E-06	2.4E-08	8.7E-07	1.4E-06	6.8E-06
3.02	Organic	PCB-1260	7.9E-01	1.2E-06			7.5E-07	2.5E-03	7.2E-04	4.2E-06	3.3E-03
3.02	Organic	Dibenz(a,h)anthracene	4.1E-01	5.9E-07			1.1E-06	6.3E-04	1.8E-04	2.6E-06	8.1E-04
3.02	Organic	Benzo(a)pyrene	5.2E-01	7.5E-07			1.4E-06	1.5E-04	4.4E-05	6.6E-06	2.1E-04
3.02	Organic	PCB-1248	3.9E-01	5.9E-07			3.7E-07	5.8E-05	1.7E-05	7.4E-06	8.3E-05
3.02	Organic	Indeno(1,2,3-cd)pyrene	3.5E-01	5.0E-08			9.2E-08	3.0E-05	8.4E-06	2.7E-07	3.8E-05
3.02	Organic	Benzo(b)fluoranthene	8.7E-01	1.2E-07			2.3E-07	2.7E-05	7.7E-06	1.1E-06	3.6E-05
3.02	Organic	Benzo(a)anthracene	9.2E-01	1.3E-07			2.4E-07	1.1E-05	3.0E-06	1.9E-06	1.6E-05
3.02	Organic	Benzo(k)fluoranthene	4.1E-01	5.8E-09			1.1E-08	6.2E-06	1.8E-06	2.6E-08	8.0E-06
3.02	Radionuclide	Technetium-99	5.2E+01	2.6E-08	8.5E-09	2.7E-10		3.3E-06	2.1E-07	7.7E-05	8.1E-05
3.02	Radionuclide	Strontium-90	2.6E+00	5.2E-08	1.0E-08			1.1E-05	3.0E-06	9.4E-06	2.3E-05
3.02	Radionuclide	Uranium-234	1.1E+01	1.7E-07	8.9E-06	2.0E-09		1.3E-06	1.0E-07	5.3E-07	1.1E-05

Table E55 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
3.02	Radionuclide	Uranium-238	6.9E+00	1.5E-07	4.8E-06	3.0E-06		1.2E-06	1.2E-07	5.1E-07	9.8E-06
3.02	Radionuclide	Cesium-137	2.5E-01	2.8E-09	2.7E-10	3.2E-06		6.0E-07	3.3E-07	7.1E-08	4.2E-06
3.02	Radionuclide	Cobalt-60	1.5E-01	9.9E-10	5.8E-10	3.2E-06		1.7E-09	2.1E-10	2.0E-08	3.3E-06
3.02	Radionuclide	Uranium-235	5.3E-01	8.7E-09	3.9E-07	1.2E-06		6.7E-08	6.5E-09	2.9E-08	1.7E-06
3.02	Pathway Total			6.0E-06	5.4E-05	1.1E-05	7.9E-06	3.5E-03	9.9E-04	1.2E-04	4.7E-03
3.03	Inorganic	Chromium	4.4E+01		5.7E-05						5.7E-05
3.03	Inorganic	Arsenic	5.3E+00	1.5E-06	8.3E-06			1.8E-06	5.2E-06	4.2E-06	2.1E-05
3.03	Inorganic	Beryllium	9.2E-01	7.8E-07	2.5E-07		4.4E-06	2.9E-08	1.0E-06	1.7E-06	8.2E-06
3.03	Organic	Dibenz(a,h)anthracene	3.6E-02	5.1E-08			9.4E-08	5.4E-05	1.5E-05	2.3E-07	7.0E-05
3.03	Organic	Benzo(a)pyrene	1.6E-01	2.3E-07			4.2E-07	4.7E-05	1.3E-05	2.0E-06	6.3E-05
3.03	Organic	Indeno(1,2,3-cd)pyrene	1.6E-01	2.3E-08			4.3E-08	1.4E-05	3.9E-06	1.3E-07	1.8E-05
3.03	Organic	Benzo(b)fluoranthene	2.8E-01	4.1E-08			7.5E-08	8.9E-06	2.5E-06	3.5E-07	1.2E-05
3.03	Organic	Benzo(a)anthracene	2.3E-01	3.3E-08			6.1E-08	2.7E-06	7.6E-07	4.7E-07	4.0E-06
3.03	Organic	Benzo(k)fluoranthene	6.7E-02	9.6E-10			1.8E-09	1.0E-06	2.9E-07	4.2E-09	1.3E-06
3.03	Radionuclide	Cesium-137	1.2E+00	1.3E-08	1.3E-09	1.5E-05		2.8E-06	1.5E-06	3.4E-07	2.0E-05
3.03	Radionuclide	Uranium-234	3.5E+00	5.4E-08	2.8E-06	6.2E-10		4.1E-07	3.1E-08	1.7E-07	3.4E-06
3.03	Radionuclide	Uranium-238	2.0E+00	4.4E-08	1.4E-06	8.9E-07		3.4E-07	3.4E-08	1.5E-07	2.9E-06

Table E55 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
3.03			Pathway Total	2.8E-06	7.0E-05	1.6E-05	5.1E-06	1.3E-04	4.4E-05	9.7E-06	2.8E-04
3.04	Inorganic	Arsenic	9.4E+01	2.8E-05	1.5E-04			3.1E-05	9.3E-05	7.5E-05	3.8E-04
3.04	Inorganic	Chromium	3.9E+01		5.1E-05						5.1E-05
3.04	Inorganic	Beryllium	1.7E+00	1.4E-06	4.5E-07		8.1E-06	5.3E-08	1.9E-06	3.0E-06	1.5E-05
3.04	Inorganic	Cadmium	5.6E+00		1.1E-06						1.1E-06
3.04	Organic	PCB-1260	1.3E-01	1.9E-07			1.2E-07	4.1E-04	1.1E-04	6.7E-07	5.2E-04
3.04	Organic	Dibenz(a,h)anthracene	2.5E-01	3.6E-07			6.6E-07	3.8E-04	1.1E-04	1.6E-06	5.0E-04
3.04	Organic	Benzo(a)pyrene	2.2E-01	3.2E-07			5.8E-07	6.5E-05	1.8E-05	2.8E-06	8.7E-05
3.04	Organic	Indeno(1,2,3-cd)pyrene	2.5E-01	3.5E-08			6.5E-08	2.1E-05	5.9E-06	1.9E-07	2.7E-05
3.04	Organic	PCB-1248	6.5E-02	9.8E-08			6.2E-08	9.8E-06	2.8E-06	1.2E-06	1.4E-05
3.04	Organic	Benzo(b)fluoranthene	2.3E-01	3.4E-08			6.2E-08	7.3E-06	2.1E-06	2.9E-07	9.8E-06
3.04	Organic	Benzo(k)fluoranthene	2.5E-01	3.6E-09			6.6E-09	3.8E-06	1.1E-06	1.6E-08	5.0E-06
3.04	Organic	Benzo(a)anthracene	1.7E-01	2.4E-08			4.4E-08	1.9E-06	5.5E-07	3.4E-07	2.9E-06
3.04	Radionuclide	Cesium-137	7.9E+00	8.8E-08	8.5E-09	1.0E-04		1.9E-05	1.0E-05	2.3E-06	1.3E-04
3.04	Radionuclide	Uranium-238	5.0E+00	1.1E-07	3.5E-06	2.2E-06		8.4E-07	8.3E-08	3.6E-07	7.0E-06
3.04	Radionuclide	Uranium-234	6.1E+00	9.5E-08	4.8E-06	1.1E-09		7.2E-07	5.4E-08	2.9E-07	6.0E-06
3.04	Radionuclide	Technetium-99	3.8E+00	1.8E-09	6.2E-10	1.9E-11		2.4E-07	1.5E-08	5.5E-06	5.8E-06

Table E55 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
3.04	Radionuclide	Cobalt-60	1.9E-01	1.2E-09	7.3E-10	4.1E-06		2.1E-09	2.7E-10	2.4E-08	4.1E-06
3.04	Radionuclide	Uranium-235	3.7E-01	6.0E-09	2.7E-07	8.0E-07		4.6E-08	4.5E-09	2.0E-08	1.1E-06
3.04			Pathway Total	3.0E-05	2.1E-04	1.1E-04	9.7E-06	9.5E-04	3.6E-04	9.4E-05	1.8E-03
4.01	Inorganic	Arsenic	1.0E+01	2.9E-06	1.6E-05			3.3E-06	9.9E-06	8.0E-06	4.0E-05
4.01	Inorganic	Chromium	1.8E+01		2.4E-05						2.4E-05
4.01	Inorganic	Beryllium	7.7E-01	6.5E-07	2.1E-07		3.7E-06	2.4E-08	8.7E-07	1.4E-06	6.9E-06
4.01	Organic	PCB-1260	2.1E+00	3.1E-06			2.0E-06	6.7E-03	1.9E-03	1.1E-05	8.6E-03
4.01	Organic	N-Nitroso-di-n-propylamine	5.0E-01	6.8E-07			1.6E-06	1.5E-07	4.1E-08	2.6E-03	2.6E-03
4.01	Organic	Dibenz(a,h)anthracene	5.0E-01	7.1E-07			1.3E-06	7.6E-04	2.1E-04	3.2E-06	9.8E-04
4.01	Organic	Benzo(a)pyrene	5.0E-01	7.1E-07			1.3E-06	1.5E-04	4.2E-05	6.2E-06	2.0E-04
4.01	Organic	Indeno(1,2,3-cd)pyrene	5.0E-01	7.1E-08			1.3E-07	4.2E-05	1.2E-05	3.9E-07	5.5E-05
4.01	Organic	Benzo(b)fluoranthene	5.0E-01	7.1E-08			1.3E-07	1.6E-05	4.4E-06	6.1E-07	2.1E-05
4.01	Organic	Benzo(k)fluoranthene	5.0E-01	7.1E-09			1.3E-08	7.6E-06	2.1E-06	3.2E-08	9.8E-06
4.01	Organic	Pentachlorophenol	2.4E+00	5.7E-08			3.2E-08	7.0E-06	2.0E-06	6.5E-07	9.7E-06
4.01	Organic	Benzo(a)anthracene	5.0E-01	7.1E-08			1.3E-07	5.8E-06	1.6E-06	1.0E-06	8.6E-06
4.01	Radionuclide	Cesium-137	2.3E+01	2.5E-07	2.5E-08	2.9E-04		5.5E-05	3.0E-05	6.5E-06	3.8E-04
4.01	Radionuclide	Cobalt-60	1.3E-01	8.4E-10	4.9E-10	2.8E-06		1.4E-09	1.8E-10	1.7E-08	2.8E-06

Table E55 (continued)

Reach	Chemical Type	Chemical	Representative Concentration (mg/kg, pCi/g)	Ingestion ECR	Inhalation ECR	External ECR	Dermal ECR	Ingestion of Milk ECR	Ingesion of Meat ECR	Ingestion of Vegetables ECR	Total ECR Across Pathways
4.01		Pathway Total		9.3E-06	4.0E-05	2.9E-04	1.0E-05	7.7E-03	2.2E-03	2.6E-03	1.3E-02
4.02	Inorganic	Arsenic	1.1E+01	3.3E-06	1.8E-05			3.7E-06	1.1E-05	9.0E-06	4.5E-05
4.02	Inorganic	Chromium	1.4E+01		1.9E-05						1.9E-05
4.02	Inorganic	Beryllium	6.7E-01	5.6E-07	1.8E-07		3.2E-06	2.1E-08	7.5E-07	1.2E-06	5.9E-06
4.02	Radionuclide	Cesium-137	4.0E-01	4.4E-09	4.3E-10	5.1E-06		9.6E-07	5.3E-07	1.1E-07	6.7E-06
4.02		Pathway Total		3.9E-06	3.6E-05	5.1E-06	3.2E-06	4.7E-06	1.2E-05	1.0E-05	7.6E-05
4.03	Inorganic	Chromium	3.7E+01		4.8E-05						4.8E-05
4.03	Inorganic	Arsenic	7.8E+00	2.3E-06	1.2E-05			2.6E-06	7.8E-06	6.3E-06	3.1E-05
4.03	Inorganic	Beryllium	1.1E+00	9.1E-07	2.9E-07		5.2E-06	3.4E-08	1.2E-06	1.9E-06	9.6E-06
4.03	Organic	Dibenz(a,h)anthracene	2.7E-01	3.8E-07			7.0E-07	4.1E-04	1.1E-04	1.7E-06	5.2E-04
4.03	Organic	Benzo(a)pyrene	4.8E-01	6.9E-07			1.3E-06	1.4E-04	4.0E-05	6.0E-06	1.9E-04
4.03	Organic	PCB-1260	3.4E-02	5.2E-08			3.3E-08	1.1E-04	3.1E-05	1.8E-07	1.4E-04
4.03	Organic	Indeno(1,2,3-cd)pyrene	8.9E-02	1.3E-08			2.3E-08	7.6E-06	2.1E-06	7.0E-08	9.9E-06
4.03	Organic	Benzo(b)fluoranthene	1.8E-01	2.5E-08			4.6E-08	5.5E-06	1.6E-06	2.2E-07	7.4E-06
4.03	Organic	Benzo(a)anthracene	1.1E-01	1.6E-08			2.9E-08	1.3E-06	3.6E-07	2.3E-07	1.9E-06
4.03	Radionuclide	Cesium-137	1.8E+01	2.0E-07	1.9E-08	2.3E-04		4.3E-05	2.4E-05	5.2E-06	3.0E-04
4.03	Radionuclide	Cobalt-60	3.9E-01	2.6E-09	1.5E-09	8.6E-06		4.4E-09	5.6E-10	5.2E-08	8.6E-06

Table E56 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Ingestion of Milk HQ	Adult Ingestion of Meat HQ	Adult Ingestion of Vegetables HQ	Total HIs Across Pathways
3.03	Inorganic	Nickel	6.2E+01	1.4E-03		3.0E-04	6.3E-01	1.8E-02	4.5E-02	7.0E-01
3.03	Inorganic	Zinc	1.6E+02	2.4E-04		7.0E-05	2.2E-01	2.0E-01	5.9E-02	4.8E-01
3.03	Inorganic	Chromium	4.4E+01	4.1E-03		1.2E-02	8.3E-04	6.7E-02	3.2E-02	1.1E-01
3.03			Hazard Index	1.8E-02	3.6E+00	1.5E-02	1.2E+00	9.6E-01	2.5E+00	8.3E+00
3.04	Inorganic	Mercury	2.6E+01	3.9E-02	2.2E-02	3.2E-07	1.3E+00	2.6E+00	7.1E+00	1.1E+01
3.04	Inorganic	Manganese	7.4E+02	2.4E-03	3.8E+00	3.4E-03	6.6E-03	9.8E-03	5.8E-01	4.4E+00
3.04	Inorganic	Arsenic	9.4E+01	1.4E-01		2.0E-02	1.6E-01	4.8E-01	3.9E-01	1.2E+00
3.04	Inorganic	Nickel	5.1E+01	1.2E-03		2.4E-04	5.1E-01	1.5E-02	3.7E-02	5.6E-01
3.04	Inorganic	Zinc	1.2E+02	1.8E-04		5.0E-05	1.6E-01	1.4E-01	4.3E-02	3.5E-01
3.04	Inorganic	Barium	2.9E+02	1.9E-03	1.5E-01	1.5E-03	1.9E-02	7.9E-04	1.5E-02	1.9E-01
3.04	Inorganic	Cadmium	5.6E+00	2.6E-03		1.5E-02	6.5E-02	2.3E-03	6.2E-02	1.5E-01
3.04	Inorganic	Vanadium	5.9E+01	3.9E-03		2.2E-02	7.3E-02	1.5E-02	1.0E-02	1.2E-01
3.04	Inorganic	Selenium	1.6E+00	1.4E-04		1.9E-05	5.3E-02	4.7E-02	8.9E-03	1.1E-01
3.04	Inorganic	Chromium	3.9E+01	3.6E-03		1.0E-02	7.3E-04	5.9E-02	2.8E-02	1.0E-01
3.04	Organic	PCB-1254	1.8E-01	4.1E-03		2.6E-03	7.3E-01	2.1E-01	3.9E-02	9.8E-01
3.04			Hazard Index	2.0E-01	4.0E+00	7.4E-02	3.1E+00	3.5E+00	8.3E+00	1.9E+01
4.01	Inorganic	Mercury	1.2E+01	1.9E-02	1.0E-02	1.5E-07	6.3E-01	1.2E+00	3.4E+00	5.2E+00
4.01	Inorganic	Manganese	8.4E+02	2.7E-03	4.3E+00	3.9E-03	7.5E-03	1.1E-02	6.6E-01	5.0E+00

Table E56 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Ingestion of Milk HQ	Adult Ingestion of Meat HQ	Adult Ingestion of Vegetables HQ	Total HIs Across Pathways
4.01	Inorganic	Nickel	2.0E+01	4.5E-04		9.4E-05	2.0E-01	5.7E-03	1.4E-02	2.2E-01
4.01	Inorganic	Zinc	6.5E+01	1.0E-04		2.8E-05	9.1E-02	8.1E-02	2.4E-02	2.0E-01
4.01	Inorganic	Arsenic	1.0E+01	1.5E-02		2.1E-03	1.7E-02	5.1E-02	4.2E-02	1.3E-01
4.01	Organic	PCB-1254	4.0E-01	9.1E-03		5.8E-03	1.6E+00	4.6E-01	8.6E-02	2.2E+00
4.01			Hazard Index	4.6E-02	4.3E+00	1.2E-02	2.6E+00	1.8E+00	4.2E+00	1.3E+01
4.02	Inorganic	Manganese	6.7E+02	2.2E-03	3.4E+00	3.1E-03	5.9E-03	8.8E-03	5.2E-01	4.0E+00
4.02	Inorganic	Nickel	1.3E+01	3.0E-04		6.4E-05	1.3E-01	3.9E-03	9.7E-03	1.5E-01
4.02	Inorganic	Mercury	3.4E-01	5.2E-04	2.9E-04	4.2E-09	1.8E-02	3.4E-02	9.4E-02	1.5E-01
4.02	Inorganic	Arsenic	1.1E+01	1.7E-02		2.4E-03	1.9E-02	5.8E-02	4.7E-02	1.4E-01
4.02	Inorganic	Zinc	4.7E+01	7.1E-05		2.0E-05	6.5E-02	5.8E-02	1.7E-02	1.4E-01
4.02			Hazard Index	2.0E-02	3.4E+00	5.5E-03	2.4E-01	1.6E-01	6.9E-01	4.6E+00
4.03	Inorganic	Manganese	1.6E+03	5.1E-03	8.1E+00	7.3E-03	1.4E-02	2.1E-02	1.2E+00	9.4E+00
4.03	Inorganic	Mercury	3.5E+00	5.4E-03	3.0E-03	4.4E-08	1.8E-01	3.5E-01	9.7E-01	1.5E+00
4.03	Inorganic	Nickel	4.0E+01	9.2E-04		1.9E-04	4.1E-01	1.2E-02	2.9E-02	4.5E-01
4.03	Inorganic	Zinc	1.1E+02	1.7E-04		5.0E-05	1.6E-01	1.4E-01	4.2E-02	3.4E-01
4.03	Inorganic	Arsenic	7.8E+00	1.2E-02		1.7E-03	1.4E-02	4.0E-02	3.3E-02	1.0E-01
4.03	Organic	PCB-1254	6.4E-02	1.5E-03		9.2E-04	2.6E-01	7.3E-02	1.4E-02	3.5E-01
4.03			Hazard Index	2.5E-02	8.1E+00	1.0E-02	1.0E+00	6.4E-01	2.3E+00	1.2E+01

Table E56 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Adult Ingestion HQ	Adult Inhalation HQ	Adult Dermal HQ	Adult Ingestion of Milk HQ	Adult Ingestion of Meat HQ	Adult Ingestion of Vegetables HQ	Total HIs Across Pathways
4.04	Inorganic	Manganese	1.7E+03	5.4E-03	8.6E+00	7.7E-03	1.5E-02	2.2E-02	1.3E+00	9.9E+00
4.04	Inorganic	Mercury	3.1E+00	4.6E-03	2.6E-03	3.8E-08	1.6E-01	3.0E-01	8.5E-01	1.3E+00
4.04	Inorganic	Zinc	1.4E+02	2.2E-04		6.1E-05	2.0E-01	1.8E-01	5.2E-02	4.2E-01
4.04	Inorganic	Nickel	3.6E+01	8.1E-04		1.7E-04	3.6E-01	1.0E-02	2.6E-02	4.0E-01
4.04	Inorganic	Arsenic	1.0E+01	1.6E-02		2.2E-03	1.8E-02	5.3E-02	4.3E-02	1.3E-01
4.04	Organic	PCB-1254	9.8E-01	2.2E-02		1.4E-02	4.0E+00	1.1E+00	2.1E-01	5.3E+00
4.04			Hazard Index	4.9E-02	8.6E+00	2.4E-02	4.7E+00	1.7E+00	2.5E+00	1.8E+01

Table E57. Chemicals with a hazard quotient (HQ) >0.1 and hazard indices for the child dredging pathways for selected subreaches of the Clinch River and Poplar Creek

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
2.04	Inorganic	Manganese	4.5E+03	1.4E-01	1.0E+02	3.9E-02	3.7E-01	2.8E-01	1.7E+01	1.2E+02
2.04	Inorganic	Nickel	1.5E+01	3.3E-03		1.4E-04	1.5E+00	2.1E-02	5.2E-02	1.5E+00
2.04	Inorganic	Zinc	6.8E+01	9.6E-04		5.5E-05	8.7E-01	3.9E-01	1.2E-01	1.4E+00
2.04	Inorganic	Selenium	2.4E+00	2.1E-03		5.4E-05	7.6E-01	3.4E-01	6.4E-02	1.2E+00
2.04	Inorganic	Arsenic	9.7E+00	1.4E-01		3.9E-03	1.6E-01	2.3E-01	1.9E-01	7.2E-01
2.04	Inorganic	Mercury	2.3E-01	3.2E-03	8.6E-04	5.2E-09	1.1E-01	1.0E-01	2.9E-01	5.1E-01
2.04	Inorganic	Barium	1.3E+02	8.0E-03	3.0E-01	1.3E-03	7.9E-02	1.7E-03	3.2E-02	4.2E-01
2.04	Inorganic	Vanadium	2.0E+01	1.2E-02		1.4E-02	2.3E-01	2.4E-02	1.6E-02	3.0E-01
2.04	Inorganic	Chromium	1.6E+01	1.4E-02		7.8E-03	2.8E-03	1.1E-01	5.4E-02	1.9E-01
2.04			Hazard Index	3.2E-01	1.0E+02	6.6E-02	4.0E+00	1.5E+00	1.7E+01	1.3E+02
3.01	Inorganic	Manganese	3.2E+02	9.7E-03	7.3E+00	2.8E-03	2.7E-02	2.0E-02	1.2E+00	8.5E+00
3.01	Inorganic	Nickel	1.0E+01	2.2E-03		9.4E-05	9.7E-01	1.4E-02	3.5E-02	1.0E+00
3.01	Inorganic	Zinc	2.8E+01	4.0E-04		2.3E-05	3.6E-01	1.6E-01	4.8E-02	5.8E-01
3.01	Inorganic	Barium	6.0E+01	3.6E-03	1.4E-01	5.9E-04	3.6E-02	7.6E-04	1.4E-02	1.9E-01
3.01	Inorganic	Vanadium	1.1E+01	6.4E-03		7.4E-03	1.2E-01	1.2E-02	8.4E-03	1.6E-01
3.01	Inorganic	Chromium	1.0E+01	8.7E-03		5.0E-03	1.8E-03	7.2E-02	3.4E-02	1.2E-01
3.01			Hazard Index	3.1E-02	7.4E+00	1.6E-02	1.5E+00	2.8E-01	1.3E+00	1.1E+01

Table E57 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
3.02	Inorganic	Manganese	1.1E+03	3.2E-02	2.4E+01	9.2E-03	8.8E-02	6.5E-02	3.9E+00	2.8E+01
3.02	Inorganic	Mercury	4.1E+00	5.8E-02	1.6E-02	9.5E-08	2.0E+00	1.9E+00	5.3E+00	9.2E+00
3.02	Inorganic	Nickel	5.2E+01	1.1E-02		4.7E-04	4.9E+00	7.2E-02	1.8E-01	5.2E+00
3.02	Inorganic	Zinc	1.2E+02	1.7E-03		9.5E-05	1.5E+00	6.8E-01	2.0E-01	2.4E+00
3.02	Inorganic	Arsenic	5.0E+00	7.2E-02		2.0E-03	8.1E-02	1.2E-01	9.8E-02	3.7E-01
3.02	Inorganic	Barium	1.1E+02	6.8E-03	2.6E-01	1.1E-03	6.7E-02	1.4E-03	2.7E-02	3.6E-01
3.02	Inorganic	Vanadium	2.2E+01	1.3E-02		1.5E-02	2.5E-01	2.6E-02	1.8E-02	3.3E-01
3.02	Inorganic	Chromium	2.4E+01	2.1E-02		1.2E-02	4.2E-03	1.7E-01	8.1E-02	2.9E-01
3.02	Inorganic	Selenium	3.3E-01	2.8E-04		7.4E-06	1.0E-01	4.7E-02	8.8E-03	1.6E-01
3.02	Inorganic	Cadmium	9.1E-01	3.9E-03		4.5E-03	9.9E-02	1.8E-03	4.7E-02	1.6E-01
3.02	Organic	PCB-1254	7.3E-01	1.6E-01		2.0E-02	2.8E+01	3.9E+00	7.3E-01	3.2E+01
3.02			Hazard Index	3.8E-01	2.4E+01	6.5E-02	3.7E+01	7.0E+00	1.1E+01	7.9E+01
3.03	Inorganic	Manganese	6.9E+02	2.1E-02	1.6E+01	6.0E-03	5.8E-02	4.3E-02	2.5E+00	1.9E+01
3.03	Inorganic	Mercury	6.7E+00	9.5E-02	2.5E-02	1.6E-07	3.2E+00	3.1E+00	8.6E+00	1.5E+01
3.03	Inorganic	Nickel	6.2E+01	1.3E-02		5.7E-04	5.9E+00	8.6E-02	2.1E-01	6.2E+00
3.03	Inorganic	Zinc	1.6E+02	2.3E-03		1.3E-04	2.1E+00	9.3E-01	2.8E-01	3.3E+00
3.03	Inorganic	Cadmium	3.3E+00	1.4E-02		1.6E-02	3.6E-01	6.4E-03	1.7E-01	5.7E-01
3.03	Inorganic	Chromium	4.4E+01	3.8E-02		2.2E-02	7.7E-03	3.1E-01	1.5E-01	5.3E-01

Table E57 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
3.03	Inorganic	Arsenic	5.3E+00	7.5E-02		2.1E-03	8.5E-02	1.3E-01	1.0E-01	3.9E-01
3.03	Inorganic	Barium	1.2E+02	7.3E-03	2.8E-01	1.2E-03	7.2E-02	1.5E-03	2.9E-02	3.9E-01
3.03	Inorganic	Vanadium	2.2E+01	1.3E-02		1.5E-02	2.5E-01	2.5E-02	1.7E-02	3.2E-01
3.03	Inorganic	Silver	3.3E+00	2.8E-03		1.8E-04	7.8E-03	2.1E-02	1.7E-01	2.0E-01
3.03			Hazard Index	2.8E-01	1.6E+01	6.3E-02	1.2E+01	4.6E+00	1.2E+01	4.5E+01
3.04	Inorganic	Mercury	2.6E+01	3.6E-01	9.8E-02	6.0E-07	1.3E+01	1.2E+01	3.3E+01	5.8E+01
3.04	Inorganic	Manganese	7.4E+02	2.2E-02	1.7E+01	6.4E-03	6.1E-02	4.6E-02	2.7E+00	2.0E+01
3.04	Inorganic	Arsenic	9.4E+01	1.3E+00		3.7E-02	1.5E+00	2.2E+00	1.8E+00	7.0E+00
3.04	Inorganic	Nickel	5.1E+01	1.1E-02		4.6E-04	4.8E+00	6.9E-02	1.7E-01	5.0E+00
3.04	Inorganic	Zinc	1.2E+02	1.6E-03		9.4E-05	1.5E+00	6.7E-01	2.0E-01	2.4E+00
3.04	Inorganic	Cadmium	5.6E+00	2.4E-02		2.7E-02	6.1E-01	1.1E-02	2.9E-01	9.6E-01
3.04	Inorganic	Barium	2.9E+02	1.8E-02	6.7E-01	2.9E-03	1.7E-01	3.7E-03	6.9E-02	9.3E-01
3.04	Inorganic	Vanadium	5.9E+01	3.6E-02		4.1E-02	6.8E-01	7.0E-02	4.7E-02	8.7E-01
3.04	Inorganic	Selenium	1.6E+00	1.3E-03		3.5E-05	4.9E-01	2.2E-01	4.1E-02	7.5E-01
3.04	Inorganic	Chromium	3.9E+01	3.3E-02		1.9E-02	6.8E-03	2.7E-01	1.3E-01	4.6E-01
3.04	Inorganic	Boron	4.4E+01	2.1E-03	2.5E-03	2.6E-05	2.3E-01	3.0E-03	7.7E-02	3.1E-01
3.04	Organic	PCB-1254	1.8E-01	3.8E-02		4.9E-03	6.8E+00	9.6E-01	1.8E-01	8.0E+00
3.04	Organic	4-Methylphenol	2.8E-01	2.4E-04		4.3E-05	9.2E-05	1.3E-05	2.1E-01	2.1E-01

Table E57 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
3.04			Hazard Index	1.9E+00	1.8E+01	1.4E-01	2.9E+01	1.6E+01	3.9E+01	1.0E+02
4.01	Inorganic	Mercury	1.2E+01	1.7E-01	4.6E-02	2.8E-07	5.9E+00	5.6E+00	1.6E+01	2.7E+01
4.01	Inorganic	Manganese	8.4E+02	2.6E-02	1.9E+01	7.3E-03	7.0E-02	5.2E-02	3.1E+00	2.3E+01
4.01	Inorganic	Nickel	2.0E+01	4.2E-03		1.8E-04	1.8E+00	2.7E-02	6.6E-02	1.9E+00
4.01	Inorganic	Zinc	6.5E+01	9.3E-04		5.3E-05	8.5E-01	3.8E-01	1.1E-01	1.3E+00
4.01	Inorganic	Arsenic	1.0E+01	1.4E-01		4.0E-03	1.6E-01	2.4E-01	1.9E-01	7.4E-01
4.01	Inorganic	Barium	7.9E+01	4.8E-03	1.8E-01	7.9E-04	4.7E-02	1.0E-03	1.9E-02	2.5E-01
4.01	Inorganic	Vanadium	1.6E+01	9.7E-03		1.1E-02	1.8E-01	1.9E-02	1.3E-02	2.3E-01
4.01	Inorganic	Chromium	1.8E+01	1.6E-02		9.0E-03	3.2E-03	1.3E-01	6.1E-02	2.2E-01
4.01	Inorganic	Selenium	3.8E-01	3.2E-04		8.5E-06	1.2E-01	5.3E-02	1.0E-02	1.8E-01
4.01	Inorganic	Silver	1.8E+00	1.5E-03		9.8E-05	4.2E-03	1.1E-02	9.3E-02	1.1E-01
4.01	Inorganic	Cadmium	6.5E-01	2.7E-03		3.2E-03	7.0E-02	1.2E-03	3.3E-02	1.1E-01
4.01	Organic	PCB-1254	4.0E-01	8.5E-02		1.1E-02	1.5E+01	2.1E+00	4.0E-01	1.8E+01
4.01			Hazard Index	4.6E-01	2.0E+01	4.7E-02	2.4E+01	8.7E+00	2.0E+01	7.3E+01
4.02	Inorganic	Manganese	6.7E+02	2.0E-02	1.5E+01	5.8E-03	5.5E-02	4.1E-02	2.4E+00	1.8E+01
4.02	Inorganic	Nickel	1.3E+01	2.8E-03		1.2E-04	1.3E+00	1.8E-02	4.5E-02	1.3E+00
4.02	Inorganic	Zinc	4.7E+01	6.6E-04		3.8E-05	6.1E-01	2.7E-01	8.0E-02	9.6E-01
4.02	Inorganic	Arsenic	1.1E+01	1.6E-01		4.5E-03	1.8E-01	2.7E-01	2.2E-01	8.3E-01

Table E57 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
4.02	Inorganic	Mercury	3.4E-01	4.8E-03	1.3E-03	7.9E-09	1.7E-01	1.6E-01	4.4E-01	7.7E-01
4.02	Inorganic	Barium	1.1E+02	6.5E-03	2.5E-01	1.1E-03	6.4E-02	1.4E-03	2.6E-02	3.4E-01
4.02	Inorganic	Vanadium	1.2E+01	7.4E-03		8.5E-03	1.4E-01	1.4E-02	9.7E-03	1.8E-01
4.02	Inorganic	Chromium	1.4E+01	1.2E-02		7.0E-03	2.5E-03	1.0E-01	4.8E-02	1.7E-01
4.02			Hazard Index	2.1E-01	1.5E+01	2.7E-02	2.5E+00	8.7E-01	3.3E+00	2.2E+01
4.03	Inorganic	Manganese	1.6E+03	4.8E-02	3.6E+01	1.4E-02	1.3E-01	9.7E-02	5.8E+00	4.2E+01
4.03	Inorganic	Mercury	3.5E+00	5.0E-02	1.3E-02	8.2E-08	1.7E+00	1.6E+00	4.5E+00	8.0E+00
4.03	Inorganic	Nickel	4.0E+01	8.6E-03		3.6E-04	3.8E+00	5.5E-02	1.4E-01	4.0E+00
4.03	Inorganic	Zinc	1.1E+02	1.6E-03		9.3E-05	1.5E+00	6.6E-01	2.0E-01	2.3E+00
4.03	Inorganic	Arsenic	7.8E+00	1.1E-01		3.1E-03	1.3E-01	1.9E-01	1.5E-01	5.8E-01
4.03	Inorganic	Selenium	9.4E-01	8.0E-04		2.1E-05	2.9E-01	1.3E-01	2.5E-02	4.5E-01
4.03	Inorganic	Chromium	3.7E+01	3.1E-02		1.8E-02	6.4E-03	2.6E-01	1.2E-01	4.4E-01
4.03	Inorganic	Barium	1.3E+02	7.9E-03	3.0E-01	1.3E-03	7.7E-02	1.7E-03	3.1E-02	4.2E-01
4.03	Inorganic	Vanadium	2.7E+01	1.7E-02		1.9E-02	3.1E-01	3.2E-02	2.2E-02	4.0E-01
4.03	Inorganic	Cadmium	6.0E-01	2.5E-03		2.9E-03	6.5E-02	1.2E-03	3.1E-02	1.0E-01
4.03	Organic	PCB-1254	6.4E-02	1.4E-02		1.7E-03	2.4E+00	3.4E-01	6.4E-02	2.8E+00
4.03			Hazard Index	2.9E-01	3.6E+01	6.0E-02	1.0E+01	3.4E+00	1.1E+01	6.2E+01
4.04	Inorganic	Manganese	1.7E+03	5.1E-02	3.8E+01	1.5E-02	1.4E-01	1.0E-01	6.1E+00	4.5E+01

Table E57 (continued)

Reach	Chemical Type	Chemical	Representative concentration (mg/kg)	Child Ingestion HQ	Child Inhalation HQ	Child Dermal HQ	Child Ingestion of Milk HQ	Child Ingestion of Meat HQ	Child Ingestion of Vegetables HQ	Total HIs Across Pathways
4.04	Inorganic	Mercury	3.1E+00	4.3E-02	1.2E-02	7.1E-08	1.5E+00	1.4E+00	3.9E+00	6.9E+00
4.04	Inorganic	Nickel	3.6E+01	7.6E-03		3.2E-04	3.3E+00	4.9E-02	1.2E-01	3.5E+00
4.04	Inorganic	Zinc	1.4E+02	2.0E-03		1.2E-04	1.8E+00	8.2E-01	2.4E-01	2.9E+00
4.04	Inorganic	Arsenic	1.0E+01	1.5E-01		4.1E-03	1.7E-01	2.5E-01	2.0E-01	7.7E-01
4.04	Inorganic	Barium	1.4E+02	8.4E-03	3.2E-01	1.4E-03	8.2E-02	1.8E-03	3.3E-02	4.4E-01
4.04	Inorganic	Vanadium	2.9E+01	1.7E-02		2.0E-02	3.3E-01	3.4E-02	2.3E-02	4.2E-01
4.04	Inorganic	Selenium	8.4E-01	7.1E-04		1.9E-05	2.6E-01	1.2E-01	2.2E-02	4.0E-01
4.04	Inorganic	Chromium	2.6E+01	2.2E-02		1.3E-02	4.6E-03	1.8E-01	8.7E-02	3.1E-01
4.04	Inorganic	Cadmium	7.3E-01	3.1E-03		3.5E-03	7.8E-02	1.4E-03	3.8E-02	1.2E-01
4.04	Organic	PCB-1254	9.8E-01	2.1E-01		2.6E-02	3.7E+01	5.2E+00	9.8E-01	4.3E+01
4.04			Hazard Index	5.1E-01	3.8E+01	8.3E-02	4.5E+01	8.2E+00	1.2E+01	1.0E+02

E1. TOXICITY INFORMATION

E1.1 INORGANICS

Antimony (BEIAS 1994)

Antimony (Sb) is a naturally occurring metal that is used in various manufacturing processes. It exists in valence states of 3 and 5. Antimony is a common urban air pollutant. Exposure to antimony may be via inhalation, oral, and dermal routes.

Antimony is sparingly absorbed following ingestion or inhalation. Both gastrointestinal and pulmonary absorption are a function of compound solubility. Antimony is transported in the blood, its distribution varying among species and dependent on its valence state. Antimony is not metabolized but may bind to macromolecules and react covalently with sulfhydryl and phosphate groups. Excretion of antimony is primarily via the urine and feces, and is also dependent upon valence state.

Acute oral exposure of humans and animals to high doses of antimony or antimony-containing compounds (antimonials) may cause gastrointestinal disorders (vomiting, diarrhea), respiratory difficulties, and death at extremely high doses. Subchronic and chronic oral exposure may affect hematologic parameters. Long-term exposure to high doses of antimony or antimonials has been shown to adversely affect longevity in animals. Limited data suggest that prenatal and postnatal exposure of rats to antimony interferes with vasomotor responses.

Acute inhalation exposure of humans may cause gastrointestinal disorders (probably due to ingestion of airborne antimony). Exposure of animals to high concentrations of antimony and antimonials (especially stibine gas) may result in pulmonary edema and death. Long-term occupational exposure of humans has resulted in electrocardiac disorders, respiratory disorders, and possibly increased mortality. Antimony levels for these occupational exposure evaluations ranged from 2.2 to 11.98 mg Sb/m^3. Based on limited data, occupational exposure of women to metallic antimony and several antimonials has reportedly caused alterations in the menstrual cycle and an increased incidence of spontaneous abortions. Reproductive dysfunction has been demonstrated in rats exposed to antimony trioxide.

No data were available indicating that dermal exposure of humans to antimony or its compounds results in adverse effects. However, dermal application of high doses of antimony oxide (1584 mg Sb/kg) resulted in the death of rabbits within one day. Eye irritation due to exposure to stibine gas and several antimony oxides has been reported for humans.

The U.S. Environmental Protection Agency (EPA) has calculated subchronic and chronic oral reference doses (RfDs) of 4.0E-04 mg/kg/d based on decreased longevity and alteration of blood chemistry in rats chronically exposed to potassium antimony tartrate in the drinking water (5 ppm equivalent to 0.35 mg Sb/kg/d). An uncertainty factor of 1000 was applied: 10 for extrapolation from a lowest-observed-adverse-effect level (LOAEL) to a no-observable-adverse-effect level (NOAEL), 10 for extrapolation from animal data, and 10 for protection of sensitive populations.

The primary target organ for acute oral exposure to antimony appears to be the gastrointestinal tract (irritation, diarrhea, vomiting) and targets for long-term exposure are the blood (hematological disorders) and liver (mild hepatotoxicity). Inhalation exposure to antimony affects the respiratory tract (pneumoconiosis, restrictive airway disorders), with secondary targets being the cardiovascular system

(altered blood pressure and electrocardiograms) and kidneys (histological changes). Only limited evidence exists for reproductive disorders due to antimony exposure.

Although some data indicate that long-term exposure of rats to antimony trioxide and trisulfide increased the incidence of lung tumors, EPA has not evaluated antimony or antimonials for carcinogenicity, and a weight-of-evidence classification is currently unavailable.

Arsenic (BEIAS 1994)

The toxicity of inorganic arsenic depends on its valence state (-3, +3, or +5), and on the physical and chemical properties of the compound in which it occurs. Trivalent (As^{+3}) compounds are generally more toxic than pentavalent (As^{+5}) compounds. The more water-soluble compounds are usually more toxic and more likely to have systemic effects than the less soluble compounds, which are more likely to cause chronic pulmonary effects. One of the most toxic inorganic arsenic compounds is arsine gas (AsH_3). Laboratory animals are generally less sensitive than humans to the toxic effects of inorganic arsenic. In addition, in rodents the critical effects appear to be immunosuppression and hepato-renal dysfunction, whereas in humans the skin, vascular system, and peripheral nervous system are the primary target organs.

Water-soluble inorganic arsenic compounds are absorbed through the gastrointestinal (GI) tract (>90%) and lungs; distributed primarily to the liver, kidney, lung, spleen, aorta, and skin; and excreted mainly in the urine, at rates as high as 80% in 61 hours following oral dosing. Pentavalent arsenic is reduced to the trivalent form and then methylated in the liver to less toxic methylarsinic acids.

Symptoms of acute inorganic arsenic poisoning in humans are nausea, anorexia, vomiting, epigastric and abdominal pain, and diarrhea. Dermatitis (exfoliative erythroderma), muscle cramps, cardiac abnormalities, hepatotoxicity, bone marrow suppression and hematological abnormalities (anemia), vascular lesions, and peripheral neuropathy (motor dysfunction and paresthesia) have also been reported. Oral doses as low as 20–60 μg/kg/d have been reported to cause toxic effects in some individuals. Severe exposures can result in acute encephalopathy, congestive heart failure, stupor, convulsions, paralysis, coma, and death. The acute lethal dose to humans has been estimated at ~0.6 mg/kg/d. General symptoms of chronic arsenic poisoning in humans are weakness, general debility and lassitude, loss of appetite and energy, loss of hair, hoarseness of voice, loss of weight, and mental disorders. Primary target organs are the skin (hyperpigmentation and hyperkeratosis), nervous system (peripheral neuropathy), and vascular system. Anemia, leukopenia, hepatomegaly, and portal hypertension have also been reported. In addition, possible reproductive effects include a high male-to-female birth ratio.

The RfD for chronic oral exposures, 0.0003 mg/kg/d, is based on a NOAEL of 0.0008 mg/kg/d and a LOAEL of 0.014 mg/kg/d for hyperpigmentation, keratosis, and possible vascular complications in a human population consuming arsenic-contaminated drinking water. Because of uncertainties in the data, EPA states that "strong scientific arguments can be made for various values within a factor of 2 or 3 of the currently recommended RfD value." The subchronic RfD is the same as the chronic RfD, 0.0003 mg/kg/d.

Acute inhalation exposures to inorganic arsenic can damage mucous membranes; cause rhinitis, pharyngitis, and laryngitis; and result in nasal septum perforation. Chronic inhalation exposures, as occurring in the work place, can lead to rhino-pharyno-laryngitis, tracheobronchitis, dermatitis, hyperpigmentation, and hyperkeratosis; leukopenia; peripheral nerve dysfunction as indicated by abnormal nerve conduction velocities; and peripheral vascular disorders as indicated by Raynaud's syndrome and increased vasospastic reactivity in fingers exposed to low temperatures. Higher rates of

cardiovascular disease have also been reported in some workers exposed to arsenic. Possible reproductive effects include a high frequency of spontaneous abortions and reduced birth weights. Arsine gas (AsH_3) at concentrations as low as 3–10 ppm for several hours can cause toxic effects. Hemolysis, hemoglobinuria, jaundice, hemolytic anemia, and necrosis of the renal tubules have been reported in exposed workers.

Subchronic and chronic reference concentrations (RfCs) for inorganic arsenic have not been derived.

Epidemiological studies have revealed an association between arsenic concentrations in drinking water and increased incidence of skin cancers (including squamous cell carcinomas and multiple basal cell carcinomas), as well as cancers of the liver and bladder and respiratory and GI tracts. Occupational exposure studies have shown a clear correlation between exposure to arsenic and lung cancer mortality. EPA has placed inorganic arsenic in weight-of-evidence group A, human carcinogen. A drinking–water unit risk of $5 \times 10^{-5} (\mu g/L)^{-1}$ has been proposed, derived from drinking-water unit risks for females and males that are equivalent to slope factors (SFs) of 1.0×10^{-3} $(\mu g/kg/d)^{-1}$ (females) and 2.0×10^{-3} $(\mu g/kg/d)^{-1}$ (males). For inhalation exposures, a unit risk of 4.3×10^{-3} $(\mu g/m^3)^{-1}$ and an SF of 50 $(mg/kg/d)^{-1}$ have been derived.

Beryllium (BEIAS 1994)

Pure beryllium is a hard, grayish metal present in the earth's crust. It can be found in emissions from coal combustion; in surface water and soil; and in house dust, food, drinking water, and cigarette smoke. Industry employs beryllium in several ways, including in brake systems for airplanes, for neutron monochromatization, as window material for x-ray tubes, and in radiation detectors. Additionally, beryllium compounds are used in manufacturing ceramics and refractories, chemical reagents, and gas mantle hardeners. The highest risk for exposure to beryllium occurs among workers employed in beryllium manufacturing, fabricating, or reclaiming industries. However, people who live near these industries and are sensitive to extremely low concentrations of beryllium in the air are also at risk. In addition, smokers inhale unusually high concentrations of beryllium, depending on the source of tobacco.

A limited amount of data indicates that the oral toxicity of beryllium is low; however, the inhaled toxicity of beryllium is well documented. Humans inhaling massive doses of beryllium compounds may develop acute berylliosis. Additionally, beryllium and its compounds are presumed to have cancer-causing potential in the human lung when inhaled. The cancer-causing ability has been investigated in workers exposed to beryllium. The degree of harm depends on the amount and duration of exposure. Short-term exposure to beryllium may cause noncarcinogenic health effects, such as acute pneumonitis berylliosis, while long-term exposure may cause lung cancer.

Boron

Boron is a solid substance that widely occurs in nature and is present in air, water, and soil. Typically it is found in the environment combined with other substances to form compounds called borates. Borates are primarily used to produce glass; however, they are also used in the production of fire retardants, leather tanning, cosmetics, metals, pesticides, and high-energy fuel. Background levels of boron have been reported up to 5 ppm of boron in surface water and as high as 360 ppm in boron-rich deposit areas. Average daily intake of boron has been estimated at 10–25 mg. (ATSDR 1992)

Animal studies suggest boron readily enters the body when contacted with damaged skin and primarily leaves the body through urine. Small amounts of boron (4.1 mg/m^3) can irritate the nose, throat, and eyes when inhaled. Large amounts of boron (4161 ppm) consumed by humans over a short

period of time can affect the stomach, intestines, liver, kidney, and brain and can eventually lead to death. Animal studies also indicate that boron will affect in particular the male reproductive organs if large amounts are eaten or drunk for long or short periods of time. No information is available on whether boron causes cancer in humans; however, in animals no evidence of cancer has been found even when exposed over long periods of time. (ATDSR 1992)

Cadmium (BEIAS 1994)

Cadmium is a naturally occurring metal that is used in various chemical forms in metallurgical and other industrial processes and in the production of pigments. Environmental exposure can occur via the diet and drinking water.

Cadmium is absorbed more efficiently by the lungs (30 to 60%) than by the GI tract, the latter involving a saturable process. Cadmium is transported in the blood and widely distributed in the body but accumulates primarily in the liver and kidneys. Cadmium burden (especially in the kidneys and liver) tends to increase in a linear fashion up to ~50 or 60 years of age, after which the body burden remains relatively constant. Metabolic transformations of cadmium are limited to its binding to protein and nonprotein sulfhydryl groups and to various macromolecules, such as metallothionein, which is especially important in the kidneys and liver. Cadmium is excreted primarily in the urine.

Acute oral exposure to 20–30 g has caused fatalities in humans. Exposure to lower amounts may cause GI irritation, vomiting, abdominal pain, and diarrhea. An asymptomatic period of one-half to one hour may precede the onset of clinical signs. Longer-term exposure to cadmium primarily affects the kidneys, resulting in tubular proteinosis, although other conditions such as "itai-itai" disease may involve the skeletal system. Cadmium involvement in hypertension is not fully understood.

Inhalation exposure to cadmium and cadmium compounds may result in effects including headache, chest pains, muscular weakness, pulmonary edema, and death. The 1-minute and 10-minute lethal concentration of cadmium for humans has been estimated to be ~2500 and 250 mg/m^3, respectively. An 8-hour time-weighted-average exposure level of 5 mg/m^3 has been estimated for lethal effects of inhalation exposure to cadmium, and exposure to 1 mg/m^3 is considered to be immediately dangerous to human health. Renal toxicity (tubular proteinosis) may also result from inhalation exposure to cadmium.

Chronic oral RfDs of 5×10^{-4} and 1×10^{-3} mg/kg/d have been established for cadmium exposure via drinking water and food, respectively. Both values reflect incorporation of an uncertainty factor of 10. The RfDs are based on an extensive data base regarding toxicokinetics and toxicity in both human and animals, the critical effect being renal tubular proteinuria. Confidence in the RfD and data base is high. Inhalation reference concentration (RfC) values are currently not available.

The target organ for cadmium toxicity via oral exposure is the kidney. For inhalation exposure, both the lungs and kidneys are target organs for cadmium-induced toxicity.

There is limited evidence from epidemiologic studies for cadmium-related respiratory-tract cancer. An inhalation unit risk of 1.8×10^{-3} $(\mu g/m^3)^{-1}$ and an inhalation SF of 6.1 $(mg/kg/d)^{-1}$ are based on respiratory tract cancer associated with occupational exposure. Based on limited evidence from multiple occupational exposure studies and adequate animal data, cadmium is placed in weight-of-evidence group B1, probable human carcinogens.

Chromium, Chromium III, and Chromium VI (BEIAS 1994)

Elemental chromium does not occur in nature but is present in ores—primarily chromite. Chromium exhibits several oxidation states, but the most prominent of these is chromium VI and chromium III. Chromium VI in the environment is manmade as a result of industrial emissions; in solution, chromium VI exists as hydrochromate, chromate, and dichromate ionic species and reacts over time to form chromium III. Chromium VI is much more mobile and toxic than is chromium III. Chromium is useful in glucose and cholesterol metabolism and therefore is an essential element to humans and animals. Nonoccupational exposure to the metal occurs via the ingestion of chromium-containing food and water, whereas occupational exposure occurs via inhalation. Workers are exposed to chromium during its use in the production of dichromate; the chemical, stainless steel, refractory, and chromium-plating industries; and the production and use of alloys.

Chromium enters the body through the lungs, gastrointestinal tract, and, to a lesser extent, the skin. Inhalation is the most important route for occupational exposure. Workers exposed to chromium have developed nasal irritation, nasal ulcers, perforation of the nasal septum, and hypersensitivity reactions and "chrome holes" of the skin. Among the general population, contact dermatitis has been associated with the use of bleaches and detergents. Inhalation of chromium compounds has been associated with the development of cancer in workers in the chromate industry. Evidence also suggests an increased risk in developing nasal, pharyngeal, and gastrointestinal carcinomas. Based on sufficient evidence reporting that humans and animals are at risk of developing cancer, chromium VI has been assigned an EPA weight-of-evidence classification of A, human carcinogen.

Manganese (BEIAS 1994)

Manganese makes up about 0.10% of the earth's crust and is the 12th most abundant element. It can exist in oxidation states from -3 to +7, the most common being +4 in the chemical form of manganese dioxide. The oxides and peroxides are used in industry as oxidizers, and the metal is used for manufacturing metal alloys to increase hardness and corrosion resistance. Manganese is an essential trace element in humans, which can elicit a variety of serious toxic responses upon prolonged exposure to elevated concentrations either orally or by inhalation. The central nervous system is the primary target.

Initial symptoms of manganese exposure are insomnia, disorientation, anxiety, lethargy, and memory loss. These symptoms will progress with prolonged exposure and will eventually include motor disturbances, tremors, and walking difficulties similar to Parkinsonism. Effects on reproduction (decreased fertility, impotence) have been observed in humans with inhalation exposure and in animals with oral exposure at the same or similar doses that initiate the central nervous system effects. Data on possible carcinogenesis following injections in mice are inconclusive; however, the EPA weight-of-evidence classification is D, not classifiable as to human carcinogenicity based on no evidence in humans and inconclusive evidence in animals.

Mercury and Mercury Salts (BEIAS 1994)

Mercury is a naturally occurring element that may exist in elemental, inorganic, or organic forms and in various oxidation states. Mercury is used in a wide variety of products and processes, including pressure sensitive devices (thermometers, barometers), electrical apparatus (wiring, switches, batteries), paints, pharmaceuticals, and various chemicals. The oxidation state and chemical form of mercury are important in determining its toxicity, with mercurous salts being less toxic than mercuric salts. Organic materials such as methyl mercury are highly toxic. In the environment, mercury may undergo transformations among the various oxidation states and chemical forms. Both environmental and

occupational exposure are relevant to mercury and its compounds, although environmental exposure is unimportant for mercury vapor. Mercury intake from occupational exposure is of greater significance than that from environmental exposure. Environmental exposure to mercury may involve dietary intake (i.e., from fish) and possibly from dental amalgams, the latter being controversial and under dispute.

Ingestion of mercury metal is usually without effect, while ingestion of inorganic salts may cause severe gastrointestinal irritation, renal failure, and death. Mercury is also known to induce hypersensitivity reactions such as contact dermatitis and acrodynia (pink disease). Inhalation of mercury vapor may cause irritation of the respiratory tract, central nervous system effects characterized by neurobehavioral changes, peripheral nervous system toxicity, renal toxicity, and death. Toxicity resulting from subchronic and chronic exposure to mercury and mercury salts usually involves the kidneys and/or the nervous system. No data are available regarding the carcinogenicity of mercury in humans or animals. The EPA has placed inorganic mercury in weight-of-evidence classification D, not classifiable as to human carcinogenicity.

Nickel and Nickel Salts (BEIAS 1994)

Nickel is a naturally occurring metal existing in various mineral forms. Nickel may be found throughout the environment including rivers, lakes, oceans, soil, air, drinking water, plants, and animals. Soil and sediment are the primary receptacles for nickel, but mobilization may occur depending on physico-chemical characteristics of the soil. Nickel is used in a wide variety of metallurgical processes such as electroplating and alloy production, as well as in nickel-cadmium batteries. Some evidence suggests that nickel may be an essential trace element for mammals. As for most metals, the toxicity of nickel is dependent on the route of exposure and the solubility of the nickel compound.

Pulmonary absorption is the major route of concern for nickel-induced toxicity. Toxic effects of oral exposure to nickel usually involve the kidneys with some evidence from animal studies showing a possible development/reproductive toxicity effect. Inhalation exposure to some nickel compounds will cause toxic effects in the respiratory tract and immune system. Asthmatic conditions have also been documented for inhalation exposure to nickel. In addition, sensitivity reactions to nickel are well documented and usually involve contact dermatitis reactions resulting from contact with items such as cooking utensils, jewelry, coins, etc., containing nickel. Epidemiologic studies have shown that occupational inhalation exposure to nickel dust (primarily nickel subsulfide) at refineries has resulted in increased incidence of pulmonary and nasal cancer.

Selenium (BEIAS 1994)

Selenium is an essential trace element important in many biochemical and physiological processes including the biosynthesis of coenzyme Q (a component of mitochondrial electron transport systems), regulation of ion fluxes across membranes, maintenance of the integrity of keratins, stimulation of antibody synthesis, and activation of glutathione peroxidase (an enzyme involved in preventing oxidative damage to cells). Recommended human dietary allowances (average daily intake) for selenium are as follows: infants up to 1 year, 10–15 μg; children 1to 10 years, 20–30 μg; adult males 11 to 51+ years, 40–70 μg; adult females 11 to 51+ years, 45–55 μg; pregnant or lactating women, 65–75 μg. There appears to be a relatively narrow range between levels of selenium intake resulting in deficiency and those causing toxicity.

Selenium occurs in several valence states: -2 (hydrogen selenide, sodium selenide, dimethyl selenium, trimethyl selenium, and selenoamino acids such as selenomethionine; 0 (elemental selenium); +4 (selenium dioxide, selenious acid, and sodium selenite); and +6 (selenic acid and sodium selenate).

Toxicity of selenium varies with valence state and water solubility of the compound in which it occurs. The latter can affect gastrointestinal absorption rates.

Gastrointestinal absorption in animals and humans for various selenium compounds ranges from about 44% to 95% of the ingested dose. Respiratory tract absorption rates of 97% and 94% for aerosols of selenious acid have been reported for dogs and rats, respectively. Selenium is found in all tissues of the body; highest concentrations occur in the kidney, liver, spleen, and pancreas. Excretion is primarily via the urine (0–15 μg/L); however, excretory products can also be found in the feces, sweat, and expired air.

In humans, acute oral exposures can result in excessive salivation, garlic odor to the breath, shallow breathing, diarrhea, pulmonary edema, and death. Other reported signs and symptoms of acute selenosis include tachycardia, nausea, vomiting, abdominal pain, abnormal liver function, muscle aches and pains, irritability, chills, and tremors. Acute toxic effects observed in animals include pulmonary congestion, hemorrhages and edema, convulsions, altered blood chemistry (increased hemoglobin and hematocrit), liver congestion, and congestion and hemorrhage of the kidneys.

General signs and symptoms of chronic selenosis in humans include loss of hair and nails, acropachia (clubbing of the fingers), skin lesions (redness, swelling, blistering, and ulcerations), tooth decay (mottling, erosion and pitting), and nervous system abnormalities attributed to polyneuritis (peripheral anesthesia, acroparaethesia, pain in the extremities, hyperreflexia of the tendon, numbness, convulsions, paralysis, motor disturbances, and hemiplegia). In domesticated animals, subchronic and chronic oral exposures can result in loss of hair, malformed hooves, rough hair coat, and nervous system abnormalities (impaired vision and paralysis). Damage to the liver and kidneys and impaired immune responses have been reported to occur in rodents following subchronic and/or chronic oral exposures.

In humans, inhalation of selenium or selenium compounds primarily affects the respiratory system. Dusts of elemental selenium and selenium dioxide can cause irritation of the skin and mucous membranes of the nose and throat, coughing, nosebleed, loss of sense of smell, dyspnea, bronchial spasms, bronchitis, and chemical pneumonia. Other signs and symptoms following acute inhalation exposures include lacrimation, irritation and redness of the eyes, gastrointestinal distress (nausea and vomiting), depressed blood pressure, elevated pulse rate, headaches, dizziness, and malaise. In animals, acute inhalation exposures also result in severe respiratory effects including edema, hemorrhage, and interstitial pneumonitis as well as in splenic damage (congestion, fissuring red pulp, and increased polymorphonuclear leukocytes) and liver congestion and mild central atrophy. Information on toxicity of selenium in humans and animals following chronic inhalation exposures is not available, and subchronic and chronic inhalation RfCs have not been derived.

Epidemiologic studies in humans have failed to show a positive association between chronic oral exposures to selenium and an increased incidence of death due to neoplasms. Some studies have indicated that selenium may have anti-neoplastic properties. In studies on laboratory animals, selenites or selenates have not been found to be carcinogenic; however, selenium sulfide produced a significant increase in the incidence of hepatocellular carcinomas in male and female rats and in female mice and a significant increase in alveolar/bronchiolar carcinomas and adenomas in female mice following chronic oral exposures. EPA has placed selenium and selenious acid in Group D, not classifiable as to carcinogenicity in humans, while selenium sulfide is placed in Group B2, probable human carcinogen. Quantitative data are, however, insufficient to derive a SF for selenium sulfide. Pertinent data regarding the potential carcinogenicity of selenium by the inhalation route in humans or animals were not located in the available literature.

Silver (BEIAS 1994)

Silver is a relatively rare metal that occurs naturally in the earth's crust and is released to the environment from various industrial sources. Human exposure to silver and silver compounds can occur orally, dermally, or by inhalation. Silver is found in most tissues, but has no known physiologic function.

In humans, accidental or intentional ingestion of large doses of silver nitrate has produced corrosive damage of the gastrointestinal tract, abdominal pain, diarrhea, vomiting, shock, convulsions, and death. Respiratory irritation was noted following acute inhalation exposure to silver or silver compounds. Silver nitrate solutions are highly irritating to the skin, mucous membranes, and eyes.

Ingestion, inhalation, or dermal absorption of silver may cause argyria, the most common indicator of long-term exposure to silver or silver compounds in humans. Argyria is a gray or blue-gray, permanent discoloration of the skin and mucous membranes that is not a toxic effect per se, but is considered cosmetically disfiguring. Chronic inhalation exposure of workers to silver oxide and silver nitrate dusts resulted in upper and lower respiratory irritation, deposition of granular silver-containing deposits in the eyes, impaired night vision, and abdominal pain. Mild allergic responses have been attributed to dermal contact with silver.

In long-term oral studies with experimental animals, silver compounds have produced slight thickening of the basement membranes of the renal glomeruli, growth depression, shortened lifespan, and granular silver-containing deposits in skin, eyes, and internal organs. Hypoactivity was seen in rats subchronically exposed to silver nitrate in drinking water.

An RfD of 0.005 mg/kg/d for subchronic and chronic exposure was calculated from a LOAEL of 0.014 mg/kg/d for argyria observed in patients receiving intravenous injections of silver arsphenamine. Data are presently insufficient to derive an RfC for silver.

Data adequate for evaluating the carcinogenicity of silver to humans or animals by ingestion, inhalation, or other routes of exposure were not found. Based on EPA guidelines, silver is placed in weight-of-evidence group D, not classifiable as to human carcinogenicity.

Vanadium (BEIAS 1994)

Vanadium is a metallic element that occurs in six oxidation states and numerous inorganic compounds. Some of the more important compounds are vanadium pentoxide (V_2O_5), sodium metavanadate ($NaVO_3$), sodium orthovanadate (Na_3VO_4), vanadyl sulfate ($VOSO_4$), and ammonium vanadate (NH_4VO_3). Vanadium is used primarily as an alloying agent in steels and nonferrous metals. Vanadium compounds are also used as catalysts and in chemical, ceramic or specialty applications.

Vanadium compounds are poorly absorbed through the gastrointestinal system (0.5–2% of dietary amount), but slightly more readily absorbed through the lungs (20–25%). Absorbed vanadium is widely distributed in the body, but short-term localization occurs primarily in bone, kidneys, and liver. In the body, vanadium can undergo changes in oxidation state[(interconversion of vanadyl (+4) and vanadate (+5) forms] and it can also bind with blood protein (transferin). Vanadium is excreted primarily in the feces following oral exposures and primarily in the urine following inhalation exposures.

The toxicity of vanadium depends on its physico-chemical state; particularly on its valence state and solubility. Based on acute toxicity, pentavalent NH_4VO_3 has been reported to be more than twice as toxic as trivalent VCl_3 and more than six times as toxic as divalent VI_2. Pentavalent V_2O_5 has been

reported to be more than five times as toxic as trivalent V_2O_3. In animals, acutely toxic oral doses cause vasoconstriction, diffuse desquamative enteritis, congestion and fatty degeneration of the liver, and congestion and focal hemorrhages in the lungs and adrenal cortex. Minimal effects seen after subchronic oral exposures to animals include diarrhea, altered renal function, and decreases in erythrocyte counts, hemoglobin, and hematocrit. In humans, intestinal cramps and diarrhea may occur following subchronic oral exposures. These studies indicate that for subchronic and chronic oral exposures the primary targets are the digestive system, kidneys, and blood.

Reference doses for chronic oral exposures are 0.007 mg/kg/d for vanadium, 0.009 mg/kg/d for vanadium pentoxide, 0.02 mg/kg/d for vanadyl sulfate, and 0.001 mg/kg/d for sodium metavanadate. The subchronic RfDs for these compounds are the same as the chronic RfDs, except for sodium metavanadate, which is 0.01 mg/kg/d.

Inhalation exposures to vanadium and vanadium compounds result primarily in adverse effects to the respiratory system. In laboratory studies, minimal effects (throat irritation and coughing) occurred after an 8-h exposure to 0.1 mg V/m^3. In studies on workers occupationally exposed to vanadium, the most common reported symptoms were irritation of the respiratory tract, conjunctivitis, dermatitis, cough, bronchospasm, pulmonary congestion, and bronchitis. Quantitative data are, however, insufficient to derive a subchronic or chronic inhalation RfC for vanadium or vanadium compounds.

There is little evidence that vanadium or vanadium compounds are reproductive toxins or teratogens. There is also no evidence that any vanadium compound is carcinogenic; however, very few adequate studies are available for evaluation. Vanadium has not been classified as to carcinogenicity by the EPA.

Zinc (BEIAS 1994)

Zinc is an essential element and is used primarily in galvanized metals and metal alloys. In addition, various inorganic zinc salts have numerous commercial uses. Zinc oxide is used in the rubber industry as a vulcanization activator and accelerator and to slow down oxidation and also as a reinforcing agent, heat conductor, pigment, ultraviolet stabilizer, supplement in animal feeds and fertilizers, catalyst, chemical intermediate, and mildew inhibitor. Zinc sulfate is used in rayon manufacture, agriculture, zinc plating, and as a chemical intermediate and mordant. Zinc chloride is used in smoke bombs, in cements for metals, in wood preservatives, in flux for soldering; in manufacture of parchment paper, artificial silk, and glues; as a mordant in printing and dye textiles; and as a deodorant, antiseptic, and astringent. Zinc chromate is used as a pigment in paints, varnishes, and oil colors. In addition, zinc phosphide is used as a rodenticide, and zinc cyanide is used in electroplating. The toxicity of the latter two compounds is caused primarily by their anion component.

Gastrointestinal absorption of zinc is variable (20–80%) and depends on the chemical compound as well as on zinc levels in the body and dietary concentrations of other nutrients. Zinc is present in all tissues with the highest concentrations in the prostate, kidney, liver, heart, and pancreas. In humans, acutely toxic oral doses of zinc cause nausea, vomiting, diarrhea, and abdominal cramps and in some cases gastric bleeding. Gastrointestinal upset has also been reported in individuals taking dietary zinc supplements for up to 6 weeks. Limited evidence suggests that the human immune system may be impaired by subchronic exposures. Chronic oral exposures to zinc have resulted in hypochromic microcytic anemia associated with hypoceruloplasminemia, hypocupremia, and neutropenia in some individuals. Under occupational exposure conditions, inhalation of zinc compounds (mainly zinc oxide fumes) can result in a condition identified as "metal fume fever," which is characterized by nasal passage irritation, cough, rales, headache, altered taste, fever, weakness, hyperpnea, sweating, pains in the legs

and chest, leukocytosis, reduced lung volume, and decreased diffusing capacity of carbon monoxide. "Metal fume fever" is an acute and reversible effect that is unlikely to occur under chronic exposure conditions when zinc air concentrations are less that 8–12 mg/m^3. No case studies or epidemiologic evidence have been presented to suggest that zinc is carcinogenic in humans by the oral or inhalation route.

E1.2 ORGANICS

Aldrin

Aldrin is a common name for a compound used as an insecticide. Aldrin is a chemical made in the laboratory and does not occur naturally in the environment. The trade names used for aldrin include Aldrec, Aldrex, Drinox, Octalene, Seedrin, and Compound 118. Pure aldrin is a white powder, and technical-grade aldrin is a tan-colored powder. Aldrin evaporates slowly in the air and has a mild chemical odor. Aldrin can be found in the soil, in water, or in the air near hazardous waste sites. Aldrin can also be found in plants and animals near hazardous waste sites. (ATSDR 1993)

From the 1950s until 1970, aldrin was used extensively as an insecticide on crops such as corn and cotton. The USDA prohibited all uses of aldrin in 1970. In 1972, however, EPA approved aldrin for killing termites, and it was used for this purpose until 1987. In 1987, the manufacturer voluntarily canceled the registration for use in controlling termites. (ATSDR 1993)

Aldrin can enter the environment from accidental spills or leaks from storage containers at waste sites. In the past, aldrin entered the environment when farmers used it to kill pests on crops and exterminators used it to kill termites. Aldrin is still present in the environment from these past uses. Sunlight and bacteria can change aldrin to dieldrin; therefore, dieldrin will be found in places where aldrin was originally released. Dieldrin in soil or water breaks down slowly; it sticks to soil and sediments on the bottom of lakes very strongly and may stay there unchanged for many years. Dieldrin does not dissolve in water very easily; however, it can attach to dust particles and become airborne, and dieldrin can also be taken up in the roots of plants. Fish and animals that eat dieldrin-contaminated materials store a large amount of dieldrin in their fat. Animals or fish that eat other animals can concentrate dieldrin in their tissue. (ATSDR 1993)

Most human exposure to aldrin and dieldrin occurs when people eat foods such as fish from contaminated lakes or streams, root crops, dairy products, and meats. Exposure to aldrin and dieldrin occurs via drinking water, breathing, or contacting contaminated soil. Exposure to aldrin is limited because aldrin is changed very quickly to dieldrin in the environment. Dieldrin stays in the environment for a long time, usually in soil or in animal fat. Background levels of aldrin and dieldrin in air and water are ~0.000001 parts of aldrin or dieldrin in 1 million parts of air or water (i.e., ~0.000001 ppm). Background levels of dieldrin in soil are ~0.001 ppm, and background levels in water are very, very small. Contaminated soils average ~0.057 ppm for dieldrin and 0.019 ppm for aldrin; contaminated groundwater averages ~0.0004 ppm for dieldrin. Contaminated fish contained ~0.030–0.050 ppm of dieldrin. (ATSDR 1993)

Studies in animals show that both aldrin and dieldrin enter the body quickly after exposure. Once aldrin is inside the body, it quickly breaks down to dieldrin. Dieldrin stays in fat for a long time, but most dieldrin and its breakdown products leave the body in feces and urine. It can take many weeks or even years for all of the compound to leave the body. (ATSDR 1993)

Aldrin and dieldrin cause similar health effects. Exposure to very high levels of aldrin or dieldrin for a short time causes convulsions or kidney damage. Long–term exposure to lower levels can also cause convulsions because of the buildup of the contaminants in the body. Exposure to moderate levels of aldrin or dieldrin also causes headaches, dizziness, irritability, vomiting, or uncontrollable muscle movements. It is not known whether either contaminant causes birth defects or cancer in people. The International Agency for Research on Cancer has determined that the carcinogenicity of aldrin and dieldrin to humans is not classifiable. EPA has determined that aldrin and dieldrin are toxic contaminants and are probable human carcinogens (i.e., an EPA Class B2 carcinogen). The oral and inhalation SF for aldrin is 17 $(mg/kg/d)^{-1}$. The RfD for chronic oral exposures to aldrin is 0.00003 mg/kg/d and is used to evaluate potential noncancerous effects from exposure to aldrin. (ATSDR 1993)

Benzo[*a*]anthracene (BEIAS 1994)

Benz[*a*]anthracene, along with a number of other polycyclic aromatic hydrocarbons, are natural products produced by the incomplete combustion of organic material. The arrangement of the aromatic rings in the benz[*a*]anthracene molecule gives it a "bay region" often correlated with carcinogenic properties. In general, the bay-region polycyclic aromatic hydrocarbons and some of their metabolites are known to react with cellular macromolecules, including deoxyribonucleic acid (DNA), which may account for both their toxicity and carcinogenicity. The inducible mixed-function oxidase enzymes oxidize benz[*a*]anthracene to form metabolites with increased water solubility that can be efficiently excreted in the urine. A minor product of this oxidation, a bay-region diol epoxide, reacts readily with DNA and has been shown to be highly carcinogenic.

The toxic effects of benz[*a*]anthracene and similar polycyclic aromatic hydrocarbons are primarily directed toward tissues that contain proliferating cells. Animal studies indicate that exposure to bay-region polycyclic aromatic hydrocarbons can damage the hematopoietic system leading to progressive anemia as well as agranulocytosis. The lymphoid system can also be affected resulting in lymphopenia. Toxic effects have been observed in the rapidly dividing cells of the intestinal epithelium, spermatogonia and resting spermatocytes in the testis and primary oocytes of the ovary. Most of these effects have occurred following both oral and parenteral exposure. Epithelial proliferation and cell hyperplasia in the respiratory tract have been reported following subchronic inhalation exposure. However, because of the lack of quantitative data, neither a reference dose nor a reference concentration have been derived.

The primary concern with benz[*a*]anthracene exposure is its potential carcinogenicity. There is no unequivocal, direct evidence of the carcinogenicity of the compound to humans; however, benz[*a*]anthracene and other known carcinogenic polycyclic aromatic hydrocarbons are components of coal tar, soot, coke oven emissions and tobacco smoke. There is adequate evidence of its carcinogenic properties in animals. Oral exposures of mice to benz[*a*]anthracene have resulted in hepatomas, pulmonary adenomas and forestomach papillomas. The EPA weight-of-evidence classification is B2, probable human carcinogen, for both oral and inhalation exposure based on adequate animal evidence and no human evidence. An SF has not been derived specifically for benz[*a*]anthracene by the EPA. However, an oral SF of 7.3 $(mg/kg/d)^{-1}$ has been calculated for benzo[*a*]pyrene based on the incidence of stomach tumors in mice treated with benzo[*a*]pyrene. A drinking water unit risk of 2.1E-4 $(\mu g/L)^{-1}$ has also been calculated for benzo[*a*]pyrene. An inhalation SF of 6.1 $(mg/kg/d)^{-1}$ (U.S. EPA 1992b) was calculated for benzo[*a*]pyrene based on the incidence of respiratory tumors in golden hamsters treated with benzo[*a*]pyrene. An inhalation unit risk of 1.7E-03 $(\mu g/m^3)^{-1}$ has also been calculated for benzo[*a*]pyrene.

Benzo[*a*]pyrene (BEIAS 1994)

Benzo(a)pyrene is a polycyclic aromatic hydrocarbon (PAH) characterized by two or more fuzed benzene rings. Despite their high lipid solubility, most PAHs show little tendency to biomagnify in food chains, probably because they are rapidly metabolized in most biota. PAHs are ubiquitous in nature, produced by forest fires, microbial synthesis, and anthropogenic activities. PAHs are teratogenic, mutagenic, and carcinogenic, with the higher molecular weight compounds being less toxic than higher compounds.

The effects of benzo[*a*]pyrene on reproduction are shown in mice exposed to 10, 40, and 160 mg of benzo(a)pyrene per kg of body weight per day during days 7–16 of gestation. Benzo[*a*]pyrene exposure of 160 mg/kg/d significantly reduced pregnancy rates and percentage of viable litters. Pup weights were significantly reduced by all three dose levels. Total sterility was observed in 97% of offspring in the 40 and 160 mg/kg/d groups, and fertility was impaired among offspring in the 10 mg/kg/d group.

An oral SF of 7.3 $(mg/kg/d)^{-1}$ has been calculated for benzo[*a*]pyrene based on the incidence of stomach tumors in mice treated with benzo[*a*]pyrene. A drinking water unit risk of 2.1E-4 $(\mu g/L)^{-1}$ has also been calculated for benzo[*a*]pyrene. An inhalation SF of 6.1 $(mg/kg/d)^{-1}$ was calculated for benzo[*a*]pyrene based on the incidence of respiratory tumors in golden hamsters treated with benzo[*a*]pyrene. An inhalation unit risk of 1.7E-3 $(\mu g/m^3)^{-1}$ has also been calculated for benzo[*a*]pyrene.

Benzo[*b*]flouranthene (BEIAS 1994)

Benzo[*b*]fluoranthene, a crystalline solid with a chemical formula of $C_{20}H_{12}$ and a molecular weight of 252.32, is a PAH with one five-membered ring and four six-membered rings. There is no commercial production or known use of this compound. Benzo[*b*]fluoranthene is found in fossil fuels and occurs ubiquitously in products of incomplete combustion. It has been detected in mainstream cigarette smoke; urban air; gasoline engine exhaust; emissions from burning coal and from oil-fired heating; broiled and smoked food; oils and margarine; and in soils, groundwater, and surface waters at hazardous waste sites.

No absorption data were available for benzo[*b*]fluoranthene; however, by analogy to structurally related PAHs, primarily benzo[*a*]pyrene, it would be expected to be absorbed from the gastrointestinal tract, lungs, and skin. Major metabolites of benzo[*b*]fluoranthene formed in vitro in rat liver include dihydrodiols and monohydroxy derivatives and monohydroxy derivatives in mouse epidermis.

No data were found concerning the acute, subchronic, chronic, developmental, or reproductive toxicity of benzo[*b*]fluoranthene. No data were available for the derivation of an oral RfD or inhalation RfC.

No long-term oral or inhalation bioassays were available to assess the carcinogenicity of benzo[*b*]fluoranthene. Benzo[*b*]fluoranthene was tested for carcinogenicity in dermal application, lung implantation, subcutaneous (s.c.) injection, and intraperitoneal (i.p.) injection studies. Dermal applications of 0.01–0.5% solutions of benzo[*b*]fluoranthene for life produced a high incidence of skin papillomas and carcinomas in mice. In initiation-promotion assays, the compound was active as an initiator of skin carcinogenesis in mice. Sarcomas and carcinomas of the lungs and thorax were seen in rats receiving single lung implants of 0.1–1 mg benzo[*b*]fluoranthene. Newborn mice receiving 0.5 μmol benzo[*b*]fluoranthene via i.p. injection developed liver and lung tumors, and mice administered three s.c. injections of 0.6 mg benzo[*b*]fluoranthene developed injection-site sarcomas.

Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned a weight-of-evidence classification of B2, probable human carcinogen, to benzo[*b*]fluoranthene.

Bis(2-ethylhexyl)phthalate (BEIAS 1994)

Bis(2-ethylhexyl)phthalate is a colorless oily liquid that is extensively used as a plasticizer in a wide variety of industrial, domestic and medical products. It is an environmental contaminant and has been detected in ground water, surface water, drinking water, air, soil, plants, fish and animals. It is rapidly absorbed from the gastrointestinal tract primarily as mono(2-ethylhexyl)phthalate. The diester can be absorbed through the skin and from the lungs. It is rapidly metabolized in the blood and tissues to the monoester, which can be excreted as a glucuronide conjugate or further hydrolyzed to phthalic acid and excreted.

Animal studies have indicated that the primary target organs are the liver and kidneys; however, higher doses are reported to result in testicular effects and decreased hemoglobin and packed cell volume. The primary intracellular effects of *bis*(2-ethylhexyl)phthalate in the liver and kidneys are an increase in the smooth endoplasmic reticulum and a proliferation in the number and size of peroxisomes. An epidemiological study reported no toxic effects from occupational exposure to air concentrations of *bis*(2-ethylhexyl)phthalate up to 0.16 mg/m^3. Other studies on occupational exposures to mixtures of phthalate esters containing *bis*(2-ethylhexyl)phthalate have reported polyneuritis and sensory-motor polyneuropathy with decreased thrombocytes, leukocytes, and hemoglobin in some exposed workers. Developmental toxicity studies with rats and mice have shown that *bis*(2-ethylhexyl)phthalate is fetotoxic and teratogenic when given orally during gestation. Oral exposure has also been shown to result in decreased sperm count in rats.

An RfD of 0.02 mg/kg/d for both subchronic and chronic oral exposure was calculated from a LOAEL of 19 mg/kg/d based on increased relative liver weight in guinea pigs given 0, 19, or 64 mg *bis*(2-ethylhexyl) phthalate/kg/d for 12 months in their diet. An RfC for inhalation exposure is not available.

Bis(2-ethylhexyl)phthalate is known to induce the proliferation of peroxisomes, which has been associated with carcinogenesis. Dose-dependent, statistically significant increases in the incidences of hepatocellular carcinomas and combined carcinomas and adenomas were seen in mice and rats exposed to *bis*(2-ethylhexyl)phthalate in their diet for 103 weeks. An increased incidence of neoplastic nodules and hepatocellular carcinomas was also reported in rats.

Based on EPA guidelines, *bis*(2-ethylhexyl)phthalate was assigned to weight-of-evidence Group B2, probable human carcinogen, on the basis of an increased incidence of liver tumors in rats and mice. A carcinogenicity SF (q_1*) of 0.014 (mg/kg/d)$^{-1}$ for oral exposure was based on the combined incidence of hepatocellular carcinomas and adenomas in male mice. A drinking water unit risk of 4.0E−07 (µg/L)$^{-1}$ was calculated based on the q_1*. A quantitative estimation of carcinogenic risk from inhalation exposure is not available.

Chlordane (BEAIS 1994)

Technical grade chlordane is a mixture of structurally related compounds including *trans*-chlordane, *cis*-chlordane, β-chlordene, heptachlor, and *trans*-nonachlor. Chlordane was used extensively as a pesticide in the United States from 1948 to 1988. Because the chemical is persistent in the environment, exposure can still occur from breathing the air of treated homes, consuming shellfish caught in contaminated waters, or eating food produced on contaminated farmlands. Chlordane is readily absorbed

after oral, inhalation, or dermal exposure and is stored in adipose tissue. The chemical is excreted in the feces from the bile, but metabolite residues have been detected in 46% of human milk samples from Arkansas/Mississippi, in 68% of samples from Mississippi, and in 100% of samples from Hawaii.

Death in humans from ingestion of chlordane was accompanied by vomiting, dry cough, agitation and restlessness, hemorrhagic gastritis, bronchopneumonia, muscle twitching, and convulsions. Nonlethal, accidental poisoning of children has resulted in convulsions, excitability, loss of coordination, dyspnea, and tachycardia; however, recovery was complete. When a municipal water supply was contaminated with chlordane in concentrations of up to 1.2 g/L, 13 persons had symptoms of gastrointestinal and neurological disorders. Signs of toxicity from chronic inhalation exposure in chlordane treated homes include sinusitis, bronchitis, dermatitis, neuritis, migraine, gastrointestinal distress, fatigue, memory deficits, personality changes, decreased attention span, numbness or paresthesias, disorientation, loss of coordination, dry eyes, and seizures. Blood dyscrasias, including production defects and thrombocytopenic purpura, have been described for both professional applicators and for home owners and their families following home termite treatment. An inhalation RfC for chlordane is under review by EPA.

Liver enlargement occurred in mice exposed to 10 mg/m^3 for 8 h/d, 5 d/week for 90 d. Increased liver weights were found in female rats (5.8 mg/m^3), increased liver and kidney weights occurred in male rats (28.2 mg/m^3), serum chemistry changes indicative of liver damage and hypersensitivity occurred in females (28.2 mg/m^3), and centrilobular hepatocyte enlargement occurred in males and females (28.2 mg/m^3) exposed to chlordane by inhalation 8 h/d, 5 d/week, for 28 d.

Long-term feeding studies with chlordane in laboratory animals resulted in significantly reduced weight gains in male (203.5 or 407.0 ppm, 80 weeks) and female (120.8 or 241.5 ppm, 80 weeks) rats, a dose-related trend in mortality of female rats and male mice (29.9 or 56.2 ppm, 80 weeks), and liver hypertrophy of female rats (≥5 ppm, 130 weeks). In a 24-month feeding study with mice, hepatocellular swelling and necrosis occurred in males and increased liver weights occurred in males and females fed 5 ppm. A chronic oral RfD of 6E-05 mg/kg/d for chlordane was calculated from a NOAEL of 0.055 mg/kg/d derived from a chronic feeding study with rats. The subchronic oral RfD is also 6E-05 mg/kg/d.

Altered endocrine and immune functions have been observed in rat pups exposed to chlordane in utero.

Exposure of humans from chlordane treated homes has been associated with leukemia, skin neoplasms, and neuroblastoma in children. An increased risk of non-Hodgkin's lymphoma has been found among farmers exposed to chlordane 20 or more days per year. Hepatic carcinomas and hepatocellular adenomas have been described for several strains of male and female mice and male rats given chlordane in the diet. EPA has classified chlordane as group B2, probable human carcinogen. The q_1^* for oral exposure is 1.3E+0 $(mg/kg/d)^{-1}$ based on an increase of hepatocellular carcinomas in mice and hepatocellular adenomas in rats. A drinking water unit risk of 3.7E-05 $(\mu g/L)^{-1}$ was calculated on the basis of the q_1^*. The q_1^* for inhalation exposure is 1.3E+0 $(mg/kg/d)^{-1}$, and the inhalation unit risk value is 3.7E-04 $(\mu g/m^3)^{-1}$. The inhalation risk estimates were calculated from the oral data.

4,4'-DDT, 4,4'-DDD, 4,4'-DDE

DDT is a white odorless powder that was widely used as a pesticide until banned in the United States but continues to be used worldwide. DDT does not occur naturally in the environment and but is made from chloral hydrate, chlorobenzene, and sulfuric acid. In the United States, DDT mostly occurs in the environment from past use as an insecticide. DDD was also used as a pesticide on a more limited extent; however, DDE is found in the environment only as a result of contamination or breakdown of DDT. (ATSDR 1994)

Typically, individuals are exposed to a mixture of DDT, DDD, and DDE by eating foods containing small amounts of these compounds. Even though these compounds are no longer used, small amounts remain in the soil and in some imported foods that have been directly exposed. Nonetheless, the amount of DDT in the U.S. has decreased and is expected to continue in this decline. (ATSDR 1994)

4,4'-DDT and its metabolites may be absorbed via the respiratory tract and the gastrointestinal tract. Acute 4,4'-DDT poisoning may cause rashes; irritation of the eyes, nose, and throat; nervous system effects; muscle weakness; and death due to respiratory failure or ventricular fibrillation. Tremors are the most noticeable indication of chronic 4,4'-DDT exposure among humans. In animals, chronic exposure to high levels may result in symptoms of central nervous system and liver toxicity. 4,4'-DDT is well known for its ability to reduce the thickness of egg shells in birds, but no major reproductive or teratogenic effects have been reported in mammals. Although tests indicate that 4,4'-DDT is not mutagenic, an increase in the number of chromatic breaks was observed in insecticide workers during a peak spraying season. Liver tumors have been reported in animals orally exposed to 4,4'-DDT and its metabolites. Carcinogenicity has not been associated with human exposure to 4,4'-DDT, 4,4'-DDD, or 4,4'-DDE. (ATSDR 1994)

Dibenz[*a,h*]anthracene

Dibenz[*a,h*]anthracene is a chemical substance formed during the incomplete burning of fossil fuel, garbage, or any organic matter and is found in smoke in general; it condenses on dust particles and is distributed into water and soil and on crops. Dibenz[*a,h*]anthracene is a PAH and is also a component of coal tar pitch, which is used in industry as a binder for electrodes and in creosote used to preserve wood. PAHs are also found in limited amounts in bitumens and asphalt used in industry and for paving. As a pure chemical, dibenz[*a,h*]anthracene resembles colorless plates or leaflets. (ATSDR 1990)

Humans may be exposed to dibenz[*a,h*]anthracene in the environment in tobacco smoke; food products such as cereals, vegetables, fruits, meats, and beverages; in the air if the home is heated with wood or coal; in some drinking water supplies; in the soils and air in the work place; and by contact with creosote-treated wood, asphalt roads, or coal tar. (ATSDR 1990)

Dibenz[*a,h*]anthracene enters the body primarily through breathing polluted air or inhaling tobacco smoke. Drinking contaminated water or accidentally swallowing soil or dust particles can also result in dibenz[*a,h*]anthracene entering the body. Dibenz[*a,h*]anthracene can be formed in food that is smoked or charcoal-broiled and can then enter the body through the digestive system. It does not normally enter the body through the skin; however, small amounts could enter the body through contact with soil containing high levels of dibenz[*a,h*]anthracene or through contact with heavy oils. (ATSDR 1990)

Dibenz[*a,h*]anthracene is a toxic chemical and has caused cancer in laboratory animals when it is ingested or applied to their skin. Because dibenz[*a,h*]anthracene causes cancer in animals, it is possible that humans exposed in the same manner could develop cancer as well. Dibenz[*a,h*]anthracene has not

been well studied, and, consequently, it is not known whether breathing it could cause cancer or other harmful effects.(ATSDR 1990)

No information is available concerning the harmful effects of dibenz[*a,h*]anthracene in humans after breathing, eating, or skin application of this substance. The levels that caused tumors in animals that ingested dibenz[*a,h*]anthracene are unclear. Skin cancer has been found in mice that had 1.2×10^{-2} mg/kg/d applied to their skin throughout their lives. It is not known whether similar levels could cause cancer in humans. (ATSDR 1990)

Indeno[1,2,3-*cd*]pyrene (BEAIS 1994)

Indeno[1,2,3-*cd*]pyrene, a crystalline solid with a chemical formula of $C_{22}H_{12}$ and a molecular weight of 276.3, is a PAH. There is no commercial production or known use of this compound. Indeno[1,2,3-*cd*]pyrene is found in fossil fuels and occurs ubiquitously in products of incomplete combustion and has been identified in soils, groundwater, and surface waters at hazardous waste sites.

No absorption data were available for indeno[1,2,3-*cd*]pyrene; however, by analogy to structurally related PAHs, primarily benzo[*a*]pyrene, it would be expected to be absorbed from the gastrointestinal tract, lungs, and skin. In vivo metabolites identified in mouse skin include the *trans*-1,2-dihydrodiol and 8- and 9-hydroxy forms of indeno[1,2,3-*cd*]pyrene. Similar metabolites were formed in vitro in rat liver microsomes.

No data were found concerning the acute, subchronic, chronic, developmental, or reproductive toxicity of indeno[1,2,3-*cd*]pyrene. Because of a lack of toxicity data, an oral RfD or inhalation RfC has not been derived.

No long-term oral or inhalation bioassays were available to assess the carcinogenicity of indeno[1,2,3-*cd*]pyrene. The compound was tested for carcinogenicity in dermal application, lung implant, s.c. injection, and i.p. injection studies. Dermal application of 0.1–0.5% solutions of indeno[1,2,3-*cd*]pyrene in acetone produced skin papillomas and carcinomas in mice. In initiation-promotion assays, indeno[1,2,3-*cd*]pyrene was active as an initiator of skin carcinogenesis. Dose-related increases of epidermoid carcinomas of the lungs were reported in rats receiving single lung implants of 0.16–4.15 mg indeno[1,2,3-*cd*]pyrene. Injection site sarcomas developed in mice given three s.c. injections of 0.6 mg indeno[1,2,3-*cd*]pyrene. The compound was not tumorigenic when newborn mice received 2.1 μmol indeno[1,2,3-*cd*]pyrene via i.p. injection.

Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned a weight-of-evidence classification of B2, probable human carcinogen, to indeno[1,2,3-*cd*]pyrene.

Methylphenols (4-Methylphenol)

Methylphenols (cresols) occur as several closely related compounds, including 2-methylphenol (ortho-cresol), 3-methyl phenol (meta-cresol), 4-methylphenol (para-cresol) and 2,4-dimethylphenol. These compounds occur naturally and are found in many foods, human and animal urine, wood and tobacco smoke, crude oil, and coal tar. Man-made methylphenols are used as disinfectants and deodorizers, to dissolve substances, and in the manufacture of other chemicals. (ATSDR 1990b)

Methylphenols are highly irritating and corrosive to tissue. Systemically, methylphenols can affect the central nervous system, liver, lungs, kidneys, gastrointestinal tract, eyes, and heart. Effects in the blood-forming system, respiratory irritation, and sclerosis of the lungs have been reported in rats exposed

for intermediate durations. No studies are available on the potential chronic, reproductive, or teratogenic effects of methylphenols. One mutagenicity study on onion root tips reports negative results for 2-methylphenol, but 4-methylphenol produced cytological abnormalities and chromosome fragmentation. In an initiation-promotion study, methylphenols have promoted the tumorigenic action of a carcinogen when applied to mouse skin (ATSDR 1990b).

Polychlorinated Biphenyls (Aroclor 1254 and Aroclor 1260)

Polychlorinated biphenyls (PCBs) are a group of man-made chemicals that contain 209 individual compounds (known as congeners); they are either oily liquids or solids and are colorless to light yellow without any known smell or taste. Seven types of PCBs mixtures include 35% of all the different PCBs commercially produced and 98% of PCBs sold in the United States since 1970. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor (i.e., Aroclor 1254, Aroclor 1260). The name Aroclor 1254 signifies that the molecule contains 12 carbon atoms (the first two digits) and approximately 54% chlorine by weight (the second two digits). Polychlorinated biphenyls do not burn easily and are a good insulating material; therefore, they have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. However, in 1977, manufacture of PCBs stopped in the United States because evidence showed that PCBs tend to build up in the environment and cause harmful effects. (ATSDR 1993)

In the past, PCBs entered the environment through their manufacture and use. Today, they can enter the environment from poorly maintained hazardous waste sites, illegal or improper dumping of PCB wastes, leaks or releases from electrical transformers containing PCBs, and disposal of PCB-containing consumer products into municipal landfills rather than into landfills designed for hazardous waste. Polychlorinated biphenyls can exist in air as both solid and liquid aerosols and as vapor that eventually returns to the land and water by settling or washout by snow or rainwater. Even extremely small amounts of PCBs can remain in water for several years, and they will bind strongly with soil and remain bonded for several years. (ATSDR 1993)

PCBs can be ingested or inhaled and can cause skin and nose irritations. Although several health effects as a result of exposure to PCBs have been seen in rats (i.e., liver damage and sometimes death after ingesting large amounts of PCBs for a short period and liver, stomach, and thyroid gland injuries; anemia; acne; and damaged reproduction organs after ingesting smaller amounts of PCBs but for a longer period), little conclusive evidence concerning the effects of PCBs on humans is available. In addition, rats that ate certain PCB mixtures throughout their lives developed liver cancers; however, it is not known if the same effects would occur in people. After inhalation exposure, workers have exhibited respiratory tract and eye irritation, coughs, and tightness of the chest, as well as gastrointestinal symptoms (anorexia, weight loss, nausea, vomiting, and abdominal pain); none of these symptoms were reported in a great quantity and therefore results are inconclusive. (ATSDR 1993)

Studies of PCB-exposed workers provide inconclusive evidence for exposure-related cancer; however, an excess risk of cancer of the liver, biliary tract, and gall bladder has been reported in workers in two capacitor plants where PCB mixtures are commonly used. The International Agency for Research on Cancer has determined that PCBs are *probably* carcinogenic to humans, and the EPA has determined that PCBs are probable human carcinogens. (ATSDR 1993)

E1.3 RADIONUCLIDES

Radionuclides are unstable atoms of chemical elements that will emit charged particles to achieve a more stable state. These charged particles are termed "alpha and beta radiation" and "neutral gamma rays." Interaction of these charged particles (and gamma rays) with matter will produce ionization events, or radiation, which may cause living cell tissue damage. Because the deposition of energy by ionizing radiation is a random process, sufficient energy may be deposited (in a critical volume) within a cell and result in cell modification or death (ICRP 1991). In addition, ionizing radiation has sufficient energy that interactions with matter will produce an ejected electron and a positively charged ion (known as free radicals) that are highly reactive and may combine with other elements, or compounds within a cell, to produce toxins or otherwise disrupt the overall chemical balance of the cell (EPA 1991d). These free radicals can also react with deoxyribonucleic acid, causing genetic damage, cancer induction, or even cell death.

Radionuclides are characterized by the type and energy level of the radiation emitted. Radiation emissions fall into two major categories: particulate (electrons, alpha particles, beta particles, and protons) or electromagnetic radiation (gamma and x rays) (ATSDR 1989b). Therefore, all radionuclides are classified by the EPA as Group A carcinogens based on their property of emitting ionizing radiation and on the extensive weight of evidence provided by epidemiological studies of humans with cancers induced by high doses of radiation. Alpha particles are emitted at a characteristic energy level for differing radionuclides. The alpha particle has a charge of +2 and a comparably large size. Alpha particles have the ability to react (and/or ionize) with other molecules, but they have very little penetrating power and lack the ability to pass through a piece of paper or human skin. However, alpha-emitting radionuclides are of concern when there is a potential for inhalation or ingestion of the radionuclide. Alpha particles are directly ionizing and deposit their energy in dense concentrations [termed high linear energy transfer (high LET)], resulting in short paths of highly localized ionization reactions. The probability of cell damage increases as a result of the increase in ionization events occurring in smaller areas; this may also be the reason for increased cancer incidence caused by inhalation of decay products of radon gas. In addition, the cancer incidence in smokers may be directly attributed to the naturally occurring alpha emitter ^{210}Po in common tobacco products (Hammonds and Hoffman 1992).

Beta emissions generally refer to beta negative particle emissions. Radionuclides with an excess of neutrons achieve stability by beta decay. Beta radiation, like alpha radiation, is directly ionizing, but, unlike alpha activity, beta particles deposit their energy along a longer track length (low-LET), resulting in more space between ionization events (Hammonds and Hoffman 1992). Beta-emitting radionuclides can cause injury to the skin and superficial body tissue but are most destructive when inhaled or ingested. Many beta emitters are similar chemically to naturally occurring essential nutrients and will therefore tend to accumulate in certain specific tissues. For example, ^{90}Sr is chemically similar to calcium and, as a result, accumulates in the bones, where it causes continuous exposure. The health effects of beta particle emissions depend upon the target organ. Those seeking the bones would cause a prolonged exposure to the bone marrow and affect blood cell formation, possibly resulting in leukemia, other blood disorders, or bone cancers. Those seeking the liver would result in liver diseases or cancer, while those seeking the thyroid would cause thyroid and metabolic disorders. In addition, beta radiation may lead to damage of genetic material, causing hereditary defects.

Gamma emissions are the energy that has been released from transformations of the atomic nucleus. Gamma emitters and x rays behave similarly but differ in their origin: gamma emissions originate in nuclear transformations, and x rays result from changes in the orbiting electron structure. Radionuclides that emit gamma radiation can induce internal and external effects. Gamma rays have high penetrating

ability in living tissue and are capable of reaching all internal body organs. Without such sufficient shielding as lead, concrete, or steel, gamma radiation can penetrate the body from the outside and does not require ingestion or inhalation to penetrate sensitive organs. Gamma rays are characterized as low-LET radiation, as is beta radiation; however, the behavior of beta radiation differs from that of gamma radiation in that beta particles deposit most of their energy in the medium through which they pass, while gamma rays often escape the medium because of higher energies, thereby creating difficulties in determining actual internal exposure. For this reason, direct whole-body measurements are necessary to detect gamma radiation, while urine/fecal analyses are usually effective in detecting beta radiation (Hammonds and Hoffman 1992).

People receive gamma radiation continuously from naturally occurring radioactive decay processes going on in the earth's surface, from radiation naturally occurring inside their bodies, from the atmosphere as fallout from nuclear testing or explosions, and from space or cosmic sources. Cesium-137 (from nuclear fallout) decays to ^{137}Ba, the highest contributor to fallout-induced gamma radiation (NCRP 1977). Beta radiation from the soil is a less penetrating form of radiation but has many contributing sources. Potassium-40, ^{137}Cs, ^{214}Pb, and ^{214}Bi are among the most common environmental beta emitters. Tritium is also a beta emitter but contributes little to the soil beta radiation because of the low energy of its emission and its low concentration in the atmosphere (NCRP 1977). Alpha radiation is also emitted by the soil but is not measurable more than a few centimeters from the ground surface. The majority of alpha emissions are attributable to ^{222}Rn and ^{220}Rn and their decay products (NCRP 1977). This contributes to what is called background exposure to radiation (ATSDR 1989b).

The general health effects of radiation can be divided into stochastic (related to dose) and nonstochastic (not related to dose) effects. The risk of development of cancer from exposure to radiation is a stochastic effect. Examples of nonstochastic effects include acute radiation syndrome and cataract formation, which occur only at high levels of exposures (Killough and Eckerman 1983).

Radiation can damage cells in different ways. It can cause damage to genetic material within the cell, and the cell either may not be able to recover from this type of damage or may survive but function abnormally. If an abnormally functioning cell divides and reproduces, a tumor or mutation in the tissue may develop. The rapidly dividing cells that line the intestines and stomach and the blood cells in bone marrow are extremely sensitive to this damage. Organ damage results from the damage caused to the individual cells. This type of damage has been reported with doses of 10 to 500 rads (0.1 to 5.0 gray, in SI units). Acute radiation sickness is seen only after doses of >50 rads (0.5 gray), which is a dose rate usually achieved only in a nuclear accident (ATSDR 1989b).

When the radiation-damaged cells are reproductive cells, genetic damage can occur in the offspring of the person exposed. The developing fetus is especially sensitive to radiation. The type of malformation that may occur is related to the stage of fetal development and the cells that are differentiating at the time of exposure. Radiation damage to children exposed in the womb is related to the dose the pregnant mother receives. Mental retardation is a possible effect of fetal radiation exposure (ATSDR 1989b).

The most widely studied population that has had known exposure to radiation is the atomic bomb survivors of Hiroshima and Nagasaki, Japan. Data indicate an increase in the rate of leukemia and cancers in this population. However, the rate at which cancer incidence is significantly affected by low radiation exposures, such as results of exposure to natural background and industrially contaminated sites, is still undergoing study and is uncertain (Hammonds and Hoffman 1992). In studies conducted to determine the rate of cancer and leukemia increase, as well as genetic defects, several radionuclides must be considered.

Cesium-137

Cesium-137, a product of nuclear fission reactions, has a radioactive half-life of 30.2 years (Kocher 1981). In ~95% of the radioactive decay, ^{137}Cs emits a beta particle with a maximum energy of 0.514 MeV (Turner 1986) and is transformed to the metastable state of ^{137m}Ba. Barium-137m then decays 90% of the time by emitting a 0.662-MeV gamma ray.

The primary sources of contamination from ^{137}Cs at the ORR are the effluent streams from research reactors and seepage from burial grounds used to store radioactive wastes. In aquatic media, ^{137}Cs tends to accumulate in the sediment. However, uptake may also occur in fish and other biota. In the Clinch/Tennessee River environment, the primary routes of human exposure are external exposure to gamma rays from the decay of ^{137m}Ba in near-shore sediment and ingestion of ^{137}Cs in fish.

Cesium-137 entering the human body via ingestion behaves similarly to potassium. It is rapidly and almost completely absorbed from the GI tract and is distributed uniformly throughout the body (ICRP 1990). Because of its relatively short metabolic half-life (110 d), an acute dose of ^{137}Cs is almost completely excreted in the urine within a year of the initial exposure. However, when considering a potentially long-term (chronic) exposure, ^{137}Cs would always be present in the body.

The SF for ingestion of ^{137}Cs and its daughter products is 7.6×10^{-10} (risk/Bq), the SF for the inhalation of airborne ^{137}Cs and its daughters is 5.1×10^{-10} (risk/Bq), and the SF for the external exposure to ^{137}Cs and its daughters is 5.4×10^{-5} (risk/year per Bq/g soil).

Cobalt-60

Cobalt-60 is produced in nuclear reactors from neutron activation of stable cobalt atoms. These cobalt atoms are present as a corrosion impurity in the water used as the primary reactor coolant of the reactor (Eichholz 1983). Cobalt-60 has a radioactive half-life of 5.27 years and decays by emitting a 0.314-MeV beta particle and two gamma rays exhibiting energies of 1.33 and 1.17 MeV (Kocher 1981). Cobalt-60 enters the environment surrounding the ORR from the effluent streams from research reactors and seepage from burial grounds used to store radioactive wastes. Important routes of human exposure for ^{60}Co include external exposure resulting from high-energy gamma rays emitted from near-shore sediment and ingestion of contaminated fish, produce, and water. Internally absorbed ^{60}Co is assumed to be uniformly distributed throughout the body. The SFs for ^{60}Co are found in Table 5.8.

Strontium-90 (BEIAS 1994)

Strontium-90 is a radioactive isotope of strontium that is produced in nuclear fission. It is a low-energy β emitter with a physical half-life of approximately 28 years. In the environment, it is accompanied by its decay product, ^{90}Y, also a β emitter.

Metabolically, strontium is an analog of calcium. Strontium-90 is rapidly absorbed from the gastrointestinal tract or the lung into the bloodstream and is subsequently deposited in bone. Retention in the bone is long term, with yearly loss of the existing burden in adults of 7.5% from cortical bone and 30% from trabecular bone.

Oral intake at high levels of activity results in β irradiation of target organs and nearby tissues. At high exposures, death results from radiation-induced hemorrhagic syndrome; at lower exposures, death results from destruction of the bone marrow. As survival times increase at lower administered activities, these effects are accompanied by neoplasms. Oral administration to miniature swine at 115×10^6 Bq/d resulted

in radiation-induced hemorrhagic syndrome and death within 4 months. Lower intakes, 4.62×10^6 to 0.037×10^6 Bq/d induced effects on the hematopoietic system ranging from pancytopenia to neutropenia. Mean survival times were decreased in all exposure groups. Subchronic exposures (5.6×10^4 to 133×10^4 Bq/d) also resulted in cytopenias in beagle dogs. Median survival times were reduced, particularly at the two highest exposures. Doses in the latter study were estimated at 22.5 to 107 Gy. In a three-generation study of miniature swine, no effects were noted on litter size, the percentage of stillborn, or birth weight when dams received life-shortening exposures. The EPA has not calculated subchronic or chronic oral RfDs for radionuclides.

Inhalation of soluble forms of ^{90}Sr at high activity levels resulted in early death of beagle dogs from bone marrow hypoplasia, panleukocytopenia, terminal hemorrhage, and bacterial infection. Long-term bone burdens of 17×10^6 to 41×10^6 Bq were calculated. Acute pulmonary effects observed in mice exposed to high activity levels of insoluble ^{90}Sr were radiation pneumonitis and pulmonary fibrosis. The dose lethal to 50% of animals was 370 Gy. The EPA has not calculated subchronic or chronic inhalation RfCs for radionuclides.

The primary effect in animals surviving acute effects of ^{90}Sr exposure is neoplasia of bone and bone-related tissues. Soft tissue carcinomas in tissues near the bone were also observed above control levels. Chronic ingestion in beagle dogs and miniature swine also produced a high incidence of myeloproliferative disease, including frank leukemia. Orally administered activity levels of 0.1×10^4 to 133×10^4 Bq/d to beagle dogs, beginning in utero and continuing to 540 days of age induced primary bone sarcomas and myeloproliferative disorders at activity levels of $\geq 5.6 \times 10^4$ Bq/d. Bone sarcomas and hematopoietic neoplasms were induced in F_1 and F_2 generations of miniature swine that chronically ingested 4.62×10^6 Bq/d or 23.1×10^6 Bq/d. These generations were exposed in utero and gradually raised to the treatment level by 6 months of age. At higher exposure activities, mean survival time was drastically reduced (to less than tumor induction time); at lower exposure activities, 0.037×10^6 to 0.925×10^6 Bq/d, no bone sarcomas were observed, and survival times were increased to approximately that of controls.

The primary effect in adult beagle dogs administered ^{90}Sr in a single inhalation exposure and surviving more than 2 years was an excess of bone tumors. This effect was induced in dogs with long-term retained bone burdens of $\geq 1.0 \times 10^6$ Bq/kg.

Bone tumors were induced in two of seven adult monkeys administered ^{90}Sr by gavage (NCRP 1991), in adult beagle dogs administered ^{90}Sr by intravenous injection, and in mice administered ^{90}Sr by i.p. injection. Soft tissue sarcomas in tissues near the bone were observed in the beagle dogs. No tumors were observed over a 20-year period in young and adult Rhesus monkeys administered a single injection at activity levels of 0.13×10^6 to 6.21×10^6 Bq.

The EPA has classified all radionuclides as Group A carcinogens based on their property of emitting ionizing radiation and on the weight of evidence provided by epidemiological studies of radiation-induced tumors in humans. An SF of 8.9E-10 (risk/Bq) was calculated for oral ingestion. The combined oral SF for strontium-90 and yttrium-90 is 9.7E-10 (risk/Bq). For inhalation exposure, the SF for ^{90}Sr is 1.5E-09 (risk/Bq); the combined inhalation SF for ^{90}Sr plus ^{90}Y is 1.7E-09 (risk/Bq). Because of their low penetration ability, external exposures (risk/year per Bq/g soil) for ^{90}Sr and ^{90}Sr plus ^{90}Y are both 0.0E+00.

E2. UNCERTAINTY ANALYSIS: DESCRIPTION OF METHODS

E2.1 INTRODUCTION

This appendix focuses on a quantitative uncertainty analysis of (1) the potential detriment associated with the ingestion of selected radionuclides and chemicals as a result of human consumption of contaminated fish, and (2) the potential detriment associated with the dredging of deep sediment from the Clinch River and Poplar Creek. Parameter uncertainties are estimated and incorporated into the quantitative uncertainty analyses of human health risks. The equations used for assessing the risk of the fish ingestion pathway and the dredging scenario are presented in the following sections of this introduction. The uncertainties involved with the fish ingestion pathway are presented in Sect. E.2, and the uncertainties involved with the dredging scenario are discussed in Sect. E.3.

E2.1.1 Background on USEPA Methods for Risk Assessment for Ingestion of Fish

For a baseline risk assessment, the USEPA (1989) uses the following equation for determining the lifetime risk of excess cancer from ingesting radionuclides:

$$LR_{rad} = C \cdot I \cdot ED \cdot EF \cdot DCF \cdot RCF \qquad \text{(E.1)}$$

where,

Lr_{rad} = excess lifetime cancer risk from radionuclides (unitless),
C = concentration in the contaminated medium (Bq/kg),
I = estimated intake of the contaminated medium (kg/d),
ED = exposure duration (30 years),
EF = exposure frequency (350 days/year),
DCF = dose conversion factor for the radionuclide of interest (Sv/Bq),
and RCF = risk conversion factor (0.073/Sv) (ICRP 1991; NCRP 1993a).

The generic equations used in USEPA methods for determining the risk from chemicals are different for non-carcinogens and carcinogens. For non-carcinogens a quantity called the Hazard Quotient (HQ) is calculated for each chemical using the following formula.

$$HQ = \frac{C \cdot I \cdot ED \cdot EF}{BM \cdot AT \cdot RfD} \qquad \text{(E.2)}$$

where,

HQ = hazard quotient (unitless),
C = concentration in the contaminated medium (mg/kg),
I = estimated intake rate of the contaminant (kg/d),
ED = exposure duration (years),
EF = exposure frequency (350 d/year),
BM = body mass (70 kg),
AT = averaging time (d),
and RfD = reference dose for the chemical of interest (mg/kg/d).

If the HQ is below 1, then it is highly unlikely that chronic exposure to the chemical would lead to a health effect. If the HQ is greater than unity, remediation of the area may be warranted. The HQs for

various chemicals are summed for each exposure pathway to obtain a Hazard Index (*HI*) for a given area (USEPA 1989).

For carcinogenic chemicals, a lifetime cancer risk is calculated from the following formula.

$$LR_{chem} = \frac{C \cdot I \cdot ED \cdot EF \cdot SF}{BM \cdot AT} \qquad \text{(E.3)}$$

where,

Lr_{chem} = excess lifetime cancer risk from chemicals (unitless),
C = concentration in the contaminated medium (mg/kg),
I = estimated intake of the contaminated medium (kg/d),
ED = exposure duration (30 years),
EF = exposure frequency (350 d/year),
SF = slope factor (or cancer potency factor) for the chemical of interest [$(mg/kg/d)^{-1}$],
BM = body mass (70 kg),
and AT = averaging time (25,550 d = 70 years).

A primary difference in evaluating risk between non-carcinogens and carcinogens is the threshold and no threshold assumption, respectively. For non-carcinogens, toxic effects occur after an exposure above a certain threshold value has occurred. It is assumed that any exposure below this threshold has no detrimental effect to the organism. For carcinogens, however, it is assumed that there is no threshold below which a risk is assumed to be zero. A carcinogen is defined as a substance for which any exposure results in a potential excess cancer risk.

These equations yield point estimates of the risks which obscure the inherent uncertainty in the calculations. If decisions concerning remediation of the contaminated area are based on point estimates, and if the true risk is either grossly overestimated or is associated with high uncertainty, the result may be inappropriate remedial efforts and/or misallocation of limited resources. Therefore, quantitative uncertainty analysis should be performed to quantify the degree of confidence in the estimate of risk. This requires analysis of the uncertainty associated with each parameter in the USEPA risk equations; the bounds of uncertainty, expressed as subjective probability distributions, must be estimated for each parameter. The term subjective probability distribution is used because of the application of judgment in the absence of relevant site specific data.

E2.1.2 Background for the Risk Assessment of the Dredging Scenario

The following equations were used in the analysis of the potential detriment resulting from contamination in the deep sediment of the Clinch River and Poplar Creek.

Ingestion of leafy vegetables:

$$HQ_{l,wg} = \frac{C_{sed} \cdot B_{v,leafy} \cdot D_l \cdot I_{wg,leafy} \cdot FI_{wg} \cdot EF_{wg} \cdot ED}{BW \cdot AT \cdot RfD} \qquad \text{(E.4)}$$

where,

$Hq_{l,veg}$ = hazard quotient from leafy-vegetable ingestion (unitless),

C_{sed} = concentration of the contaminant in the dredged sediment (mg/kg),
$B_{v,leafy}$ = soil-plant uptake factor (unitless, fresh weight),
D_l = sediment dilution factor (unitless),
$I_{veg,leafy}$ = ingestion of leafy-vegetables (kg/year, fresh weight)
Fi_{veg} = fraction of vegetable ingestion that is from the contaminated site (unitless),
Ef_{ing} = exposure frequency (unitless),
ED = exposure duration (years),
BW = body weight (kg),
AT = averaging time (d),
and RfD = oral reference dose (mg/kg/d).

Ingestion of non-leafy vegetables:

$$HQ_{nl,veg} = \frac{C_{sed} \cdot B_{v,non\text{-}leafy} \cdot D_l \cdot I_{veg,nleafy} \cdot FI_{veg} \cdot EF_{ing} \cdot ED}{BW \cdot AT \cdot RfD} \quad \text{(E.5)}$$

where,
$Hq_{nl,veg}$ = hazard quotient from non-leafy vegetable ingestion (unitless),
C_{sed} = concentration of the contaminant in the dredged sediment (mg/kg),
$B_{v,non\text{-}leafy}$ = soil-plant uptake factor (unitless, fresh weight),
D_l = sediment dilution factor (unitless),
$I_{veg,nleafy}$ = ingestion of non-leafy vegetables (kg/year, fresh weight)
Fi_{veg} = fraction of vegetable ingestion that is from the contaminated site (unitless),
Ef_{ing} = exposure frequency (unitless),
ED = exposure duration (years),
BW = body weight (kg),
AT = averaging time (d),
and RfD = oral reference dose (mg/kg/d).

Ingestion of milk:

$$HQ_{milk} = \frac{C_{sed} \cdot B_{v,past} \cdot D_l \cdot Q_m \cdot FI_Q \cdot F_m \cdot I_{milk} \cdot FI_{milk} \cdot EF_{ing} \cdot ED}{BW \cdot AT \cdot RfD} \quad \text{(E.6)}$$

where,
Hq_{milk} = hazard quotient from milk ingestion (unitless),
C_{sed} = concentration of the contaminant in the dredged sediment (mg/kg),
$B_{v,past}$ = soil-plant uptake factor (unitless, dry weight),
Q_m = ingestion of pasture by dairy cow (kg/d),
FI_Q = fraction of the pasture ingestion that is from the contaminated source (unitless),
F_m = milk transfer coefficient (d/L),
D_l = sediment dilution factor (unitless),
I_{milk} = ingestion of milk (L/year)
Fi_{milk} = fraction of the milk ingestion that is from the contaminated source (unitless),
Ef_{ing} = exposure frequency (unitless),
ED = exposure duration (years),

BW = body weight (kg),
AT = averaging time (d),
and RfD = oral reference dose (mg/kg/d).

Ingestion of meat:

$$HQ_{meat} = \frac{C_{sed} \cdot B_{v,past} \cdot Q_f \cdot FI_Q \cdot F_f \cdot D_l \cdot I_{meat} \cdot FI_{beef} \cdot EF_{ing} \cdot ED}{BW \cdot AT \cdot RfD} \quad \text{(E.7)}$$

where,
Hq_{meat} = hazard quotient from meat ingestion (unitless),
C_{sed} = concentration of the contaminant in the dredged sediment (mg/kg),
$B_{v,past}$ = soil-plant uptake factor (unitless, dry weight),
Q_f = ingestion of pasture by beef cow (kg/d),
FI_Q = fraction of the pasture ingestion that is from the contaminated source (unitless),
F_f = meat transfer coefficient (d/kg),
D_l = sediment dilution factor (unitless),
I_{meat} = ingestion of meat (kg/year)
Fi_{beef} = fraction of the beef ingestion that is from the contaminated source (unitless),
ED = exposure duration (years),
Ef_{ing} = exposure frequency (unitless),
BW = body weight (kg),
AT = averaging time (d),
and RfD = oral reference dose (mg/kg/d).

External Exposure from Radionuclides:

$$LR_{ext(out)} = C_{sed} \cdot D_l \cdot \left(1 - \frac{e^{-\lambda_{eff} ED}}{\lambda_{eff}}\right) \cdot \rho_{soil} \cdot P_{out} \cdot EF_{ext} \cdot DCF_{ext} \cdot RCF \quad \text{(E.8)}$$

where,
$Lr_{ext(out)}$ = excess lifetime cancer risk from radionuclide exposure (unitless),
C_{sed} = concentration of the contaminant in the dredged sediment (Bq/kg),
D_l = sediment dilution factor (unitless),
λ_{eff} = loss rate from radioactive decay and from harvesting/leaching ($year^{-1}$),
ED = exposure duration (years),
Ef_{ext} = exposure frequency (unitless),
ρ_{soil} = soil density (kg/m^3),
P_{out} = percent of time spent outdoors (unitless),
DCF_{ext} = external dose rate conversion factor for a contaminated soil depth of 15 cm (Sv/year per Bq/m^3),
and RCF = risk conversion factor (Sv^{-1}).

E2.2 DESCRIPTION OF PARAMETER UNCERTAINTY IN THE FISH INGESTION PATHWAY

The subjective probability distributions used for each of the uncertain parameters in the risk assessment equations reflect the degree of belief that the true, but unknown, value for each parameter does not exceed a specified value for that parameter. Where data are limited, but uncertainty is relatively low (less than a factor of 10), a range is used to specify a uniform distribution. If there is knowledge about a most likely value or midpoint, in addition to a range, a triangular distribution is assigned. When the range of uncertainty exceeds a factor of 10, a log-uniform or log-triangular distribution is often used. The use of normal, log-normal, or empirical distributions is usually based on fits to available data. Piece-wise uniform or log-uniform distributions can also be used and are especially common when eliciting subjective judgment from a group of experts (IAEA 1989). Other distribution types suitable for Monte Carlo analysis include the gamma, beta, Poisson, Weibull, and a variety of discrete distributions (Decisioneering, Inc. 1994; Palisade Corp. 1991).

In this section, the uncertainty associated with the contaminant concentration in fish is discussed first, followed by discussion of exposure factors that are independent within a class (radionuclides, non-carcinogenic chemicals, and carcinogenic chemicals) of contaminants which include the daily intake, the exposure frequency, the exposure duration, the body mass, and the averaging time. Additional topics discussed in this section are the uncertainties involved with radionuclide specific parameters, the dose conversion factors and the risk conversion factor, and with chemical specific parameters, the slope factors and the reference doses. The subjective probability distributions and uncertainty ranges for all of the parameters used in the fish ingestion pathway except the concentrations of the contaminants in fish are summarized in Table E.58.

Table E.58. List of assumptions for the parameters used in the uncertainty analysis of the fish ingestion pathway

Parameter	Distribution	Minimum	Central Value	Maximum	Units
ED, carcinogens	Constant	---	30	---	years
ED, non-carc.	Constant	---	1	---	year
EF	Constant	---	350	---	days/year
$I_{m,\ adult}$	Triangular	0.113	0.230[a]	0.454	kg/fish-meal
$I_{m,\ child}$	Uniform	0.025	---	0.1	kg/fish-meal
$I_{f,}$ non-carc.	Log-Uniform	0.033	---	0.571	fish-meal/d
$I_{f,}$ carc.	Log-Uniform	0.033		0.286	fish-meal/d
AT, carcinogens	Constant	---	25,550	---	d
AT, non-carc.	Constant	---	365	---	d
Body Mass, adult	Constant	---	70	---	kg
Body Mass, child	Constant	---	20	---	kg
RfD, chlordane	Log-Triangular	6.0E-06	6.0E-05[a]	1.9E-03	mg/kg/d
RfD, MeHg	Log-Uniform	3.0E-05	---	9.5E-04	mg/kg/d
RfD, Aroclor-1254	Log-Uniform	2.0E-05	---	3.5E-04	mg/kg/d
SF, chlordane	Triangular	0	1.3[a]	5	$(mg/kg/d)^{-1}$
SF, Aroclor-1260	Triangular	0	7.7[a]	10	$(mg/kg/d)^{-1}$
$DCF_{ing,}$ Cs-137	Log-Triangular	7.0E-09	1.4E-08[a]	2.8E-08	Sv/Bq
RCF	Log-Triangular	0.018	0.073[a]	0.292	risk/Sv

[a] mode.

E2.2.1 Concentration in Fish (*C*)

For this uncertainty analysis, only those concentrations where at least one measurement per reach (a section of the river or reservoir) was above detection limits are considered. The uncertainty bounds on the estimated arithmetic mean concentration were quantified for each selected contaminant in each reach. A distribution was obtained that represents the subjective uncertainty of the estimated arithmetic mean concentration. The following equation was used to estimate the uncertainty factor for the arithmetic mean concentrations.

$$UF_{mean} = \frac{UCL_{mean}}{\bar{X}_{est}} \qquad \text{(E.9)}$$

where,

Uf_{mean} = the uncertainty factor for the arithmetic mean,
UCL_{mean} = the 95% upper confidence limit on the mean,
and $_{est}$ = the arithmetic mean.

E2.2.1.1 Radionuclide concentrations

The selected radionuclide for this uncertainty analysis is Cs-137. The values for the arithmetic mean concentration of Cs-137 and the (upper confidence limit) UCL on the mean were obtained for Clinch River and Poplar Creek and are summarized by species in Table E.59. A uniform distribution was used to represent the uncertainty of the estimated arithmetic mean concentration for the radionuclide presented in Table E.59. The maximum value for the uniform distribution was set at the 95% UCL on the arithmetic mean, and the minimum value for the distribution was obtained by dividing the estimated arithmetic mean by the uncertainty factor. These values are also presented in Table E.59. By using this method to obtain the uncertainty range on the mean concentration, there is high confidence that the true mean will be between the (lower confidence limit) LCL and the UCL.

Table E.59. Summary statistics and estimates of uncertainty for radionuclide contaminant concentrations in largemouth bass of reach 2

Species	Radionuclide	Units	Ratio of detects to total samples	Estimated Mean	UCL mean	LCL est.
Largemouth bass	Cs-137	Bq/kg	8/8	2.4E+02	7.1E+02	8.3E+01

E2.2.1.2 Chemical concentrations

The selected chemical contaminants for this uncertainty analysis are mercury, chlordane, Aroclor-1254, and Aroclor-1260. Of these chemicals, mercury and Aroclor-1254 are non-carcinogens, chlordane is both a non-carcinogen and a carcinogen, and Aroclor-1260 is a carcinogen. A non-carcinogen is defined as a substance for which a toxic reaction results from exceeding a threshold level of exposure. A carcinogen is a substance that may cause cancer at any level of exposure. Carcinogens are classified according to the evidence of their carcinogenicity. Radionuclides are classified as "A" which denotes there is ample evidence derived from human epidemiological data. PCBs and chlordane are classified as "B2" carcinogens which implies no information from humans and all data comes from animals (USEPA 1988a).

Non-carcinogens. The values for the estimated arithmetic mean concentration and the UCL on the mean were obtained for the Clinch River and Poplar Creek and are summarized for chlordane, mercury, and Aroclor-1254 in Table E.60. The UCL concentrations and LCL concentrations were calculated as described in the previous section and are also presented in Table E.60. As with the radionuclide contaminants, a uniform distribution, for the interval between the lower and upper confidence limits, was used to represent the uncertainty of the arithmetic mean concentrations except for chlordane (reach 1, catfish and reach 4, S/H Bass) and PCB-1254 (reach 1, catfish) which has an uncertainty range greater than one order of magnitude. Due to the large degree of uncertainty in the estimate of the mean concentration, a log-uniform distribution was used.

Table E.60. Summary statistics and estimates of uncertainty for select non-carcinogenic contaminant concentrations (mg/kg) in fish where at least one measurement was above the detection limits

Fish	Contaminant	Reach	Ratio of detects to total samples	Estimated Mean	LCLest.	UCLmean
Bluegill	Mercury	3	64/67	4.1E-01	3.6E-01	4.6E-01
		4	40/59	1.5E-01	1.2E-01	1.9E-01
LMB[a]	Mercury	2	26/34	2.7E-01	1.8E-01	3.9E-01
		3	36/36	6.2E-01	5.1E-01	7.5E-01
		4	40/48	3.1E-01	2.0E-01	3.4E-01
	Chlordane	2	21/26	2.7E-01	1.8E-01	3.9E-01
		3	27/29	7.2E-02	6.7E-02	7.8E-02
		4	49/50	7.0E-02	6.6E-02	7.3E-02
	PCB-1254	2	16/26	1.6E-01	1.0E-01	2.5E-01
		3	27/29	3.3E-01	2.5E-01	4.3E-01
		4	49/50	2.0E-01	1.7E-01	2.3E-01
Catfish	Mercury	4	19/25	2.6E-01	1.7E-01	3.9E-01
	Chlordane	1	7/11	2.4E-01	9.2E-02	6.2E-01
		2	37/42	2.0E-01	1.5E-01	2.5E-01
		3	67/67	8.6E-02	7.9E-02	9.4E-02
		4	91/92	1.2E-01	1.1E-01	1.3E-01
	PCB-1254	1	11/11	9.8E-02	5.8E-02	1.6E-01
		2	37/38	6.7E-01	4.6E-01	9.6E-01
		3	64/64	3.2E-01	2.5E-01	4.1E-01
		4	88/92	6.0E-01	4.6E-01	7.9E-01
S/H Bass[b]	Chlordane	2	15/15	1.4E-01	1.3E-01	1.5E-01
		4	15/15	1.0E-01	9.3E-02	1.1E-01
	PCB-1254	2	15/15	5.6E-01	5.1E-01	6.1E-01
		4	15/15	4.5E-01	4.1E-01	5.0E-01

[a] LMB = largemouth bass.
[b] S/H Bass = Includes Striped bass, white bass, and hybrid of the two species.

Carcinogens. The estimated arithmetic mean concentrations and the UCLs on the mean for Aroclor-1260 and chlordane were also obtained for the Clinch River and Poplar Creek. These concentrations are summarized in Table E.61. The UCL concentrations and LCL concentrations were calculated as described in Sect. E.2.1 and are also presented in Table E.61.

Table E.61. Summary statistics and estimates of uncertainty for select carcinogenic chemical contaminant concentrations (mg/kg) in fish where at least one measurement was above the detection limits

Reach	Species	Contaminant	Ratio of detects to total	Estimated Mean	UCLmean	LCLest.
1	Catfish	Aroclor-1260	11/11	2.9E-01	4.1E-01	2.1E-01
	Catfish	Chlordane	7/11	2.4E-01	6.2E-01	9.2E-02
2	LMB	Aroclor-1260	16/26	1.6E-01	2.5E-01	1.1E-01
	Catfish	Aroclor-1260	42/42	1.0E+00	1.3E+00	8.3E-01
	S/H Bass	Aroclor-1260	15/15	3.9E-01	4.4E-01	3.4E-01
3	LMB	Aroclor-1260	27/29	3.4E-01	5.0E-01	2.2E-01
	Catfish	Aroclor-1260	69/69	7.0E-01	8.4E-01	5.9E-01
4	LMB	Aroclor-1260	48/50	2.0E-01	2.4E-01	1.7E-01
	Catfish	Aroclor-1260	91/92	8.5E-01	1.0E+00	7.0E-01
	S/H Bass	Aroclor-1260	15/15	7.0E-01	7.8E-01	6.2E-01

[a]A log-uniform distribution was used for this concentration.

As with the previously discussed contaminants, a uniform distribution was used to represent the uncertainty in the estimate of the arithmetic mean concentrations except for the chlordane concentration in catfish for Reach 1 which has an uncertainty range greater than one order of magnitude. Due to the large degree of uncertainty in the estimate of the mean concentration, a log-uniform distribution was used.

E2.2.2 Exposure Factors Independent of the Contaminant Type

Five exposure factors are used in the risk assessment models which are independent of specific radionuclides and chemicals: fish ingestion (daily intake) (*I*), exposure frequency (*EF*), exposure duration (*ED*), body mass (*BM*), and averaging time (*AT*). The subjective uncertainty bounds and probability distributions for these parameters were chosen such that the true but unknown value pertaining to the maximally exposed individual lies within the interval. Meetings were held with individuals having knowledge of these factors to discuss the uncertainty ranges for the parameters presented in this section. A literature review and moderate knowledge of the local behavior were used to determine the best estimate of uncertainty for each of these parameters.

E2.2.2.1 Fish ingestion (I), kg/d

The fish ingestion rate was defined in the following manner:

$$I = I_m \cdot I_f \qquad \text{(E.10)}$$

where,

I_m = the mass of fish consumed per meal (kg/fish-meal)

and I_f = the frequency of meals consisting of fish caught in the Clinch River/Poplar Creek system (fish-meal/day).

A subjective probability distribution was formulated to represent the uncertainty in each individual parameter, i.e., distributions for I_m (same for both carcinogens and non-carcinogens) and I_f (different for carcinogens and non-carcinogens) were determined.

Fish ingestion (adult), kg/fish-meal. The amount of fish eaten per meal was estimated to be 0.230 kg/fish-meal for the Clinch River/Poplar Creek system. The 95th percentile value given for fin fish by the USEPA (1989) is 0.284 kg/fish-meal, obtained from a study by Pao et al. (1982). In addition, Rupp et al. (1980) analyzed fish consumption from several surveys performed in the late 1960s to early 1970s. Perhaps the most relevant of these was a survey done in 1966–67 on the Columbia River. This survey was restricted to households with at least one fisherman, and memory recall was used to estimate the fish consumption rate over a period of one year. The average fish meal was determined to be 0.200 kg, and the maximum fish meal was estimated at 0.313 kg.

After consideration of these surveys, a triangular distribution was used to represent the subjective uncertainty for I_m. For the avid fisherman, the most likely value (the mode) was estimated at 0.230 kg/fish-meal (this corresponds to approximately one-half of a pound). The Columbia River study was used as a starting point in the consideration of a range of uncertainty because of its direct applicability to the present assessment's target individual (the avid fisherman). A meeting was held for the purpose of determining the range of uncertainty. Risk assessors felt that it was unlikely that an avid fisherman would eat more than 0.454 kg/fish-meal (approximately one pound of fish per meal) or less than 0.113 kg/fish-meal (approximately one-quarter of a pound of fish per meal). Therefore, a maximum value of 0.454 kg/fish-meal and a minimum value of 0.113 kg/fish-meal were used for the triangular distribution.

Fish ingestion (child), kg/fish-meal. A review of several publications was performed (Rupp 1979; Müller and Pröhl 1993; Yang and Nelson 1986; SAIC 1993) in order to obtain the intake of various food products by children. The subjective probability distributions derived for each of the child's intake parameters are consistent with the values reported in the reviewed literature. The uncertainty was based primarily on subjective judgment of various risk assessors. Since each value is equally likely to be the true but unknown rate of intake, a uniform distribution was used to represent the uncertainty. The lower and upper limits used for the uniform distributions are values that target the reasonably maximally exposed child. Because it is highly unlikely that the upper bounds for each rate of intake will be sampled simultaneously and since the reasonable maximum exposure (RME) should provide a conservative estimate of exposure, no correction was made for the caloric intake of a child.

The lower bound for the ingestion of fish for children was determined by assuming that a maximally exposed child would consume no less than 5 kg/year (approximately 1/2 ounce of fish every day of the year). Assuming a child will consume a fish meal each time their parents do, the value of 200 fish meals

per year can be assumed. A child will therefore consume no less than 0.025 kg/meal. The upper bound for the ingestion of fish for a child who was an avid fish lover would not consume more than 20 kg/year (approximately 2 ounces of fish every day of the year). This would be approximately 0.1 kg/meal. These values are consistent with values reported in Rupp et al. (1980) and IAEA (in press).

Frequency of fish-meals used for carcinogens. For the frequency of meals (I_f), the uncertainty was based primarily on subjective judgment of various risk assessors. Because each value was equally likely to be the true but unknown number of meals per day, a log-uniform distribution was used to represent the uncertainty. An upper bound value was determined by assuming that an avid fisherman would not consume more than two meals per week of fish caught from the Clinch River and Poplar Creek system over a thirty year period. This results in a maximum frequency of 0.286 fish-meals/day. A lower bound was formulated by assuming that a fisherman would not consume less than one meal per month of fish caught from the Clinch River and Poplar Creek system. This value translates to 12 meals/year, which closely matches the average frequency of 14 meals/year obtained in the Columbia River survey (Rupp et al. 1980). This value results in a minimum frequency value of 0.033 fish-meals/day.

Note, these estimates exclude values for subsistence fishermen who may be obtaining a major portion of their dietary requirements from fish caught in the Clinch River and Poplar Creek. At the present time, the actual number of individuals in this category is not likely to be large and will not be considered in this uncertainty analysis. The target individual in this assessment is an avid fisherman, not a subsistence fisherman.

Frequency of fish-meals used for non-carcinogens. For non-carcinogens, where toxic effects are believed to occur above a threshold exposure, the uncertainty bounds for I_f must take into account the possibility of an avid fisherman consuming a substantial amount of fish during a one-year period. An upper-bound value was determined by assuming that an avid fisherman would not consume more than four meals per week of fish caught from the Clinch River and Poplar Creek over a one year period. A lower bound was determined by assuming that a fisherman would not consume less than one meal per month. Because of the lack of site specific data, a log-uniform distribution was chosen to represent the subjective uncertainty in I_f.

The uncertainty values for the I_m and the I_f parameters for carcinogens and non-carcinogens are summarized in Table E.62.

Table E.62. Summary information for the uncertainty in the parameters used to calculate daily intake

Class	Parameter	Distribution	Minimum	Maximum	Mode
Both[a], Adult	I_m *(kg/meal)*	Triangular	0.113	0.454	0.230
Both[a], Child	I_m *(kg/meal)*	Uniform	0.025	0.1	---
Carcinogens	I_f*(meal/day)*	Log-Uniform	0.033	0.286	---
Non-Carcinogens	I_f*(meal/day)*	Log-Uniform	0.033	0.571	---

[a] Both = Carcinogens and Noncarcinogens.

E2.2.2.2 Exposure frequency (*EF*), 350 days/year

The *EF* represents the average number of days out of a year that a person is exposed to the daily intake rate. The USEPA (1991) currently recommends the use of 350 days/year. This value takes into account 2 weeks of vacation per year during which the individual will not be exposed to the contaminant/pathway being studied. For this uncertainty analysis, the reasonable maximally exposed individual (RME) is defined as an avid fisherman who is exposed at a frequency of 350 days per year.

E2.2.2.3 Exposure duration (*ED*), years

The exposure duration *(ED)* represents the number of years that an individual will be exposed to the given exposure conditions, i.e., an estimate of the projected length of time that a person will live in the area under consideration.

For all carcinogens, USEPA (1989) recommends a value of 30 years for the *ED*. For this uncertainty analysis, the RME is defined as an avid fisherman who is exposed to carcinogens for thirty years.

For non-carcinogens, immediate toxic effects from over-exposure are of primary concern. These effects typically occur when a person has ingested too much of a contaminated medium. For this uncertainty analysis, the RME is defined as an avid fisherman who is exposed to non-carcinogens for one year.

E2.2.2.4 Body mass (*BM*), kg

The "average" value for the body mass of Reference Man is 70 kg (ICRP 1975). The child body weight is defined to be 15 kg. For this uncertainty analysis, the RME is defined as the reference individual. Therefore, the body mass will not be assigned any uncertainty.

E2.2.2.5 Averaging time (*AT*), days

The averaging time is defined as the period of time over which an exposure is averaged. Because it serves as a prorating parameter (USEP 1989), the values for the averaging time were fixed for this uncertainty analysis. For non-carcinogens, the averaging time is equal to the exposure duration. Therefore, *AT* for non-carcinogens is set at 365 days. For carcinogenic substances, where the effect from a single exposure could occur several years after the received dose, the exposure is averaged over a lifetime (70 years). Therefore, *AT* for carcinogens equals 25,550 days (70 years).

E2.2.3 Radionuclide Specific Factors

E2.2.3.1 Dose conversion factor (*DCF*), Sv/Bq

The committed effective dose per unit intake is defined as the *DCF* for this report. The committed effective dose (hereafter referred to as "dose") is defined by the International Commission on Radiological Protection (ICRP 1989) as the time integral of the dose-equivalent rate in a particular tissue that is received by an individual following an intake of radioactive material into the body. A 70-year lifetime was assumed in this calculation. For an adult, a body weight corresponding to Reference Man [70 kg (ICRP 1975)] and an averaging time of 50 years (ICRP 1989; ICRP 1991; NCRP 1993a) were assumed.

Dosimetric models and the parameters that are used to determine the "dose" vary with the intake pathway, the radionuclide, age at the time of exposure, gender, etc. Recent studies have used various biokinetic data, and in some cases (such as Pu) radionuclide-specific models have been used to obtain age-dependent doses to members of the public (ICRP 1989; ICRP in press).

Recently, members of the National Council on Radiation Protection and Measurements (NCRP) scientific committee 57-16 were asked to estimate the uncertainty factors associated with the ingestion and inhalation "dose" factors for a variety of radionuclides (NCRP, in press). These uncertainty factors were estimated for the application of ICRP-30 "dose" factors and might not apply to the more recent projected factors listed in ICRP-56 (ICRP 1989) or to current revisions of the ICRP-56 values (ICRP,in press). An uncertainty factor pertaining to Cs-137 was obtained by expert judgment (Eckerman 1993). The "dose" factor for Cs-137 and its associated uncertainty factor from both sources are summarized in Table E.63.

Table E.63. Dose conversion factors for the ingestion pathway and corresponding uncertainty factors for ^{137}Cs

Contaminant	*DCF* for Ingestion[a] (Sv/Bq)	Uncertainty Factor[b] A[c]	B[d]
Cs-137	1.4E-08	2	2

[a]ICRP (in press).
[b]These uncertainty factors apply to the adult male.
[c]NCRP (in press).
[d]Eckerman (1993).

The uncertainty factor values from both sources are the same for Cs-137. The primary source of uncertainty for Cs-137 is inaccuracy in the biokinetic data used to estimate the *DCF*.

A log-triangular distribution was used to represent the subjective uncertainty in the DCF value. The *DCF* value itself was used as the mode of the triangle. The maximum value was obtained by multiplying the *DCF* by the UF, and the minimum value by dividing the *DCF* by the UF. The mode, maximum, and minimum for Cs-137 are summarized below.

Mode	=	1.4E-08
Maximum	=	2.8E-08
Minimum	=	7.0E-09

E2.2.3.2 Risk conversion factor (*RCF*)

The risk conversion factor (*RCF*) as determined by the ICRP (1991) and the NCRP (1993a) is 0.073/Sv; this value is based primarily on extensive analyses of the atomic bomb survivors in Nagasaki and Hiroshima, Japan, by such scientific bodies as the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the National Research Council of the National Academy of Sciences (NRC/NAS). The *RCF* serves as a method of predicting the excess lifetime risk for genetic defects (1.3%/Sv), dying of cancer (5%/Sv), and a weighted risk for occurrences of non-fatal cancer (1%/Sv) (ICRP 1991; NCRP 1993a). The *RCF* is defined by the ICRP's definition of "detriment" where the risk of genetic defects and occurrences of cancer incidence are weighted against the number of fatalities (ICRP 1991).

There are several sources of uncertainty in the *RCF*, but two sources tend to dominate the overall estimate of uncertainty (NCRP 1993a). These are (1) the uncertainty in the *RCF* evaluated at high dose and high dose rate exposures, and (2) the uncertainty in extrapolating the *RCF* to low dose and low dose rate exposures. Of these, the uncertainty in extrapolating to low dose and low dose rate exposures appears to be the predominant uncertainty in the *RCF* at low doses (NCRP 1993a).

An uncertainty factor of approximately 2 is recommended for the uncertainty in the *RCF* at high dose and high dose rate exposures, and a UF of greater than or equal to 2 is recommended for the uncertainty involved in the extrapolation to low doses (NCRP 1993a). The possibility of the minimum value for the *RCF* being zero cannot be excluded, due to the absence of sufficient data to allow a significant analysis of the risk for exposure at low doses (NRC/NAS 1990; NCRP 1993a). However, for this uncertainty analysis, a minimum value of zero will not be used, on the assumption that the underlying model for the risk associated with radiation exposure is correct and that a threshold dose does not exist.

Based on the above information, an uncertainty factor of 4 was used for this analysis. *A log-triangular distribution was used to represent this subjective uncertainty.* The recommended *RCF* value of 0.073/Sv was used as the mode, the maximum was determined by multiplying the *RCF* by 4, and the minimum was obtained by dividing the *RCF* by 4. These values are summarized below.

Mode	=	0.073
Maximum	=	0.292
Minimum	=	0.018

E2.2.4 Chemical Specific Factors

E2.2.4.1 Non-carcinogens — reference doses

The risk from exposure to non-carcinogens is evaluated by calculating a quantity referred to as the Hazard Quotient. The potential exposure to an individual is divided by a value called the reference dose (*RfD*) to obtain this quotient. "A *RfD* is defined as an estimate of a daily exposure level (chronic) for the human population that is likely to be without an appreciable risk of deleterious effects" (USEPA 1989). Therefore, when the *HQ* is greater than 1, further study and perhaps remediation is recommended.

The *RfD* is obtained by dividing a NOAEL, which is obtained from the analysis of a human or more often an animal data set, by an uncertainty factor and a modifying factor (USEPA 1989). An uncertainty factor of 10 is applied to protect the most sensitive population, a value of 10 is used when extrapolating from animals to humans, a value of 10 is used when a NOAEL is obtained from a subchronic study, and a factor of 10 is applied when a LOAEL is obtained instead of a NOAEL (USEPA 1989). Finally, a modifying factor is applied based on best professional judgment. The following sections will discuss the uncertainties for the methyl-mercury, chlordane, and Aroclor-1254 *RfD*s.

Methyl-mercury. The *RfD* for methyl-mercury (MeHg) is 3.0E-04 mg/kg/d, and a safety factor of 10 is reported (USEPA 1992). This value was based on an animal study that was performed in the 1950s (Canady 1993).

There have been three major outbreaks of MeHg poisoning. The first two occurred in Minamata and Niigata, Japan during the late 1950s to early 1960s and were caused by industrial release of MeHg and other mercury compounds into Minamata Bay and the Agano River (WHO 1976). Although there were numerous people affected, this study has proven ineffective in obtaining a better *RfD* because of

the inability to relate an exposure level to the observed effect (Canady 1993). The third and largest recorded outbreak occurred in Iraq during the winter of 1971–1972 (WHO 1976). The people of Iraq used wheat and other grain seed which was treated with MeHg to make bread. Excessive ingestion of this bread due to their bad economic conditions resulted in a major poisoning epidemic. Studies have been performed to relate the concentration in hair and blood to the actual exposure (USEPA 1984; WHO 1976).

The USEPA is currently reevaluating the *RfD* for MeHg based on this Iraqi data (Canady 1993). A LOAEL value from the Iraq data set which approximates the NOAEL obtained in the rat study is under review. However, this LOAEL (which would be divided by 10 to obtain a value close to the current *RfD*) occurs with severe neurological effects. Less obvious effects to the central nervous system could be occurring that are being overlooked (Canady 1993). Therefore, a lower *RfD* value may be derived by the USEPA.

In the draft update on the "Toxicological Profile for Mercury" published by the Agency for Toxic Substances and Disease Registry (ATSDR 1992), an acute Minimum Risk Level (MRL) of 4.0E-05 mg/kg/d is recommended for methyl-mercury. This is an order of magnitude lower than the currently recommended chronic *RfD*.

A log-uniform distribution is used to represent the uncertainty in the RfD. To protect against more subtle neurological effects and to incorporate the latest recommendation by the ATSDR, a minimum value was obtained by dividing the *RfD* by the safety factor of 10 (3.0E-05 mg/kg/d), and a maximum value was determined by multiplying the *RfD* by the square root of the safety factor (9.5E-04 mg/kg/d). The uncertainty range determined for the methyl-mercury *RfD* was said to be a rational way to proceed by Dr. Kenneth Reuhl (1994).

Chlordane. The *RfD* for chlordane is 6.0E-05 mg/kg/d, and a safety factor of 1000 is given (USEPA 1988b). There is only one study that is reported with significant information to derive an *RfD* for chlordane (USEPA 1988b). The *RfD* was based on an unpublished report by the Velsicol Chemical Corporation (1983) describing the results obtained from a rat study. A LOAEL of 0.055 mg/kg/d which caused a significant increase in hepatocellular necrosis (liver tumors) in males was used to derive the *RfD* (USEPA 1988b; Velsicol Chemical Corp. 1983).

The Integrated Research Information System (IRIS) which is maintained by the USEPA was consulted to obtain names of experts on the *RfD* for chlordane. Two contacts were listed: Dr. William Burnam and Dr. Eric Clegg of the USEPA. Dr. Burnam and Dr. Clegg were contacted to obtain a range of uncertainty for the chlordane *RfD*. When Dr. Burnam was asked his opinion on the bounds of uncertainty for the chlordane *RfD*, he stated that he would have no problem setting the lower limit at the *RfD* and setting the upper limit at the NOEL obtained in the rat study. He said that no effect was seen until an exposure 5 times that of the NOEL was exceeded and that the effect which was observed is a very sensitive indicator (Burnam 1994). However, Dr. Clegg suggested bounding the *RfD* by an order of magnitude on either side (Clegg 1994).

Using the limited information pertaining to the chlordane *RfD* and the statements made by two experts listed in IRIS (Burnam 1994; Clegg 1994), the following uncertainties were determined. The *RfD* was multiplied by the square root of 1000 (the safety factor) to obtain a maximum value of 1.9E-03 which is an order of magnitude lower than the NOEL. The *RfD* was divided by a factor of ten (Clegg 1994) to obtain a minimum value of 6.0E-06. The reported *RfD* was used as the most likely value to occur (mode). *Therefore, a log-triangular distribution was used to represent the uncertainty in the*

RfD for chlordane with a mode of 6.0E-05 mg/kg/d, a minimum of 6.0E-06 mg/kg/d, and a maximum of 1.9E-03 mg/kg/d.

Aroclor-1254. The RfD for Aroclor-1254 is 2.0E-05 mg/kg/d, and a safety factor of 300 is given (IRIS 1994). This RfD value was based on studies of Aroclor-1254 ingestion by female Rhesus (*Macaca mulatta*) monkeys reported by Arnold et al. (1993a); (1993b); Tryphonas et al. (1989); (1991a); and (1991b). The safety factor consists of a 10-fold factor to account for sensitive individuals, a factor of 10 to account for the use of a LOAEL instead of a NOAEL, and a factor of three to extrapolate from Rhesus monkeys to humans. A full 10-fold factor for interspecies extrapolation is not assumed to be necessary due to similarities between monkeys and humans of toxic responses and metabolism of PCBs.

Based on a study of groups of 16 adult female Rhesus monkeys ingesting gelatin capsules containing Aroclor-1254 in 1:1 glycerol: cove oil vehicle daily at doses of 0, 5, 20, 40 or 80 mg/kg/d for over five years, the following results were reported. Monkeys that ingested 0.005–0.08 mg/kg/d doses of Aroclor-1254 showed ocular exudate, prominence and inflammation of the Meibomian glands and a distortion in their nail bed formation. Accidental oral ingestion of PCBs by humans have produced similar effects. From these studies a LOAEL of 0.005 mg/kg/d was established. This information is supported by Tryphonas et al. (1989); (1991a); (1991b); Arnold (1992); Arnold et al. (1993a); (1993b); Loo et al. (1989); and Luster et al. (1992).

In another study Aroclor-1254 was fed to groups of eight female and four male adult Rhesus monkeys once daily in dosages of 0, 5, 25, or 100 mg/kg for 14 months in order to conduct a reproduction study. No treatment related effects were observed in the low-dose adults or their infants, thus indicating a NOAEL of 0.005 mg/kg/d. A 15% reduction in birth weight of infants was observed for the mid-dose infants. At two months of age, these infants had a reduced body weight of 22% below controls. Some adults receiving 25 and 100 mg/kg/d, as well as their infants, had ocular and dermal signs characteristic of PCB intoxication. Based on these effects the 0.025 mg/kg/d dosage is a LOAEL. These results are supported by Levinskas et al. (1984).

A log-uniform distribution is used to represent the uncertainty in the RfD. The RfD, 2.0E-05 mg/kg/d, was used as the minimum value of the log-uniform distribution. It is believed to be conservative enough due to its safety factor of 300 and because another study conducted on monkeys exhibited no adverse effects at dosages of 0.005 mg/kg/d. A maximum value of 3.5E-04 mg/kg/d was determined by multiplying the RfD by the square root of the safety factor. A personal conference with Jeff Swartout (1995) confirmed that the RfD was conservative enough to be used as the minimum value.

E2.2.4.2 Carcinogens — slope factors

As is assumed for radionuclides, the risk from exposure to a chemical carcinogenic substance is believed to exist no matter how small the level of exposure. This implies the absence of a threshold below which there would be no risk. The potential excess lifetime risk of cancer from exposure to carcinogens is evaluated by relating a potential dose to risk. This "conversion" is determined by applying a quantity called the Slope Factor (*SF*).

There are several sources of uncertainty associated with the derivation of these *SF*s. Some of these include accuracy of the data in "sensitive" species at high doses, the extrapolation of a response at high doses to low doses, and extrapolation from animals to humans.

The following sections describe the subjective probability distributions chosen to represent the uncertainty in the *SF*s for PCBs and chlordane.

Poly-chlorinated Biphenyls. The *SF* for PCBs is reported as 7.7 $(mg/kg/d)^{-1}$ (USEPA 1992). This value is the highest determined *SF* from three studies of Aroclor-1260 (USEPA 1988a) tested on rats. One large area of uncertainty in the *SF* for PCBs is that a rat population is exposed to a known concentration of a specific Aroclor with a certain outcome. In reality, no one knows what form the human population is exposed to because of the transformation of PCBs in the environment (Cogliano 1993). In addition, Aroclor-1260 was chosen to be representative of all of the Aroclors (USEPA 1988a). However, recent studies suggest that this assumption may not be correct (Silberhorn et al. 1990).

Aroclor-1260 has been evaluated in three separate rat studies. From these studies, *SF*s of 3.9, 5.7, and 7.7 $(mg/kg/d)^{-1}$ have been determined (USEPA 1988a). These values differ by about a factor of 1.3-1.5. A UF of 1.3 was multiplied by the reported *SF* to obtain a maximum value. Because the only significant evidence of carcinogenicity exists in rats, the possibility of Aroclor-1260 not being a carcinogen in humans can not be ignored. Therefore, *a triangular distribution with a mode of 7.7 $(mg/kg/d)^{-1}$, a minimum of 0 $(mg/kg/d)^{-1}$, and a maximum of 10 $(mg/kg/d)^{-1}$ was used to represent the uncertainty in the SF for Aroclor-1260.*

The uncertainty distribution obtained using the "boot strap" method for PCBs (Evers et al. 1994) fell within the subjective probability distributions used in this analysis.

Chlordane. The reported *SF* for chlordane is 1.3 $(mg/kg/d)^{-1}$ (USEPA 1992). As with PCBs, there is considerable uncertainty due to the transformation of chlordane in the environment.

Slope factors have been evaluated for 4 mice studies and 1 rat study (USEPA 1986). The largest *SF* obtained from the 4 mice studies was 4.7 $(mg/kg/d)^{-1}$, and the smallest *SF* was 0.3 $(mg/kg/d)^{-1}$ (USEPA 1986). The USEPA *SF* of 1.3 $(mg/kg/d)^{-1}$ was derived by taking the geometric mean of these 4 mice studies. This value compares to the *SF* of 1.1 $(mg/kg/d)^{-1}$ which was derived from the rat study (USEPA 1986).

Because the studies were done for mice and rats exposed to technical chlordane, as with PCBs, the possibility of no carcinogenic effect in humans can not be ignored. A maximum uncertainty estimate of 5 for the SF was obtained by rounding the largest *SF* derived from the mice studies. Therefore, *a triangular distribution with a mode of 1.3 $(mg/kg/d)^{-1}$, a minimum of 0 $(mg/kg/d)^{-1}$, and a maximum of 5 $(mg/kg/d)^{-1}$ was used to describe the uncertainty in the SF for chlordane.*

The uncertainty distribution obtained using the "boot strap" method for chlordane (Evers et al. 1994) fell within the subjective probability distributions used in this analysis.

E2.3 DESCRIPTION OF PARAMETER UNCERTAINTY IN THE DREDGING SCENARIO

In this section, the uncertainty associated with the dredging scenario is discussed. This scenario includes the possibility that at some time in the future deep sediments the Clinch River and Poplar Creek which are contaminated with inorganic mercury and Cs-137 could be dredged and used on a farm. Several pathways are included in this scenario: 1) ingestion of leafy vegetables grown on contaminated soil, 2) ingestion of non-leafy vegetables grown on contaminated soil, 3) ingestion of milk from a dairy cow which has eaten contaminated pasture grass, 4) ingestion of meat from a beef cow which has eaten contaminated pasture grass, and 5) for Cs-137 only, external exposure from the dredged sediment.

The subjective probability distributions used for each of the uncertain parameters in the risk assessment equations reflect the degree of belief that the true but unknown value for each parameter does

not exceed a specified value for that parameter. Uncertainties for many parameters presented in Equations E.4 through E.8 have been previously researched (Hoffman and Baes 1979; Hoffman et al. 1982). The distributions that have been recommended in the past have been adopted for this analysis if they were consistent with the findings obtained from an independent review of various reported and/or default values provided in various publications.

The uncertainty associated with the concentration in the deep sediment is discussed first, followed by discussion of exposure factors that are independent of contaminant type which include intake rate, exposure frequency, exposure duration, percent of time outdoors/indoors, shielding factor, dilution factor, fraction ingested, and soil density. The final topics discussed in this section are the uncertainties involved with radionuclide and chemical specific parameters which include the soil/plant transfer factors, the milk/meat transfer factors, loss rate from harvesting/leaching, and the reference doses. The subjective probability distributions and uncertainty ranges for all of the parameters used in the dredging scenario are summarized in Table E.64.

Table E.64. List of assumptions for the parameters used in the uncertainty analysis of the dredging scenario

Parameter	Distribution	Minimum	Mean	Maximum	Units
C_{sed}	Uniform	240	---	500	Bq/kg
λ_{HL}	Log-Triangular	2.3E-02	2.4E-02[a]	3.2E-01	$year^{-1}$
ρ_{soil}	Triangular	1100	1300[a]	1600	kg/m^3
$ED_{carc.}$	Constant	---	30	---	year
$ED_{noncarc.}$	Constant	---	1	---	year
EF_{ext}	Uniform	0.23	---	0.96	unitless
EF_{ing}	Constant	---	0.96	---	unitless
P_{out}	Uniform	0.25	---	0.60	unitless
P_{in}	Uniform	$1-P_{out}$	---	$1-P_{out}$	unitless
S_f	Uniform	0.2	---	0.8	unitless
D_l	Uniform	0.30	---	1.00	unitless
Q_m	Uniform	11	---	21	kg/d
Q_f	Uniform	8	---	16	kg/d
FI_Q	Uniform	0.5	---	0.9	unitless
$I_{veg,\ leafy}$	Uniform	10	---	85	kg/year
$I_{veg,\ non\text{-}leafy}$	Uniform	40	---	165	kg/year
I_{milk}	Uniform	80	---	400	L/year
I_{meat}	Uniform	40	---	125	kg/year
FI_{veg}	Uniform	0.3	---	1.0	unitless
FI_{milk}	Uniform	0.5	---	1.0	unitless
FI_{meat}	Uniform	0.5	---	1.0	unitless
DCF_{ing} Cs-137	Log-Triangular	7.0E-09	1.4E-08[a]	2.8E-08	Sv/Bq
RCF	Log-Triangular	0.018	0.073[a]	0.292	risk/Sv
RfD, Mercury	Log-Uniform	3.0E-05	---	9.5E-04	mg/kg-d

[a] mode.

E2.3.1 Concentration of Select Contaminants in Deep Sediment

The selected radionuclide for this uncertainty analysis is Cs-137. Using lognormal statistics, an arithmetic mean was estimated for the sediment concentration for each subreach. The estimated mean and 95% UCL on the mean obtained from this analysis for each subreach to be studied are presented in Table E.65.

Table E.65. Summary statistics and estimates of uncertainty for ^{137}Cs concentrations in deep sediment

Pathway	Reach	Units	Ratio of detects to total samples	Estimated Mean	UCL mean	LCL est.
External	2.04	Bq/kg	4/4	3.7E+02	2.7E+03	4.8E+01
	3.04	Bq/kg	3/3	2.6E+02	1.9E+03	3.4E+01
	4.03	Bq/kg	3/3	5.2E+02	7.8E+02	3.4E+02

A uniform distribution was used to represent the uncertainty of the estimated arithmetic mean concentration for Reach 4.03. The upper bound of the uniform distribution was set at the 95% UCL on the arithmetic mean, and the lower bound of the distribution was obtained by dividing the estimated arithmetic mean by the uncertainty factor obtained from Equation E.10. Log-uniform distributions were used to represent the uncertainty of the estimated arithmetic mean concentration for Reaches 2.04 and 3.04 due to the large uncertainty in the data.

The selected chemical contaminant for the uncertainty analysis of the dredging scenario is mercury. The values for the estimated arithmetic mean concentration and the UCL on the mean were obtained for the Clinch River and Poplar Creek and are summarized in Table E.66. The UCL concentrations and LCL concentrations were calculated as described in Sect. E.2.1 and are also presented in Table E.66.

Table E.66. Summary statistics and estimates of uncertainty for inorganic mercury concentrations in deep sediment

Pathway	Reach	Units	Ratio of detects to total samples	Estimated Mean	UCL mean	LCL est.
Milk	3.04	mg/kg	3/3	1.4E+01	8.0E+01	2.5E+00
Meat	3.04	mg/kg	3/3	1.4E+01	8.0E+01	2.5E+00
Vegetables	3.04	mg/kg	3/3	1.4E+01	8.0E+01	2.5E+00

A log-uniform distribution was used to represent the uncertainty of the estimated arithmetic mean concentration for all inorganic mercury analyses.

E2.3.2 Exposure Factors Independent of the Contaminant Type

Several exposure factors are used in the risk assessment models which are element independent: intake rate, exposure frequency, exposure duration, dilution factor, and fraction ingested which is contaminated. The subjective uncertainty bounds and probability distributions for these parameters were chosen such that the true but unknown value pertaining to the maximally exposed individual lies within the interval. Meetings were held to discuss the uncertainty ranges for several parameters presented in this section. A literature review and moderate knowledge of the local behavior were used to determine the best estimate of uncertainty for each of these parameters.

E2.3.2.1 Intake rates

Various ingestion rates must be considered for the agricultural pathways of the dredging scenario. The rate of pasture ingestion by dairy and beef cows must be considered for the grass-cow-milk-human

and grass-cow-meat-human pathways. In addition, the amount of leafy vegetables, non-leafy vegetables, milk, and meat that a RME will eat or drink must be evaluated. These parameters are discussed below.

Intake of pasture by dairy (Q_m) and beef cows (Q_f)

When determining the amount of pasture that a cow will eat, a dry weight basis is used. Several studies have discussed the uncertainties with the pasture ingestion of dairy and beef cows (Hoffman and Baes 1979; Hoffman et al. 1982; Shor and Fields 1980). A uniform distribution was used to represent the uncertainty in the ingestion rate of dairy cows and beef cows. The upper limit and lower limit of the uniform distributions were obtained by using 16 kg/d and 12 kg/d as a midpoint for the dairy cow and the beef cow, respectively (IAEA 1982), and adding and subtracting two times the standard deviation, 2.6 kg/d (dairy) and 2.0 kg/d (beef) (Hoffman et al. 1982). The uncertainty ranges are summarized in Table E.64.

Intake of various food products by adults ($I_{veg,leafy}$, $I_{veg,non-leafy}$, I_{milk}, and I_{meat})

For the intake of various food products by humans, the uncertainty was based primarily on subjective judgment of various risk assessors. A review of several publications was conducted (Hoffman and Baes 1979; Hoffman et al. 1982; ICRP 1975; NCRP 1984; 1989; Rupp 1979; USEPA 1991), and the subjective probability distributions derived for each of the human intake parameters are consistent with the values reported in the reviewed literature. Because each value is equally likely to be the true but unknown rate of intake, a uniform distribution was used to represent the uncertainty. The lower and upper limits used for the uniform distributions are values that target the RME individual. Because it is highly unlikely that the upper bounds for each rate of intake will be sampled simultaneously and because the RME individual should provide a conservative estimate of exposure, no correction was made for the caloric intake of an individual.

The lower bound for the ingestion of leafy vegetables was determined by assuming that an individual would not consume less than 10 kg/year (approximately 1 ounce of leafy vegetables every day of the year). The upper bound for the ingestion of leafy vegetables was determined by assuming that an individual who loves vegetables would not consume more than 85 kg/year (approximately 8 ounces of leafy vegetables every day of the year). These values are consistent with survey ranges reported in Rupp (1979).

The lower bound for the ingestion of non-leafy vegetables was determined by assuming that an individual would not consume less than 40 kg/year (approximately 4 ounces of non-leafy vegetables every day of the year). The upper bound for the ingestion of non-leafy vegetables was determined by assuming that an individual who loves vegetables would not consume more than 165 kg/year (approximately 16 ounces of leafy vegetables every day of the year). These values are consistent with survey ranges reported in Rupp (1979).

The lower bound for the ingestion of milk was determined by assuming that an avid milk drinker would not consume less than 80 L/year (approximately 1 cup of milk every day of the year). The upper bound for the ingestion of milk was determined by assuming that an avid milk drinker would not consume more than 400 L/year (more than 1 liter of milk every day of the year). These values are consistent with survey ranges reported in Rupp (1979).

The lower bound for the ingestion of beef was determined by assuming that an avid meat lover would not consume less than 40 kg/year (approximately 4 ounces of beef every day of the year). The upper bound for the ingestion of beef was determined by assuming that an avid meat lover would not

consume more than 125 kg/year (approximately 12 ounces of beef every day of the year). These values are consistent with survey ranges reported in Rupp (1979).

Intake of various food products by children ($I_{veg,leafy}$, $I_{veg,non-leafy}$, I_{milk}, and I_{meat})

A review of several publications was performed (Rupp 1979; Müller and Pröhl 1993; Yang and Nelson 1986; and SAIC 1993) in order to obtain the intake of various food products by children. The subjective probability distributions derived for each of the child's intake parameters are consistent with the values reported in the reviewed literature. The uncertainty was based primarily on subjective judgment of various risk assessors. Since each value is equally likely to be the true but unknown rate of intake, a uniform distribution was used to represent the uncertainty. The lower and upper limits used for the uniform distributions are values that target the reasonably maximally exposed child. Because it is highly unlikely that the upper bounds for each rate of intake will be sampled simultaneously, and since the RME individual should provide a conservative estimate of exposure, no correction was made for the caloric intake of a child.

The lower bound for the ingestion of leafy vegetables was determined by assuming that a child, ages three to six, would consume no less than 5.5 kg/year (approximately 0.5 ounces of leafy vegetables every day of the year). The upper bound for the ingestion of leafy vegetables by children was determined by assuming a child who loves vegetables would not consume more than 36.5 kg/year (approximately 3.5 ounces of leafy vegetables every day of the year). The minimum value is based upon an average daily value of 15 g/d reported in (IAEA 1994). The maximum value is based upon data reported by Müller and Pröhl (1993) in which an average daily value of leafy vegetables consumed by a child would be 74 g/d. These values are also consistent with values reported in Rupp (1979).

The lower bound for the ingestion of non-leafy vegetables was determined by assuming that a child, ages three to six, would consume no less than 26 kg/year (approximately 2.6 ounces of non-leafy vegetables every day of the year). The upper bound for the ingestion of non-leafy vegetables by a child was determined by assuming a child who loves vegetables would not consume more than 44 kg/year (approximately 4.3 ounces of non-leafy vegetables every day of the year). The lower bound was based on the study reported by Rupp (1979) in which an average value of 80 g/d of non-leafy vegetables was reported to be consumed by a child. The upper bound was based on data reported by Müller and Pröhl (1993), in which an average daily intake of 95 g/d was reported to be consumed of non-leafy vegetables by a child. This value (95 g/d) was divided by our lower assumed value of 75 g/d and then multiplied by the average value of 95 g/d in order to produce an upper bound of 120 g/d.

The lower bound for the ingestion of milk was determined by assuming that a child between the ages of three to six years who was an avid milk drinker would consume no less than 130 L/year (approximately 1.5 cups of milk every day of the year). The upper bound for the ingestion of milk was determined by assuming that a child between the ages of three and six years who was an avid milk drinker would consume no more than 525 L/year (approximately 1.5 quarts of milk every day of the year). These values are consistent with survey ranges reported in Rupp (1979); ICRP (1975); IAEA (1994); (1995); and (in press).

The lower bound for the ingestion of beef for a child who is an avid meat lover would consume no less than 11 kg/year (approximately 1 ounce of beef every day of the year). The upper bound for the ingestion of meat for a child was determined by assuming that a child who is an avid beef lover would consume no more than 44 kg/year (approximately 4.2 ounces of beef every day of the year). A value of 30 g/d was assumed as a lower bound based on the average value of 38 g/d reported in Rupp (1979). An upper bound of 120 g/d was assumed based on the average value of 53 g/d reported by Müller and Pröhl

(1993) and the value of 64.6 g/d maximum likely exposure reported by Yang and Nelson (1986) and SAIC (1993).

E2.3.2.2 Exposure frequency (*EF*)

The *EF* represents the frequency at which the RME is exposed to the given situation. The exposure frequency is different for the external pathways and the agricultural pathways.

For the agricultural pathways, the USEPA (1991) currently recommends the use of 350 days/year. This value takes into account 2 weeks of vacation per year during which the individual will not be exposed to the contaminant/pathway being studied. For this uncertainty analysis, the reasonable maximally exposed individual (RME) is defined as an individual who is exposed at a frequency of 0.96 (EF_{ing}, 350 days/year).

For the external pathways, the number of hours that the RME may be on his/her property must be considered. To determine the lower and upper limits of the exposure frequency (EF_{ext}), a meeting was held with various risk assessors. From this meeting, a uniform distribution ranging between 0.23 and 0.96 was determined to represent the external exposure frequency. The lower limit was determined by rationalizing that an individual would spend at least 6 hours per day for 350 days each year on his property. The most time that an individual would conceivable stay on his property was determined to be 8400 hours (24 hours a day for 350 days of the year). Therefore, there is high confidence that the true exposure frequency for the RME is bounded by this uncertainty range.

E2.3.2.3 Exposure duration (*ED*)

The exposure duration *(ED)* represents the number of years that an individual will be exposed to the given exposure conditions, i.e., an estimate of the projected length of time that a person will live in the area under consideration. For all carcinogens, USEPA (1989) recommends a value of 30 years for the *ED*. For this uncertainty analysis, the RME is defined as an individual who is exposed to the contamination for thirty years. For all noncarcinogens, the *ED* is set at a value of one year.

E2.3.2.4 Sediment dilution factor (D_l)

Because it is unlikely that an individual would be able to dredge enough sediment such that mixing with topsoil would not occur, a sediment dilution factor was incorporated into each risk assessment equation. A meeting with various risk assessors was held to discuss the potential uncertainty in the sediment dilution factor. Soil mixing is most likely to occur in the top six inches. If two inches of dredged sediment were put on the farm and mixed with top soil, the concentration in the sediment would be diluted to one-third its original concentration. Therefore, a dilution factor of 0.3 was determined as the most dilution of the sediment concentration that would occur. To account for the most conservative scenario, it was assumed that the possibility existed that no dilution of the sediment concentration would occur. Therefore, a uniform distribution with a value greater than 0.3 and lower than 1.0 was used to represent the uncertainty in the dilution factor.

E2.3.2.5 Fraction ingested (FI)

Because it is unlikely that a cow will not be fed supplements, a fraction of contaminated pasture actually ingested (FI_Q) is incorporated into the grass-cow-milk-human and grass-cow-meat-human pathways. It is unlikely that FI_Q will exceed 90% or will be below 50%. Because this is based primarily on subjective judgment and the true value is equally likely between 50 and 90%, a uniform distribution

with a minimum value of 0.5 and a maximum value of 0.9 was used to represent the uncertainty associated with FI_Q.

In addition, it is unlikely that someone living on the farm will eat or drink all of his/her vegetables, milk, and meat from vegetables, milk, and meat produced on the farm. The uncertainties associated with the fraction of contaminated vegetables eaten, with the fraction of contaminated milk consumed, and with the fraction of contaminated meat eaten by an individual living on the farm were discussed in a meeting of risk assessors. From this meeting, it was determined that a person could possibly obtain all of his produce from his own contaminated farm (FI = 1) and would not obtain less than 50% of his milk and meat from the contaminated cows raised on his farm or less than 30% of his vegetables from his own garden. Because each value is equally likely to be the true fraction ingested, a uniform distribution was used to represent the uncertainty in the FIs. These uncertainties are summarized in Table E.64.

E2.3.2.6 Soil density (ρ_{soil})

The density of soil ranges from 1100 to 1600 kg/m^3 (Hillel 1980). Soils consisting of clay are around 1100 kg/m^3, and sandy soils have a density around 1600 kg/m^3. Because we are assuming that deep sediments will be mixed with topsoil, a density of 1300 kg/m^3 was chosen as a most likely value. A triangular distribution with a minimum value of 1100, a mode of 1300, and a maximum value of 1600 kg/m^3 was used to describe the uncertainty in the soil density.

E2.3.3 Factors Dependent on Contaminant

Uncertainties involved with radionuclide specific parameters such as the parameter specific to external exposure to Cs-137 and the reference dose for inorganic mercury are presented in this section. In addition, uncertainties pertaining to element specific parameters such as the soil/plant transfer factors and the milk/meat transfer factors are discussed in this section.

<u>Cs-137 specific parameters</u>

The dose conversion factor for external exposure (DCF_{ext}) to Cs-137 was obtained from Eckerman and Ryman (1993). A contaminated soil depth of 15cm was assumed for this analysis. Because Ba-137m is a short-lived daughter of Cs-137, the DCF_{ext} for Ba-137m must be added to the DCF_{ext} for Cs-137. Cs-137 decays to Ba-137m 95% of the time; therefore, the DCF_{ext} for Ba-137m is multiplied by 95% before it is added to the Cs-137 DCF_{ext}. The value obtained for the DCF_{ext} is 5.1E-10 Sv/year per Bq/m^3. The uncertainties with the scatter cross-sections for reference man and with the application of reference man to the RME are the two major contributions to the overall uncertainty in the DCF_{ext} (Leggett 1994). Because it is unlikely that the uncertainty in the DCF_{ext} is greater than the uncertainty in the internal DCF, an uncertainty factor of 2 is used to bound the range of uncertainty in DCF_{ext}. A log-triangular distribution with a mode of 5.1E-10, a lower limit of 2.6E-10 and an upper limit of 1.0E-09 was used to represent the uncertainty associated with the external DCF.

The uncertainties associated with the loss rate from decay and from harvesting/leaching (λ_{eff}) result from the uncertainty in the loss rate from harvesting/leaching. The loss rate from radiological decay is determined by dividing the natural log of 2 by the half-life of the radionuclide (Cs-137: 0.693/30 years = 2.3E-02 year^{-1}). The uncertainty estimates for λ_{eff} were determined by adding the radiological decay rate to the minimum, mean, and maximum value reported for the loss rate from harvesting and leaching in Hoffman et al. (1982). These values are summarized in Table E.64.

Reference Dose for Inorganic Mercury

The RfD for inorganic mercury (3.0E-04 mg/kg/d) is based on three studies. Currently, the EPA is reviewing this reference dose and the studies from which it is derived Rick Canady (1995).

Death from oral exposure to inorganic mercury is usually caused by shock, cardiovascular collapse, acute renal failure, and severe gastrointestinal damage (Gleason et al. 1957; Troen et al. 1951). In a study by Troen et al. (1951), eighteen cases of human poisoning were reported. Nine of the patients died following oral ingestion of single doses of mercuric chloride. The lethal doses varied from 29 to less than 50 mg mercury/kg. Gastrointestinal lesions and renal involvement were the most common findings (Toxicological Profile for Mercury).

A chronic exposure (350 days) of rates that were given 7 mg of mercury per kg/d as mercuric chloride in drinking water resulted in a positive inotropic response, increased blood pressure and cardiac contractility, and decreased baroreflex sensitivity (Carmignani et al. 1989). A case study reported by Pesce et al. (1977) involved a human patient who ingested a single dose of 15.8 mg mercury per kg as mercuric chlorides and exhibited a dramatic increase in urinary protein secretion. In a study with Fischer-344 male rats a significant increase in the absolute and relative kidney weights began at 1.9 mg/kg/d (NTP 1991).

Using the information pertaining to inorganic mercury from several studies and an interview with Rick Canady (1995), the following uncertainties were determined. Since the RfD is assumed to be a safe value, the minimum value was obtained by dividing the RfD by ten (3.0E-05) to protect against more subtle effects than those observed in several studies. The maximum value was obtained by personal communication with Rick Cannady and set to 9.5E-04. *A log-uniform distribution was used to represent the uncertainty in the RfD for inorganic mercury.*

Element dependent transfer factors

Several transfer factors are required for the agricultural pathways considered in the dredging scenario, including 1) the soil/plant concentration factors (B_v) for three different food crops (leafy vegetables and non-leafy vegetables for human consumption and pasture forage for cow consumption) and 2) the animal product transfer factors for cow's milk (F_m) and meat (F_f). For this analysis, all vegetable transfer factors are defined in terms of the wet weight of plants, while the pasture forage is given as dry weight.

The primary reference for the uncertainties in the soil-to-plant transfer factors and the animal product transfer factors for Cs-137 is a document that was prepared for the U. S. Nuclear Regulatory Commission (Hoffman et al. 1982). The selection of values for the soil/plant transfer factor and animal product transfer factor for Cs-137 was further supported by an intensive search of numerous publications (Kennedy and Strenge 1993; NCRP 1989; Ng 1982; Ng et al. 1979a; Ng et al. 1979b). From the reported values, an average of the reported values, the minimum reported value, and the maximum reported value were compared to the uncertainty estimates documented in Hoffman et al. (1982). Because these values were similar, the uncertainty estimates presented in Hoffman et al. (1982) were used in this uncertainty analysis. These values are summarized in Table E.67.

The soil-to-plant transfer factors and the animal product transfer factors are less studied for inorganic mercury. The largest source of uncertainty occurs due to the lack of knowledge about the solubility of the inorganic mercury. An in depth review of the available literature was performed, and the

uncertainty ranges and distributions for the factors pertaining to inorganic mercury are presented in Table E.67. Wide uncertainty bands were used for these factors due to the large lack of knowledge.

Table E.67. Ranges of plant-to-soil concentration ratios and transfer coefficients to cow's milk and beef *

	Units	Minimum	Estimated mean	Maximum	Assigned Distribution
Cesium-137					
Bv (leafy veg.)	unitless	1.0 E-04	5.5 E-03	8.0 E-02	Log-Triangular
Bv (non-leafy veg	unitless	1.0 E-05	5.0 E-03	1.0 E-01	Log-Triangular
Bv (pasture, dry	unitless	7.0 E-04	4.4 E-02	1.2 E+00	Log-Triangular
Ff (meat)	d/kg	3.0 E-03	2.1 E-02	2.0 E-01	Log-Triangular
Fm (milk)	d/L	3.7 E-03	6.7 E-03	5.0 E-02	Log-Triangular
Inorganic Mercury					
Bv (leafy veg.)	unitless	5.0 E-01	---	5.0 E-03	Log-Uniform
Bv (non-leafy veg	unitless	1.0 E-02	---	1.0 E-01	Log-Uniform
Bv (pasture, dry	unitless	1.0 E-02	---	2.0 E+00	Log-Uniform
Ff (meat)	d/kg	1.0 E-05	1.0 E-02	2.5 E-01	Log-Triangular
Fm (milk)	d/L	1.0 E-05	---	1.0 E-03	Log-Uniform

* Ranges taken from Hoffman et al. (1982) and subjective judgment.

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Appendix F

ECOLOGICAL RISK ASSESSMENT DATA

Appendix F1

ECOTOXICOLOGICAL PROFILES

F1. ECOTOXICOLOGICAL PROFILES

This section contains ecotoxicological profiles for the contaminants of potential ecological concern (COPECs) for the Clinch River/ Poplar Creek (CR/PC) Operable Unit (OU). The ecotoxicological information is presented for only those endpoints for which the chemicals are COPECs.

F1.1 INORGANIC CHEMICALS

F1.1.1 Aluminum

Toxicity of Aluminum in Water to Aquatic Biota. Aluminum can be highly toxic to aquatic biota under some circumstances, but its toxicity is strongly dependent on pH, hardness, and organic matter content. Aluminum is amphoteric, i.e., it is more soluble in both acidic and basic solutions than in approximately neutral solutions. The Environmental Protection Agency's (EPA's) water quality criteria for aluminum (EPA 1988-Al) assume a pH range of 6.5 to 9.0 within which aluminum occurs primarily in the form of monomeric, dimeric, and polymeric hydroxides. Toxicities of aluminum in the field may be substantially lower than indicated by dissolved aluminum analysis values because of complexation with humic and fulvic acids. At pH values below 6.5, however, aluminum may be substantially more toxic than indicated by the EPA criteria because low pH favors the formation and solubilization of cationic aluminum (Al^{3+}), but such values do not normally occur in the Clinch River and Poplar Creek system.

Between pH 6.5 and 9.0, acute toxicities of aluminum reported by EPA range between 1.9 mg/L (*Ceriodaphnia dubia*) and > 79.9 mg/L (midge larvae, *Tanytarsus dissimilis*) (Table F1.1). Acute toxicities for fish ranged from 3.6 mg/L (juvenile brook trout, *Salvelinus fontinalis*) to > 50.0 mg/L (juvenile green sunfish, *Lepomis cyanellus*). Chronic toxicities reported by EPA ranged from 0.742 mg/L (*Daphnia magna*) to 3.288 mg/L (fathead minnow, *Pimephales promelas*).

Toxicities to aquatic plants fall within roughly the same ranges: 6.48 mg/L caused mortality of the diatom *Cyclotella meneghiniana*, and concentrations from 0.40 to 0.90 mg/L were chronically toxic to *Cyclotella meneghiniana* and the green algae *Selenastrum capricornutum*. Bioconcentration factors from 50 to 231 were obtained in tests with young brook trout. Toxicities of body burdens were not determined. The acute and chronic National Ambient Water Quality Criteria (NAWQC) for the protection of aquatic organisms for aluminum are 0.750 and 0.087 mg/L, respectively.

Toxicity of Aluminum in Soil to Terrestrial Plants. Aluminum interferes with cell division in roots, decreases root respiration, fixes P in unavailable forms in roots, interferes with uptake, transport, and use of Ca, Mg, P, K, and water, and interferes with enzyme activities (Foy et al. 1978). Symptoms of toxicity include stubby, brittle roots, stunting, late maturity, and collapse of growing points. Seedlings are more susceptible to damage from aluminum toxicity than are older plants. Seedling establishment of white clover in a silt loam soil (pH 5.0) was reduced by approximately 30% by the addition of 50 ppm Al as $Al_2(SO_4)_3$ (Mackay et al. 1990), the lowest concentration tested.

Table F1.1. Toxicity of aluminum to aquatic animals

Concentration (mg/L)	Effect[a]
>79.9	Midge (*Tanytarsus dissimilis*) LC50
>50.0	Green sunfish (*Lepomis cyanellus*) LC50
>49.8	Yellow perch (*Perca flavescens*) LC50
>47.9	Channel catfish (*Ictalurus punctatus*) LC50
>40.0	Chinook salmon (*Oncorhynchus tshawytsca*) LC50
38	Cladoceran (*Daphnia magna*) EC50
35	Fathead minnow (*Pimephales promelas*) LC50
31	Snail (*Physa sp.*) LC50
>23.0	Planaria (*Dugasia tigrina*) LC50
>22.6	Stonefly (*Acroneuria sp.*) LC50
22	Amphipod (*Gammarus pseudolimnaeus*) LC50
10	Rainbow trout (*Oncorhynchus mykiss*) LC50
4	Caldoceran (*Ceriodaphnia sp.*) EC50
4	Brook trout (*Salvelinus fontinalis*) LC50
3	Fathead minnow (*Pimephales promelas*) CV
2	Cladoceran (*Ceriodaphnia dubia*) CV
2	Cladoceran (*Ceriodaphnia dubia*) EC50
1	Acute NAWQC
1	Cladoceran (*Daphnia magna*) CV
0	Chronic NAWQC

[a]LC = Lethal Concentration; EC = Effects Concentration; CV = Chronic Value; NAWQC = National Ambient Water Quality Criteria.

F1.1.2 Arsenic

Toxicity of Arsenic in Sediments to Benthic Invertebrates. Sediments of Waukegan Harbor, Wisconsin, which had more than 47 mg/kg arsenic, caused 34% mortality in *H. azteca*. Sediment from the Sheboygan River, Wisconsin, which had 2.7 mg/kg arsenic caused significant mortality to the freshwater prawn, *Macrobrachium rosenbergii*. However, this sediment also was contaminated with metals and polychlorinated biphenyls (PCBs). At two rivers in Illinois, a low number of benthic macroinvertebrate taxa was associated with arsenic concentrations of 7.4 and 3.7 mg/kg. However, a high number of taxa was associated with 5.9 and 5.0 mg/kg arsenic in the same two rivers (studies cited in Long and Morgan 1991).

Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) values are 8.2 mg/kg and 70 mg/kg, respectively. Only 11% of the documented studies in Long et al (1995) indicated biological effects at concentrations between the ER-L and ER-M, while 63% of the studies at concentrations above the ER-M indicated biological effects.

Toxicity of Arsenic to Wildlife. Arsenic is present in the earth's crust at approximately 2 ppm, but tissues of animals generally contain an average of <0.5 ppm (Venugopal and Luckey 1978). Arsenic may be a required micronutrient; growth, survival, and reproduction of goats are poor if the diet contains <0.05 ppm arsenic (NAS 1977).

Arsenic is a carcinogen and teratogen. Other effects include reduced growth, hearing/sight loss, liver/kidney damage, and death (Eisler 1988a). Inorganic arsenic is usually more toxic than organic arsenic compounds. Wildlife mortality and malformations have been observed for chronic doses of 1–10 mg arsenic/kg body weight (bw) and dietary concentrations of 5–50 ppm (Eisler 1988a). Acute LD_{50}s for mammals of 35–100 mg calcium arsenate/kg bw and 10–50 mg lead arsenate/kg bw have been reported (NRCC 1978).

Schroeder and Mitchner (1971) exposed mice to 5 ppm sodium arsenite in drinking water for three generations. While mice fed arsenic survived well, litter size decreased in subsequent generations. A dose of 0.38 mg arsenic/kg over a lifetime was sufficient to cause a slight decrease in the median lifespan of laboratory mice (Schroeder and Balassa 1967), but it had no effect on growth. As little as 3 mg arsenic trioxide/kg bw or 1 mg sodium arsenite/kg bw can be lethal (NAS 1977).

Because metabolism of arsenic in rats is unlike that in other animals, results of toxicity studies using rats generally should not be extrapolated to other species (Eisler 1988a).

Among birds, LD_{50} levels for arsenic compounds range from 17.4 to 3300 mg/kg bw (Eisler 1988a). While no mortality was observed among mallard ducks fed a diet containing 100 ppm sodium arsenite for 128 days, 12% to 92% mortality was observed for ducks fed diets containing 250 to 1000 ppm arsenite (USFWS 1964). Camardese et al. (1990) and Whitworth et al. (1991) fed mallards diets containing 30, 100, or 300 ppm sodium arsenate. While no effects were observed on behavior, growth was reduced for male ducks consuming 300 ppm arsenic and for female ducks at all exposure levels.

Toxicity of Arsenic in Soil to Plants. Arsenic is not essential for plant growth. It is taken up actively by roots, with arsenate being more easily absorbed than arsenite. Arsenic and phosphate ions are likely taken up by the same carrier (Asher and Reay 1979). The phytotoxicity is strongly affected by the form in which it occurs in soils. Arsenite (III) is more toxic than arsenate (V), and both are considerably more toxic than organic forms (Peterson et al. 1981). In experiments with toxic levels of arsenic, rice and

legumes appear to be more sensitive than other plants. Symptoms include wilting of new-cycle leaves, followed by retardation of root and top growth, and leaf necrosis (Aller et al. 1990). Arsenic is chemically similar to P, it is translocated in the plant in a similar manner and is able to replace P in many cell reactions. Arsenic (III) probably reacts with sulphydryl enzymes leading to membrane degradation and cell death. Arsenic (V) is known to uncouple phosphorylation and affect enzyme systems (Peterson et al. 1981). The mechanism of toxicity of organo-arsenicals is unclear.

Soil type affected the toxicity of arsenic (III) added to two soils on the shoot weight of cotton and soybeans grown from seed for 6 weeks (Deuel and Swoboda 1972). In a sandy loam soil, shoot weights of both crops were reduced (cotton 22%; soybeans 45%) by 11 ppm arsenic (the lowest concentration tested). Soybean growth in a clay soil was reduced 28% by 22.4 ppm arsenic (lowest concentration tested). Cotton growth in this soil was reduced 29% by 89.6 ppm arsenic. The source of arsenic (V) has been shown to influence the effect on corn grown from seed for 4 weeks in a loamy sand (pH 7.1). Plant weight reductions rose from less than 10% with the addition of 10 ppm arsenic in any form, to almost 100% for NaH_2AsO_4, more than 75% for $Al(H_2AsO_4)_3$, and about 65% for $Ca(H_2AsO_4)_2$ with the addition of 100 ppm arsenic (Woolson et al. 1971).

F1.1.3 Barium

Toxicity of Barium in Water to Aquatic Life. There is relatively little information of the aquatic toxicity of barium, and none has been found for fish. Only one test using a standard organism was found: an acute value of 410 mg/L was reported for *Daphnia magna* (LeBlanc 1980 cited in Suter and Mabrey 1994). Barium sulfate and chloride were lethal to yellow crabs (*Cancer anthonyi*) in 7-day exposures at 1,000 and 100 mg/L, respectively (MacDonald et al. 1988). Barium inhibited growth of duckweed by 50% at 102 to 400 mg/L in various ambient waters (Wang 1988). Barium inhibited calcification of the freshwater green alga *Goeotaenium* at 50.0 mg/L (Prasad 1984). The state of Illinois has a water quality standard for indigenous aquatic life of 5.0 mg/L (Wang 1988). Barium is bioconcentrated from water by algae and vascular plants, but is not bioaccumulated through food chains (Moore 1991).

Toxicity of Barium in Sediment to Benthic Invertebrates. The benchmarks used for barium are based on background because sediment toxicity data were not found (Hull and Suter 1994). The EPA Region V Sediment Classifications of Nonpolluted (less than 20 mg/kg), Moderately Polluted (between 20 and 60 mg/kg), and Heavily Polluted (greater than 60 mg/kg) are poorly founded scientifically and considered adequate only for determining the suitability of dredged material for open water disposal.

Toxicity of Barium to Wildlife. The soluble salts of barium, an alkaline earth metal, are toxic in mammalian systems. At low doses, barium acts as a muscle stimulant and at higher doses affects the nervous system, eventually leading to paralysis. The LD_{50} for rats is listed as 630 mg/kg for barium carbonate, 118 mg/kg for barium chloride, and 921 mg/kg for barium acetate (Lewis and Sweet 1984).

Schroeder and Mitchener (1975a, b) exposed rats and mice to 5 mg barium/L in drinking water for their lifetime. There was a slight but significant reduction in longevity of treated male mice when measured as the mean age at death of the last surviving 10% of animals. The overall average life span of the group, however, was about the same as the control group. In another study, Perry et al. (1983) exposed rats to 0, 1, 10, or 100 ppm barium for up to 16 months. A significant increase in average blood pressure was observed in the highest dose group; a slight but statistically significant increase was seen in the 10 ppm dose group. Information on developmental and reproductive toxicity of barium to mammals is not available.

The LD_{50} of barium to chickens is 623 mg/kg (Johnson et al., 1960). Johnson et al. (1960) report that while chickens will tolerate 1000 ppm barium in their diet without adverse effects, 2000 ppm reduces growth, 8000 ppm produces 50% mortality in 4 weeks, and diets containing 16,000 or 32,000 ppm barium are 100% lethal.

F1.1.4 Boron

Toxicity of Boron in Water to Aquatic Life. Relatively little aquatic toxicity information is available for boron. The only standard data are LC50s and CVs for *Daphnia magna* exposed to boric acid in relatively hard water. Lewis and Valentine (1981) reported an LC50 of 226 mg/L and a CV of 8.83 mg/L and Gersich (1984) reported an LC50 of 133 mg/L and a CV of 9.33 mg/L. Toxic concentrations from nonstandard and poorly documented tests fall within this range.

Toxicity of Boron in Soil to Plants. Boron is a plant micronutrient involved in transport of sugars across membranes, synthesis of nucleic acids, and protein utilization. It is rapidly taken up, mainly as the neutral $B(OH)_3$ molecule and equally distributed between roots and shoots (Wallace and Romney 1977a). Toxicity symptoms include needle tip necrosis and discoloration in pines (Neary et al. 1975) and burning of leaf edges in other plants. Grasses and legumes appear to have greater than average tolerance to high B concentrations (Gupta 1984), and pines appear to be particularly sensitive (Stone and Baird 1956).

John et al. (1977) investigated the effects of B added as H_3BO_3 on shoot weight of corn seedlings grown 7 weeks in muck and two silt loam soils. Addition of 50 ppm B to the muck soil (pH 4.5; % organic matter 56) resulted in a 56% reduction in plant growth (10 ppm B had no effect). Growth was reduced 37% by the addition of the lowest concentration tested (0.5 ppm) in one silt loam soil (pH 5.7; % organic matter 6), and 83% by the addition of 50 ppm B in the other (pH 5.7; % organic matter 3) (10 ppm had no effect).

F1.1.5 Cadmium

Toxicity of Cadmium in Water to Aquatic Life. Cadmium occurs predominately in the form of a free divalent cation in most well oxygenated, low organic matter, fresh waters (EPA 1985-Cd). However, both particulate matter and dissolved organic matter can bind cadmium in biologically unavailable forms.

There is no evidence that cadmium is a biologically essential or beneficial element (Eisler 1985a). Cd toxicity is related to water hardness, with a reduction in toxicity associated with increased water hardness (EPA 1985-Cd). Therefore, the cadmium toxicity values presented in Table F1.2 that are not from tests conducted in waters of moderate hardness (within the range found in the Clinch River) are normalized to 100 mg/L using the slopes calculated by the EPA (1985-Cd). Aquatic organisms are able to bioconcentrate Cd, although there is evidence that only the lower trophic levels can biomagnify this element.

Toxicity of Cadmium in Sediment to Benthic Organisms. Fertilized eggs of the goldfish, leopard frog, and largemouth bass were placed in natural stream sediment spiked with cadmium (Francis et al. 1984) and maintained until 4 days posthatching, which resulted in a total exposure duration of 6 to 7 days. Sediments with 1000 mg/kg cadmium were not toxic to goldfish or leopard frog but resulted in 25% mortality during 4 days posthatching for largemouth bass. A sediment concentration of 100 mg/kg cadmium was not toxic to the largemouth bass. Organic matter content of the sediment was 2.3%.

Table F1.2. Aqueous concentrations of cadmium causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek

Concentration (mg/L)[a]	Effect[b]
24.6	goldfish (*Carassius auratus*) LC50
18.0	stonefly LC50[c]
17.7	mayfly (*Ephemerella grandis*) LC50
17.3	Tubificid worm (*Rhyacodrilus montana*) LC50
16.8	mosquitofish ((*Gambusia affinis*) LC50
16.5	white perch (*Morone americana*) LC50
15.1	Tubificid worm (*Stylodrilus heringlanus*) LC50
12.7	bluegill (*Lepomis macrochirus*) LC50
12.5	channel catfish (*Ictalurus punctatus*) LC50
12.4	Tubificid worm (*Spirosperma nikolskyl*) LC50
10.9	threespine stickleback (*Gasterosteus aculeatus*) LC50
10.4	Tubificid worm (*Varichaeta pacifica*) LC50
9.62	Tubificid worm (*Spirosperma ferox*) LC50
8.79	Tubificid worm (*Quistadrilus multisetosus*) LC50
8.79	Tubificid worm (*Tubifex tubifex*) LC50
8.30	snail (*Amicola* sp.) LC50
7.80	guppy (*Poecilla reticulata*) LC50
7.68	white sucker (*Catostomus commersoni*) LC50
7.43	caddisfly LC50
6.86	green sunfish (*Lepomis cyanellus*) LC50
6.59	Tubificid worm (*Branchiura sowerbyl*) LC50
6.31	flagfish (*Jordanella floridae*) LC50
5.24	northern squawfish (*Ptychochellus oregonensis*) LC50
5.05	mayfly (*Paraleptophlebia praepedita*) LC50
4.67	Tubificid worm (*Limnodrilus hoffmelsterl*) LC50
3.71	worm (*Nals* sp.) LC50
2.94	pumpkinseed (*Lepomus gibbosus*) LC50
2.62	midge (*Chironomus* sp.) LC50
1.61	American eel (*Anguilla rostrata*) LC50
0.875	isopod (*Asellus bicrenata*) LC50
0.705	crayfish (*Orconectes limosus*) LC50
0.484	bryozoan (*Plumatella emarginata*) LC50
0.471	common carp (*Cyprinus carpio*) LC50
0.448	amphipod (*Hyalella azteca*) LC50
0.343	snail (*Physa gyrina*) LC50

Table F1.2 (continued)

Concentration (mg/L)[a]	Effect[b]
0.311	bryozoan (*Pectinatella magnifica*) LC50
0.227	snail (*Aplexa hypnorum*) LC50
0.216	banded killifish (*Fundulus diaphanus*) LC50
0.181	*Ceriodaphnia reticulata* EC50
0.153	amphipod (*Gammarus* sp.) LC50
0.132	amphipod (*Gammarus pseudolimnaeus*) LC50
0.122	*Daphnia pulex* EC50
0.100	cladoceran (*Simocephalus serralatus*) EC50
0.0935	isopod (*Lirceus alabamae*) LC50
0091.0	cladoceran (*Simocephalus vetulus*) EC50
0.0891	cladoceran (*Molina macrocopa*) EC50
0.0720	fathead minnow (*Pimephales promelas*) LC50
0.0667	bryozoan (*Lophopodella carteri*) LC50
0.0281	bluegill (*Lepomis macrochirus*) CV
0.0266	*Daphnia magna* EC50
0.0262	fathead minnow (*Pimephales promelas*) CV
0.0141	Atlantic salmon (*Salmo salar*) CV
0.0141	smallmouth bass (*Micropterus dolomieui*) CV
0.0140	Northern pike (*Esox lucius*) CV
0.0140	lake trout (*Salvelinus namaycush*) CV
0.0135	white sucker (*Catostomas commersoni*) CV
0.0129	coho salmon (*Oncorhynchus kisutch*) LC50
0.0127	brown trout (*Salmo trutta*) CV
0.00930	chinook salmon (*Oncorhynchus tshawytscha*) LC50
0.00920	flagfish (*Jordanella floridae*) CV
0.00834	snail (*Aplexa hypnorum*) CV
0.00784	rainbow trout (*Oncorhynchus mykiss*) LC50
0.00739	coho salmon (*Oncorhynchus kisutch*) CV
0.00678	cladoceran (*Ceriodaphnia reticulata*) CV
0.00464	chinook salmon (*Oncorhynchus kisutch*) CV
0.00407	brook trout (*Salvelinus fontinalis*) CV
0.00390	acute NAWQC
0.00358	brown trout (*Salmo trutta*) LC50
0.00110	chronic NAWQC
0.000330	cladoceran (*Molna macrocopa*) CV
0.000233	cladoceran (*Daphnia magna*) CV

[a] Effect levels were converted based on a 100 mg/L water hardness. Slopes used for the conversion were associated with individual species, where specified in the Criteria document. Otherwise, 1.128 and 0.7852 were the slopes for the acute and chronic test conversions, respectively.

[b] LC = Lethal Concentration; EC = Effects Concentration; CV = Chronic Value; NAWQC = National Ambient Water Quality Criteria.

[c] The stonefly acute test did not specify the hardness of the water.

Spiked sediment toxicity tests were performed using sediment from Steele's Run (organic carbon content of 2.3%), a stream in the Kentucky River drainage system. Treatment was of early-life-stage rainbow trout, in which the test was initiated at the early eyed-egg stage and continued through 10 days posthatching, giving an exposure period of 20 days. Sediment concentrations of between 2 and 13 mg/kg resulted in between 47 and 63% mortality relative to controls. A concentration of 121 mg/kg resulted in 89% mortality (Birge et al. 1979).

An Illinois harbor sediment containing 2.5 mg/kg cadmium resulted in 34% mortality of *Hyalella azteca*. A concentration of 1.98 mg/kg caused 95% mortality to *Hyalella azteca* in a Washington lake sediment. Significant mortality to the prawn *Macrobrachium rosenbergii* resulted from 2.8 mg/kg cadmium in a Wisconsin river (studies cited in Long and Morgan 1991).

Confidence in the Long and Morgan (1991) ER-L and ER-M is very high, because data are available from many approaches, from multiple methods for some approaches, and are relatively consistent (Long and Morgan 1991). The updated ER-L and ER-M (Long et al. 1995), which do not include freshwater data, also show good consistency. That is, 37% of the documented studies indicated biological effects at concentrations between the ER-L and ER-M, and 66% of the studies at concentrations above the ER-M indicated biological effects. However, resistance to cadmium is higher among marine species than among freshwater species (Eisler 1985a).

Toxicity of Cadmium to Wildlife. While there is little information to indicate that this relatively rare metal is biologically essential or beneficial, Cd has been suggested as the cause of various deleterious effects to wildlife (Eisler 1985a). Mammals and birds are comparatively resistant to the biocidal properties of Cd, which include growth retardation, anemia, and testicular damage. Cd tends to bioaccumulate in the liver and kidney, eventually acting as a cumulative toxin. Cd residues of 2 ppm whole body fresh weight are evidence of Cd contamination, and residues >5 ppm whole animal fresh weight may be life-threatening (Eisler 1985a).

The lowest oral dose resulting in death for rats was 250 mg Cd/kg bw (EPA 1980a). Weigel et al. (1987) fed rats 0.24, 0.85, or 2.25 mg/kg Cd in diet for 8 weeks. Concentrations $\geq$0.85 mg/kg resulted in reduced food intake, reduced body weights, and reduced enzyme activity, but no hematological effects were noted. Ma et al. (1991) determined that an average cadmium intake of 15 mg/kg/day corresponded with critical renal metal loads of 120 mg/kg, a level indicative of adverse health effects. Rats on a diet with 5 ppm Cd suffered shortened lifespans (Schroeder et al. 1965). Cd at 50 ppm in the diet depleted iron from rat livers (Whanger 1973). Rats eating diets with 7.15 ppm Cd (as CdO) exhibited growth reductions, but those consuming a diet with 2.80 ppm Cd did not (Weigel et al. 1984). In a 3 generation reproductive study, the population of mice exposed to 1 ppm $CdCl_2$ in their drinking water died out after the second generation (Schroeder and Mitchner 1971). Rats receiving >6 mg Cd/kg bw daily during pregnancy gave birth to malformed fetuses (Ferm and Layton 1981).

No mortality was observed among adult mallard ducks fed diets containing 0, 2, 20, and 200 ppm Cd; however, egg production was significantly reduced in the group consuming 200 ppm Cd (White and Finley 1978). In addition, the testes of males in the 200 ppm Cd group atrophied and the spermatogenic process was disrupted (White et al. 1978). Among mallard ducklings, 20 ppm Cd in the diet produces mild to severe kidney lesions, reduces packed cell volume and hemoglobin concentrations in the blood (Cain et al. 1983). Avoidance behavior of black ducklings is impaired by diets containing 40 ppm Cd (Heinz and Haseltine 1983).

Toxicity of Cadmium in Soil to Plants. Cadmium is not essential for plant growth. If present in available form, it is readily taken up by the roots, translocated through the plant, and accumulated.

Cadmium is chemically similar to Zn, an essential element. Competition between the two for organic ligands may explain some of the toxic effects of Cd, and the ameliorative effects of Zn on Cd toxicity. Cadmium depresses uptake of Fe, Mn, and probably Ca, Mg, and N (Wallace et al. 1977e; Iwai et al. 1975). Cadmium is toxic at low concentrations. Symptoms resemble Fe chlorosis and include necrosis, wilting, reduced Zn levels, and reduction in growth. The mechanisms of toxicity include reduced photosynthetic rate, poor root system development, reduced conductivity of stems, and ion interactions in the plant. Agronomic crops are more sensitive to Cd toxicity than trees (Adriano 1986).

A number of researchers have measured reductions in growth of a variety of plants in different soils with 10 ppm or less of Cd added to soil as soluble salts. Plants tested include sycamore and spruce trees, wild flowering plants, and crops and horticultural plants (corn, lettuce, radish, wheat). Soils range from light sands to heavy silty clay loams in the acid to neutral pH range. There are no clear trends in responses indicating that any particular type of plant is more sensitive to Cd (reductions in growth range from 23 to 45%), or that growth conditions (pH and soil texture) consistently affected toxicity. Grasses appear to be generally less sensitive than several other plant groups with growth adversely affected at concentrations greater than 10 ppm (up to 160 ppm for oats) under a variety of growth conditions. The following paragraphs give information on representative experiments conducted to evaluate the effects of Cd on plant growth.

Miles and Parker (1979a) investigated the effects of Cd added as $CdCl_2$ on seed germination, and root and shoot weights of a variety of native plants grown from seed for 6 weeks in a sandy soil (pH 4.8, % organic matter 2). Seed germination of black-eyed Susan, and growth of black-eyed Susan, rough blazing star, long-fruited thimbleweed, and wild bergamot were reduced by more than 20% with the addition of 10 ppm Cd, the lowest concentration tested. Growth of Kentucky bluegrass roots and shoots, little bluestem roots, and poison-ivy roots and shoots was reduced by approximately 90%, 60%, and 70%, respectively, with the addition of 30 ppm Cd where 10 ppm Cd did not have an effect.

Experiments evaluating effects of Cd on tree growth show variable responses. Dixon (1988) measured the response of red oak seedlings grown for 16 weeks in a sandy loam soil (pH 6, % organic matter 1.5) with the addition of Cd ($CdCl_2$). Cadmium at 20 ppm reduced tree weight by 28%, while 10 ppm had no effect. Carlson and Bazzaz (1977) measured root, woody stem, green stem and foliage weights, and main stem diameter of 2 to 3-year old American sycamore saplings associated with 90 days exposure to Cd as $CdCl_2$ added to a silty clay loam soil. The lowest concentration tested (5 ppm Cd) was responsible for a 30% reduction in leaf weight. Burton et al. (1984) grew Sitka-spruce seedlings from 4 weeks of age in a mixture of acidic peaty gley soil and sand with Cd added (0.1, 0.4, 1, 2, 4, 8, and 16 ppm as $CdCl_2$). Two ppm Cd lead to a reduction of about 45% in root and shoot weight of the 18-week old seedlings.

Sadana and Singh (1987a and b) investigated the effects of Cd added to a loamy sand soil (pH 8.4, % organic matter 1) on lettuce and grain yield of wheat grown from seed to maturity. Lettuce growth was reduced 23% by the addition of 4 ppm Cd and wheat grain yield was reduced by 28% by 10 ppm Cd (lowest concentration tested).

The effects of a range of Cd concentrations added as $CdSO_4$ on a variety of crops (spinach, radish, lettuce, carrot, soybean, curlycress, corn, turnip, field bean, wheat, tomato, zucchini, and cabbage) grown from seed to maturity in a silt loam soil (pH 7.5) was evaluated by Bingham et al. (1975). Concentrations causing a 25% reduction in plant weights ranged from 4 (spinach) to 170 (cabbage).

Haghiri (1973) determined the effects of additions of 2 to 100 ppm Cd as $CdCl_2$ to a silty clay loam soil (pH 6.7, % organic matter 4) on dry matter yield (26 to 37 d) of lettuce, radish, wheat, and soybean.

Concentrations causing reductions in plant weights ranged from 2 (40 and 36% reductions in lettuce and radish) to 10 (50% reduction in soybean).

In two studies using Brown earth soils, Khan and Frankland investigated the effects of Cd added as $CdCl_2$, the less soluble CdO, or a combination, on growth (42 d) of radish (1983, 1984), wheat and oats (1984). Radish growth was reduced 22% by the addition of 10 ppm Cd as $CdCl_2$, or 100 ppm as CdO (29%), to a soil having a pH of 5.4 (1983). Addition of 50 ppm as $CdCl_2$+CdO (1:1) reduced radish root growth 43% in soil having a pH of 4.6 (1984). Wheat growth was reduced 61% by the addition of 50 ppm Cd as $CdCl_2$ and 47% by the addition of 100 ppm CdO. Oat growth was reduced 25% by the addition of 10 ppm Cd as $CdCl_2$. All concentrations were the lowest tested.

F1.1.6 Chromium

Toxicity of Chromium in Water to Aquatic Life. Inorganic chromium occurs as two forms in ambient water, chromium (III) and chromium (VI) (EPA 1985-Cr). Toxicity appears to be quite different for each state and has not been shown to be additive. For this reason trivalent and hexavalent chromium are treated as separate materials. Acute values for chromium (III) are available for 18 animal genera ranging from 2.2 mg/L for a mayfly to 71 mg/L for a caddisfly. Chronic values ranged from <0.044 mg/L for a cladoceran to 1.025 mg/L for the fathead minnow. Acute values for chromium (VI) are available for 27 genera and range from 0.23 mg/L for a cladoceran to 1,870 mg/L for a stonefly. Daphnids appear to be especially sensitive to chromium (VI). Chronic values for rainbow trout and brook trout were both 0.264 mg/L, as compared to the chronic value of 1.987 mg/L for the fathead minnow. Both valences of chromium appear to increase in toxicity with decreasing hardness. Green algae are quite sensitive to chromium (VI) and were affected by a concentration of 0.397 mg/L of chromium (III) in soft water. The bioconcentration factor for chromium (VI) was approximately one for rainbow trout in two studies (Table F1.3). No bioconcentration factor was available for chromium (III) in fresh water.

Toxicity of Chromium in Sediment to Benthic Organisms. There is relatively little consistency in the effects data presented in the NOAA report (Long and Morgan 1991). This may be due to the lack of chromium speciation data in the NOAA studies. All of the data were reported as total chromium, whereas the hexavalent form has been reported to be the most toxic. In Lake Union, Washington, a concentration of 20 mg/kg resulted in 95% mortality of *Hyalella azteca*. However, in the Dupage and Kishwaukee rivers in Illinois chromium levels of 34 and 29 mg/kg, respectively, had the highest number of benthic macroinvertebrate taxa, while concentrations of 60 and 43 mg/kg, respectively, has the lowest number of benthic macroinvertebrate taxa. In the Keweenaw Waterway of Michigan, 36 mg/kg chromium was not toxic to *Daphnia magna,* but levels of 109 mg/kg were significantly toxic. In Torch Lake, Michigan, concentrations of 180 mg/kg chromium resulted in significant mortality to *Daphnia magna* and *Hexagenia* sp. (studies cited in Long and Morgan, 1991).

Toxicity of Chromium in Soil to Plants. Chromium is not an essential element in plants. The (VI) form is more soluble and available to plants than the (III) form and is considered the more toxic form (Smith, et al., 1989). In soils within a normal Eh and pH range, Cr(VI), a strong oxidant, is likely to be reduced to the less available Cr(III) form although the (III) form may be oxidized to the (VI) form in the presence of oxidized Mn (Bartlett and James, 1979). In nutrient solution, however, both forms are about equally taken up by plants and toxic to plants (McGrath, 1982). Cr(VI), as CrO_4^{2-}, may share a root membrane carrier with SO_4^{2-}. Cr(VI) is more mobile in plants than Cr(III) but translocation varies with plant type. After plant uptake it generally remains in the roots because of the many binding sites in the cell wall capable of binding especially the Cr(III) ions (Smith et al., 1989). Within the plant Cr(VI) may be reduced to the +3 form and complexed as an anion with organic molecules. Symptoms of toxicity include

Table F1.3. Toxicity of chromium to aquatic animals

Concentration (mg/L)	Effect[a]
	Chromium(VI)
1,870	Stonefly (*Neophasganophora capitata*) LC50
176	Crayfish (*Orconectes rusticus*) LC50
140	Damselfly (*Enallagma aspersum*) LC50
133	Bluegill (*Lepomis macrochirus*) LC50
120	Goldfish (*Carassius auratus*) LC50
115	Green sunfish (*Lepomis cyanellus*) LC50
86	Striped shiner (*Notropis chrysocephalus*) LC50
75	Sand shiner (*Notropis stramineus*) LC50
73	White crappie (*Pomoxis annularis*) LC50
69	Rainbow trout (*Oncorhynchus mykiss*) LC50
61	Midge (*Chironomus tentans*) LC50
59	Brook trout (*Salvelinus fontinalis*) LC50
57	Midge (*Tanytarsus dissimilis*) LC50
54	Bluntnose minnow (*Pimephales notatus*) LC50
51	Central stoneroller (*Campostoma anomalum*) LC50
50	Silverjaw minnow (*Ericymba buccata*) LC50
48	Emerald shiner (*Notropis atherinoides*) LC50
46	Johnny darter (*Etheostoma nigrum*) LC50
41	Fathead minnow (*Pimephales promelas*) LC50
36	Yellow perch (*Perca flavescens*) LC50
30	Striped bass (*Morone saxatilis*) LC50
30	Guppy (*Powcilia reticulata*) LC50
23	Snail (*Physa heterostropha*) LC50

Table F1.3 (continued)

Concentration (mg/L)	Effect[a]
2	Fathead minnow (*Pimephales promelas*) CV
2	Bryozoan (*Lophopodella carteri*) LC50
1	Bryozoan (*Pectinatella magnifica*) LC50
1	Bryozoan (*Plumatella emarginata*) LC50
1	Amphipod (*Hyalella azteca*) LC50
0	Rainbow trout (*Oncorhyncus mykiss*) CV
0	Brook trout (*Salvelinus fontinalis*) CV
0	Rainbow trout (*Oncorhyncus mykiss*) CV
0	Amphipod (*Gammarus pseudolimnaeus*) LC50
0	Cladoceran (*Ceriodaphnia reticulata*) EC50
0	Cladoceran (*Simocephalus serrulatus*) EC50
0	Cladoceran (*Ceriodaphnia reticulata*) CV
0	Cladoceran (*Daphnia pulex*) EC50
0	Cladoceran (*Simocephalus vetulus*) EC50
0	Cladoceran (*Daphnia magna*) EC50
0	Cladoceran (*Simocephalus serrulatus*) CV
0	Acute NAWQC
0	Chronic NAWQC
0	Cladoceran (*Daphnia pulex*) CV
0	Cladoceran (*Simocephalus vetulus*) CV
Chromium(III)	
139	Caddisfly (*Hydropsyche betteni*) LC50
88	Caddisfly (unidentified) LC50
76	Damselfly (unidentified) LC50
32	Goldfish (*Carassius auratus*) LC50

Table F1.3 (continued)

Concentration (mg/L)	Effect[a]
29	Rainbow trout (*Oncorhynchus mykiss*) LC50
27	Stiped bass (*Morone saxatilis*) LC50
26	Guppy (*Poecilia reticulata*) LC50
26	Pumpkinseed (*Lepomis gibbosus*) LC50
26	Banded killifish (*Fundulus diaphanus*) LC50
22	White perch (*Morone americana*) LC50
22	Common carp (*Cyprinus carpo*) LC50
21	American eel (*Anguilla rostrata*) LC50
19	Midge (*Chironomus sp.*) LC50
18	Snail (*Amnicola sp.*) LC50
16	Worm (*Nais sp.*) LC50
9	Cladoceran (*Daphnia magna*) EC50
6	Fathead minnow (*Pimephales promelas*) LC50
6	Amphipod (*Gammarus sp.*) LC50
5	Bluegill (*Lepomis macrochirus*) LC50
4	May fly (*Ephemerella subvaria*) LC50
2	Acute NAWQC
1	Fathead minnow (*Pimephales promelas*) CV
0	Chronic NAWQC
0	Rainbow trout (*Oncorhyncus mykiss*) CV
0	Cladoceran (*Daphnia magna*) CV
0	Cladoceran (*Daphnia magna*) CV

[a]LC = Lethal Concentration; EC = Effects Concentration; CV = Chronic Value; NAWQC = National Ambient Water Quality Criteria.

stunted growth, poorly developed roots, and leaf curling. Chromium may interfere with C, N, P, Fe, and Mo metabolism, and enzyme reactions (Kabata-Pendias and Pendias, 1984).

Turner and Rust (1971) investigated the effect of Cr added as Cr(VI) on soybean seedlings grown 3 days in a loam soil. Fresh shoot weight was reduced 30% by 30 ppm Cr, while 10 ppm had no effect. Adema and Henzen (1989) calculated EC_{50} concentrations for effects of Cr added as Cr(VI) on lettuce, tomato and oats grown in a growth chamber from seed for 14 days. The EC_{50} for lettuce in a humic sand soil (pH 5.1, % organic matter 3.7) was greater than 11 ppm, while in a loam soil (pH 7.4, % organic matter 1.4) it was 1.8 ppm Cr. The EC_{50} for tomato in the humic sand soil was 21 ppm, while in the loam soil it was 6.8 ppm Cr. The EC_{50} for oats in the humic sand soil was 31 ppm, while in the loam soil it was 7.4 ppm Cr. Results of these experiments show the ameliorating effects of organic matter on Cr (VI) toxicity.

F1.1.7 Cobalt

Toxicity of Cobalt in Water to Aquatic Life. Comparatively little is known about the toxicity of cobalt (Kimball, date unknown). Acute and chronic toxicity tests using fathead minnows (*Pimephales promelas*) and *Daphnia magna* were conducted in relatively hard water. Acute toxicity values for cobalt ranged from 3.61 mg/L for fathead minnows to 6.68 mg/L for *D. magna*. Chronic toxicity values ranged from .0011 mg/L for fathead minnows to .0051 mg/L for *D. magna*.

F1.1.8 Copper

Toxicity of Copper in Water to Aquatic Life. Copper occurs in natural waters primarily as the divalent cupric ion in free and complexed forms (EPA 1985-Cu). Copper is a minor nutrient for both plants and animals at low concentrations but is toxic to aquatic life at concentrations only slightly higher. Concentrations of 1 to 10 μg/L are usually reported for unpolluted surface waters in the United States.

The toxicity of copper to aquatic life is related primarily to activity of the cupric (Cu^{2+}) ion, and possibly to the hydroxy complexes. The cupric ion is highly reactive, forms moderate to strong complexes and precipitates with inorganic and organic constituents (e.g., carbonate, phosphate, amino acids), and is readily sorbed onto surfaces of suspended solids. The proportion of free cupric ion may be less than 1 percent in eutrophic waters where complexation predominates. These complexes appear to be much less toxic than free cupric ions, thus reducing toxicity. Hence, even dissolved copper measurements may overestimate copper exposure relative to laboratory test waters due to dissolved organic and inorganic ligands (EPA 1985-Cu, Benson et al. 1994).

Toxicity of copper appears to be a function of calcium hardness and associated carbonate alkalinity. Therefore, only those acute LC50 and EC50 values that were determined in waters with hardness falling in the range observed in the Clinch River/Poplar Creek OU are used in this assessment (Table F1.4). Because only one chronic toxicity test was conducted in such waters, other chronic values are presented that are corrected for a hardness of 100 mg/L using slope values from EPA (1985-Cu) (Table F1.4). Acute and chronic NAWQC for 100 mg/L hardness are also presented. The sensitivities of the aquatic plants are highly variable, bracketing those of animals (Table F1.4). Copper is not known to be appreciably bioaccumulated by fish, but some algae and bivalve molluscs do bioconcentrate or bioaccumulate copper by factors of over 1000 (EPA 1985-Cu).

Toxicity of Copper in Sediments to Benthic Organisms. A concentration of 156 mg/kg Cu caused 95% mortality to *Hyalella azteca* at Lake Union, Washington. In Waukegan Harbor, Illinois, there was 34% mortality to the same species at a concentration of 19.5 mg/kg. In Illinois, a high number of benthic

Table F1.4. Aqueous concentrations of copper causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek. Effects reported for CVs are those occurring at the upper bound on the CV (the LOEC)[a]. Unadjusted values from EPA (1985).

Concentration (mg/L)	Effect[b]
8.0[c]	Highest plant value, growth inhibition in *Chlamydomonas sp.*
3.0	Crayfish (*Orconectes rusticus*) LC50
1.5	Tilapia (*Tilapia mossambica*) LC50
1.5	Pumpkinseed (*Lepomis gibbosus*) LC50
0.30	Midge (*Chironomus tentans*) LC50
0.12[d]	Northern pike ELS CV [100% early life-stage mortality][e]
0.11	Snail (*Gyraulus circumstriatus*) LC50
0.069	Snail (*Physa heterostropha*) LC50
0.068	Coho salmon mean LC50
0.060[d]	Lake trout ELS CV [~60% reduction in juvenile standing crop][e]
0.057[d]	Bluegill sunfish CV [57% reduction in larval survival][f]
0.056	*Salmo mean* LC50
0.043	*Daphnia* mean EC50
0.041	Amphipod (*Gammarus pulex*) LC50
0.041[d]	White sucker ELS CV [100% early life-stage mortality][e]
0.038[d]	Rainbow trout ELS CV [100% early life-stage mortality][e]
0.033[d]	Caddisfly (*Clistornia magnifica*) CV [30% adult emergence][g]
0.029	*Daphnia magna* CV [unspecified effect][h]
0.024[d]	Brook trout CV [100% alevin mortality][i]
0.022[d]	Snails (*Physa integra* and *Campeloma decisum*) CVs [>90% reduction in survival][j]
0.019[d]	Fathead minnow CV [100% spawning inhibition][k]
0.018[d]	Acute NAWQC

Table F1.4 (continued)

Concentration (mg/L)	Effect[b]
0.012[d]	Chronic NAWQC
0.012[d]	Amphipod (*Gammarus pseudolimnaeus*) CV [>90% reduction in survival and fecundity][j]
0.005[d]	Bluntnose minnow CV [80% reduction in fecundity][j]
0.001[c]	Lowest plant value, growth lag in *Chlorella pyrenoidosa*

[a] LOEC = Lowest Observed Effect Concentration.
[b] LC = Lethal Concentration; CV = Chronic Value; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria.
[c] Hardness unspecified.
[d] Corrected for a hardness of 100 mg/L.
[e] McKim et al. (1978).
[f] Benoit (1975).
[g] Nebeker et al. (1984).
[h] Chapman et al. n.d.
[i] McKim and Benoit (1971).
[j] Arthur and Leonard (1970).
[k] Mount (1968), Mount and Stephan (1969).
[l] Horning and Neiheisel (1979).

invertebrate taxa were found in one river with a sediment copper concentration of 62 mg/kg; although another Illinois river had a high number of taxa at 19.5 mg/kg and a low number of taxa at a concentration of 45 mg/kg (studies cited in Long and Morgan 1991).

Toxicity of Copper to Wildlife. Copper occurs naturally in elemental form and as a component of many minerals. It is an essential nutrient that is normally present in a wide variety of tissues (ATSDR 1990; EPA 1987). Because of its high electrical and thermal conductivity, it is widely used in the manufacture of electrical equipment. Common copper salts, such as the sulfate, carbonate, cyanide, oxide, and sulfide are used as fungicides, as components of ceramics and pyrotechnics, for electroplating, and for numerous other industrial applications (ACGIH 1986). The largest anthropogenic releases of copper to the environment result from mining operations, agriculture, solid waste, and sludge from sewage treatment plants. Natural discharges to air and water, such as windblown dust and volcanic eruptions, may be significant (ATSDR 1990).

Copper is a component of a number of metalloenzymes such as catalase, peroxidases, and cytochrome oxidase and is essential for the utilization of iron (Goyer 1991; Stokinger 1981). Although most copper salts occur in two valence states, as cuprous (Cu^{+}) or cupric (Cu^{2+}) ions, the biological availability and toxicity of copper is most likely associated with the divalent state (ATSDR 1990). Copper sulfate is the most common copper salt. Copper is soluble in nitric acid and hot sulfuric acid, very slightly soluble in hydrochloric acid and ammonia, and insoluble in water (Stokinger 1981).

The metabolism of copper involves mainly its transfer to and from various organic ligands, most notably sulfhydryl and imidazole groups on amino acids and proteins (ATSDR 1990). The liver is one of the main organs involved in the storage and metabolism of copper. Absorption of ingested copper

occurs primarily in the upper gastrointestinal tract (EPA 1987). Soluble copper compounds (oxides, hydroxides, citrates) are readily absorbed but water-insoluble compounds (sulfides) are poorly absorbed (Venugopal and Luckey 1978). Zinc, molybdenum, and other metals may decrease dietary copper absorption (USAF 1990).

In animal studies, oral exposure to copper caused hepatic and renal accumulation of copper, liver and kidney necrosis at doses of ≥100 mg/kg/day, and hematological effects at doses of 40 mg/kg/day (EPA 1986; Haywood 1985; Rana and Kumar 1978; Gopinath et al. 1974; Kline et al. 1971). Oral or intravenous administration of copper sulfate can increase fetal mortality and developmental abnormalities in experimental animals (Lecyk 1980; Ferm and Hanlon 1974). Rat oral LD_{50} values for various copper compounds are 140 mg/kg for copper chloride ($CuCl_2$); 470 mg/kg for copper oxide (Cu_2O); 940 mg/kg for copper nitrate ($Cu(NO_3)_2 \cdot 3H_2O$); and 960 mg/kg for copper sulfate ($CuSO_4 \cdot 5 H_2O$) (Stokinger 1981). Deaths in animals given lethal doses of copper have been attributed to extensive hepatic centrilobular necrosis (USAF 1990).

In a 90-day subchronic study with copper cyanide (CuCN), high mortality, attributed to hemolytic anemia, was seen in both male and female rats receiving 50 mg/kg/day by gavage, but not in those receiving ≤ 5 mg/kg/day (EPA 1986c). In general, male rats appeared to be more sensitive to the effects of CuCN than female rats. Rats receiving 500 ppm copper in their diet (about 5 mg/day) appeared normal, while rats receiving 1000 ppm exhibited depressed growth, those at 2000 ppm hardly grew at all, and those on a 4000 ppm diet lost weight rapidly and died (Boyden et al. 1938). Salt licks containing 5–9% copper sulfate caused anorexia, hemolytic anemia, icterus, and hemoglobinuria, followed by death within 2 days in sheep using the licks (Gopinath et al. 1974). The estimated ingested dose was 40–49 g over a 25- to 86-day period. Lecyk (1980) observed reduced litter size, decreased fetal weights, and skeletal abnormalities in the offspring of mice fed diets supplemented with 3000 or 4000 ppm copper sulfate (155 or 207 mg copper/kg/day, respectively) for one month prior to gestation and on days 0–19 of gestation.

Aulerich et al. (1982) reported an increased mortality rate in the offspring of minks fed a diet supplemented with >3 mg copper/kg/day as copper sulfate for 50 weeks. Although kit mortality was greater and litter mass was reduced relative to controls, reproductive performance of mink fed diets supplemented with up to 200 ppm copper for 357 days was within the normal range for the species (Aulerich et al. 1982). Lifetime exposure to 42.4 mg copper/kg/day (as copper gluconate) in drinking water caused a 12.8% decrease in the maximal lifespan in mice (Massie and Aiello 1984).

Domestic chicks on diets ≥324 ppm copper grew slowly; mortality increased with dietary copper concentrations of 1270 ppm (Mayo et al. 1956). Arthur et al. (1958) observed no ill effects in chicks fed ≤500 ppm copper in diet up to 8 weeks of age. Dietary copper levels from 588–1176 ppm for 10 weeks exerted a toxic effect on chick growth; the minimum toxic level of copper appeared to be about 500 ppm (Mehring et al. 1960). Turkey poults tolerated 676 ppm copper in starter diets for 21 days with no deleterious effects, but copper was definitely toxic at levels >1620 ppm (Vohra and Kratzer 1968). Chickens given a daily dose of >70 mg/kg of $CuCO_3$ died while those receiving <60 mg/kg exhibited slight symptoms of copper poisoning but survived (Pullar, 1940). No symptoms of copper poisoning were observed in domestic mallards ingesting ≤29 mg/kg/day of $CuCO_3$, but daily intakes ≥55 mg/kg/day were toxic (Pullar 1940).

F1.1.9 Iron

Toxicity of Iron in Water to Aquatic Life. Because iron is the fourth most abundant element in the earth's crust, it commonly occurs at high concentrations in whole water analyses. Dissolved

concentrations in water are dependent on redox conditions and pH. The most common dissolved inorganic form of iron is $Fe(OH)_2^+$ (Dave 1984). Toxicity of iron to aquatic organisms has received little attention because it is observed in unusual circumstances such as acid mine drainage or discharge of acidic metal working wastes.

Iron is acutely toxic to freshwater fish and invertebrates at concentrations ranging from 300 µg/L to 2000 µg/L (Train 1979, cited in Dave 1984). Reproduction of *Daphnia magna* was stimulated at concentrations up to 1 µg/L, and reproduction and survival were inhibited by iron at 158 µg/L and 256 µg/L, respectively (Dave 1984). This is considerably lower than the 4,380 µg/L concentration causing 16% reproductive decrement in another test with *Daphnia magna* (Biesinger and Christensen 1972). Dave argued that his result was more applicable to a situation in which "an acidic iron-containing waste water is discharged into a lake or a river" where it is neutralized, but Biesinger and Christensen's (1972) result "is probably more close to the steady-state situation in natural freshwater without any point source of iron." Survival of brown trout alevin (swim-up fry) and eyed-eggs was reduced at an average iron concentration of 5170 µg/L (Geertz-Hansen and Mortensen 1983).

Toxicity of iron to aquatic plants was not reported. Bioconcentration factors and toxicities of body burdens were also not determined for iron. The chronic NAWQC for freshwater aquatic life of 1000 µg/L is not based on the standard method for criteria derivation. Rather, it is based on effects observed at acid mine drainage sites.

Toxicity of Iron in Sediments to Benthic Organisms. There is minimal information on the toxicity of iron in sediment to benthic invertebrates. However, Hull and Suter (1994) describe sediment criteria which are utilized as screening benchmarks. The Ontario Ministry of the Environment (MOE) has prepared provincial sediment quality guidelines (SQGs). These values are based on Ontario sediments and benthic species from a wide range of geographical areas within the province. The lowest effect level (low) is the level at which actual ecotoxic effects become apparent. The severe effects level (severe) represents contaminant levels that could potentially eliminate most of the benthic organisms. These "low" and "severe" effects levels are 3% (30,000 mg/kg) and 4% (40,000 mg/kg), respectively (Hull and Suter 1994).

Beak Consultants in Canada also developed potential SQGs for Ontario MOE using the background approach. A SQG of 5.9% (59,000 mg/kg) represents a background level to which the site contaminant concentration should be compared. This sediment guideline is not based on/or related to biological effects (Hull and Suter 1994).

The EPA Region V Sediment Classification guidelines are for sediments of Great Lakes Harbors. The "polluted" values ranging from 17,000-25,000 mg/kg are qualified as being "moderately polluted" in the guidelines. The Region V values are poorly founded scientifically and are considered adequate only for determining the suitability of dredged material for open water disposal (Hull and Suter 1994).

F1.1.10 Lead

Toxicity of Lead in Water to Aquatic Life. Although lead occurs in a variety of forms in the aquatic environment, the relative toxicities of these forms are not well defined (EPA 1985-Pb). Acute and chronic lead toxicity increases as hardness decreases (EPA 1985-Pb). Therefore, the lead toxicity values presented in Table F1.5 that are not from tests conducted in waters of moderate hardness (within the range found in the Clinch River) are normalized to 100 mg/L using the slopes calculated by the EPA (1985-Pb). Bioconcentration was observed in four invertebrate and two fish species with concentration factors ranging from 42 to 1700. Toxicities of body burdens were not determined. The acute and chronic NAWQC for lead are 0.082 mg/L and 0.0032 mg/L at a hardness of 100 mg/L as $CaCO_3$.

Toxicity of Lead in Sediment to Benthic Organisms. Although a relatively large amount of data exists for lead and measures of effects in sediments, there are no spiked sediment bioassays and there is a wide concentration range associated with effects (Long and Morgan 1991). Also, freshwater biota may be more sensitive to lead than marine species (Eisler 1988).

Significant effects were observed in *Daphnia magna* exposed to Keweenaw Waterway sediments containing 27 mg/kg lead. Taxa richness of macroinvertebrate communities in the Kishwaukee River were reduced in sediments containing 31 mg/kg and taxa-rich in sediment containing 21 mg/kg. Significant toxicity to *D. magna* and *H. limbata* was observed at 110 mg/kg in sediments of Torch Lake, Michigan (studies cited in Long and Morgan 1991).

Table F1.5. Toxicity of lead to aquatic animals

Concentration (mg/L)	Effect[a]
784	Goldfish (*Carassius auratus*) LC50
600	Midge (*Tanytarsus dissimilis*) LC50
513	Guppy (*Poecilia reticulata*) LC50
14	Brook trout (*Salvelinus fontinalis*)LC50
12	Rainbow trout (*Oncorhynchus mykiss*) LC50
10	Bluegill (*Lepomis macrochirus*) LC50
6	Snail (*Aplexa hypnorm*) LC50
5	Fathead minnow (*Pimephales promelas*) LC50
0	Rainbow trout (*Oncorhynchus mykiss*) CV
0	Amphipod (*Gammarus pseudolimnaeus*) LC50
0	Cladoceran (*Daphnia magna*) EC50
0	Brook trout (*Salvelinus fontinalis*) CV
0	Cladoceran (*Daphnia magna*) CV
0	Rainbow trout (*Oncorhynchus mykiss*) CV
0	Acute NAWQC
0	Cladoceran (*Daphnia magna*) CV
0	Cladoceran (*Daphnia magna*) CV
0	Snail (*Lymnaea palustris*) CV
0	Chronic NAWQC

[a]LC = Lethal Concentration; CV = Chronic Value; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria.

F1.1.11 Manganese

Toxicity of Manganese in Water to Aquatic Life. There is evidence that manganese occurs in surface waters both in suspension in the quadrivalent state and in the trivalent state in a relatively stable, soluble complex (APHA 1989). Comparatively little is known about the toxicity of manganese (Kimball date unknown).

Acute and chronic toxicity tests using fathead minnows and *Daphnia magna* were conducted in relatively hard water. Acute toxicity values for manganese ranged from 17.48 mg/L for *D. magna* to 33.80 mg/L for fathead minnow. Manganese toxicity was increased by the presence of food during the *D. magna* acute toxicity tests. Chronic toxicity values ranged from <1.10 mg/L for *D. magna* to 1.77 mg/L for fathead minnows.

Toxicity of manganese to aquatic plants was not reported. Bioconcentration factors and toxicities of body burdens were also not determined for manganese. There are no NAWQC for manganese.

Toxicity of Manganese in Sediment to Benthic Organisms. Very little sediment toxicity information is available for manganese. The Ontario Ministry of the Environment has estimated that most benthic organisms in that region will not be adversely affected by concentrations of 460 mg/kg, which is consistent with the Great Lakes pre-colonial sediments background level of 400 mg/kg. A concentration of 1,110 mg/kg is estimated to be toxic to most benthic organisms (Persaud et al. 1990).

Toxicity of Manganese to Wildlife. Manganese makes up about 0.10% of the earth's crust and is the 12th most abundant element (NAS 1980). It can exist in oxidation states from -3 to +7, the most common being +4 in the chemical form of manganese dioxide (Keen and Leach 1988). The oxides and peroxides are used in industry as oxidizers, and the metal is used for manufacturing metal alloys to increases hardness and corrosion resistance. In living systems, manganese is an essential element that is found most often in the +2 valence state.

Normal nutritional requirements of manganese are satisfied through the diet, which is the normal source of the element, with minor contributions from water and air. Manganese is absorbed throughout the intestinal tract. It can elicit a variety of serious toxic responses upon prolonged exposure to elevated concentrations either orally or by inhalation. The central nervous system is the primary target. Manganese and iron are mutually antagonistic; therefore, animals with low iron intake are more sensitive to manganese toxicity (NAS 1980).

Effects on reproduction (decreased fertility, impotence) have been observed in humans with inhalation exposure and in animals with oral exposure at the same or similar doses that initiate the central nervous system effects.

In a 120-day study, Grummer et al. (1955) suggested that the critical level of manganese required by growing pigs was approximately 12–20 ppm. There were no significant differences in reproductive performance among sows fed a diet supplemented with 40, 80, or 160 ppm manganese (Grummer et al. 1955), but addition of 500 ppm manganese to the diet slowed growth and caused stiffness of limbs. Swine may be somewhat more sensitive than other mammals; ingesting excess manganese at levels as high as 1000 ppm resulted in metabolic deviations but almost no effects on growth or other indicators of toxicosis in most experiments were reported in NAS (1980). Cunningham et al. (1966) suggested that the minimum toxic level of manganese was between 820 and 2460 ppm based on 84-day experiments with calves, but they noted the influence of decreased food intake at higher levels of manganese. In a second study controlling daily feed intake, no significant differences in average daily weight gain were

observed in calves on diets containing up to 3000 ppm manganese (Cunningham et al. 1966). Adverse effects are more commonly observed at levels >2000 ppm (NAS 1980). When pregnant rats were fed a diet with 3550 ppm manganese beginning at day 2 of gestation, their offspring, fed the same diet to age 225 days, exhibited decreased fertility (Laskey et al. 1982).

Diets containing 1000 mg/kg of manganese as manganese carbonate fed to chicks for 20 weeks caused no adverse effects (Gallup and Norris 1939). Assuming a body weight of 0.556 kg (Opresko et al. 1994) and a daily ingestion rate of 0.04 kg [from the allometric relationship described by Nagy (1987)], the dietary concentration would be equivalent to a dose of 72 mg/kg-day. Turkey poults tolerated manganese levels of 3600 ppm in starter diets for 21 days with no deleterious effects, but growth depression was observed at 4800 ppm (Vohra and Kratzer 1968). Gallup and Norris (1939) concluded that a minimum of 30–50 ppm manganese in the diet would be necessary to prevent perosis, a disease involving manganese deficiency, depending on the breed of chicken studied.

Toxicity of Manganese in Soil to Plants. Manganese occurs in relatively high concentrations in soils as oxides and hydroxides, nodules, and coatings on other soil particles. These forms are not readily available to plants. Manganese is essential for plant growth. It is involved in N assimilation, as a catalyst in plant metabolism, and functions with Fe in the synthesis of chlorophyll (Labanauskas 1966). Toxicity symptoms include marginal chlorosis and necrosis of leaves, and root browning. Excess Mn interferes with enzymes, decreases respiration, and is involved in the destruction of auxin (Foy et al. 1978). Growth of beans was reduced 29% by the addition of 500 ppm Mn to soil (Wallace et al. 1977a). Wong and Bradshaw (1982) measured a 70% reduction in root length of ryegrass in response to 0.75 ppm in solution. The benchmark for Mn in soil is 500 ppm, and in solution, 4 ppm.

F1.1.12 Mercury

Toxicity of Mercury in Water to Aquatic Life. Mercury in the environment commonly occurs as mercury (II) and methylmercury (EPA 1985-Hg). Elemental mercury is oxidized to mercury (II) under natural conditions, and mercury (II) can be methylated by both aerobic and anaerobic bacteria. Mercury (II) can also be methylated in the slime coat, liver, and intestines of fish, but methylation apparently does not occur in other tissues or in plants. Numerous factors such as alkalinity, ascorbic acid, chloride, dissolved oxygen, hardness, organic complexing agents, pH, sediment, and temperature probably affect the acute and chronic toxicity and bioaccumulation of the various forms of mercury. Because methyl mercury was not detected in water the summary of mercury toxicity data includes only inorganic mercury (Table F1.6).

Toxicity of Mercury in Sediment to Benthic Organisms. Sediments from the Little Grizzly Creek system in California, which had 0.8 to 3.5 (mean 1.5) mg/kg mercury and an organic carbon content of approximately 1%, caused greater than 90% mortality in *Daphnia magna* and *Hexagenia limbata* (mayfly larva) (Maleug et al, 1984). A Michigan lake sediment in the same study, with an organic carbon content of 2.2% and mercury concentration of 0.29 mg/kg, caused 100% mortality in *D. magna* and 40% mortality in *H. limbata*. However, sediments from the Phillips Chain of Lakes in Wisconsin, with mercury concentrations from 0.8 to 9.4 mg/kg, resulted in less than 20% mortality in both species. These sediments had a high organic carbon content of approximately 15% (studies cited in Long and Morgan 1991).

Sediments from Waukegan Harbor, Illinois, with a mercury concentration of 0.1 mg/kg resulted in 34% mortality to *Hyalella azteca*. A study of benthic macroinvertebrate communities in Illinois rivers conducted by the Illinois Environmental Protection Agency found that the lowest number of benthic

Table F1.6. Aqueous concentrations of mercuric chloride causing effects on freshwater aquatic biota

Concentration (mg/L)	Effect[a]
2.00	Mayfly (*Ephemerella subvaria*) LC50
2.00	Stonefly (*Acroneuria lycorias*) LC50
2.00	Caddisfly (*Hydropsyche betteni*) LC50
1.00	Mozambique tilapia (*Tilapia mossambica*) LC50
0.500	Tubificid worm (*Spirosperma nikolskyi*) LC50
0.370	Snail (*Aplexa hypnorum*) LC50
0.330	Tubificid worm (*Spirosperma ferox*) LC50
0.275	Rainbow trout (*Oncorhynchus mykiss*) LC50
0.250	Tubificid worm (*Quistadrilus multisetosus*) LC50
0.240	Tubificid worm (*Rhyacodrilus montana*) LC50
0.240	Coho salmon (*Oncorhynchus kisutch*) LC50
0.180	Tubificid worm (*Limnodrilus hoffmelsteri*) LC50
0.180	mosquitofish (*Gambusia affinis*) LC50
0.160	bluegill (*Lepomis macrochirus*) LC50
0.159	fathead minnow (*Pimephales promelas*) LC50
0.140	Tubificid worm (*Stylodrilus heringianus)* LC50
0.140	Tubificid worm (*Tubifex tubifex*) LC50
0.100	Tubificid worm (*Varichaeta pacifica*) LC50
0.080	Tubificid worm (*Branchiura sowerbyi*) LC50
0.050	Crayfish (*Orconectes limosus*) LC50
0.030	guppy (*Poecilla reticulata)*LC50
0.020	Crayfish (*Faxonella clypeatus*) LC50
0.00316	Cladoceran (*Daphnia magna*) EC50
0.00243	acute NAWQC (Hg^{++})
0.00222	Cladoceran (*Daphnia pulex*) EC50
0.00130	final chronic value (Hg^{++})
0.00111	Cladoceran (*Daphnia magna*) CV
0.00024	fathead minnow (*Pimephales promelas*) CV

[a] LC = Lethal Concentration; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria;b CV = Chronic Value.

macroinvertebrate taxa occurred at a site with 1.6 mg/kg mercury, while the highest number of taxa occurred at a site with 0.3 mg/kg mercury (studies cited in Long and Morgan 1991).

ER-L and ER-M values are 0.15 mg/kg and 0.71 mg/kg, respectively. Biological effects were observed in only 42% of the documented studies with concentrations greater than the ER-M (Long et al. 1995).

Toxicity of Mercury to Wildlife. Mercury has no known biological function and is potentially toxic to fish and wildlife. Mercury is a mutagen, teratogen, and carcinogen that adversely affects the central nervous, renal, and reproductive systems of wildlife (Eisler 1987). Inorganic mercury compounds in aquatic systems are readily converted to organomercury by microbial action (Berlin 1979), with organomercury compounds being more toxic than inorganic mercury compounds. Biota bioconcentrate mercury compounds can be further biomagnified through food chains (Wren 1986).

Daily doses of 0.1–0.5 mg/kg bw/day and dietary concentrations of 1.0–5.0 ppm are lethal to sensitive mammals (Eisler 1987). Central nervous system toxicity, weight loss, and mortality were observed among rats fed a diet containing 250 ppm methyl mercury (MeHg) for 2 weeks (Verschuuren et al. 1976a). Rats consuming 2.5 ppm MeHg in the diet for 2 years displayed reduced growth, increased kidney weight, and altered kidney histochemistry (Verschuuren et al. 1976b). To study effects on reproduction, Verschuuren et al. (1976c) fed rats a diet containing 0, 0.1, 0.5, and 2.5 ppm MeHg for three generations. While no effects were observed among rats fed 0.1 or 0.5 ppm MeHg, offspring viability was reduced among rats in the 2.5 ppm treatment. Among mink, 93-day consumption of diets containing 1.8 to 15.0 ppm MeHg produced mortality, ataxia, anorexia, and paralysis (Wobeser et al. 1976), with the highest exposures showing the greatest effects.

The LD_{50} for MeHg for *Coturnix* quail ranges from 14.4 to 33.7 mg/kg bw (Eisler 1987). Growth was decreased and mortality increased among leghorn cockerels fed diets containing 6 to 18 ppm MeHg (Fimreite 1970). Ring-necked pheasants fed diets of MeHg-treated grains displayed reduced egg production and hatchability and laid more shell-less eggs than controls (Fimreite 1971). Heinz (1979) fed mallard ducks a diet containing 0.5 ppm MeHg for three generations. While MeHg consumption did not affect adult weights or weight change during the reproductive season, MeHg-exposed females laid fewer eggs (with more eggs outside the nest box), produced fewer young, and displayed slightly thinner eggshells. Young of MeHg-treated adults were less responsive to maternal calls and hyper-responsive to fright stimuli.

Toxicity of Mercury in Soil to Plants. Mercury in soil is strongly associated with organic matter, and to a lesser extent, clay and Fe and Mn oxides. In general, little Hg is found in soil solution available to plants. Mercury and its compounds taken up by roots are translocated to only a limited extent in plants. Organic forms of Hg may be translocated to a greater degree than inorganic forms in some plants (Huckabee and Blaylock 1973). Gay (1975) reports that pea plants form methylmercury as an intermediate product from Hg added to the soil in organic and inorganic forms. There was no primary reference data describing toxicity of Hg to plants grown in soil. Kloke (1979) report unspecified toxic effects on plants grown in a surface soil with the addition of 0.3 ppm Hg and this has been chosen as the benchmark concentration for all mercury species (inorganic and organic) in soil.

F1.1.13 Molybdenum

Toxicity of Molybedenum to Soil to Plants. Molybdenum is required for symbiotic N_2 fixation by legumes and for growth of nonleguminous plants. The most important functions of molybdenum in plants are related to enzymes active in N metabolism (activation of nitrogenase and nitrate reductase).

The majority of molybdenum taken up by the root system tends to remain in the roots, although significant amounts may be translocated to the shoots in some cases (Wallace and Romney 1977a). Toxicity symptoms include chlorosis, apparently due to interference with Fe metabolism (Warington 1954).

F1.1.14 Nickel

Toxicity of Nickel in Water to Aquatic Life. Although nickel can exist in several oxidation states, the divalent cation state predominates and is generally considered the most toxic form (EPA 1986-Ni). As with many metals the toxicity of nickel increases as hardness decreases. Fish and invertebrates have approximately the same range of sensitivity. Nickel bioconcentration factors range from 0.8 for fish muscle to 193 for a cladoceran. Toxic effects of nickel are summarized in Table F1.7.

Table F1.7. Aqueous concentrations of nickel causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek

Concentration (mg/L)[a]	Effect[b]
77.7	banded killifish (*Fundulus diaphanus*) LC50
72.7	stonefly (*Acroneuria lycorias*) LC50
54.3	caddisfly LC50
38.3	goldfish (*Carassius auratus*) LC50
38.1	damselfly LC50
25.3	Worm (*Nals* sp.) LC50
24.1	rainbow trout (*Oncorhyncus mykiss*) LC50
23.4	amphipod (*Gammarus* sp.) LC50
23.3	white perch (*Morone americana*) LC50
23.0	snail (*Amnicola* sp.) LC50
21.9	American eel (*Anguilla rostrata*) LC50
19.4	bluegill (*Lepomis macrochirus*) LC50
17.6	common carp (*Cyprinus carpio*) LC50
17.4	guppy (*Poecilla reticulata*) LC50
14.3	fathead minnow (*Pimephales promelas*) LC50
13.6	pumpkinseed (*Lepomis gibbosus*) LC50
12.2	striped bass (*Morone saxatillis*) LC50
8.33	Mayfly (*Ephemerella subvaria*) LC50
7.75	rock bass (*Ambioplites rupestris*) LC50
3.67	*Daphnia pulicaria* EC50
2.50	*Daphnia magna* EC50
1.42	acute NAWQC
0.502	fathead minnow (*Pimephales promelas*) CV
0.231	Caddisfly (*Clistoronia magnifica*) CV
0.162	rainbow trout (*Oncorhynchus mykiss*) CV
0.158	chronic NAWQC

Table F1.7 (continued)

Concentration (mg/L)[a]	Effect[b]
0.0809 0.0106	*Daphnia magna* CV *Ceriodaphnia dubia* CV [100% mortality]
0.0106	*Ceriodaphnia dubia* CV[c]

[a] Effect levels were converted based on a 100 mg/L water hardness. Slopes used for the conversion were associated with individual species, where specified in the Criteria document. Otherwise, 0.846 was the slope for both acute and chronic test conversions.

[b] LC = Lethal Concentration; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria; CV = Chronic Value.

[c] Seven day test at 117 mg/L hardness from Kszos et al. (1992).

Toxicity of Nickel in Sediment to Benthic Organisms. No information is available from spiked sediment toxicity tests for nickel; data are only from field studies (Long and Morgan 1991). In sediments of Lake Union, Washington, 88 mg/kg resulted in 95% mortality of *Hyalella azteca* (Long and Morgan 1991). Sediments with between 22 and 63 (mean of 40) mg/kg nickel from the Little Grizzly Creek system in California caused greater than 90% mortality in *Daphnia magna* and *Hexagenia limbata* (Maleug et al. 1984). This lake had an organic carbon content of 1%. A Michigan lake sediment in the same study, with an organic carbon content of 2.2% and a nickel concentration of 150 mg/kg, caused 100% mortality in *D. magna* and 40% mortality in *H. limbata*. However, sediments from the Phillips Chain of Lakes in Wisconsin, with a high organic carbon content of approximately 15% and nickel concentrations from 140 to 350 mg/kg, resulted in less than 20% mortality in both species (studies cited in Long and Morgan 1991).

ER-L and ER-M values are 20.9 mg/kg and 51.6 mg/kg, respectively. A relatively low percentage (17%) of the documented studies in Long et al (1995) indicated an incidence of biological effects at concentrations greater than the ER-M.

Toxicity of Nickel in Soil to Plants. Nickel is not generally considered to be an essential element for plants. However, it may be required by nodulated legumes for internal N transport as part of the urease enzyme (Aller et al. 1990). It is generally adsorbed as the Ni(II) ion and translocated in xylem and phloem with an organic chelate (Hutchinson 1981). Nickel is fairly uniformly distributed between roots and shoots (Wallace and Romney 1977a). Symptoms of Ni toxicity are generally Fe-deficiency induced chlorosis and foliar necrosis (Khalid and Tinsley 1980). Excess nickel affects nutrient absorption by roots, root development, and metabolism, and it inhibits photosynthesis and transpiration. Nickel can replace Co and other heavy metals located at active sites in metallo-enzymes and disrupt their functioning.

A limited number of studies have evaluated the effects of Ni on oak, rye grass, corn, cotton, and beans. Dixon (1988) measured a 30% weight reduction of red oak seedlings grown for 16 weeks in a sandy loam soil (pH 6, % organic matter 1.5) with addition of 50 ppm Ni ($NiCl_2$) (no effect at 20 ppm Ni). Oats grown from seed for 110 d in the presence of 50 ppm Ni (as $NiCl_2$) in soil (pH 6.1, % organic matter 1.4) had reductions of 38 and 63% in grain and straw weight (Halstead et al. 1969). In a second soil (pH 5.7, % organic matter 4.1) only straw weight was reduced (45%) by addition of 100 ppm Ni (50 ppm had no effect). Traynor and Knezek (1973) measured a 21% reduction in corn plant weight with the addition of 294 ppm Ni (as $NiCl_2$) to a sandy soil (pH 5, % organic matter 2) in which the plants had been grown for 5 weeks from seed. Addition of 220 ppm had no effect.

Wallace et al. (1977b) report the results of experiments on the effects of Ni (as $NiSO_4$) on seedlings of a variety of plants grown in a loam soil at several pHs. Corn grown in soil at pH 4.2, 5.6, and 7.5 experienced 74, 80, and 50% reductions in shoot weight after 14 days growth with the addition of 250 ppm Ni. Ni at 100 ppm had no effect. At pH 5.8, bush beans grown for 16 days had a 64% reduction in shoot weight with the addition of 100 ppm (lowest concentration tested). At pH 7.5, a 36% reduction in plant weight occurred with 250 ppm Ni, while 100 ppm had no effect. After 28 days growth in a loam soil at pH 5.8, bush bean leaf weight was reduced 45% by the addition of 100 ppm Ni, while 25 ppm had no effect. For barley under these same growth conditions, 25 ppm Ni (lowest concentration tested) reduced shoot weight 88%.

F1.1.15 Selenium

Toxicity of Selenium to Wildlife. While selenium is an essential nutrient that interacts with Vitamin E and maintains muscle integrity, it has a very narrow tolerance range; in humans, while 0.04–0.1 ppm is required in diet, 4 ppm may produce toxic effects (Eisler 1985b). In mammals, chronic selenium poisoning is induced by diets containing 1–44 ppm selenium (Harr 1978). Symptoms include liver cirrhosis, lameness, loss of hair, emaciation, reduced conception, and increased fetal resorption. Plants convert inorganic selenium to organic selenium compounds, thereby increasing their biological availability (Lo and Sandi 1980).

To evaluate the effects of selenium on reproduction, Schroeder and Mitchner (1971) exposed mice to 3 ppm selenate in drinking water for three generations. This dosage level increased juvenile mortality, number of runts, and resulted in reproductive failure by the third generation. In another study, exposure to 3 ppm selenate or selenite in water for a lifetime had no effect on mouse longevity and no tumorigenicity was observed (Schroeder and Mitchner 1972).

Selenium is both embryotoxic and teratogenic to birds, with organic selenium (selenomethionine) being more toxic than inorganic selenium (Hoffman and Heinz 1988). Mallard ducks were fed diets containing 1, 5, 10, 25, or 100 ppm selenite (Heinz et al. 1987) or 1, 2, 4, 8, or 16 ppm selenomethionine (Heinz et al. 1989) for about 10 weeks. Exposure to 1, 5, or 10 ppm selenite or 1, 2, or 4 ppm selenomethionine in the diet had no effect on survival, growth, or reproductive success of adults. The diet containing 100 ppm selenite killed 11 of 12 adults. While only one adult receiving the 25 ppm diet died, time to laying and interval between eggs was increased, and duckling survivorship was reduced in this treatment (Heinz et al. 1987). Diets containing 8 and 16 ppm selenomethionine resulted in 6.8% and 67.9% malformed embryos, respectively. In addition, duckling survival was significantly reduced (Heinz et al. 1989).

The most visible incident of environmental selenium toxicity occurred at the Kesterson National Wildlife Refuge in California. Agricultural wastewater containing approximately 0.3 ppm selenium was used for marsh management at the refuge (Ohlendorf et al. 1986). Mean selenium concentrations in plants, invertebrates, and fish at the site were 22–175 ppm (dry weight). As a result, reproductive success among water birds was poor, and the incidence of embryo mortality and developmental abnormalities was dramatically increased. Raccoons on the refuge were found to bioaccumulate selenium (Clark et al. 1989). While peak births at the refuge was 2 months later than reported at other locations, no adverse effects on raccoon reproduction were observed.

Metabolism of selenium may be significantly modified through interactions with heavy metals, and selenium may provide some protection from adverse effects associated with various metals, including cadmium and mercury (Eisler 1985b). Arsenite inhibits methylation of selenium but increases fecal excretion of selenite (Venugopal and Luckey 1978).

Toxicity of Selenium in Soil to Plants. Selenium is not proven to be essential for plant growth. It is absorbed by plants as selenite (IV), selenate (VI), or in organic form and the selenate may be the more toxic. It is believed that selenate is taken up actively, while selenite uptake is largely passive (Peterson et al. 1981). Selenium is translocated to all parts of the plant, including the seed, in low molecular weight compounds (Broyer et al. 1972). Toxicity symptoms include chlorosis, stunting and yellowing of the leaves. The mechanism of toxicity is thought to be indiscriminate replacement of S by Se in proteins and nucleic acids with disruptions in metabolism (Trelease et al. 1960). Wan et al. (1988) measured 30 to 85% reductions in shoot weight of alfalfa grown in soils containing 1.5 ppm Se. Shoot weights of alfalfa (Soltanpour and Workman 1980) and sorghum (Carlson et al. 1991) were reduced approximately 25–90% and 55% by 2 and 1 ppm Se in various soils. The benchmark for Se in soil is 1 ppm.

F1.1.16 Silver

Toxicity of Silver in Water to Aquatic Life. Toxicity of silver to freshwater fish and invertebrates is dependent on water hardness and chloride content, with silver being more toxic in soft and low chloride water (EPA 1980-Ag). Toxicity of silver is dependent upon the form of the element. In tests with fathead minnow, free silver ion is the form of silver most acutely toxic to fish, with a 96-h LC_{50} of 0.016 mg/L, followed by silver thiosulfate complex (280-360 mg/L), and silver sulfide (>240 mg/L). The aqueous toxicity of silver is summarized in Table F1.8.

Toxicity of Silver in Sediment to Benthic Organisms. Effects were not observed in association with silver concentrations less than approximately 0.6 mg/kg (Long and Morgan 1991). No data were available for freshwater systems. At concentrations of 2.1 to 2.6 mg/kg in marine systems, there was an absence of *Macoma balthica* in Fraser River sediments, low arthropod abundance and low species richness in southern California benthos, and increased burrowing time of *M. balthica* exposed to Strait of Georgia sediments (studies cited in Long and Morgan 1991).

ER-L and ER-M values are 1.0 mg/kg and 3.7 mg/kg, respectively. A high percentage (92.8%) of the documented studies in Long et al (1995) indicated an incidence of biological effects at concentrations greater than the ER-M.

Toxicity of Silver in Soil to Plants. Silver taken up by plants remains in the root system precipitated with phosphate or chloride (Ward et al. 1979). The toxicity of Ag is related to the binding potential of Ag^+ ions to enzymes and other active molecules at cell surfaces (Cooper and Jolly 1970).

There was no primary reference data showing toxicity of Ag to plants grown in soil. Linzon (1978) reported unspecified toxic effects on plants grown in a surface soil with the addition of 2 ppm Ag.

F1.1.17 Thallium

Toxicity of Thallium to Wildlife. Thallium is a widely distributed metal, occurring at concentrations of approximately 1 ppm in the earths crust (Kazantzis 1979). Principal systems affected by Tl exposure include nervous and digestive; renal damage and hair loss have also been observed. Thallium sulfate, which has been widely used as a rodenticide, has an acute oral LD_{50} of 16 mg/kg (Ware 1978). In chronic studies, rats tolerated a dose of 10 mg Tl acetate/ kg, while 30 mg/kg was lethal to males by 15 weeks. All rats fed a daily dose of 0.45 mg Tl/kg died after 4 months (Kazantzis 1979). Rats exposed to 10 ppm Tl in drinking water for 2 mo accumulated Tl in testis and exhibited signs of testicular toxicity including reduced sperm motility (Formigli et al. 1986).

Table F1.8. Aqueous concentrations of silver causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek

Concentration (mg/L)[a]	Effect[b]
15.9	scud (*Gammarus pseudolimnaeus*) LC50
15.2	rotifer (*Philodina acuticornis*) LC50
11.3	midge (*Tanytarsus dissimilis*) LC50
0.309	bluegill (*Lepomis macrochirus*) LC50
0.046	rainbow trout (*Oncorhynchus mykiss*) LC50
0.0339	flagfish (*Jordanella floridae*) LC50
0.0271	fathead minnow (*Pimephales promelas*) LC50
0.011	mottled sculpin (*Cottus bairdi*) LC50
0.0106	speckled dace (*Rhinichthys osculus*) LC50
0.00791	cladoceran (*Daphnia magna*) CV
0.00683	cladoceran (*Daphnia magna*) EC50
0.0041	NAWQC acute value
0.0012	rainbow trout (*Oncorhynchus mykiss*) CV

[a] Acute effect levels were converted based on a 100 mg/L water hardness. Slopes used for the conversion were associated with individual species, where specified in the Criteria document. Otherwise, 1.72 was used. Chronic values were not converted based on water hardness because no correlation was evident. A chronic NAWQC has not been determined.
[b] LC = Lethal Concentration; CV = Chronic Value; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria.

Bean and Hudson (1976) orally dosed 3 golden eagles with 60 and 120 mg Tl_2SO_4/kg bw; the bird receiving 60 mg Tl_2SO_4/kg survived while the two dosed with 120 mg Tl_2SO_4/kg died, suggesting an LD_{50} between the doses. Oral LD_{50}'s for quail, geese, and ducks are 12, 15, and 30 mg/kg, respectively (Shaw 1933). No long-term studies of thallium toxicity to birds are currently available.

F1.1.18 Uranium

Toxicity of Uranium in Water to Aquatic Life. Relatively little aquatic toxicity data are available for uranium. The only standard data are LC50s for fathead minnow with values for various uranium salts ranging from 2.8 to 135 mg/L (Cushman et al. 1977). Toxic concentrations from nonstandard and poorly documented tests fall within this range.

Toxicity of Uranium in Soil to Plants. Uranium exists in the water-soluble fraction of plant tissue, probably as the uranyl ion and bound to cell wall proteins (Whitehead et al. 1971). The mechanisms of U phytotoxicity involve inhibition of enzyme systems and possibly binding to nucleic acids (Feldman et al. 1967). The minimal amount of radiation measured in the experimental plants has led researchers to the conclusion that toxic effects are the result of the element rather than radiation (Sheppard et al. 1983). Sheppard et al. (1983) grew swiss chard in a sandy (pH 6.4) and a peaty (pH 3, % organic matter 92) soil to test the effects of ^{238}U added as uranyl nitrate [$UO_2(NO_3)_2$]. In the sandy soil, root weight was

reduced 23% by 5 ppm U (lowest concentration tested), while shoot weight was not affected. In the peaty soil, root weight was reduced 44% by 10 ppm U (lowest concentration tested), while shoot weight was not affected.

F1.1.19 Vanadium

Toxicity of Vanadium to Wildlife. Vanadium is a metallic element that occurs in six oxidation states and numerous inorganic compounds. The toxicity of vanadium depends on its physico-chemical state, particularly on its valence state and solubility. Based on acute toxicity, pentavalent NH_4VO_3 has been reported to be more than twice as toxic as trivalent VCl_3 and more than 6 times as toxic as divalent VI_2. Pentavalent V_2O_5 has been reported to be more than 5 times as toxic as trivalent V_2O_3 (Roshchin 1967). In animals, acutely toxic oral doses cause vasoconstriction, diffuse desquamative enteritis, congestion and fatty degeneration of the liver, and congestion and focal hemorrhages in the lungs and adrenal cortex (Gosselin et al. 1984). Minimal effects seen after subchronic oral exposures to animals include diarrhea, altered renal function, and decreases in erythrocyte counts, hemoglobin, and hematocrit (Domingo et al. 1985; Zaporowska and Wasilewski 1990).

A vanadyl sulfate concentration of 5 µg/mL in drinking water, plus a vanadium level of 3.2 µg/g in the diet (4.1 mg V/kg total) of mice, was reported to cause no adverse effects over a lifetime exposure period (Schroeder and Balassa 1967). In similar lifetime studies, rats and mice exhibited no adverse effects when exposed to 5 ppm vanadium (as vanadyl sulfate) in drinking water (Schroeder et al. 1970; Schroeder and Mitchner 1975b). The estimated dose levels were 0.7 mg V/kg/day for rats and 0.9 mg V/kg/day for mice. Vanadium pentoxide in the diet of rats at levels of 10 and 100 ppm for their entire lifetime resulted in no significant toxicological effects except for a reduction in hair cystine content (Stokinger 1981).

White and Dieter (1978) observed no mortality among mallard ducks fed diets containing 1, 10, or 100 ppm vanadyl sulfate for 12 weeks. Altered lipid metabolism was observed among birds fed 100 ppm vanadium; no other effects were observed. Among chickens, 200 to 400 ppm $Ca_2(VO_4)_2$ in the diet produced 100% mortality; weight gain decreased among chicks fed 20 to 40 ppm $Ca_2(VO_4)_2$ (Romoser et al. 1961).

Toxicity of Vanadium in Soil to Plants. Vanadium is not known to be essential for plant growth, although it may be involved in N_2 fixation in nodules of legume roots. Toxicity symptoms include chlorosis, dwarfing, and inhibited root growth (Pratt 1966). Vanadium inhibits various enzyme systems while stimulating others, the overall effect on plant growth being negative (Peterson and Girling 1981). After uptake, it remains in the root system in insoluble form with Ca (Wallace and Romney 1977a). There was no primary reference data describing toxicity of V to plants grown in soil. Kloke (1979) reports unspecified toxic effects on plants grown in a surface soil with the addition of 50 ppm V. Vanadium added at a concentration of 2.5 ppm was toxic to plants in a study reported by EPA (1975).

F1.1.20 Zinc

Toxicity of Zinc in Water to Aquatic Life. Zinc is a commonly occurring nutrient element. Zinc occurs in many forms in natural waters and aquatic sediments. At pH 6.0 in fresh water, the dominant forms of dissolved zinc are the free ion (98%) and zinc sulfate (2%), whereas at pH 9.0, the dominant forms are the monohydroxide ion (78%), zinc carbonate (16%), and the free ion (6%) (EPA 1987-Zn). Zinc toxicity, which is relatively well defined, increases as either hardness decreases or temperature increases (EPA 1987-Zn). The aqueous toxicity of zinc is summarized in Table F1.9. Although freshwater plants are often more sensitive to zinc than freshwater animals, the range of toxicity values was much greater:

growth of the algae *Selenastrum capricornutum* was inhibited by 0.030 mg/L, whereas several other species of green algae had 96-hour EC_{50}s that exceeded 200.0 mg/L. Zinc bioaccumulated in freshwater animal tissue from 51 to 1130 times the water concentration. Toxicities of body burdens were not determined.

Toxicity of Zinc in Sediment to Benthic Organisms. A concentration of 127 mg/kg caused 34% mortality to *Hyalella azteca* in Waukegan Harbor, Illinois. A concentration of 320 mg/kg in Lake Union, Washington, caused 95% mortality to *H. azteca*. In Torch Lake, Michigan, there was significant mortality of *Daphnia magna* and *Hexagenia limbata* associated with concentrations of 310 mg/kg. At two rivers in Illinois, the highest number of benthic macroinvertebrate taxa was associated with concentrations of 96 and 182 mg/kg zinc, while the lowest number of taxa was associated with concentrations of 107 and 327 mg/kg, respectively (studies cited in Long and Morgan 1991).

Table F1.9. Aqueous concentrations of zinc causing effects on freshwater aquatic biota at hardness equivalent to Clinch River and Poplar Creek

Concentration (mg/L)[a]	Effect[b]
160	damselfly (*Argia sp.*) LC50
35.6	amphipod (*Crangonyx pseudogracilis*) LC50
33.8	pumpkinseed (*Lepomis gibbosus*) LC50
33.1	Worm (*Nals sp.*) LC50
31.9	banded killifish (*Fundulus diaphanus*) LC50
30.3	snail (*Amnicola sp.*) LC50
24.5	American eel (*Anquilla rostrata*) LC50
24.2	white perch (*Morone americana*) LC50
20.9	isopod (*Asellus communis*) LC50
18.9	guppy (*Poecilla reticulata*) LC50
18.4	goldfish (*Carassius auratus*) LC50
17.5	Worm (*Lumbriculus variegatus*) LC50
14.6	amphipod (*Gammarus sp.*) LC50
14.1	Caddisfly (*Clistoronia magnifica*) CV
13.0	common carp (*Cyprinus carpio*) LC50
11.8	northern squawfish (*Ptychochallus oregonensis*) LC50
10.8	golden shiner (*Notemigonus crysoleucas*) LC50
10.3	isopod (*Asellus bicrenata*) LC50
9.41	white sucker (*Catostomus commersoni*) LC50
8.82	Asiatic clam (*Corbicula fluminea?*) LC50

Table F1.9 (continued)

Concentration (mg/L)[a]	Effect[b]
8.75	bluegill (*Lepomis macrochirus*) LC50
7.81	southern platyfish (*Xiphophorus maculatus*) LC50
6.81	fathead minnow (*Pimephales promelas*) LC50
5.87	isopod (*Lirceus alabamae*) LC50
3.91	Atlantic salmon (*Salmo salar*) LC50
3.70	brook trout (*Salvelinus fontinalis*) LC50
3.07	bryozoan (*Lophopodella carteri*) LC50
3.01	flagfish (*Jordanella floridae*) LC50
2.93	coho salmon (*Oncorhynchus kisutch*) LC50
2.89	bryozoan (*Plumatella emarginata*) LC52
2.84	snail (*Hellsoma campanulatum*) LC 50
2.70	sockeye salmon (*Oncorhynchus nerka*) LC50
2.35	bryozoan (*Pectinatella magnifica*) LC50
2.27	Tublificid worm (*Limnodrilus hoffmeisteri*) LC50
2.08	snail (*Physa gyrina*) LC50
2.07	snail (*Physa heterostropha*) LC50
1.62	brook trout (*Salvelinus fontinalis*) CV
1.42	Mozambique tilapia (*Tilapia mossambica*) LC50
1.37	rainbow trout (*Oncorhynchus mykiss*) CV
1.26	rainbow trout (*Oncorhynchus mykiss*) LC50
1.25	guppy (*Poecilla reticulata*) CV
1.20	chinook salmon (*Oncorhynchus tshawytscha*) CV
0.848	cladoceran (*Daphnia magna*) EC50
0.803	chinook salmon (*Oncorhynchus tshawytsche*) LC50
0.598	Sockeye salmon (*Oncorhynchus nerka*) CV
0.455	cladoceran (*Daphnia pulex*) EC50
0.410	longfin dace (*Agosia chrysogaster*) LC50
0.313	cladoceran (*Ceriodaphnia dubia*) EC50
0.218	striped bass (*Morone saxatilis*) LC50
0.203	fathead minnow (*Pimephales promelas*) CV

Table F1.9 (continued)

Concentration (mg/L)[a]	Effect[b]
0.120	acute NAWQC
0.110	chronic NAWQC
0.0928	Cladoceran (*Daphnia magna*) CV
0.0912	cladoceran (*Ceriodaphnia reticulata*) EC50
0.0900	cutthroat trout (*Salmo clarki*) LC50[c]
0.0730	flagfish (*Jordanella floridae*) CV

[a] Effect levels were converted based on a 100 mg/L water hardness. Slopes used for the conversion were associated with individual species, where specified in the Criteria document. Otherwise, 0.8473 was the slope for both the acute and chronic test conversions.
[b] LC = Lethal Concentration; CV = Chronic Value; EC = Effects Concentration; NAWQC = National Ambient Water Quality Criteria.
[c] The cutthroat trout acute test did not specify the hardness of the water.

Zinc. Zinc makes up about 0.002% of the earth's crust (NAS 1980). Zinc is an essential trace element in all living organisms; it assures the stability of biological molecules and structures such as DNA, membranes, and ribosomes (Eisler 1993). It is used commercially primarily in galvanized metals and metal alloys, but zinc compounds also have wide applications as chemical intermediates, catalysts, pigments, vulcanization activators and accelerators in the rubber industry, UV stabilizers, and supplements in animal feeds and fertilizers. Zinc compounds are also used in rayon manufacture, smoke bombs, soldering fluxes, mordants for printing and dyeing, wood preservatives, mildew inhibitors, deodorants, antiseptics, and astringents (Lloyd 1984; ATSDR 1989). In addition, zinc phosphide is used as a rodenticide.

Zinc occurs in nature as a sulfide, oxide, or carbonate (Eisler 1993). It is divalent in solution. In freshwater with pH >4 and <7 it exists almost exclusively as the aquo ion $(Zn(H_2O)_6)^{2+}$ (Campbell and Stokes 1985). Zinc interacts with many chemicals, and it may diminish the toxic effects of cadmium and protects against lead toxicosis in terrestrial animals (Eisler 1993). Background concentrations seldom exceed 0.040 mg/L in water or 200 mg/kg in soil or sediment (Eisler 1993).

Although it is essential for normal growth and reproduction (Prasad 1979; Stahl et al. 1989) and important to central nervous system function (Eisler 1993), the primary toxic effect of zinc is on zinc-dependent enzymes that regulate RNA and DNA. It is most harmful to aquatic life in conditions of low pH, low alkalinity, low dissolved oxygen, and elevated temperature. Zinc is relatively nontoxic in mammals, but excessive intake can cause a variety of effects. It is not known to be carcinogenic by normal exposure routes (Eisler 1993).

Gastrointestinal absorption of zinc is variable (20–80%) and depends on the chemical compound as well as on zinc levels in the body and on dietary concentrations of other nutrients (EPA 1984). Information on pulmonary absorption is limited and complicated by the potential for gastrointestinal absorption due to mucociliary clearance from the respiratory tract and subsequent swallowing. Pulmonary inflammation and changes in lung function have been observed in inhalation studies on animals (Amur et al. 1982; Lam et al. 1985; Drinker and Drinker 1928). Zinc is present in all tissues with the highest concentrations in the prostate, kidney, liver, heart, and pancreas. Zinc is a vital

component of many metalloenzymes such as carbonic anhydrase, which regulates CO_2 exchange (Stokinger 1981).

In animals, gastrointestinal and hepatic lesions (Allen et al. 1983; Brink et al. 1959), pancreatic lesions (Maita et al. 1981; Drinker et al. 1927), anemia (ATSDR 1989; Fox and Jacobs 1986; Maita et al. 1981), and diffuse nephrosis (Maita et al. 1981; Allen et al. 1983) have been observed following subchronic oral exposures. Anemia and pancreatitis were the major adverse effects observed in chronic animal studies (Aughey et al. 1977; Drinker et al. 1927; Walters and Roe 1965; Sutton and Nelson 1937). Teratogenic effects have not been seen in animals exposed to zinc; however, high oral doses can affect reproduction and fetal growth (Ketcheson et al. 1969; Schlicker and Cox 1967, 1968; Sutton and Nelson 1937).

Livestock and small mammals are tolerant of extended dietary loadings >100 times the minimum recommended daily zinc requirement (Eisler 1993). No adverse effects on general health or reproduction were observed in dairy cows fed 1310 mg zinc/kg food (Miller et al. 1989). A diet of 4000–5000 mg zinc/kg food for 18 days resulted in fetotoxicity and poor reproduction in rats (NAS 1979). Acute oral LD_{50} doses of 350–800 mg zinc/kg bw have been reported for rats (Eisler 1993). Wlostowski et al. (1988) recommended 30 mg zinc/kg in the diet of bank voles.

Dogs on diets with up to 1000 mg zinc/kg of food for up to 1 year showed no measurable signs of damage (NAS 1979). Horses ingesting >90 mg zinc/kg bw daily in the vicinity of a lead-zinc smelter exhibited decreased growth and death (NAS 1979). No effects were observed in mice fed <682 mg zinc/kg food (<109 mg zinc/kg bw daily) for 13 weeks, but at 6820 mg zinc/kg food, adverse effects on growth and survival were documented (Maita et al. 1981). In a 37-day study involving rats, doses of 97 mg/kg-day administered as zinc carbonate in the diet had no adverse effects on the reproductivity of rats (Kinnamon 1963). European ferrets (*Mustela putorius furo*) fed up to 500 mg zinc/kg for up to 197 days all survived with no significant histopathologies, but those fed 1500 or 3000 mg/kg diet died within 21 days (Straube et al. 1980; Reece et al. 1986). Reproduction ceased entirely in female rats ingesting a diet with 500 mg zinc/kg/day (Sutton and Nelson 1937), possibly a result of zinc-induced anemia.

Mallards (*Anas platyrhynchos*) fed diets containing >3000 mg zinc/kg for 30 or 60 days suffered leg paralysis, decreased food consumption, and high mortality (Gasaway and Buss 1972; NAS 1979). Egg production in Japanese quail (*Coturnix coturnix japonica*) hens fed 15,000 mg zinc (as ZnO)/kg feed for 7 days decreased to near zero within 3 days (Hussein et al. 1988). Seven percent of 14-day old quail fed 600 mg zinc (as zinc phosphide)/kg feed over 5 days died, 53% of those fed 990 mg/kg died, and 93% of those fed 1634 mg/kg died (Hill and Camardese 1986). Domestic chicken pullets and hens on a diet with 20,000 mg zinc/kg feed for 5 days were lighter weight by day 5 and produced significantly fewer eggs for 4 weeks following treatment (Palafox and Ho-A 1980). Eggs collected 14–28 days post-treatment had reduced fertility and hatchability. However, normal growth, egg production, fertility, and hatchability were observed 4–12 weeks post-treatment. Acute oral LD_{50} values for zinc phosphide, a rodenticide, were between 16 and 47 mg/kg bw in ring-necked pheasants (*Phasianus colchicus*), golden eagles (*Aquila chrysaetos*), mallards, and horned larks (*Eremophila alpestris*) (Hudson et al. 1984), but much of the biocidal action is attributed to the phosphide rather than the zinc (Eisler 1993).

Diets containing 28, 48, 228, or 2028 mg zinc/kg for 12–44 weeks had no effect on overall egg production by domestic chickens although zinc levels were elevated in hens on the highest zinc diet (Stahl et al. 1990). All day-old chicks fed diets containing 16,000 mg zinc/kg feed for 5 weeks and 80% of those fed 8000 mg/kg died; those on a 4,000 mg zinc/kg diet showed no significant reductions in growth or survival (Oh et al. 1979). In a 60-day study, doses of 170 mg/kg-day administered as zinc

carbonate in the diet caused increased mortality and altered blood chemistry in mallards (Gasaway and Buss 1972).

In chickens, adverse effects associated with zinc deficiency have been observed at <38 mg zinc/kg dry weight feed (Blamberg et al. 1960; Westmoreland and Hoekstra 1969; Stahl et al. 1989), but concentrations of 93–120 mg/kg are suggested as adequate in the diet (Blamberg et al. 1960; Westmoreland and Hoekstra 1969). Greater than 178 mg/kg dry weight feed is considered excessive (Stahl et al. 1989), and dietary concentrations >2000 mg/kg dry weight feed are considered toxic (NAS 1979; Oh et al. 1979; Stahl et al. 1990). Turkey poults tolerated zinc levels up to 2000 ppm in starter diets for 21 days with no deleterious effects, but levels ≥4000 ppm resulted in marked growth depression (Vohra and Kratzer 1968). No mortality was observed in poults on a diet containing 10,000 ppm zinc (Vohra and Kratzer 1968), but increased mortality has been observed for chickens on diets with 3000 ppm zinc (Roberson and Schaible 1960).

Toxicity of Zinc in Soil to Plants. Zinc is an essential element for plant growth. It has a part in many enzymes, and is involved in disease protection and metabolism of carbohydrates and proteins. Zinc is actively taken up by roots in ionic form, and less so in organically chelated form (Collins 1981). It is fairly uniformly distributed between roots and shoots being transported in the xylem in ionic form (Wallace and Romney 1977a). Transport in the phloem appears to be as an anionic complex (van Goor and Wiersma 1976). Toxicity symptoms include chlorosis and depressed plant growth (Chapman 1966). It acts to inhibit CO_2 fixation, phloem transport of carbohydrates, and alter membrane permeability (Collins 1981). Muramoto et al. (1990) measured the effects of addition of Zn as ZnO to an alluvial soil (pH 6) on root and stem weights, stem length, and grain yield of wheat and rice grown from seed to maturity. Root weight of rice was reduced about 29% by 1000 ppm (lowest concentration tested). Wheat grain yield and plant weight were reduced 66 and 28% by 1000 ppm (lowest concentration tested).

The effect of Zn on soybean growth has been evaluated. Number of seeds produced per plant was decreased by 28% when plants were grown from seed to maturity in an average garden soil to which 25 ppm Zn was added as $ZnSO_4$ (Aery and Sakar 1991). Zn at 10 ppm had no effect. The work of White et al. (1979) shows the ameliorating effect on Zn toxicity of increased pH in a sandy loam soil. Soybean leaf weight was reduced 30% by 131 ppm Zn at pH 5.5, while 115 ppm had no effect. Lata and Veer (1990) measured 45 and 22% reductions in plant weights of spinach and coriander after 60 days in soil with 87 ppm Zn.

F1.2 ORGANIC CHEMICALS

F1.2.1 Acenaphthene

Toxicity of Acenaphthene in Sediment to Benthic Organisms. In the studies used to calculate the NOAA ER-L, effects were usually observed in association with concentrations of 0.15 mg/kg or greater (Long and Morgan 1991). The AET for Puget Sound sediments, derived from the Microtox© bioassay, the benthic community composition, oyster larvae bioassay, and *Rhepoxynius abronius* amphipod bioassay, were 0.5, 0.5, 0.5, and 0.63 mg/kg, respectively, in a 1986 study and 0.5, 0.73, 0.5, and 2.0 mg/kg, respectively, in a 1988 study (Long and Morgan 1991). Confidence in the ER-L is low (Long and Morgan 1991). The EPA sediment quality criterion assuming 1% organic carbon is 1.3 mg/kg (EPA, 1993-Acen).

F1.2.2 Anthracene

Toxicity of Anthracene in Sediment to Benthic Organisms. In the studies used to calculate the NOAA ER-L, effects are almost always observed with concentrations exceeding 0.3 mg/kg (Long and Morgan 1991). Confidence in the ER-L is low because there is no consistency in the effects observed at lower concentrations (Long and Morgan 1991).

F1.2.3 Benzo(a)anthracene

Toxicity of Benzo(a)anthracene in Sediment to Benthic Organisms. In bioassays of the lower Columbia River sediments, no toxicity to *Hyalella azteca* was observed at concentrations of 2.2 mg/kg. However, these data were not used in the calculation of the ER-L (Long and Morgan 1991). In the studies used to calculate the ER-L, no effects were observed at concentrations below 0.06 mg/kg. The overall AET from these data was 0.55 mg/kg, although AET values in the data base ranged from 1.3 to 5.1 mg/kg for Puget Sound to 0.06 to 1.1 mg/kg for San Francisco Bay. Confidence in the ER-L is low (studies cited in Long and Morgan 1991). The EPA (1988) interim freshwater criterion value assuming 1% organic carbon is 13.2 mg/kg.

F1.2.4 Benzo(a)pyrene

Toxicity of Benzo(a)pyrene in Sediment to Benthic Organisms. Only one study was found relating effects data in freshwater sediment to concentrations of benzo(a)pyrene: 220 mg/kg resulted in 95% mortality of *H. azteca*. In the studies documented in Long et al. (1995), 63% indicated biological effects at concentrations between the ER-L and ER-M, and 80% of the studies at concentrations above the ER-M indicated biological effects.

F1.2.5 Bis(2-ethylhexyl)phthalate

Toxicity of Bis(2-ethylhexyl)phthalate in Water to Aquatic Life. Chemicals used as plasticizers. As a group, the esters are colorless liquids, have low volatility, and are poorly soluble in water. Bis(2-ethylhexyl)phthalate, also known as di-2-ethylhexyl phthalate or DEHP, is the most widely used phthalate ester (EPA 1980-bis).

Of the available acute toxicity tests only a *Daphnia magna* test resulted in an LC50 (11.1 mg/L). Calculated LC_{50} values exceeded the highest test concentrations for the midge, scud, and bluegill and were >18.00 mg/L, >32.00 mg/L, and >770 mg/L, respectively. Data are available from two chronic studies of bis(2-ethylhexyl)phthalate: rainbow trout and *Daphnia magna* had chronic values of 0.0084 mg/L and < 0.003 mg/L, respectively.

Bioconcentration factors for bis(2-ethylhexyl)phthalate in fish and invertebrate species ranged from 14 to 2680. Toxicities of body burdens were not determined for phthalate esters. There are no NAWQC for phthalate esters.

Bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate is the most abundant of the phthalate esters, a class of chemicals that are plasticizers and common laboratory contaminants. The LC50 and CV for *Daphnia magna* of are 11 mg/L and <0.003 mg/L, respectively (EPA 1980-phth). At 0.003 mg/L, reproduction was reduced 60% (Mayer and Sanders 1973). However, a subsequent study did not find significant effects on *Daphnia magna* survival or reproduction below 0.811 mg/L with a CV of 0.358 mg/L (Knowles et al. 1987). The CV for rainbow trout is 0.084 mg/L; at the LOEC of 0.014 mg/L 20%

of larvae died (Mehre and Mayer 1976). BCFs for fish and invertebrates range from 54 to 2,680 (EPA 1980-phth).

F1.2.6 Carbon disulfide

Toxicity of Carbon Disulfide in Water to Aquatic Life. The EC50 for *Daphnia magna* is 2.1 mg/L and the LC50 for mosquitofish is 135 mg/L (Van Leeuwen et al. 1985 AQUIRE). The secondary chronic value is derived from these values.

F1.2.7 Chrysene

Toxicity of Chrysene in Sediment to Benthic Organisms. In freshwater systems, a concentration of 4.1 mg/kg was not toxic to *Hyalella azteca* in the Columbia River but a concentration of 170 mg/kg in Lake Union, Washington, resulted in 95% mortality to *Hyalella azteca*. However, these data were not used to calculate the ER-L. In the studies used to calculate the ER-L, effects were almost always observed at concentrations exceeding 0.9 mg/kg, although the lowest Puget Sound and San Francisco Bay AET values were 1.4 and 1.7 mg/kg, respectively (studies cited in Long and Morgan 1991). Confidence in the ER-L is moderate.

F1.2.8 4,4'-DDD

Toxicity of 4,4'-DDD in Water to Aquatic Life. No data regarding effects of 4,4'-DDD on benthic invertebrates were found from freshwater systems. The NS&T Program marine data were from only two geographic regions and spiked sediment bioassays were not performed. Therefore, confidence in the NOAA ER-L and ER-M is low (Long and Morgan 1991).

Toxicity of 4,4'-DDD in Sediment to Benthic Organisms. No data regarding effects of 4,4'-DDT on benthic invertebrates were found from freshwater systems. Although marine data are available from all approaches, the degree of confidence in the ER-L and ER-M is low (Long and Morgan 1991). The data do not cluster about the ER-L and ER-M, especially at the upper end of the bioeffects range, and are not from a broad range of geographic areas.

F1.2.9 DDT-Total

Toxicity of Total DDT in Sediment to Benthic Organisms. Limited data were found regarding effects of total DDT (the summation of all quantified isomers) on freshwater benthic invertebrates. Confidence in the ER-L and ER-M is moderate because marine and/or freshwater data are available from all approaches (Long and Morgan 1991). In the Dupage River in Illinois, the highest number of benthic macroinvertebrate taxa were observed at concentrations averaging 0.020 mg/kg, whereas the least taxa were associated with 0.222 mg/kg total DDT. In sediments of Trinity River in Texas, *D. magna* survival was significantly affected at .031 mg/kg and low mortality occurred at .007 mg/kg. *H. azteca* LC50s in spiked sediment bioassays were 11.0, 19.6, and 49.7 mg/kg total DDT at organic carbon concentrations of 3%, 7.2%, and 10.5%, respectively (studies cited in Long and Morgan 1991).

F1.2.10 Dibenz(a,h)anthracene

Toxicity of Dibenz(a,h)anthracene in Sediment to Benthic Organisms. In studies used to calculate the ER-L, effects in sediments were observed at concentrations as low as 0.042 mg/kg in marine systems (Long and Morgan 1991). Confidence in the ER-L is moderate. The safe sediment level, based upon equilibrium partitioning and the acute NAWQC, is 240 mg/kg (Long and Morgan 1991).

F1.2.11 Fluoranthene

Toxicity of Fluoranthene in Sediment to Benthic Organisms. Lake Union, Washington, sediment with a concentration of 570 mg/kg caused 95% mortality to *Hyalella azteca*. Columbia River, Washington, sediment with 2.1 mg/kg fluoranthene was not toxic to *Hyalella azteca*. The lowest AET for Puget Sound and San Francisco Bay was 1.7 and 2.0, respectively. The confidence in the ER-L is high (Long and Morgan 1991). The EPA freshwater SQC assuming 1% organic carbon is 6.2 mg/kg (EPA 1993-Fluor).

A freshwater sediment with approximately 0.5% organic carbon was spiked with fluoranthene to generate an EC_{50} for *Hyalella azteca* and *Chironomus tentans*, using organism immobility as the endpoint (Suedel et al. 1993). The EC_{50} values were between 2.3 and 7.4 mg/kg for *H. azteca* and between 3.0 and 8.7 mg/kg for *C. tentans*.

F1.2.12 Fluorene

Toxicity of Fluorene in Sediment to Benthic Organisms. Lake Union, Washington, sediment with a concentration of 40 mg/kg fluorene caused 95% mortality in *Hyalella azteca*. A sediment quality criterion (SQC) calculated using equilibrium partitioning and the acute NAWQC and 1% organic carbon yields a value of 7.0 mg/kg. Confidence in the ER-L is low (Long and Morgan 1991).

F1.2.13 2-Methylnaphthalene

Toxicity of 2-Methylnaphthalene Sediment to Benthic Organisms. No data regarding effects of 2-methylnaphthalene on benthic invertebrates were found from freshwater systems, and the NS&T Program marine data were from only a few geographic regions. Therefore, the confidence in the NOAA ER-L is low (Long and Morgan 1991). The lowest AETs (concentrations at which adverse effects are always expected to occur) for Puget Sound and San Francisco Bay were 0.67 and 0.027 mg/kg, respectively.

F1.2.14 Naphthalene

Toxicity of Naphthalene in Sediment to Benthic Organisms. Lake Union, Washington, sediments with 40 mg/kg naphthalene caused 95% mortality in *Hyalella azteca*. Effects were almost always observed at concentrations greater than 0.50 mg/kg in marine systems (Long and Morgan 1991). The Puget Sound AET was 2.1 mg/kg. Confidence in the ER-L is moderate (Long and Morgan 1991).

F1.2.15 PCB-Total

Toxicity of Total PCB in Sediment to Benthic Organisms. ER-L and ER-M values are 0.0227 mg/kg and 0.180 mg/kg, respectively (Long et al. 1995). Freshwater data indicated little or no concordance between toxicity and PCB concentrations. Relatively poor relationships were observed between the incidence of effects and the concentrations of total PCBs in marine sediments. For example, there is a relatively low (51%) incidence of biological effects at concentrations greater than the ER-M ("probable-effects range") (Long et al. 1995). Co-occurrence analyses and apparent effects thresholds are highly variable and are predominantly for marine and estuarine systems. Co-occurrence analyses indicated that concentrations of PCBs ranging from 0.038 mg/kg to 0.276 mg/kg were highly toxic (43–79% mortality) to the amphipod *Rhepoxynius abronius*. Amphipod bioassays also resulted in LC_{50} and/or EC_{50} at PCB concentrations of 0.26 mg/kg (studies cited in Long and Morgan 1991). Apparent effects thresholds,

approximately 1 mg/kg, resulted in reduction of the benthic community composition in Puget Sound. However, some inconsistency in effects is expected given the variance in composition of PCB mixtures.

Toxicity of PCBs to Wildlife. Polychlorinated biphenyls (PCBs) are a family of man-made chemicals consisting of 209 individual compounds with varying toxicity (ATSDR 1989b). Aroclor is the trade name for PCBs made by Monsanto. Because of their insulating and nonflammable properties, PCBs were widely used in industrial applications such as coolants and lubricants in transformers, capacitors, and electrical equipment (ATSDR 1989b). The United States stopped manufacturing PCBs in 1977 due to evidence that they accumulate in the environment. PCBs have become widespread environmental contaminants.

Most exposures to PCBs are oral. Absorption of PCBs following oral exposure is often >90% (ATSDR 1989b). PCBs are preferentially stored in adipose tissues in animals. They may cross the placenta or be transferred to offspring through milk. PCBs with higher chlorine content (the last 2 digits of the Aroclor designation indicate the percent Cl content of the compound) tend to persist in the environment longer than those with lower Cl content, and PCBs are known to bioaccumulate and biomagnify to toxic concentrations in animals (Eisler 1986, ATSDR 1989b). Chronic exposures are of particular concern. PCBs with high K_{ow} values and high numbers of chlorines in adjacent positions are generally the most toxic. Although relatively insoluble in water, PCBs are generally freely soluble in nonpolar organic solvents and in biological lipids (EPA 1980b).

Sixty percent of mice fed diets containing 1,000 ppm Aroclor 1254 for 14 days died within 15 days, but none of the mice fed diets with only 250 ppm Aroclor for 14 days died (Sanders et al. 1974). These diets translate to doses of 130 and 32.5 mg/kg/day, respectively (ATSDR 1989b). White-footed mice fed 10 ppm Aroclor 1254 for 18 months had fewer offspring produced and a longer time between litters than control mice (Linzey 1987).

Feeding studies suggest a total intake of 500-2,000 mg/kg of Aroclor 1254 obtained through the diet over 1 to 7 weeks is lethal in rats (Hudson et al. 1984). Male rats consuming diets containing 0–100 ppm Aroclor 1254 for 104 weeks suffered dose-related reduced survival (NCI 1978); however, there was no effect on similarly treated female rats. Dietary concentrations of ≥20 ppm Aroclor 1254 reduced litter sizes in one- and two-generation reproduction studies with rats; concentrations <5 ppm had no effect (Linder et al. 1974).

Mink are one of the most susceptible mammals; dietary levels as low as 0.1 ppm fresh weight have caused death and reproductive toxicity (Eisler 1986b). Diets containing 20 ppm Aroclor 1242 were lethal to mink in a 247-day experiment. The LC_{50} for chronic exposures is 6.65 ppm Aroclor 1254 for mink over a 8 month period (Ringer et al. 1981). Diets containing 5 ppm Aroclor 1242 caused complete reproductive failure (Bleavins et al. 1980). Exposure for 160 days to 3.57 ppm Aroclor 1254 resulted in 100% mortality of adult mink (Platonow and Karstad 1973).

A chronic study was conducted over 4.5 months exposing mink to 1, 5 and 15 ppm Aroclor 1254 in the diet. There was a significant reduction in the number of offspring born alive at the 5 and 15 mg/kg exposures (Aulerich and Ringer 1977). Mink fed carp containing 1.5 ppm Aroclor 1254 for 6 months produced no offspring that survived to 24 hours (Hornshaw et al. 1983). No effects were observed in mink fed 0.64 ppm Aroclor 1254 for 160 days (Platonow and Karstad 1973). Exposure of mink for 6 months to 1 ppm Aroclor 1254 resulted in no significant difference from controls in number of offspring, or offspring mortality (Wren et al. 1987). Therefore, the 1 ppm dose was considered to be a chronic NOAEL.

A dietary dose of 25 ppm Aroclor 1254 fed for at lease a month before egg-laying in mallard ducks had no detrimental effect on reproductive success (Custer and Heinz 1980). Dietary exposure of 5 ppm Aroclor 1254 for 39 weeks to laying hens and roosters resulted in reduced egg production, although hatchability of fertile eggs was not affected (Platonow and Reinhart 1973). Screech owls fed 3 ppm Aroclor 1248 through two breeding seasons did not have significantly different reproductive success, relative to controls (McLane and Hughes 1980). Exposure of pheasants to 12.5 mg/bird/week (1.8 mg/kg/day) of Aroclor 1254 for 17 weeks resulted in significantly reduced egg hatchability (Dahlgren et al. 1972). Because this study considered exposure throughout a critical lifestage (reproduction), the 12.5 mg/bird/week dose was considered to be a chronic LOAEL.

F1.2.16 PCB-1248

Toxicity of PCB-1248 in Sediment to Benthic Organisms. The log K_{oc} for Aroclor 1248 is 7.02. The sediment quality benchmark (SQB) of 1.05 mg/kg is derived using the equilibrium partitioning approach based on 1% organic carbon. The secondary chronic value (Suter and Mabrey 1994) of 0.00001 mg/L is used as the water quality benchmark. The secondary chronic value implies a greater than 20% chance that the NAWQC, if its value were known, would be exceeded. For comparison, substitution of the lowest chronic value for daphnids results in a SQB of 450 mg/kg for Aroclor 1248.

F1.2.17 PCB-1254

Toxicity of PCB-1254 in Water to Aquatic Life. Polychlorinated biphenyls are highly persistent and widely distributed industrial chemicals. PCB 1254 is a mixture of isomers of biphenyl with approximately 54% chlorine substitution. Because few toxicity tests have been performed with that mixture, Table F1.10 summarizes aquatic toxicity for all mixtures. Bioconcentration factors for PCBs range from 3,000 to 274,000 in laboratory studies (EPA 1980b).

Toxicity of PCB-1254 in Sediment to Benthic Organisms. The log K_{oc} for Aroclor 1254 is 5.93. Using the secondary chronic value (Suter and Mabrey 1994) of 0.00002 mg/L as the water quality benchmark in the equilibrium partitioning equation results in a sediment benchmark of 0.17 mg/kg based on 1% organic carbon. For comparison, substitution of the lowest chronic value for daphnids results in a SQB of 17.9 mg/kg for Aroclor 1254.

F1.2.18 PCB-1260

Toxicity of PCB-1260 in Sediment to Benthic Organisms. The log K_{oc} for Aroclor 1260 is 7.02. The sediment quality benchmark (SQB) of 1099 mg/kg is derived using the equilibrium partitioning approach based on 1% organic carbon. The secondary chronic value (Suter and Mabrey 1994) of 0.0105 mg/L is used as the water quality benchmark. For comparison, substitution of the lowest chronic value for daphnids results in a SQB of 220 mg/kg for Aroclor 1260.

F1.2.19 Phenanthrene

Toxicity of Phenanthrene in Sediment to Benthic Organisms. Lake Union, Washington, sediments with 410 mg/kg phenanthrene caused 95% mortality among *Hyalella azteca*. Columbia River, Washington, sediments with 0.58 mg/kg phenanthrene were not toxic to the same species (studies cited in Long and Morgan 1991). Confidence in the ER-L is moderate. The EPA sediment quality criterion is 1.8 mg/kg, assuming 1% organic carbon (EPA 1993-Phen).

Table F1.10. Aqueous concentrations of PCBs causing effects on freshwater aquatic biota

Concentration (mg/L)	Effect[a]
0.283	damselfly (*Ischnura verticalis*) LC50
0.046	Scud (*Gammarus pseudolimnaeus*) LC50
0.033	fathead minnow (*Pimephales promelas*) LC50
0.019	redear sunfish (*Lepomis microlophus*) LC50
0.010	Scud (*Gammarus fasciatus*) LC50
0.00514	cladoceran (*Daphnia magna*) CV
0.00402	Scud (*Gammarus pseudolimnaeus*) CV
0.0023	largemouth bass (*Micropterus salmoides*) LC50
0.0020	rainbow trout (*Oncorhynchus mykiss*) LC50
0.00186	fathead minnow (*Pimephales promelas*) CV
0.0010	brook trout (*Salvelinus fontinalis*) CV
0.00080	Midge (*Tanytarsus dissimilis*) CV

[a] LC = Lethal Concentration; CV = Chronic Value.

F1.2.20 Pyrene

Toxicity of Pyrene in Sediment to Benthic Organisms. Lake Union, Washington, sediments with 750 mg/kg pyrene caused 95% mortality among *Hyalella azteca*. A concentration of 2.5 mg/kg in Columbia River, Washington, sediments was not toxic to the same species (studies cited in Long and Morgan 1991). The EPA interim sediment quality criterion, based on equilibrium partitioning and 1% organic carbon, is 13.1 mg/kg (Long and Morgan 1991). Confidence in the ER-L is moderate.

Table F1.11. Concentrations of PCB causing toxic effects in lipids and whole bodies of fish. Concentrations are the geometric means of body burdens at the LOEC[a] and NOEC[b].

Species	PCB Form	mg/kg lipid wet weight	mg/kg wet weight	LOEC Effect	Source
Channel catfish	1242	<213[c]	<14.3 <11.9[k]	growth	Hansen et al. 1976
Fathead minnow	1242	NE[d]	>390[e]	100% mortality	Nebeker et al. 1974
Fathead minnow	1248	370[f]	ca 26[f]	growth (F2)	DeFoe et al. 1978
Lake trout	1254	22[g]	0.7	survival	Berlin et al. 1981
Coho salmon	1254	NE[d]	<645	100% mortality	Mayer et al. 1977
Fathead minnow	1254	NE[d]	126[h]	repro	Nebeker et al. 1974
Brook trout	1254	NE[d]	94[i]	mortality	Mauck et al. 1978
Fathead minnow	1260	NE[d]	<350[j]	weight	DeFoe et al. 1978

[a] LOEC = Lowest Observed Effect Concentration.
[b] NOEC = No Observed Effect Concentration.
[c] The < sign signifies that the value corresponds to a LOEC, not a CV.
[d] Not estimated due to lack of lipid content data.
[e] 390mg/kg is the residue that was associated with no mortality and extremely variable spawning. Mortality occurred at higher exposures, but residues were not measured.
[f] These values are approximate due to extraction of the LOEC, NOEC, and lipid content from figures.
[g] The residue is normalized for lipid content based on an estimate of R. Hesselberg, one of the authors of the paper. His estimate of 3 % lipid is from another study, but is from fish of the same species and about the same age.
[h] Value for males; the female value is higher.
[i] The residue for effects on weight was not presented in the paper but is probably < 71 mg/kg.
[j] 350 mg/kg was the body residue at 250 days exposure. The 66 days exposure was associated with an 8% decrease in weight.
[k] Concentration in edible carcass; all others are whole fish.

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Appendix F2

FISH COMMUNITY

Table F2.1 Mean and upper confidence bound (UCB) aqueous chemical concentrations in filtered (FLTR) and unfiltered (WHOL) samples, aqueous ecotoxicological benchmarks and their values for each chemical, and the quotients of UCBs/benchmark values. All units are mg/L. Only the chemicals for which at least one quotient equaled or exceeded 1 are included. If only one observation (Obs.) resulted in detection of the the chemical, the UCB was set to that observed value.

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
1,1-Dichloroethane	75-34-3	O	WHOL	21	18	2	0.00120	0.00120	0.00008	14.6800	LCV_ALLO
1,1-Dichloroethane	75-34-3	O	WHOL	21	18	2	0.00120	0.00120	0.00008	14.6800	LCV_FISH
1,1-Dichloroethane	75-34-3	O	WHOL	21	18	2	0.00120	0.00120	0.00015	8.2190	LTV_FISH
1,1-Dichloroethane	75-34-3	O	WHOL	21	18	2	0.00120	0.00120	0.00144	0.8340	S_ACU_V
1,1-Dichloroethane	75-34-3	O	WHOL	21	18	2	0.00120	0.00120	0.02575	0.0466	S_CHR_V
1,2-Dichloroethene	540-59-0	O	WHOL	21	18	8	0.01461	0.02002	0.00210	9.5380	LCV_ALLO
1,2-Dichloroethene	540-59-0	O	WHOL	21	18	8	0.01461	0.02002	0.00210	9.5380	LCV_FISH
1,2-Dichloroethene	540-59-0	O	WHOL	21	18	8	0.01461	0.02002	0.00350	5.7190	LTV_FISH
1,2-Dichloroethene	540-59-0	O	WHOL	21	18	8	0.01461	0.02002	0.03587	0.5580	S_ACU_V
1,2-Dichloroethene	540-59-0	O	WHOL	21	18	8	0.01461	0.02002	0.64153	0.0312	S_CHR_V
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00003	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00002	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00001	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00001	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00001	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00001	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00001	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00004	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00000	282.1700	LCV_ALLO
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00001	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00001	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00000	1394.9270	LCV_DAPH
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00003	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00002	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00001	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00001	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00001	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00001	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00001	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00004	282.1700	LCV_FISH
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00000	282.1700	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00009	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00006	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00002	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00002	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00003	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00002	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00002	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00013	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00001	98.7720	LTV_FISH
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00002	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00002	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00001	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00001	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00001	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00001	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00001	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00003	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00000	372.0000	S_ACU_V
2-Butanone	78-93-3	O	WHOL	00	10	2	0.00705	0.00840	0.00040	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	01	28	4	0.00335	0.00588	0.00028	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	02.02	9	1	0.00200	0.00200	0.00010	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	03.03	9	1	0.00200	0.00200	0.00010	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	04.01	9	1	0.00300	0.00300	0.00014	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	18	9	1	0.00200	0.00200	0.00010	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	20.01	9	1	0.00200	0.00200	0.00010	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	20.02	10	2	0.00630	0.01235	0.00059	20.8000	S_CHR_V
2-Butanone	78-93-3	O	WHOL	21	18	1	0.00100	0.00100	0.00005	20.8000	S_CHR_V
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00002	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00001	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00003	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00003	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00009	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00001	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00001	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00002	507.6400	LCV_ALLO
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00001	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00000	3114.1820	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00000	3114.1820	LCV_DAPH
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00002	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00001	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00003	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00003	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00009	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00001	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00001	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00002	507.6400	LCV_FISH
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00006	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00004	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00009	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00008	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00028	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00002	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00002	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00005	161.8670	LTV_FISH
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00005	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00004	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00007	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00007	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00023	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00002	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00002	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00004	200.0000	S_ACU_V
Acetone	67-64-1	O	WHOL	00	10	1	0.00970	0.00970	0.00087	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	01	28	1	0.00700	0.00700	0.00063	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	02.02	9	1	0.01400	0.01400	0.00125	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	03.03	9	1	0.01300	0.01300	0.00116	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	13	9	1	0.04500	0.04500	0.00402	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	18	9	1	0.00300	0.00300	0.00027	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	20.02	10	1	0.00300	0.00300	0.00027	11.2000	S_CHR_V
Acetone	67-64-1	O	WHOL	22	10	1	0.00780	0.00780	0.00070	11.2000	S_CHR_V
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.05196	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.05401	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.09716	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.02629	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.02192	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.12685	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.05466	0.4600	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.04593	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.04768	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.05055	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.03216	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.05239	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.02478	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.02636	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.04826	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.08726	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	1.08976	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.72408	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.65003	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.74754	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.71017	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.67345	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	1.17778	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	1.03885	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	1.41898	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	1.19643	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.93423	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.57966	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.64308	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.50884	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.42859	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.56195	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	1.05583	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	2.03458	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.75434	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.66129	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	4.58023	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	3.06737	0.4600	LCV_ALLO
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.05196	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.05401	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.09716	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.02629	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.02192	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.12685	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.05466	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.04593	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.04768	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.05055	0.4600	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.03216	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.05239	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.02478	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.02636	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.04826	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.08726	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	1.08976	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.72408	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.65003	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.74754	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.71017	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.67345	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	1.17778	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	1.03885	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	1.41898	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	1.19643	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.93423	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.57966	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.64308	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.50884	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.42859	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.56195	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	1.05583	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	2.03458	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.75434	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.66129	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	4.58023	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	3.06737	0.4600	LCV_AQPL
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.01258	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.01308	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.02352	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.00637	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.00531	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.03071	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.01323	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.01112	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.01154	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.01224	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.00779	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.01269	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.00600	1.9000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.00638	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.01168	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.02113	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	0.26384	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.17530	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.15737	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.18098	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.17194	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.16305	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	0.28515	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	0.25151	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	0.34354	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	0.28966	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.22618	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.14034	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.15569	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.12319	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.10376	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.13605	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568.	0.25562	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	0.49258	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.18263	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.16010	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	1.10890	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	0.74263	1.9000	LCV_DAPH
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.00727	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.00756	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.01359	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.00368	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.00307	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.01775	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.00765	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.00643	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.00667	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.00707	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.00450	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.00733	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.00347	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.00369	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.00675	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.01221	3.2880	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	0.15246	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.10130	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.09094	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.10458	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.09935	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.09422	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	0.16478	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	0.14534	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	0.19852	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	0.16738	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.13070	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.08110	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.08997	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.07119	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.05996	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.07862	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	0.14771	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	0.28464	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.10553	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.09252	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	0.64079	3.2880	LCV_FISH
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	0.42913	3.2880	LCV_FISH
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.04426	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.04601	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.08277	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.02240	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.01867	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.10806	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.04657	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.03912	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.04062	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.04306	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.02739	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.04463	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.02111	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.02246	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.04111	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.07434	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	0.92832	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.61681	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.55373	0.5400	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.63679	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.60496	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.57368	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	1.00330	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	0.88495	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	1.20876	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	1.01918	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.79582	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.49378	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.54781	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.43346	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.36509	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.47869	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	0.89941	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	1.73316	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.64259	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.56332	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	3.90167	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	2.61294	0.5400	LTV_DAPH
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.00509	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.00529	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.00951	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.00257	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.00215	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.01241	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.00535	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.00450	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.00467	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.00495	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.00315	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.00513	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.00243	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.00258	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.00472	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.00854	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	0.10666	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.07087	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.06362	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.07316	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.06951	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.06591	4.7000	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	0.11527	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	0.10168	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	0.13888	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	0.11710	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.09143	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.05673	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.06294	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.04980	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.04195	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.05500	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	0.10334	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	0.19913	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.07383	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.06472	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	0.44828	4.7000	LTV_FISH
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	0.30021	4.7000	LTV_FISH
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.03187	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.03313	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.05959	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.01613	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.01344	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.07780	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.03353	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.02817	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.02924	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.03101	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.01972	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.03214	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.01520	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.01617	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.02960	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.05352	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	0.66839	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	0.44411	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	0.39868	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	0.45849	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	0.43557	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	0.41305	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	0.72237	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	0.63716	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	0.87031	0.7500	NAWQ_ACU

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	0.73381	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	0.57299	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	0.35552	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	0.39442	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	0.31209	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	0.26287	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	0.34466	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	0.64758	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	1.24787	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	0.46266	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	0.40559	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	21	18	17	1.05449	2.10690	2.80920	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	1.88132	0.7500	NAWQ_ACU
Aluminum	7429-90-5	I	FLTR	00	1	1	0.02390	0.02390	0.27471	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	01	17	15	0.02036	0.02484	0.28557	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	02.01	3	3	0.02194	0.04470	0.51374	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	02.02	12	4	0.00953	0.01209	0.13902	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	02.03	6	2	0.00736	0.01008	0.11589	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	03.01	13	13	0.03552	0.05835	0.67069	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	03.02	13	12	0.01970	0.02515	0.28903	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	03.03	13	11	0.01752	0.02113	0.24284	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	03.04	15	14	0.01851	0.02193	0.25211	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	04.01	15	14	0.01909	0.02325	0.26729	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	04.02	6	4	0.01183	0.01479	0.17004	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	04.04	9	7	0.01789	0.02410	0.27703	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	07.01	5	1	0.01140	0.01140	0.13103	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	07.02	17	10	0.01104	0.01213	0.13940	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	08	2	1	0.02220	0.02220	0.25517	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	FLTR	13	46	36	0.02520	0.04014	0.46140	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	00	11	11	0.35118	0.50129	5.76196	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	01	48	47	0.24938	0.33308	3.82849	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	02.01	3	3	0.12123	0.29901	3.43692	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	02.02	21	21	0.24075	0.34387	3.95251	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	02.03	6	6	0.17027	0.32668	3.75491	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	02.04	10	10	0.23938	0.30979	3.56077	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	03.01	33	33	0.45244	0.54178	6.22737	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	03.02	13	13	0.34300	0.47787	5.49279	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	03.03	22	22	0.51559	0.65273	7.50266	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	03.04	15	15	0.40367	0.55036	6.32597	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	04.01	24	24	0.31790	0.42974	4.93958	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	04.02	6	6	0.14820	0.26664	3.06487	0.0870	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Aluminum	7429-90-5	I	WHOL	04.04	9	9	0.19457	0.29582	3.40020	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	07.01	5	5	0.14764	0.23407	2.69042	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	07.02	17	16	0.13956	0.19715	2.26610	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	08	2	2	0.06340	0.25849	2.97121	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	13	57	56	0.42175	0.48568	5.58255	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	18	9	9	0.53000	0.93591	10.75754	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	20.01	9	7	0.21256	0.34700	3.98848	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	20.02	10	10	0.21613	0.30419	3.49648	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	21 .	18	17	1.05449	2.10690	24.21728	0.0870	NAWQ_CHR
Aluminum	7429-90-5	I	WHOL	22	10	10	1.02250	1.41099	16.21827	0.0870	NAWQ_CHR
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00770	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00879	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00714	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.01263	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.01372	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00823	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.01135	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.01069	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.01007	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00832	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.01244	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00778	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.01062	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00733	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00557	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00923	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00180	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00213	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00233	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00197	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00287	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00289	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00272	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00197	0.6100	LCV_ALLO
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00194	0.6100	LCV_ALLO
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00770	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00879	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00714	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.01263	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.01372	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00823	0.6100	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.01135	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.01069	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.01007	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00832	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.01244	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00778	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.01062	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00733	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00557	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00923	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00180	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00213	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00233	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00197	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00287	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00289	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00272	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00197	0.6100	LCV_AQPL
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00194	0.6100	LCV_AQPL
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00087	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00099	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00081	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.00143	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.00155	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00093	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.00128	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.00121	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.00114	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00094	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.00141	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00088	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.00120	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00083	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00063	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00104	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00020	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00024	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00026	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00022	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00032	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00033	5.4000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00031	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00022	5.4000	LCV_DAPH
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00022	5.4000	LCV_DAPH
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00294	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00335	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00272	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.00481	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.00523	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00314	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.00433	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.00408	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.00384	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00317	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.00474	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00296	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.00405	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00279	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00212	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00352	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00069	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00081	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00089	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00075	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00109	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00110	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00104	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00075	1.6000	LCV_FISH
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00074	1.6000	LCV_FISH
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00247	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00282	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00229	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.00405	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.00440	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00264	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.00364	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.00343	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.00323	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00267	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.00399	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00250	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.00341	1.9000	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00235	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00179	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00296	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00058	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00068	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00075	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00063	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00092	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00093	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00087	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00063	1.9000	LTV_DAPH
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00062	1.9000	LTV_DAPH
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00203	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00232	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00189	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.00333	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.00362	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00217	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.00300	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.00282	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.00266	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00220	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.00328	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00205	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.00280	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00194	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00147	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00244	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00048	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00056	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00061	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00052	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00076	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00076	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00072	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00052	2.3100	LTV_FISH
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00051	2.3100	LTV_FISH
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.00477	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.00545	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.00442	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.00782	0.9850	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.00850	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.00509	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.00703	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.00662	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.00624	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.00515	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.00770	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.00482	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.00658	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.00454	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.00345	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.00572	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.00112	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.00132	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.00144	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.00122	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.00177	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.00179	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.00169	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.00122	0.9850	S_ACU_V
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.00120	0.9850	S_ACU_V
Antimony	7440-36-0	I	FLTR	00	1	1	0.00470	0.00470	0.04519	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	01	20	13	0.00407	0.00536	0.05157	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	02.01	3	2	0.00323	0.00436	0.04190	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	02.02	13	12	0.00640	0.00770	0.07407	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	02.03	6	6	0.00633	0.00837	0.08046	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	03.01	14	8	0.00398	0.00502	0.04825	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	03.02	14	10	0.00621	0.00692	0.06656	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	03.03	14	12	0.00546	0.00652	0.06269	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	03.04	16	14	0.00483	0.00615	0.05909	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	04.01	16	11	0.00422	0.00508	0.04882	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	04.02	6	6	0.00572	0.00759	0.07296	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	04.04	11	8	0.00351	0.00474	0.04561	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	07.01	5	5	0.00520	0.00648	0.06228	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	07.02	17	12	0.00333	0.00447	0.04299	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	08	2	1	0.00340	0.00340	0.03269	0.1040	S_CHR_V
Antimony	7440-36-0	I	FLTR	13	47	42	0.00495	0.00563	0.05415	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	01	51	1	0.00110	0.00110	0.01058	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	02.01	3	1	0.00130	0.00130	0.01250	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	03.01	34	2	0.00141	0.00142	0.01366	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	03.02	14	1	0.00120	0.00120	0.01154	0.1040	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Antimony	7440-36-0	I	WHOL	03.04	16	3	0.00172	0.00175	0.01681	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	04.01	25	2	0.00172	0.00176	0.01695	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	04.02	6	2	0.00162	0.00166	0.01596	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	07.02	17	1	0.00120	0.00120	0.01154	0.1040	S_CHR_V
Antimony	7440-36-0	I	WHOL	13	58	2	0.00112	0.00118	0.01136	0.1040	S_CHR_V
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00140	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00120	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00141	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00127	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00148	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00142	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00134	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00125	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00186	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.00214	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.00584	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00144	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00121	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.05470	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00131	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00120	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00120	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00153	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00159	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00131	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00117	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00142	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00184	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.00572	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00141	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.00404	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.05963	0.9140	LCV_DAPH
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00043	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00037	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00043	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00039	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00046	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00044	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00041	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00039	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00057	2.9620	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.00066	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.00180	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00045	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00037	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.01688	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00040	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00037	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00037	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00047	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00049	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00041	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00036	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00044	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00057	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.00177	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00043	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.00125	2.9620	LCV_FISH
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.01840	2.9620	LCV_FISH
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00203	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00174	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00203	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00184	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00214	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00205	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00194	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00181	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00269	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.00309	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.00843	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00208	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00175	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.07899	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00189	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00174	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00174	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00221	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00230	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00190	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00169	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00205	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00266	0.6330	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.00826	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00203	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.00584	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.08610	0.6330	LTV_DAPH
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00060	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00052	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00060	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00055	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00064	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00061	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00058	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00054	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00080	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.00092	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.00251	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00062	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00052	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.02347	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00056	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00052	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00052	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00066	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00068	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00056	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00050	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00061	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00079	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.00246	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00060	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.00174	2.1300	LTV_FISH
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.02559	2.1300	LTV_FISH
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00356	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00306	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00357	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00323	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00376	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00360	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00341	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00318	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00472	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.00544	0.3600	NAWQ_ACU

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.01482	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00366	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00308	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.13889	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00333	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00306	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00306	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00389	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00404	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00333	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00297	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00361	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00468	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.01453	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00357	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.01027	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.15139	0.3600	NAWQ_ACU
Arsenic	7440-38-2	I	FLTR	01	20	3	0.00123	0.00128	0.00675	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	02.02	13	1	0.00110	0.00110	0.00579	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	02.04	2	1	0.00129	0.00129	0.00676	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	03.01	14	2	0.00112	0.00116	0.00612	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	03.02	14	2	0.00134	0.00135	0.00712	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	03.03	14	3	0.00118	0.00130	0.00682	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	03.04	16	4	0.00115	0.00123	0.00646	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	04.01	16	4	0.00112	0.00114	0.00602	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	04.02	6	1	0.00170	0.00170	0.00895	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	04.04	11	3	0.00181	0.00196	0.01031	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	07.01	5	5	0.00394	0.00534	0.02808	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	07.02	17	5	0.00115	0.00132	0.00694	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	FLTR	13	47	6	0.00106	0.00111	0.00583	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	00	11	1	0.05000	0.05000	0.26316	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	01	51	4	0.00114	0.00120	0.00631	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	02.02	22	1	0.00110	0.00110	0.00579	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	02.04	11	1	0.00110	0.00110	0.00579	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	03.02	14	1	0.00140	0.00140	0.00737	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	03.03	23	3	0.00129	0.00145	0.00765	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	03.04	16	4	0.00109	0.00120	0.00632	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	04.01	25	3	0.00103	0.00107	0.00563	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	04.02	6	1	0.00130	0.00130	0.00684	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	04.04	11	4	0.00129	0.00169	0.00887	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	07.01	5	5	0.00408	0.00523	0.02753	0.1900	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Arsenic	7440-38-2	I	WHOL	07.02	17	3	0.00111	0.00129	0.00677	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	13	58	10	0.00213	0.00370	0.01945	0.1900	NAWQ_CHR
Arsenic	7440-38-2	I	WHOL	20.01	9	1	0.05450	0.05450	0.28684	0.1900	NAWQ_CHR
Barium	7440-39-3	I	FLTR	00	1	1	0.02960	0.02960	0.00510	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	01	17	17	0.02340	0.02424	0.00418	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	02.01	3	3	0.02442	0.03179	0.00548	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	02.02	12	12	0.02406	0.02552	0.00440	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	02.03	6	6	0.02392	0.02622	0.00452	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	02.04	1	1	0.03217	0.03217	0.00555	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	03.01	13	13	0.03304	0.03667	0.00632	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	03.02	13	13	0.03367	0.03675	0.00634	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	03.03	13	13	0.02961	0.03215	0.00554	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	03.04	15	15	0.02902	0.03132	0.00540	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	04.01	15	15	0.02431	0.02557	0.00441	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	04.02	6	6	0.02405	0.02551	0.00440	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	04.04	9	9	0.02458	0.02601	0.00449	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	07.01	5	5	0.02982	0.03518	0.00607	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	07.02	17	16	0.02459	0.02593	0.00447	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	08	2	2	0.02440	0.03766	0.00649	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	13	46	46	0.03749	0.03974	0.00685	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	00	11	11	0.04841	0.07445	0.01284	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	01	48	48	0.03195	0.03459	0.00596	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	02.01	3	3	0.02860	0.03561	0.00614	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	02.02	21	21	0.02996	0.03178	0.00548	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	02.03	6	6	0.02873	0.03045	0.00525	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	02.04	10	9	0.03012	0.03289	0.00567	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	03.01	33	33	0.03491	0.03638	0.00627	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	03.02	13	13	0.03765	0.04029	0.00695	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	03.03	22	21	0.03539	0.03723	0.00642	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	03.04	15	15	0.03452	0.03658	0.00631	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	04.01	24	23	0.02938	0.03122	0.00538	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	04.02	6	6	0.02763	0.02890	0.00498	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	04.04	9	9	0.02763	0.02878	0.00496	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	07.01	5	5	0.03362	0.03722	0.00642	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	07.02	17	17	0.02765	0.02862	0.00493	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	08	2	2	0.02590	0.02906	0.00501	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	13	57	57	0.04303	0.04509	0.00777	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	18	9	9	0.02602	0.03057	0.00527	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	20.01	9	8	0.03159	0.03438	0.00593	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	20.02	10	10	0.07413	0.09024	0.01556	5.8000	LCV_ALLO
Barium	7440-39-3	I	WHOL	21	18	16	0.04774	0.06138	0.01058	5.8000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Barium	7440-39-3	I	WHOL	22	10	10	0.05437	0.07905	0.01363	5.8000	LCV_ALLO
Barium	7440-39-3	I	FLTR	00	1	1	0.02960	0.02960	0.00510	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	01	17	17	0.02340	0.02424	0.00418	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	02.01	3	3	0.02442	0.03179	0.00548	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	02.02	12	12	0.02406	0.02552	0.00440	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	02.03	6	6	0.02392	0.02622	0.00452	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	02.04	1	1	0.03217	0.03217	0.00555	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	03.01	13	13	0.03304	0.03667	0.00632	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	03.02	13	13	0.03367	0.03675	0.00634	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	03.03	13	13	0.02961	0.03215	0.00554	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	03.04	15	15	0.02902	0.03132	0.00540	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	04.01	15	15	0.02431	0.02557	0.00441	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	04.02	6	6	0.02405	0.02551	0.00440	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	04.04	9	9	0.02458	0.02601	0.00449	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	07.01	5	5	0.02982	0.03518	0.00607	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	07.02	17	16	0.02459	0.02593	0.00447	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	08	2	2	0.02440	0.03766	0.00649	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	13	46	46	0.03749	0.03974	0.00685	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	00	11	11	0.04841	0.07445	0.01284	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	01	48	48	0.03195	0.03459	0.00596	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	02.01	3	3	0.02860	0.03561	0.00614	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	02.02	21	21	0.02996	0.03178	0.00548	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	02.03	6	6	0.02873	0.03045	0.00525	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	02.04	10	9	0.03012	0.03289	0.00567	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	03.01	33	33	0.03491	0.03638	0.00627	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	03.02	13	13	0.03765	0.04029	0.00695	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	03.03	22	21	0.03539	0.03723	0.00642	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	03.04	15	15	0.03452	0.03658	0.00631	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	04.01	24	23	0.02938	0.03122	0.00538	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	04.02	6	6	0.02763	0.02890	0.00498	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	04.04	9	9	0.02763	0.02878	0.00496	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	07.01	5	5	0.03362	0.03722	0.00642	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	07.02	17	17	0.02765	0.02862	0.00493	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	08	2	2	0.02590	0.02906	0.00501	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	13	57	57	0.04303	0.04509	0.00777	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	18	9	9	0.02602	0.03057	0.00527	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	20.01	9	8	0.03159	0.03438	0.00593	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	20.02	10	10	0.07413	0.09024	0.01556	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	21	18	16	0.04774	0.06138	0.01058	5.8000	LCV_DAPH
Barium	7440-39-3	I	WHOL	22	10	10	0.05437	0.07905	0.01363	5.8000	LCV_DAPH
Barium	7440-39-3	I	FLTR	00	1	1	0.02960	0.02960	0.42836	0.0691	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Barium	7440-39-3	I	FLTR	01	17	17	0.02340	0.02424	0.35079	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	02.01	3	3	0.02442	0.03179	0.46012	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	02.02	12	12	0.02406	0.02552	0.36930	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	02.03	6	6	0.02392	0.02622	0.37944	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	02.04	1	1	0.03217	0.03217	0.46548	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	03.01	13	13	0.03304	0.03667	0.53065	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	03.02	13	13	0.03367	0.03675	0.53188	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	03.03	13	13	0.02961	0.03215	0.46533	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	03.04	15	15	0.02902	0.03132	0.45325	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	04.01	15	15	0.02431	0.02557	0.37007	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	04.02	6	6	0.02405	0.02551	0.36915	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	04.04	9	9	0.02458	0.02601	0.37648	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	07.01	5	5	0.02982	0.03518	0.50917	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	07.02	17	16	0.02459	0.02593	0.37526	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	08	2	2	0.02440	0.03766	0.54499	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	13	46	46	0.03749	0.03974	0.57514	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	00	11	11	0.04841	0.07445	1.07735	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	01	48	48	0.03195	0.03459	0.50061	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	02.01	3	3	0.02860	0.03561	0.51540	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	02.02	21	21	0.02996	0.03178	0.45987	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	02.03	6	6	0.02873	0.03045	0.44073	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	02.04	10	9	0.03012	0.03289	0.47601	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	03.01	33	33	0.03491	0.03638	0.52655	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	03.02	13	13	0.03765	0.04029	0.58305	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	03.03	22	21	0.03539	0.03723	0.53880	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	03.04	15	15	0.03452	0.03658	0.52937	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	04.01	24	23	0.02938	0.03122	0.45188	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	04.02	6	6	0.02763	0.02890	0.41826	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	04.04	9	9	0.02763	0.02878	0.41650	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	07.01	5	5	0.03362	0.03722	0.53863	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	07.02	17	17	0.02765	0.02862	0.41420	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	08	2	2	0.02590	0.02906	0.42050	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	13	57	57	0.04303	0.04509	0.65256	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	18	9	9	0.02602	0.03057	0.44239	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	20.01	9	8	0.03159	0.03438	0.49758	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	20.02	10	10	0.07413	0.09024	1.30590	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	21	18	16	0.04774	0.06138	0.88830	0.0691	S_ACU_V
Barium	7440-39-3	I	WHOL	22	10	10	0.05437	0.07905	1.14403	0.0691	S_ACU_V
Barium	7440-39-3	I	FLTR	00	1	1	0.02960	0.02960	7.78947	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	01	17	17	0.02340	0.02424	6.37887	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	02.01	3	3	0.02442	0.03179	8.36688	0.0038	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Barium	7440-39-3	I	FLTR	02.02	12	12	0.02406	0.02552	6.71541	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	02.03	6	6	0.02392	0.02622	6.89983	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	02.04	1	1	0.03217	0.03217	8.46447	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	03.01	13	13	0.03304	0.03667	9.64937	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	03.02	13	13	0.03367	0.03675	9.67173	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	03.03	13	13	0.02961	0.03215	8.46169	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	03.04	15	15	0.02902	0.03132	8.24197	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	04.01	15	15	0.02431	0.02557	6.72937	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	04.02	6	6	0.02405	0.02551	6.71276	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	04.04	9	9	0.02458	0.02601	6.84599	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	07.01	5	5	0.02982	0.03518	9.25889	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	07.02	17	16	0.02459	0.02593	6.82376	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	08	2	2	0.02440	0.03766	9.91023	0.0038	S_CHR_V
Barium	7440-39-3	I	FLTR	13	46	46	0.03749	0.03974	10.45841	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	00	11	11	0.04841	0.07445	19.59084	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	01	48	48	0.03195	0.03459	9.10328	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	02.01	3	3	0.02860	0.03561	9.37212	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	02.02	21	21	0.02996	0.03178	8.36243	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	02.03	6	6	0.02873	0.03045	8.01440	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	02.04	10	9	0.03012	0.03289	8.65582	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	03.01	33	33	0.03491	0.03638	9.57486	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	03.02	13	13	0.03765	0.04029	10.60239	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	03.03	22	21	0.03539	0.03723	9.79762	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	03.04	15	15	0.03452	0.03658	9.62609	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	04.01	24	23	0.02938	0.03122	8.21705	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	04.02	6	6	0.02763	0.02890	7.60581	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	04.04	9	9	0.02763	0.02878	7.57370	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	07.01	5	5	0.03362	0.03722	9.79453	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	07.02	17	17	0.02765	0.02862	7.53187	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	08	2	2	0.02590	0.02906	7.64655	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	13	57	57	0.04303	0.04509	11.86628	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	18	9	9	0.02602	0.03057	8.04459	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	20.01	9	8	0.03159	0.03438	9.04809	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	20.02	10	10	0.07413	0.09024	23.74678	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	21	18	16	0.04774	0.06138	16.15308	0.0038	S_CHR_V
Barium	7440-39-3	I	WHOL	22	10	10	0.05437	0.07905	20.80334	0.0038	S_CHR_V
Benzoic acid	65-85-0	O	FLTR	00	1	1	0.00100	0.00100	0.00008	12.9760	LCV_ALLO
Benzoic acid	65-85-0	O	FLTR	13	46	2	0.00150	0.00234	0.00018	12.9760	LCV_ALLO
Benzoic acid	65-85-0	O	FLTR	00	1	1	0.00100	0.00100	0.00008	12.9760	LCV_FISH
Benzoic acid	65-85-0	O	FLTR	13	46	2	0.00150	0.00234	0.00018	12.9760	LCV_FISH
Benzoic acid	65-85-0	O	FLTR	00	1	1	0.00100	0.00100	0.00013	7.4090	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Benzoic acid	65-85-0	O	FLTR	13	46	2	0.00150	0.00234	0.00032	7.4090	LTV_FISH
Benzoic acid	65-85-0	O	FLTR	00	1	1	0.00100	0.00100	0.00135	0.7430	S_ACU_V
Benzoic acid	65-85-0	O	FLTR	13	46	2	0.00150	0.00234	0.00315	0.7430	S_ACU_V
Benzoic acid	65-85-0	O	FLTR	00	1	1	0.00100	0.00100	0.02404	0.0416	S_CHR_V
Benzoic acid	65-85-0	O	FLTR	13	46	2	0.00150	0.00234	0.05624	0.0416	S_CHR_V
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.22642	0.0053	LCV_ALLO
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.26415	0.0053	LCV_ALLO
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.18868	0.0053	LCV_ALLO
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.00001	100.0000	LCV_AQPL
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.00001	100.0000	LCV_AQPL
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.00001	100.0000	LCV_AQPL
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.22642	0.0053	LCV_DAPH
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.26415	0.0053	LCV_DAPH
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.18868	0.0053	LCV_DAPH
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.02105	0.0570	LCV_FISH
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.02456	0.0570	LCV_FISH
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.01754	0.0570	LCV_FISH
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.31579	0.0038	LTV_DAPH
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.36842	0.0038	LTV_DAPH
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.26316	0.0038	LTV_DAPH
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.00811	0.1480	LTV_FISH
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.00946	0.1480	LTV_FISH
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.00676	0.1480	LTV_FISH
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.00443	0.2710	S_ACU_V
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.00517	0.2710	S_ACU_V
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.00369	0.2710	S_ACU_V
Beryllium	7440-41-7	I	WHOL	00	11	1	0.00120	0.00120	0.23576	0.0051	S_CHR_V
Beryllium	7440-41-7	I	WHOL	01	51	1	0.00140	0.00140	0.27505	0.0051	S_CHR_V
Beryllium	7440-41-7	I	WHOL	20.02	10	1	0.00100	0.00100	0.19646	0.0051	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	1.79949	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	1.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.66667	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	1.16667	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	1.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.79516	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	10.00000	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	5.79308	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.66667	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	12.50000	0.0030	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	1.18509	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.33333	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	2.00000	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	1.66667	0.0030	LCV_ALLO
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	1.79949	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	1.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.66667	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	1.16667	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	1.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.79516	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	10.00000	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	5.79308	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.66667	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	12.50000	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	1.18509	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.33333	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	2.00000	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	1.66667	0.0030	LCV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	0.64268	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.11905	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	0.47619	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.23810	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	0.41667	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	0.47619	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.28398	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.11905	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	3.57143	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	2.06896	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.23810	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	4.46429	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	0.42325	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.11905	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.11905	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	0.71429	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	0.59524	0.0084	LCV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	1.79949	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.33333	0.0030	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	1.33333	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.66667	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	1.16667	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	1.33333	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.79516	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.33333	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	10.00000	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	5.79308	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.66667	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	12.50000	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	1.18509	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.33333	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.33333	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	2.00000	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	1.66667	0.0030	LTV_DAPH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	0.09997	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.01852	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	0.07407	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.03704	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	0.06481	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	0.07407	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.04418	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.01852	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	0.55556	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	0.32184	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.03704	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	0.69444	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	0.06584	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.01852	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.01852	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	0.11111	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	0.09259	0.0540	LTV_FISH
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	0.01888	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.00350	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	0.01399	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.00699	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	0.01224	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	0.01399	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.00834	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.00350	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	0.10490	0.2860	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	0.06077	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.00699	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	0.13112	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	0.01243	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.00350	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.00350	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	0.02098	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	0.01748	0.2860	S_ACU_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	01	20	2	0.00230	0.00540	0.16765	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.01	2	1	0.00100	0.00100	0.03106	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.02	12	1	0.00400	0.00400	0.12422	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.03	5	1	0.00200	0.00200	0.06211	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	02.04	1	1	0.00350	0.00350	0.10870	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	03.01	12	1	0.00400	0.00400	0.12422	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.01	14	4	0.00150	0.00239	0.07408	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.02	6	1	0.00100	0.00100	0.03106	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	04.04	9	1	0.03000	0.03000	0.93168	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	FLTR	13	46	4	0.00771	0.01738	0.53973	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	01	23	1	0.00200	0.00200	0.06211	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	02.04	2	1	0.03750	0.03750	1.16460	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.02	12	2	0.00245	0.00356	0.11041	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	03.03	13	1	0.00100	0.00100	0.03106	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.01	5	1	0.00100	0.00100	0.03106	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	07.02	17	1	0.00600	0.00600	0.18634	0.0322	S_CHR_V
Bis(2-ethylhexyl)phthalate	117-81-7	O	WHOL	10	2	1	0.00500	0.00500	0.15528	0.0322	S_CHR_V
Boron	7440-42-8	I	FLTR	00	1	1	0.01730	0.01730	0.00196	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	01	17	13	0.04409	0.05372	0.00608	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	02.01	3	2	0.04849	0.13701	0.01552	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	02.02	12	8	0.04383	0.06298	0.00713	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	02.03	6	3	0.03622	0.05458	0.00618	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	02.04	1	1	0.03358	0.03358	0.00380	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	03.01	13	12	0.05282	0.07547	0.00855	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	03.02	13	12	0.04983	0.06423	0.00727	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	03.03	13	10	0.04094	0.05290	0.00599	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	03.04	15	14	0.03896	0.05111	0.00579	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	04.01	15	10	0.04030	0.05182	0.00587	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	04.02	6	5	0.02926	0.04244	0.00481	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	04.04	9	7	0.04937	0.06064	0.00687	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	07.01	5	3	0.03543	0.04793	0.00543	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	07.02	17	9	0.05170	0.06463	0.00732	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	08	2	1	0.01170	0.01170	0.00133	8.8300	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Boron	7440-42-8	I	FLTR	13	46	38	0.04165	0.04697	0.00532	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	00	1	1	0.02640	0.02640	0.00299	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	01	20	16	0.05201	0.06507	0.00737	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	02.01	3	1	0.09020	0.09020	0.01022	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	02.02	12	7	0.04421	0.04792	0.00543	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	02.03	6	3	0.04377	0.05784	0.00655	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	02.04	1	1	0.04290	0.04290	0.00486	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	03.01	33	22	0.02717	0.03714	0.00421	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	03.02	13	12	0.05020	0.06789	0.00769	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	03.03	13	10	0.03399	0.04700	0.00532	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	03.04	15	13	0.04760	0.06455	0.00731	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	04.01	15	10	0.04757	0.06308	0.00714	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	04.02	6	4	0.03413	0.04086	0.00463	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	04.04	9	6	0.04023	0.05978	0.00677	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	07.01	5	2	0.03783	0.05826	0.00660	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	07.02	17	10	0.04345	0.05779	0.00654	8.8300	LCV_ALLO
Boron	7440-42-8	I	WHOL	13	48	43	0.04747	0.05448	0.00617	8.8300	LCV_ALLO
Boron	7440-42-8	I	FLTR	00	1	1	0.01730	0.01730	0.00196	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	01	17	13	0.04409	0.05372	0.00608	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	02.01	3	2	0.04849	0.13701	0.01552	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	02.02	12	8	0.04383	0.06298	0.00713	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	02.03	6	3	0.03622	0.05458	0.00618	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	02.04	1	1	0.03358	0.03358	0.00380	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	03.01	13	12	0.05282	0.07547	0.00855	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	03.02	13	12	0.04983	0.06423	0.00727	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	03.03	13	10	0.04094	0.05290	0.00599	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	03.04	15	14	0.03896	0.05111	0.00579	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	04.01	15	10	0.04030	0.05182	0.00587	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	04.02	6	5	0.02926	0.04244	0.00481	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	04.04	9	7	0.04937	0.06064	0.00687	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	07.01	5	3	0.03543	0.04793	0.00543	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	07.02	17	9	0.05170	0.06463	0.00732	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	08	2	1	0.01170	0.01170	0.00133	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	13	46	38	0.04165	0.04697	0.00532	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	00	1	1	0.02640	0.02640	0.00299	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	01	20	16	0.05201	0.06507	0.00737	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	02.01	3	1	0.09020	0.09020	0.01022	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	02.02	12	7	0.04421	0.04792	0.00543	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	02.03	6	3	0.04377	0.05784	0.00655	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	02.04	1	1	0.04290	0.04290	0.00486	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	03.01	33	22	0.02717	0.03714	0.00421	8.8300	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Boron	7440-42-8	I	WHOL	03.02	13	12	0.05020	0.06789	0.00769	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	03.03	13	10	0.03399	0.04700	0.00532	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	03.04	15	13	0.04760	0.06455	0.00731	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	04.01	15	10	0.04757	0.06308	0.00714	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	04.02	6	4	0.03413	0.04086	0.00463	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	04.04	9	6	0.04023	0.05978	0.00677	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	07.01	5	2	0.03783	0.05826	0.00660	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	07.02	17	10	0.04345	0.05779	0.00654	8.8300	LCV_DAPH
Boron	7440-42-8	I	WHOL	13	48	43	0.04747	0.05448	0.00617	8.8300	LCV_DAPH
Boron	7440-42-8	I	FLTR	00	1	1	0.01730	0.01730	2.47143	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	01	17	13	0.04409	0.05372	7.67495	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	02.01	3	2	0.04849	0.13701	19.57313	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	02.02	12	8	0.04383	0.06298	8.99677	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	02.03	6	3	0.03622	0.05458	7.79762	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	02.04	1	1	0.03358	0.03358	4.79643	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	03.01	13	12	0.05282	0.07547	10.78198	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	03.02	13	12	0.04983	0.06423	9.17642	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	03.03	13	10	0.04094	0.05290	7.55659	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	03.04	15	14	0.03896	0.05111	7.30111	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	04.01	15	10	0.04030	0.05182	7.40336	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	04.02	6	5	0.02926	0.04244	6.06357	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	04.04	9	7	0.04937	0.06064	8.66286	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	07.01	5	3	0.03543	0.04793	6.84678	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	07.02	17	9	0.05170	0.06463	9.23322	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	08	2	1	0.01170	0.01170	1.67143	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	13	46	38	0.04165	0.04697	6.70946	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	00	1	1	0.02640	0.02640	3.77143	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	01	20	16	0.05201	0.06507	9.29598	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	02.01	3	1	0.09020	0.09020	12.88571	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	02.02	12	7	0.04421	0.04792	6.84538	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	02.03	6	3	0.04377	0.05784	8.26277	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	02.04	1	1	0.04290	0.04290	6.12857	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	03.01	33	22	0.02717	0.03714	5.30578	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	03.02	13	12	0.05020	0.06789	9.69795	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	03.03	13	10	0.03399	0.04700	6.71419	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	03.04	15	13	0.04760	0.06455	9.22192	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	04.01	15	10	0.04757	0.06308	9.01173	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	04.02	6	4	0.03413	0.04086	5.83643	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	04.04	9	6	0.04023	0.05978	8.54057	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	07.01	5	2	0.03783	0.05826	8.32226	0.0070	LTV_DAPH
Boron	7440-42-8	I	WHOL	07.02	17	10	0.04345	0.05779	8.25564	0.0070	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Boron	7440-42-8	I	WHOL	13	48	43	0.04747	0.05448	7.78321	0.0070	LTV_DAPH
Boron	7440-42-8	I	FLTR	00	1	1	0.01730	0.01730	0.00157	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	01	17	13	0.04409	0.05372	0.00488	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	02.01	3	2	0.04849	0.13701	0.01246	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	02.02	12	8	0.04383	0.06298	0.00573	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	02.03	6	3	0.03622	0.05458	0.00496	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	02.04	1	1	0.03358	0.03358	0.00305	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	03.01	13	12	0.05282	0.07547	0.00686	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	03.02	13	12	0.04983	0.06423	0.00584	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	03.03	13	10	0.04094	0.05290	0.00481	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	03.04	15	14	0.03896	0.05111	0.00465	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	04.01	15	10	0.04030	0.05182	0.00471	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	04.02	6	5	0.02926	0.04244	0.00386	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	04.04	9	7	0.04937	0.06064	0.00551	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	07.01	5	3	0.03543	0.04793	0.00436	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	07.02	17	9	0.05170	0.06463	0.00588	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	08	2	1	0.01170	0.01170	0.00106	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	13	46	38	0.04165	0.04697	0.00427	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	00	1	1	0.02640	0.02640	0.00240	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	01	20	16	0.05201	0.06507	0.00592	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	02.01	3	1	0.09020	0.09020	0.00820	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	02.02	12	7	0.04421	0.04792	0.00436	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	02.03	6	3	0.04377	0.05784	0.00526	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	02.04	1	1	0.04290	0.04290	0.00390	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	03.01	33	22	0.02717	0.03714	0.00338	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	03.02	13	12	0.05020	0.06789	0.00617	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	03.03	13	10	0.03399	0.04700	0.00427	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	03.04	15	13	0.04760	0.06455	0.00587	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	04.01	15	10	0.04757	0.06308	0.00573	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	04.02	6	4	0.03413	0.04086	0.00371	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	04.04	9	6	0.04023	0.05978	0.00543	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	07.01	5	2	0.03783	0.05826	0.00530	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	07.02	17	10	0.04345	0.05779	0.00525	11.0000	S_ACU_V
Boron	7440-42-8	I	WHOL	13	48	43	0.04747	0.05448	0.00495	11.0000	S_ACU_V
Boron	7440-42-8	I	FLTR	00	1	1	0.01730	0.01730	0.03163	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	01	17	13	0.04409	0.05372	0.09822	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	02.01	3	2	0.04849	0.13701	0.25048	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	02.02	12	8	0.04383	0.06298	0.11513	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	02.03	6	3	0.03622	0.05458	0.09979	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	02.04	1	1	0.03358	0.03358	0.06138	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	03.01	13	12	0.05282	0.07547	0.13798	0.5470	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Boron	7440-42-8	I	FLTR	03.02	13	12	0.04983	0.06423	0.11743	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	03.03	13	10	0.04094	0.05290	0.09670	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	03.04	15	14	0.03896	0.05111	0.09343	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	04.01	15	10	0.04030	0.05182	0.09474	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	04.02	6	5	0.02926	0.04244	0.07760	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	04.04	9	7	0.04937	0.06064	0.11086	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	07.01	5	3	0.03543	0.04793	0.08762	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	07.02	17	9	0.05170	0.06463	0.11816	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	08	2	1	0.01170	0.01170	0.02139	0.5470	S_CHR_V
Boron	7440-42-8	I	FLTR	13	46	38	0.04165	0.04697	0.08586	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	00	1	1	0.02640	0.02640	0.04826	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	01	20	16	0.05201	0.06507	0.11896	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	02.01	3	1	0.09020	0.09020	0.16490	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	02.02	12	7	0.04421	0.04792	0.08760	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	02.03	6	3	0.04377	0.05784	0.10574	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	02.04	1	1	0.04290	0.04290	0.07843	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	03.01	33	22	0.02717	0.03714	0.06790	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	03.02	13	12	0.05020	0.06789	0.12411	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	03.03	13	10	0.03399	0.04700	0.08592	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	03.04	15	13	0.04760	0.06455	0.11801	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	04.01	15	10	0.04757	0.06308	0.11532	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	04.02	6	4	0.03413	0.04086	0.07469	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	04.04	9	6	0.04023	0.05978	0.10929	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	07.01	5	2	0.03783	0.05826	0.10650	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	07.02	17	10	0.04345	0.05779	0.10565	0.5470	S_CHR_V
Boron	7440-42-8	I	WHOL	13	48	43	0.04747	0.05448	0.09960	0.5470	S_CHR_V
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	2.60000	0.0002	LCV_ALLO
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	2.06667	0.0002	LCV_ALLO
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	16.00000	0.0002	LCV_ALLO
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	16.00000	0.0002	LCV_ALLO
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	2.40000	0.0002	LCV_ALLO
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.19500	0.0020	LCV_AQPL
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.15500	0.0020	LCV_AQPL
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	1.20000	0.0020	LCV_AQPL
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	1.20000	0.0020	LCV_AQPL
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.18000	0.0020	LCV_AQPL
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	2.60000	0.0002	LCV_DAPH
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	2.06667	0.0002	LCV_DAPH
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	16.00000	0.0002	LCV_DAPH
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	16.00000	0.0002	LCV_DAPH
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	2.40000	0.0002	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.22941	0.0017	LCV_FISH
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.18235	0.0017	LCV_FISH
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	1.41176	0.0017	LCV_FISH
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	1.41176	0.0017	LCV_FISH
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.21176	0.0017	LCV_FISH
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.52000	0.0008	LTV_DAPH
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.41333	0.0008	LTV_DAPH
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	3.20000	0.0008	LTV_DAPH
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	3.20000	0.0008	LTV_DAPH
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.48000	0.0008	LTV_DAPH
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.21667	0.0018	LTV_FISH
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.17222	0.0018	LTV_FISH
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	1.33333	0.0018	LTV_FISH
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	1.33333	0.0018	LTV_FISH
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.20000	0.0018	LTV_FISH
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.10000	0.0039	NAWQ_ACU
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.07949	0.0039	NAWQ_ACU
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	0.61538	0.0039	NAWQ_ACU
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	0.61538	0.0039	NAWQ_ACU
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.09231	0.0039	NAWQ_ACU
Cadmium	7440-43-9	I	FLTR	01	20	1	0.00039	0.00039	0.35455	0.0011	NAWQ_CHR
Cadmium	7440-43-9	I	FLTR	04.04	11	1	0.00031	0.00031	0.28182	0.0011	NAWQ_CHR
Cadmium	7440-43-9	I	FLTR	13	47	1	0.00240	0.00240	2.18182	0.0011	NAWQ_CHR
Cadmium	7440-43-9	I	FLTR	22	1	1	0.00240	0.00240	2.18182	0.0011	NAWQ_CHR
Cadmium	7440-43-9	I	WHOL	22	11	1	0.00036	0.00036	0.32727	0.0011	NAWQ_CHR
Calcium	7440-70-2	I	FLTR	00	1	1	32.20000	32.20000	0.27759	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	01	20	20	28.30754	29.55724	0.25480	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	02.01	3	3	28.18855	37.02582	0.31919	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	02.02	13	13	27.07692	28.79939	0.24827	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	02.03	6	6	27.16000	29.97594	0.25841	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	02.04	2	2	35.11474	38.99606	0.33617	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	03.01	14	14	25.82495	29.65099	0.25561	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	03.02	14	14	28.42394	31.96497	0.27556	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	03.03	14	14	24.95233	28.14448	0.24262	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	03.04	16	15	24.93004	27.48386	0.23693	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	04.01	16	16	27.38070	28.83334	0.24856	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	04.02	6	6	27.31167	28.39043	0.24475	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	04.04	10	10	23.75063	25.91987	0.22345	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	05	4	4	21.97500	30.62735	0.26403	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	07.01	5	5	31.02000	32.09737	0.27670	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	07.02	17	16	27.55882	28.68024	0.24724	116.0000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Calcium	7440-70-2	I	FLTR	08	2	2	28.30000	47.24125	0.40725	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	10	2	2	34.30000	37.45688	0.32290	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	13	47	47	24.90395	26.65514	0.22979	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	22	1	1	35.30000	35.30000	0.30431	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	00	11	11	31.70000	33.54447	0.28918	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	01	51	51	30.78637	31.71534	0.27341	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	02.01	3	3	30.60000	38.09210	0.32838	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	02.02	22	22	29.31364	30.85958	0.26603	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	02.03	6	6	28.53333	31.72181	0.27346	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	02.04	11	11	31.74545	33.62352	0.28986	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	03.01	34	33	23.66201	26.12697	0.22523	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	03.02	14	14	28.70714	32.02776	0.27610	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	03.03	23	23	26.76522	29.44923	0.25387	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	03.04	16	15	25.36250	27.78153	0.23950	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	04.01	25	25	28.30200	29.59237	0.25511	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	04.02	6	6	27.96667	29.59513	0.25513	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	04.04	10	10	23.75500	25.84438	0.22280	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	05	4	4	21.92500	30.69812	0.26464	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	07.01	5	5	31.74000	32.95646	0.28411	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	07.02	17	17	28.83779	29.97667	0.25842	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	08	2	2	27.90000	31.05688	0.26773	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	10	2	2	34.55000	36.12844	0.31145	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	13	58	58	25.65626	27.29581	0.23531	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	18	9	9	18.66667	20.44137	0.17622	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	20.01	9	9	44.20000	46.40657	0.40006	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	20.02	10	10	42.69000	48.18448	0.41538	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	21	18	18	32.93333	38.91140	0.33544	116.0000	LCV_ALLO
Calcium	7440-70-2	I	WHOL	22	11	11	39.12727	42.80439	0.36900	116.0000	LCV_ALLO
Calcium	7440-70-2	I	FLTR	00	1	1	32.20000	32.20000	0.27759	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	01	20	20	28.30754	29.55724	0.25480	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	02.01	3	3	28.18855	37.02582	0.31919	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	02.02	13	13	27.07692	28.79939	0.24827	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	02.03	6	6	27.16000	29.97594	0.25841	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	02.04	2	2	35.11474	38.99606	0.33617	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	03.01	14	14	25.82495	29.65099	0.25561	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	03.02	14	14	28.42394	31.96497	0.27556	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	03.03	14	14	24.95233	28.14448	0.24262	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	03.04	16	15	24.93004	27.48386	0.23693	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	04.01	16	16	27.38070	28.83334	0.24856	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	04.02	6	6	27.31167	28.39043	0.24475	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	04.04	10	10	23.75063	25.91987	0.22345	116.0000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Calcium	7440-70-2	I	FLTR	05	4	4	21.97500	30.62735	0.26403	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	07.01	5	5	31.02000	32.09737	0.27670	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	07.02	17	16	27.55882	28.68024	0.24724	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	08	2	2	28.30000	47.24125	0.40725	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	10	2	2	34.30000	37.45688	0.32290	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	13	47	47	24.90395	26.65514	0.22979	116.0000	LCV_DAPH
Calcium	7440-70-2	I	FLTR	22	1	1	35.30000	35.30000	0.30431	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	00	11	11	31.70000	33.54447	0.28918	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	01	51	51	30.78637	31.71534	0.27341	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	02.01	3	3	30.60000	38.09210	0.32838	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	02.02	22	22	29.31364	30.85958	0.26603	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	02.03	6	6	28.53333	31.72181	0.27346	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	02.04	11	11	31.74545	33.62352	0.28986	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	03.01	34	33	23.66201	26.12697	0.22523	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	03.02	14	14	28.70714	32.02776	0.27610	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	03.03	23	23	26.76522	29.44923	0.25387	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	03.04	16	15	25.36250	27.78153	0.23950	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	04.01	25	25	28.30200	29.59237	0.25511	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	04.02	6	6	27.96667	29.59513	0.25513	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	04.04	10	10	23.75500	25.84438	0.22280	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	05	4	4	21.92500	30.69812	0.26464	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	07.01	5	5	31.74000	32.95646	0.28411	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	07.02	17	17	28.83779	29.97667	0.25842	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	08	2	2	27.90000	31.05688	0.26773	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	10	2	2	34.55000	36.12844	0.31145	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	13	58	58	25.65626	27.29581	0.23531	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	18	9	9	18.66667	20.44137	0.17622	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	20.01	9	9	44.20000	46.40657	0.40006	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	20.02	10	10	42.69000	48.18448	0.41538	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	21	18	18	32.93333	38.91140	0.33544	116.0000	LCV_DAPH
Calcium	7440-70-2	I	WHOL	22	11	11	39.12727	42.80439	0.36900	116.0000	LCV_DAPH
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	0.04098	0.2440	LCV_ALLO
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	0.04174	0.2440	LCV_ALLO
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	0.09836	0.2440	LCV_ALLO
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	0.04098	0.2440	LCV_DAPH
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	0.04174	0.2440	LCV_DAPH
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	0.09836	0.2440	LCV_DAPH
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	0.00105	9.5380	LCV_FISH
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	0.00107	9.5380	LCV_FISH
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	0.00252	9.5380	LCV_FISH
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	0.00175	5.7190	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	0.00178	5.7190	LTV_FISH
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	0.00420	5.7190	LTV_FISH
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	0.06289	0.1590	S_ACU_V
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	0.06406	0.1590	S_ACU_V
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	0.15094	0.1590	S_ACU_V
Carbon disulfide	75-15-0	O	WHOL	02.04	9	1	0.01000	0.01000	1.12486	0.0089	S_CHR_V
Carbon disulfide	75-15-0	O	WHOL	03.03	9	2	0.00578	0.01019	1.14574	0.0089	S_CHR_V
Carbon disulfide	75-15-0	O	WHOL	13	9	1	0.02400	0.02400	2.69966	0.0089	S_CHR_V
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.00323	1.2400	LCV_ALLO
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.00231	1.2400	LCV_ALLO
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.00089	4.4830	LCV_DAPH
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.00064	4.4830	LCV_DAPH
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.00323	1.2400	LCV_FISH
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.00231	1.2400	LCV_FISH
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.00048	8.4000	LTV_FISH
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.00034	8.4000	LTV_FISH
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.00119	3.3600	S_ACU_V
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.00085	3.3600	S_ACU_V
Chloroform	67-66-3	O	WHOL	03.03	9	1	0.00400	0.00400	0.02128	0.1880	S_CHR_V
Chloroform	67-66-3	O	WHOL	21	18	6	0.00217	0.00286	0.01523	0.1880	S_CHR_V
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.03409	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.05682	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.08578	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.03890	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.04926	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.03795	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.04669	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.03740	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.03914	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.04763	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.04717	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.04377	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.07681	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.03182	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.06160	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.03964	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.14130	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.07127	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.08922	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.12333	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.05959	0.0440	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.03523	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.04726	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.04206	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.05910	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.05326	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.04192	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.04308	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.08671	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.04119	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.04017	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.02273	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.05706	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.12485	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.26370	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.18612	0.0440	LCV_ALLO
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.38548	0.0440	LCV_ALLO
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.00378	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.00630	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.00951	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.00431	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.00546	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.00421	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.00518	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.00415	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.00434	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.00528	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.00523	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.00485	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.00851	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.00353	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.00683	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.00439	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.01566	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.00790	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.00989	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.01367	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.00660	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.00390	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.00524	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.00466	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.00655	0.3970	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.00590	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.00465	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.00477	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.00961	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.00457	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.00445	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.00252	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.00632	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.01384	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.02923	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.02063	0.3970	LCV_AQPL
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.04272	0.3970	LCV_AQPL
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.03409	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.05682	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.08578	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.03890	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.04926	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.03795	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.04669	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.03740	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.03914	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.04763	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.04717	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.04377	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.07681	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.03182	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.06160	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.03964	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.14130	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.07127	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.08922	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.12333	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.05959	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.03523	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.04726	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.04206	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.05910	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.05326	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.04192	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.04308	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.08671	0.0440	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.04119	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.04017	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.02273	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.05706	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.12485	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.26370	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.18612	0.0440	LCV_DAPH
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.38548	0.0440	LCV_DAPH
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.02179	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.03632	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.05483	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.02487	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.03149	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.02426	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.02985	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.02391	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.02502	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.03045	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.03015	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.02798	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.04910	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.02034	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.03938	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.02534	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.09033	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.04556	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.05704	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.07884	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.03809	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.02252	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.03021	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.02689	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.03778	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.03405	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.02680	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.02754	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.05543	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.02633	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.02568	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.01453	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.03648	0.0688	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.07981	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.16857	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.11898	0.0688	LCV_FISH
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.24642	0.0688	LCV_FISH
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.01685	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.02809	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.04241	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.01923	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.02435	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.01876	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.02308	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.01849	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.01935	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.02355	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.02332	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.02164	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.03797	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.01573	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.03046	0.0890	LTV_FISH
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.01960	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.06986	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.03523	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.04411	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.06097	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.02946	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.01742	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.02337	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.02079	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.02922	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.02633	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.02072	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.02130	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.04287	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.02036	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.01986	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.01124	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.02821	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.06172	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.13037	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.09202	0.0890	LTV_FISH
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.19058	0.0890	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.00088	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.00147	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.00222	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.00101	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.00127	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.00098	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.00121	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.00097	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.00101	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.00123	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.00122	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.00113	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.00199	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.00082	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.00159	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.00103	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.00366	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.00184	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.00231	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.00319	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.00154	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.00091	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.00122	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.00109	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.00153	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.00138	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.00108	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.00111	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.00224	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.00107	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.00104	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.00059	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.00148	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.00323	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.00683	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.00482	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.00998	1.7000	NAWQ_ACU
Chromium	7440-47-3	I	FLTR	00	1	1	0.00150	0.00150	0.00714	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	01	20	12	0.00198	0.00250	0.01191	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	02.01	3	3	0.00186	0.00377	0.01797	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	02.02	13	5	0.00141	0.00171	0.00815	0.2100	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Chromium	7440-47-3	I	FLTR	02.03	6	5	0.00169	0.00217	0.01032	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	02.04	2	1	0.00167	0.00167	0.00795	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	03.01	14	8	0.00171	0.00205	0.00978	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	03.02	14	9	0.00137	0.00165	0.00784	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	03.03	14	10	0.00149	0.00172	0.00820	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	03.04	16	9	0.00167	0.00210	0.00998	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	04.01	16	8	0.00158	0.00208	0.00988	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	04.02	6	3	0.00138	0.00193	0.00917	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	04.04	10	6	0.00250	0.00338	0.01609	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	07.01	5	1	0.00140	0.00140	0.00667	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	07.02	17	6	0.00200	0.00271	0.01291	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	FLTR	13	47	34	0.00159	0.00174	0.00831	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	00	11	4	0.00389	0.00622	0.02961	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	01	51	20	0.00258	0.00314	0.01493	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	02.01	3	3	0.00230	0.00393	0.01869	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	02.02	22	7	0.00290	0.00543	0.02584	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	02.03	6	4	0.00193	0.00262	0.01249	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	02.04	11	1	0.00155	0.00155	0.00738	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	03.01	34	32	0.00194	0.00208	0.00990	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	03.02	14	11	0.00160	0.00185	0.00881	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	03.03	23	13	0.00223	0.00260	0.01238	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	03.04	16	12	0.00200	0.00234	0.01116	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	04.01	25	10	0.00170	0.00184	0.00878	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	04.02	6	4	0.00150	0.00190	0.00903	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	04.04	10	6	0.00241	0.00382	0.01817	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	07.01	5	2	0.00123	0.00181	0.00863	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	07.02	17	8	0.00159	0.00177	0.00842	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	08	2	1	0.00100	0.00100	0.00476	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	13	58	43	0.00219	0.00251	0.01196	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	18	9	2	0.00536	0.00549	0.02616	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	20.02	10	3	0.01054	0.01160	0.05525	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	21	18	9	0.00654	0.00819	0.03900	0.2100	NAWQ_CHR
Chromium	7440-47-3	I	WHOL	22	11	11	0.01379	0.01696	0.08077	0.2100	NAWQ_CHR
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	0.88235	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	0.88235	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.22312	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.37230	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.23350	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.24057	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	1.01961	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	1.23354	0.0051	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	1.50980	0.0051	LCV_ALLO
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	0.88235	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	0.88235	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.22312	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.37230	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.23350	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.24057	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	1.01961	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	1.23354	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	1.50980	0.0051	LCV_DAPH
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	0.01552	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	0.01552	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.00392	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.00655	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.00411	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.00423	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	0.01793	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	0.02169	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	0.02655	0.2900	LCV_FISH
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	1.02273	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	1.02273	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.25862	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.43153	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.27064	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.27884	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	1.18182	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	1.42978	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	1.75000	0.0044	LTV_DAPH
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	0.00556	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	0.00556	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.00140	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.00234	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.00147	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.00151	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	0.00642	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	0.00777	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	0.00951	0.8100	LTV_FISH
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	0.02308	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	0.02308	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.00584	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.00974	0.1950	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.00611	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.00629	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	0.02667	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	0.03226	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	0.03949	0.1950	S_ACU_V
Cobalt	7440-48-4	I	WHOL	01	48	1	0.00450	0.00450	1.47059	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	02.02	21	1	0.00450	0.00450	1.47059	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	03.01	33	10	0.00108	0.00114	0.37187	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	03.03	22	2	0.00148	0.00190	0.62051	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	03.04	15	2	0.00113	0.00119	0.38916	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	13	57	7	0.00117	0.00123	0.40095	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	18	9	1	0.00520	0.00520	1.69935	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	21	18	2	0.00482	0.00629	2.05589	0.0031	S_CHR_V
Cobalt	7440-48-4	I	WHOL	22	10	1	0.00770	0.00770	2.51634	0.0031	S_CHR_V
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	6.08696	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	27.18758	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	20.29853	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	16.41716	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	19.86234	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	16.33048	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	16.63936	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	16.54216	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	58.50694	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	84.74953	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	14.11042	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	23.03597	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	26.68335	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	18.98262	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	18.69565	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	18.29638	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	10.00000	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	34.32088	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	32.20921	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	28.24685	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	57.78487	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	37.97508	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	18.64917	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	14.60363	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	20.60131	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	20.48783	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	76.52451	0.0002	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	15.90985	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	26.15775	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	70.16058	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	53.83167	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	81.30435	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	20.49393	0.0002	LCV_ALLO
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	58.30520	0.0002	LCV_ALLO
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	1.40000	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	6.25314	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	4.66866	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	3.77595	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	4.56834	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	3.75601	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	3.82705	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	3.80470	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	13.45660	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	19.49239	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	3.24540	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	5.29827	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	6.13717	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	4.36600	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	4.30000	0.0010	LCV_AQPL
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	4.20817	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	2.30000	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	7.89380	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	7.40812	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	6.49678	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	13.29052	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	8.73427	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	4.28931	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	3.35883	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	4.73830	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	4.71220	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	17.60064	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	3.65927	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	6.01628	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	16.13693	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	12.38128	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	18.70000	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	4.71360	0.0010	LCV_AQPL
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	13.41020	0.0010	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	6.08696	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	27.18758	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	20.29853	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	16.41716	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	19.86234	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	16.33048	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	16.63936	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	16.54216	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	58.50694	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	84.74953	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	14.11042	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	23.03597	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	26.68335	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	18.98262	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	18.69565	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	18.29638	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	10.00000	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	34.32088	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	32.20921	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	28.24685	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	57.78487	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	37.97508	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	18.64917	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	14.60363	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	20.60131	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	20.48783	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	76.52451	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	15.90985	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	26.15775	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	70.16058	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	53.83167	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	81.30435	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	20.49393	0.0002	LCV_DAPH
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	58.30520	0.0002	LCV_DAPH
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	0.36842	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	1.64556	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	1.22860	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	0.99367	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	1.20219	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	0.98842	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	1.00712	0.0038	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	1.00124	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	3.54121	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	5.12958	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	0.85405	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	1.39428	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	1.61504	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	1.14895	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	1.13158	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	1.10741	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	0.60526	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	2.07732	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	1.94950	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	1.70968	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	3.49751	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	2.29849	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	1.12877	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	0.88390	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	1.24692	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	1.24005	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	4.63175	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	0.96296	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	1.58323	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	4.24656	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	3.25823	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	4.92105	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	1.24042	0.0038	LCV_FISH
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	3.52900	0.0038	LCV_FISH
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	0.23079	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	1.03085	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	0.76964	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	0.62248	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	0.75311	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	0.61919	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	0.63090	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	0.62722	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	2.21836	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	3.21338	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	0.53501	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	0.87344	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	1.01173	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	0.71975	0.0061	LCV_NDI

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	0.70887	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	0.69373	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	0.37916	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	1.30132	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	1.22125	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	1.07101	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	2.19099	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	1.43987	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	0.70711	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	0.55371	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	0.78112	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	0.77682	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	2.90152	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	0.60324	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	0.99180	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	2.66023	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	2.04110	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	3.08276	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	0.77705	0.0061	LCV_NDI
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	2.21071	0.0061	LCV_NDI
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	6.82927	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	30.50314	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	22.77396	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	18.41925	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	22.28458	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	18.32200	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	18.66854	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	18.55949	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	65.64193	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	95.08483	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	15.83120	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	25.84523	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	29.93741	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	21.29757	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	20.97561	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	20.52765	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	11.21951	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	38.50635	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	36.13716	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	31.69159	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	64.83180	0.0002	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	42.60619	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	20.92346	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	16.38456	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	23.11366	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	22.98634	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	85.85677	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	17.85008	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	29.34772	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	78.71675	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	60.39650	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	91.21951	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	22.99319	0.0002	LTV_DAPH
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	65.41559	0.0002	LTV_DAPH
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	0.28000	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	1.25063	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	0.93373	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	0.75519	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	0.91367	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	0.75120	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	0.76541	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	0.76094	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	2.69132	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	3.89848	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	0.64908	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	1.05965	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	1.22743	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	0.87320	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	0.86000	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	0.84163	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	0.46000	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	1.57876	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	1.48162	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	1.29936	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	2.65810	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	1.74685	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	0.85786	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	0.67177	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	0.94766	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	0.94244	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	3.52013	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	0.73185	0.0050	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	1.20326	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	3.22739	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	2.47626	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	3.74000	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	0.94272	0.0050	LTV_FISH
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	2.68204	0.0050	LTV_FISH
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	0.07778	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	0.34740	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	0.25937	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	0.20977	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	0.25380	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	0.20867	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	0.21261	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	0.21137	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	0.74759	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	1.08291	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	0.18030	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	0.29435	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	0.34095	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	0.24256	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	0.23889	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	0.23379	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	0.12778	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	0.43854	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	0.41156	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	0.36093	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	0.73836	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	0.48524	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	0.23829	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	0.18660	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	0.26324	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	0.26179	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	0.97781	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	0.20329	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	0.33424	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	0.89650	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	0.68785	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	1.03889	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	0.26187	0.0180	NAWQ_ACU
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	0.74501	0.0180	NAWQ_ACU
Copper	7440-50-8	I	FLTR	00	1	1	0.00140	0.00140	0.11667	0.0120	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Copper	7440-50-8	I	FLTR	01	20	15	0.00459	0.00625	0.52110	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	02.01	3	3	0.00265	0.00467	0.38906	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	02.02	13	12	0.00311	0.00378	0.31466	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	02.03	6	6	0.00328	0.00457	0.38069	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	03.01	14	13	0.00301	0.00376	0.31300	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	03.02	14	13	0.00317	0.00383	0.31892	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	03.03	14	11	0.00317	0.00380	0.31706	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	03.04	16	14	0.00705	0.01346	1.12138	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	04.01	16	14	0.01076	0.01949	1.62437	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	04.02	6	6	0.00244	0.00325	0.27045	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	04.04	10	9	0.00369	0.00530	0.44152	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	07.01	5	5	0.00400	0.00614	0.51143	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	07.02	17	14	0.00348	0.00437	0.36383	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	08	2	1	0.00430	0.00430	0.35833	0.0120	NAWQ_CHR
Copper	7440-50-8	I	FLTR	13	47	46	0.00344	0.00421	0.35068	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	00	11	1	0.00230	0.00230	0.19167	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	01	51	19	0.00513	0.00789	0.65782	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	02.01	3	3	0.00413	0.00741	0.61734	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	02.02	22	12	0.00494	0.00650	0.54140	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	02.03	6	6	0.00703	0.01329	1.10754	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	02.04	11	2	0.00375	0.00873	0.72786	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	03.01	34	33	0.00367	0.00429	0.35744	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	03.02	14	13	0.00277	0.00336	0.27990	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	03.03	23	12	0.00383	0.00474	0.39486	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	03.04	16	14	0.00370	0.00471	0.39268	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	04.01	25	14	0.00977	0.01760	1.46672	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	04.02	6	6	0.00238	0.00366	0.30494	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	04.04	10	9	0.00418	0.00602	0.50136	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	07.01	5	5	0.00726	0.01614	1.34474	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	07.02	17	15	0.00755	0.01238	1.03177	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	08	2	1	0.01870	0.01870	1.55833	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	13	58	47	0.00389	0.00471	0.39280	0.0120	NAWQ_CHR
Copper	7440-50-8	I	WHOL	21	18	4	0.01253	0.01341	1.11752	0.0120	NAWQ_CHR
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	3.12821	0.0078	LCV_ALLO
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	0.81333	0.0300	LCV_AQPL
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	3.12821	0.0078	LCV_FISH
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	1.33115	0.0183	LCV_NDI
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	4.60377	0.0053	LTV_FISH
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	1.10909	0.0220	NAWQ_ACU
Cyanide	57-12-5	I	FLTR	01	28	1	0.02440	0.02440	4.69231	0.0052	NAWQ_CHR
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.00527	0.6970	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.00500	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00292	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00215	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.00359	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.00543	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00143	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.01004	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00245	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.00502	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.00575	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00272	0.6970	LCV_ALLO
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.00527	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.00500	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00292	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00215	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.00359	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.00543	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00143	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.01004	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00245	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.00502	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.00575	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00272	0.6970	LCV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.00512	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.00486	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00284	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00209	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.00349	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.00528	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00139	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.00976	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00238	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.00488	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.00559	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00264	0.7170	LCV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.00734	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.00698	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00407	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00300	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.00500	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.00756	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00200	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.01400	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00341	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.00700	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.00802	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00378	0.5000	LTV_DAPH
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.01360	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.01292	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00753	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00556	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.00926	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.01401	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00370	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.02593	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00631	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.01296	0.2700	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.01484	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00701	0.2700	LTV_FISH
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.01569	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.01490	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.00869	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.00641	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.01069	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.01616	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.00427	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.02991	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.00728	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.01496	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.01713	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.00809	0.2340	S_ACU_V
Di-n-butylphthalate	84-74-2	O	FLTR	01	20	8	0.00255	0.00367	0.11229	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	03.01	12	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	03.04	14	2	0.00314	0.00349	0.10666	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.01	14	5	0.00160	0.00203	0.06220	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.02	6	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	04.04	9	1	0.00150	0.00150	0.04587	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	07.02	17	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	FLTR	13	46	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	01	23	6	0.00187	0.00250	0.07649	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	02.02	13	2	0.00200	0.00378	0.11567	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	02.03	5	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	03.01	13	1	0.00100	0.00100	0.03058	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	03.04	15	1	0.00700	0.00700	0.21407	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	04.01	15	6	0.00133	0.00170	0.05213	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	04.04	10	1	0.00350	0.00350	0.10703	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	07.02	17	4	0.00300	0.00401	0.12257	0.0327	S_CHR_V
Di-n-butylphthalate	84-74-2	O	WHOL	13	49	3	0.00133	0.00189	0.05787	0.0327	S_CHR_V
Di-n-octylphthlate	117-84-0	O	WHOL	03.02	12	1	0.00200	0.00200	0.00282	0.7080	LCV_ALLO
Di-n-octylphthlate	117-84-0	O	WHOL	03.02	12	1	0.00200	0.00200	0.00282	0.7080	LCV_DAPH
Di-n-octylphthlate	117-84-0	O	WHOL	03.02	12	1	0.00200	0.00200	0.00052	3.8220	LCV_FISH
Di-n-octylphthlate	117-84-0	O	WHOL	03.02	12	1	0.00200	0.00200	0.00645	0.3100	LTV_DAPH
Di-n-octylphthlate	117-84-0	O	WHOL	03.02	12	1	0.00200	0.00200	0.02000	0.1000	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Diethylphthalate	84-66-2	O	FLTR	02.02	12	1	0.00100	0.00100	0.00001	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	FLTR	03.03	12	1	0.00300	0.00300	0.00004	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	FLTR	13	46	3	0.00133	0.00189	0.00002	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	WHOL	02.02	13	1	0.00100	0.00100	0.00001	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	WHOL	03.03	13	1	0.00200	0.00200	0.00002	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	WHOL	13	49	4	0.00125	0.00167	0.00002	85.6000	LCV_ALLO
Diethylphthalate	84-66-2	O	FLTR	02.02	12	1	0.00100	0.00100	0.00001	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	FLTR	03.03	12	1	0.00300	0.00300	0.00004	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	FLTR	13	46	3	0.00133	0.00189	0.00002	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	WHOL	02.02	13	1	0.00100	0.00100	0.00001	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	WHOL	03.03	13	1	0.00200	0.00200	0.00002	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	WHOL	13	49	4	0.00125	0.00167	0.00002	85.6000	LCV_AQPL
Diethylphthalate	84-66-2	O	FLTR	02.02	12	1	0.00100	0.00100	0.00025	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	FLTR	03.03	12	1	0.00300	0.00300	0.00076	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	FLTR	13	46	3	0.00133	0.00189	0.00048	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	WHOL	02.02	13	1	0.00100	0.00100	0.00025	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	WHOL	03.03	13	1	0.00200	0.00200	0.00051	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	WHOL	13	49	4	0.00125	0.00167	0.00042	3.9500	S_ACU_V
Diethylphthalate	84-66-2	O	FLTR	02.02	12	1	0.00100	0.00100	0.00455	0.2200	S_CHR_V
Diethylphthalate	84-66-2	O	FLTR	03.03	12	1	0.00300	0.00300	0.01364	0.2200	S_CHR_V
Diethylphthalate	84-66-2	O	FLTR	13	46	3	0.00133	0.00189	0.00861	0.2200	S_CHR_V
Diethylphthalate	84-66-2	O	WHOL	02.02	13	1	0.00100	0.00100	0.00455	0.2200	S_CHR_V
Diethylphthalate	84-66-2	O	WHOL	03.03	13	1	0.00200	0.00200	0.00909	0.2200	S_CHR_V
Diethylphthalate	84-66-2	O	WHOL	13	49	4	0.00125	0.00167	0.00759	0.2200	S_CHR_V
Dimethylbenzene	1330-20-7	O	WHOL	01	28	1	0.00140	0.00140	0.00002	62.3080	LCV_ALLO
Dimethylbenzene	1330-20-7	O	WHOL	01	28	1	0.00140	0.00140	0.00002	62.3080	LCV_FISH
Dimethylbenzene	1330-20-7	O	WHOL	01	28	1	0.00140	0.00140	0.00052	2.6800	LTV_FISH
Dimethylbenzene	1330-20-7	O	WHOL	01	28	1	0.00140	0.00140	0.00091	1.5400	S_ACU_V
Dimethylbenzene	1330-20-7	O	WHOL	01	28	1	0.00140	0.00140	0.01624	0.0862	S_CHR_V
Iron	7439-89-6	I	FLTR	00	1	1	0.38600	0.38600	2.44304	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	01	19	9	0.08780	0.14201	0.89878	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	02.01	3	3	0.23691	0.58423	3.69763	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	02.02	13	6	0.05183	0.10775	0.68196	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	02.03	6	4	0.13223	0.29038	1.83786	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	02.04	2	1	0.13057	0.13057	0.82636	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	03.01	14	12	0.08589	0.13358	0.84544	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	03.02	14	11	0.07638	0.11318	0.71635	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	03.03	14	8	0.08651	0.13140	0.83167	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	03.04	16	10	0.07866	0.11911	0.75387	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	04.01	16	9	0.11759	0.17659	1.11765	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	04.02	6	4	0.12736	0.30044	1.90149	0.1580	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Iron	7439-89-6	I	FLTR	04.04	10	5	0.11148	0.21572	1.36530	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	05	3	1	0.02900	0.02900	0.18354	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	07.01	5	2	0.02044	0.02109	0.13346	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	07.02	17	4	0.17098	0.47406	3.00038	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	08	2	2	0.03420	0.14217	0.89978	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	13	46	41	0.09968	0.14446	0.91433	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	22	1	1	0.02500	0.02500	0.15823	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	00	11	11	0.43400	0.62437	3.95171	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	01	51	47	0.31752	0.40888	2.58783	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	02.01	3	3	0.41333	0.63923	4.04574	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	02.02	22	20	0.27009	0.37564	2.37749	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	02.03	6	6	0.35845	0.56238	3.55935	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	02.04	11	10	0.30545	0.40714	2.57686	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	03.01	34	34	0.77467	0.89476	5.66304	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	03.02	14	14	0.53136	0.65187	4.12575	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	03.03	23	23	0.67591	0.81998	5.18978	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	03.04	16	16	0.58975	0.75841	4.80009	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	04.01	25	24	0.41990	0.54079	3.42273	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	04.02	6	6	0.30335	0.53148	3.36383	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	04.04	10	10	0.33861	0.48584	3.07494	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	05	4	4	0.27775	0.52607	3.32954	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	07.01	5	5	0.19840	0.28869	1.82713	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	07.02	17	16	0.21739	0.30566	1.93456	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	08	2	2	0.10350	0.35289	2.23350	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	13	58	57	0.65821	0.75250	4.76265	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	18	9	8	0.64256	1.18747	7.51564	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	20.01	9	7	0.18956	0.29655	1.87689	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	20.02	10	10	0.20667	0.28288	1.79041	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	21	18	17	1.62656	3.20237	20.26819	0.1580	LCV_ALLO
Iron	7439-89-6	I	WHOL	22	11	11	0.89473	1.15593	7.31604	0.1580	LCV_ALLO
Iron	7439-89-6	I	FLTR	00	1	1	0.38600	0.38600	2.44304	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	01	19	9	0.08780	0.14201	0.89878	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	02.01	3	3	0.23691	0.58423	3.69763	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	02.02	13	6	0.05183	0.10775	0.68196	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	02.03	6	4	0.13223	0.29038	1.83786	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	02.04	2	1	0.13057	0.13057	0.82636	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	03.01	14	12	0.08589	0.13358	0.84544	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	03.02	14	11	0.07638	0.11318	0.71635	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	03.03	14	8	0.08651	0.13140	0.83167	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	03.04	16	10	0.07866	0.11911	0.75387	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	04.01	16	9	0.11759	0.17659	1.11765	0.1580	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Iron	7439-89-6	I	FLTR	04.02	6	4	0.12736	0.30044	1.90149	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	04.04	10	5	0.11148	0.21572	1.36530	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	05	3	1	0.02900	0.02900	0.18354	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	07.01	5	2	0.02044	0.02109	0.13346	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	07.02	17	4	0.17098	0.47406	3.00038	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	08	2	2	0.03420	0.14217	0.89978	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	13	46	41	0.09968	0.14446	0.91433	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	22	1	1	0.02500	0.02500	0.15823	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	00	11	11	0.43400	0.62437	3.95171	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	01	51	47	0.31752	0.40888	2.58783	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	02.01	3	3	0.41333	0.63923	4.04574	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	02.02	22	20	0.27009	0.37564	2.37749	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	02.03	6	6	0.35845	0.56238	3.55935	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	02.04	11	10	0.30545	0.40714	2.57686	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	03.01	34	34	0.77467	0.89476	5.66304	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	03.02	14	14	0.53136	0.65187	4.12575	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	03.03	23	23	0.67591	0.81998	5.18978	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	03.04	16	16	0.58975	0.75841	4.80009	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	04.01	25	24	0.41990	0.54079	3.42273	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	04.02	6	6	0.30335	0.53148	3.36383	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	04.04	10	10	0.33861	0.48584	3.07494	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	05	4	4	0.27775	0.52607	3.32954	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	07.01	5	5	0.19840	0.28869	1.82713	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	07.02	17	16	0.21739	0.30566	1.93456	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	08	2	2	0.10350	0.35289	2.23350	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	13	58	57	0.65821	0.75250	4.76265	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	18	9	8	0.64256	1.18747	7.51564	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	20.01	9	7	0.18956	0.29655	1.87689	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	20.02	10	10	0.20667	0.28288	1.79041	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	21	18	17	1.62656	3.20237	20.26819	0.1580	LCV_DAPH
Iron	7439-89-6	I	WHOL	22	11	11	0.89473	1.15593	7.31604	0.1580	LCV_DAPH
Iron	7439-89-6	I	FLTR	00	1	1	0.38600	0.38600	0.29692	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	01	19	9	0.08780	0.14201	0.10924	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	02.01	3	3	0.23691	0.58423	0.44940	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	02.02	13	6	0.05183	0.10775	0.08288	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	02.03	6	4	0.13223	0.29038	0.22337	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	02.04	2	1	0.13057	0.13057	0.10043	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	03.01	14	12	0.08589	0.13358	0.10275	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	03.02	14	11	0.07638	0.11318	0.08706	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	03.03	14	8	0.08651	0.13140	0.10108	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	03.04	16	10	0.07866	0.11911	0.09162	1.3000	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Iron	7439-89-6	I	FLTR	04.01	16	9	0.11759	0.17659	0.13584	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	04.02	6	4	0.12736	0.30044	0.23110	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	04.04	10	5	0.11148	0.21572	0.16594	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	05	3	1	0.02900	0.02900	0.02231	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	07.01	5	2	0.02044	0.02109	0.01622	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	07.02	17	4	0.17098	0.47406	0.36466	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	08	2	2	0.03420	0.14217	0.10936	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	13	46	41	0.09968	0.14446	0.11113	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	22	1	1	0.02500	0.02500	0.01923	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	00	11	11	0.43400	0.62437	0.48029	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	01	51	47	0.31752	0.40888	0.31452	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	02.01	3	3	0.41333	0.63923	0.49171	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	02.02	22	20	0.27009	0.37564	0.28896	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	02.03	6	6	0.35845	0.56238	0.43260	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	02.04	11	10	0.30545	0.40714	0.31319	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	03.01	34	34	0.77467	0.89476	0.68828	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	03.02	14	14	0.53136	0.65187	0.50144	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	03.03	23	23	0.67591	0.81998	0.63076	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	03.04	16	16	0.58975	0.75841	0.58340	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	04.01	25	24	0.41990	0.54079	0.41599	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	04.02	6	6	0.30335	0.53148	0.40883	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	04.04	10	10	0.33861	0.48584	0.37372	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	05	4	4	0.27775	0.52607	0.40467	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	07.01	5	5	0.19840	0.28869	0.22207	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	07.02	17	16	0.21739	0.30566	0.23512	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	08	2	2	0.10350	0.35289	0.27146	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	13	58	57	0.65821	0.75250	0.57885	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	18	9	8	0.64256	1.18747	0.91344	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	20.01	9	7	0.18956	0.29655	0.22811	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	20.02	10	10	0.20667	0.28288	0.21760	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	21	18	17	1.62656	3.20237	2.46337	1.3000	LCV_FISH
Iron	7439-89-6	I	WHOL	22	11	11	0.89473	1.15593	0.88918	1.3000	LCV_FISH
Iron	7439-89-6	I	FLTR	00	1	1	0.38600	0.38600	24.12500	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	01	19	9	0.08780	0.14201	8.87546	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	02.01	3	3	0.23691	0.58423	36.51409	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	02.02	13	6	0.05183	0.10775	6.73435	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	02.03	6	4	0.13223	0.29038	18.14883	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	02.04	2	1	0.13057	0.13057	8.16031	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	03.01	14	12	0.08589	0.13358	8.34872	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	03.02	14	11	0.07638	0.11318	7.07399	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	03.03	14	8	0.08651	0.13140	8.21275	0.0160	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Iron	7439-89-6	I	FLTR	03.04	16	10	0.07866	0.11911	7.44442	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	04.01	16	9	0.11759	0.17659	11.03683	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	04.02	6	4	0.12736	0.30044	18.77721	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	04.04	10	5	0.11148	0.21572	13.48236	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	05	3	1	0.02900	0.02900	1.81250	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	07.01	5	2	0.02044	0.02109	1.31795	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	07.02	17	4	0.17098	0.47406	29.62873	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	08	2	2	0.03420	0.14217	8.88532	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	13	46	41	0.09968	0.14446	9.02901	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	22	1	1	0.02500	0.02500	1.56250	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	00	11	11	0.43400	0.62437	39.02317	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	01	51	47	0.31752	0.40888	25.55481	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	02.01	3	3	0.41333	0.63923	39.95171	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	02.02	22	20	0.27009	0.37564	23.47772	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	02.03	6	6	0.35845	0.56238	35.14856	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	02.04	11	10	0.30545	0.40714	25.44648	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	03.01	34	34	0.77467	0.89476	55.92251	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	03.02	14	14	0.53136	0.65187	40.74180	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	03.03	23	23	0.67591	0.81998	51.24904	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	03.04	16	16	0.58975	0.75841	47.40090	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	04.01	25	24	0.41990	0.54079	33.79947	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	04.02	6	6	0.30335	0.53148	33.21778	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	04.04	10	10	0.33861	0.48584	30.36507	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	05	4	4	0.27775	0.52607	32.87917	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	07.01	5	5	0.19840	0.28869	18.04295	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	07.02	17	16	0.21739	0.30566	19.10374	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	08	2	2	0.10350	0.35289	22.05582	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	13	58	57	0.65821	0.75250	47.03118	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	18	9	8	0.64256	1.18747	74.21693	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	20.01	9	7	0.18956	0.29655	18.53428	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	20.02	10	10	0.20667	0.28288	17.68028	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	21	18	17	1.62656	3.20237	200.14841	0.0160	LTV_DAPH
Iron	7439-89-6	I	WHOL	22	11	11	0.89473	1.15593	72.24590	0.0160	LTV_DAPH
Iron	7439-89-6	I	FLTR	00	1	1	0.38600	0.38600	0.38600	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	01	19	9	0.08780	0.14201	0.14201	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	02.01	3	3	0.23691	0.58423	0.58423	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	02.02	13	6	0.05183	0.10775	0.10775	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	02.03	6	4	0.13223	0.29038	0.29038	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	02.04	2	1	0.13057	0.13057	0.13057	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	03.01	14	12	0.08589	0.13358	0.13358	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	03.02	14	11	0.07638	0.11318	0.11318	1.0000	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Iron	7439-89-6	I	FLTR	03.03	14	8	0.08651	0.13140	0.13140	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	03.04	16	10	0.07866	0.11911	0.11911	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	04.01	16	9	0.11759	0.17659	0.17659	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	04.02	6	4	0.12736	0.30044	0.30044	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	04.04	10	5	0.11148	0.21572	0.21572	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	05	3	1	0.02900	0.02900	0.02900	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	07.01	5	2	0.02044	0.02109	0.02109	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	07.02	17	4	0.17098	0.47406	0.47406	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	08	2	2	0.03420	0.14217	0.14217	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	13	46	41	0.09968	0.14446	0.14446	1.0000	NAWQ_CHR
Iron	7439-89-6	I	FLTR	22	1	1	0.02500	0.02500	0.02500	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	00	11	11	0.43400	0.62437	0.62437	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	01	51	47	0.31752	0.40888	0.40888	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	02.01	3	3	0.41333	0.63923	0.63923	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	02.02	22	20	0.27009	0.37564	0.37564	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	02.03	6	6	0.35845	0.56238	0.56238	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	02.04	11	10	0.30545	0.40714	0.40714	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	03.01	34	34	0.77467	0.89476	0.89476	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	03.02	14	14	0.53136	0.65187	0.65187	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	03.03	23	23	0.67591	0.81998	0.81998	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	03.04	16	16	0.58975	0.75841	0.75841	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	04.01	25	24	0.41990	0.54079	0.54079	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	04.02	6	6	0.30335	0.53148	0.53148	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	04.04	10	10	0.33861	0.48584	0.48584	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	05	4	4	0.27775	0.52607	0.52607	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	07.01	5	5	0.19840	0.28869	0.28869	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	07.02	17	16	0.21739	0.30566	0.30566	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	08	2	2	0.10350	0.35289	0.35289	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	13	58	57	0.65821	0.75250	0.75250	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	18	9	8	0.64256	1.18747	1.18747	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	20.01	9	7	0.18956	0.29655	0.29655	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	20.02	10	10	0.20667	0.28288	0.28288	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	21	18	17	1.62656	3.20237	3.20237	1.0000	NAWQ_CHR
Iron	7439-89-6	I	WHOL	22	11	11	0.89473	1.15593	1.15593	1.0000	NAWQ_CHR
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.11323	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.20392	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.12235	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.11658	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.17945	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.09788	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.08972	0.0123	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.10777	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.08568	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.13866	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.05544	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.08157	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.13874	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.28363	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.11089	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.16349	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.14321	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.10678	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.15738	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.15395	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.14344	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.22838	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.11055	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.12614	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.12235	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.18760	0.0123	LCV_ALLO
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.13013	0.0123	LCV_ALLO
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.00278	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.00500	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.00300	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.00286	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.00440	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.00240	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.00220	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.00264	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.00210	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.00340	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.00136	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.00200	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.00340	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.00695	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.00272	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.00401	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.00351	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.00262	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.00386	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.00377	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.00352	0.5000	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.00560	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.00271	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.00309	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.00300	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.00460	0.5000	LCV_AQPL
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.00319	0.5000	LCV_AQPL
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.11323	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.20392	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.12235	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.11658	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.17945	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.09788	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.08972	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.10777	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.08568	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.13866	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.05544	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.08157	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.13874	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.28363	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.11089	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.16349	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.14321	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.10678	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.15738	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.15395	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.14344	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.22838	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.11055	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.12614	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.12235	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.18760	0.0123	LCV_DAPH
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.13013	0.0123	LCV_DAPH
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.07353	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.13242	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.07945	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.07570	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.11653	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.06356	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.05826	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.06998	0.0189	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.05564	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.09004	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.03600	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.05297	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.09009	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.18418	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.07201	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.10617	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.09300	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.06934	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.10219	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.09997	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.09314	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.14831	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.07179	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.08191	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.07945	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.12182	0.0189	LCV_FISH
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.08450	0.0189	LCV_FISH
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.05453	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.09819	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.05892	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.05614	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.08641	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.04713	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.04321	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.05190	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.04126	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.06677	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.02669	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.03928	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.06681	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.13658	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.05340	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.07873	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.06896	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.05142	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.07578	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.07414	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.06907	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.10998	0.0255	LCV_NDI

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.05324	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.06074	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.05892	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.09034	0.0255	LCV_NDI
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.06266	0.0255	LCV_NDI
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.06310	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.11364	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.06818	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.06497	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.10000	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.05455	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.05000	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.06006	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.04775	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.07727	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.03089	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.04545	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.07732	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.15806	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.06180	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.09111	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.07981	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.05950	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.08770	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.08579	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.07993	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.12727	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.06161	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.07029	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.06818	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.10455	0.0220	LTV_FISH
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.07252	0.0220	LTV_FISH
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.01693	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.03049	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.01829	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.01743	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.02683	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.01463	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.01341	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.01611	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.01281	0.0820	NAWQ_ACU

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.02073	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.00829	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.01220	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.02074	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	0.04241	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.01658	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.02444	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.02141	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.01596	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.02353	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.02302	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.02145	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.03415	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.01653	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.01886	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.01829	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.02805	0.0820	NAWQ_ACU
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.01946	0.0820	NAWQ_ACU
Lead	7439-92-1	I	FLTR	01	20	5	0.00120	0.00139	0.43382	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	02.01	3	1	0.00250	0.00250	0.78125	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	02.03	6	1	0.00150	0.00150	0.46875	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	03.01	14	2	0.00141	0.00143	0.44664	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	03.02	14	1	0.00220	0.00220	0.68750	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	03.03	14	1	0.00120	0.00120	0.37500	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	03.04	16	1	0.00110	0.00110	0.34375	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	04.01	16	2	0.00131	0.00132	0.41289	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	04.04	11	2	0.00087	0.00105	0.32827	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	07.02	17	1	0.00170	0.00170	0.53125	0.0032	NAWQ_CHR
Lead	7439-92-1	I	FLTR	13	47	4	0.00064	0.00068	0.21239	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	00	11	1	0.00100	0.00100	0.31250	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	01	51	10	0.00153	0.00170	0.53154	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	02.01	3	2	0.00157	0.00348	1.08666	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	02.02	22	7	0.00122	0.00136	0.42486	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	02.03	6	3	0.00182	0.00200	0.62638	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	03.01	34	19	0.00159	0.00176	0.54868	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	03.02	14	5	0.00116	0.00131	0.40909	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	03.03	23	9	0.00163	0.00193	0.60295	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	03.04	16	8	0.00152	0.00189	0.58984	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	04.01	25	7	0.00148	0.00176	0.54955	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	04.02	6	1	0.00280	0.00280	0.87500	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	04.04	11	4	0.00117	0.00136	0.42356	0.0032	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Lead	7439-92-1	I	WHOL	07.01	5	3	0.00132	0.00155	0.48326	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	07.02	17	7	0.00140	0.00150	0.46876	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	08	2	1	0.00230	0.00230	0.71875	0.0032	NAWQ_CHR
Lead	7439-92-1	I	WHOL	13	58	22	0.00144	0.00160	0.49856	0.0032	NAWQ_CHR
Magnesium	7439-95-4	I	FLTR	00	1	1	10.10000	10.10000	0.12317	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	01	20	20	8.33357	8.70002	0.10610	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	02.01	3	3	7.69106	10.77408	0.13139	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	02.02	13	13	7.60769	8.23375	0.10041	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	02.03	6	6	7.59517	8.57958	0.10463	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	02.04	2	2	10.09265	12.66458	0.15445	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	03.01	14	14	6.93106	7.78785	0.09497	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	03.02	14	14	7.59500	8.43569	0.10287	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	03.03	14	14	6.65172	7.32014	0.08927	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	03.04	16	15	6.91520	7.64299	0.09321	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	04.01	16	16	7.84614	8.22460	0.10030	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	04.02	6	6	7.77017	8.40390	0.10249	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	04.04	10	10	6.72896	7.35502	0.08970	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	05	4	4	5.93000	8.80141	0.10733	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	07.01	5	5	7.74600	8.83747	0.10777	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	07.02	17	16	7.82765	8.20039	0.10000	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	08	2	2	8.45000	8.76569	0.10690	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	10	2	2	10.25000	11.19706	0.13655	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	13	47	47	7.95242	8.46630	0.10325	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	22	1	1	6.24000	6.24000	0.07610	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	00	11	11	9.07727	9.71053	0.11842	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	01	51	51	8.60239	8.87755	0.10826	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	02.01	3	3	7.94667	10.41530	0.12702	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	02.02	22	22	7.94818	8.38779	0.10229	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	02.03	6	6	7.83167	8.93519	0.10897	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	02.04	11	11	8.67545	9.35576	0.11409	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	03.01	34	33	6.12720	6.62816	0.08083	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	03.02	14	14	7.73786	8.58763	0.10473	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	03.03	23	23	6.90478	7.50299	0.09150	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	03.04	16	15	6.99188	7.68556	0.09373	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	04.01	25	25	7.93040	8.27325	0.10089	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	04.02	6	6	7.98167	8.69165	0.10600	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	04.04	10	10	6.73450	7.32269	0.08930	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	05	4	4	5.92000	8.81500	0.10750	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	07.01	5	5	7.85600	8.85780	0.10802	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	07.02	17	17	8.01213	8.33846	0.10169	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	08	2	2	8.59500	8.81598	0.10751	82.0000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Magnesium	7439-95-4	I	WHOL	10	2	2	10.35000	11.29706	0.13777	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	13	58	58	8.10827	8.59809	0.10485	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	18	9	9	4.40667	5.09063	0.06208	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	20.01	9	9	8.15444	9.29624	0.11337	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	20.02	10	10	12.54000	14.50051	0.17684	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	21	18	18	7.70667	8.67669	0.10581	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	WHOL	22	11	11	7.64909	8.74591	0.10666	82.0000	LCV_ALLO
Magnesium	7439-95-4	I	FLTR	00	1	1	10.10000	10.10000	0.12317	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	01	20	20	8.33357	8.70002	0.10610	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	02.01	3	3	7.69106	10.77408	0.13139	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	02.02	13	13	7.60769	8.23375	0.10041	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	02.03	6	6	7.59517	8.57958	0.10463	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	02.04	2	2	10.09265	12.66458	0.15445	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	03.01	14	14	6.93106	7.78785	0.09497	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	03.02	14	14	7.59500	8.43569	0.10287	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	03.03	14	14	6.65172	7.32014	0.08927	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	03.04	16	15	6.91520	7.64299	0.09321	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	04.01	16	16	7.84614	8.22460	0.10030	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	04.02	6	6	7.77017	8.40390	0.10249	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	04.04	10	10	6.72896	7.35502	0.08970	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	05	4	4	5.93000	8.80141	0.10733	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	07.01	5	5	7.74600	8.83747	0.10777	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	07.02	17	16	7.82765	8.20039	0.10000	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	08	2	2	8.45000	8.76569	0.10690	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	10	2	2	10.25000	11.19706	0.13655	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	13	47	47	7.95242	8.46630	0.10325	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	FLTR	22	1	1	6.24000	6.24000	0.07610	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	00	11	11	9.07727	9.71053	0.11842	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	01	51	51	8.60239	8.87755	0.10826	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	02.01	3	3	7.94667	10.41530	0.12702	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	02.02	22	22	7.94818	8.38779	0.10229	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	02.03	6	6	7.83167	8.93519	0.10897	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	02.04	11	11	8.67545	9.35576	0.11409	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	03.01	34	33	6.12720	6.62816	0.08083	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	03.02	14	14	7.73786	8.58763	0.10473	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	03.03	23	23	6.90478	7.50299	0.09150	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	03.04	16	15	6.99188	7.68556	0.09373	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	04.01	25	25	7.93040	8.27325	0.10089	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	04.02	6	6	7.98167	8.69165	0.10600	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	04.04	10	10	6.73450	7.32269	0.08930	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	05	4	4	5.92000	8.81500	0.10750	82.0000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Magnesium	7439-95-4	I	WHOL	07.01	5	5	7.85600	8.85780	0.10802	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	07.02	17	17	8.01213	8.33846	0.10169	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	08	2	2	8.59500	8.81598	0.10751	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	10	2	2	10.35000	11.29706	0.13777	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	13	58	58	8.10827	8.59809	0.10485	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	18	9	9	4.40667	5.09063	0.06208	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	20.01	9	9	8.15444	9.29624	0.11337	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	20.02	10	10	12.54000	14.50051	0.17684	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	21	18	18	7.70667	8.67669	0.10581	82.0000	LCV_DAPH
Magnesium	7439-95-4	I	WHOL	22	11	11	7.64909	8.74591	0.10666	82.0000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00945	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.01211	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00726	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00808	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00460	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00108	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.05850	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.05513	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.04890	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.05125	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00626	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00436	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00877	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.01273	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.01255	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.06455	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.07259	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.09420	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.05690	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.04737	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.05041	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.04720	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.13046	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.08258	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.08051	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.08130	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.08080	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.05256	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.06316	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.06553	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.05217	1.1000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.07002	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.09361	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.11846	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.07774	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.02889	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.02974	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.36479	1.1000	LCV_ALLO
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.13698	1.1000	LCV_ALLO
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00945	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.01211	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00726	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00808	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00460	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00108	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.05850	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.05513	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.04890	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.05125	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00626	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00436	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00877	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.01273	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.01255	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.06455	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.07259	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.09420	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.05690	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.04737	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.05041	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.04720	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.13046	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.08258	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.08051	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.08130	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.08080	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.05256	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.06316	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.06553	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.05217	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.07002	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.09361	1.1000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.11846	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.07774	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.02889	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.02974	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.36479	1.1000	LCV_DAPH
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.13698	1.1000	LCV_DAPH
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00588	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.00752	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00451	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00502	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00286	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00067	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.03635	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.03426	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.03039	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.03185	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00389	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00271	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00545	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.00791	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.00780	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.04011	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.04511	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.05854	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.03536	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.02944	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.03133	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.02933	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.08108	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.05132	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.05004	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.05053	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.05021	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.03266	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.03925	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.04073	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.03242	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.04352	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.05818	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.07362	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.04831	1.7700	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.01795	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.01848	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.22670	1.7700	LCV_FISH
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.08513	1.7700	LCV_FISH
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00945	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.01211	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00726	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00808	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00460	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00108	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.05850	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.05513	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.04890	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.05125	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00626	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00436	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00877	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.01273	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.01255	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.06455	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.07259	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.09420	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.05690	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.04737	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.05041	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.04720	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.13046	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.08258	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.08051	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.08130	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.08080	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.05256	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.06316	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.06553	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.05217	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.07002	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.09361	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.11846	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.07774	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.02889	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.02974	1.1000	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.36479	1.1000	LTV_DAPH
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.13698	1.1000	LTV_DAPH
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00819	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.01049	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00629	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00700	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00399	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00093	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.05067	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.04775	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.04235	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.04439	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00542	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00378	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00760	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.01102	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.01087	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.05591	1.2700	LTV_FISH
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.06287	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.08159	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.04929	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.04103	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.04366	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.04088	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.11299	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.07153	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.06973	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.07042	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.06998	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.04552	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.05470	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.05676	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.04519	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.06065	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.08108	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.10260	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.06733	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.02502	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.02576	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.31596	1.2700	LTV_FISH
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.11864	1.2700	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.00707	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.00906	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.00543	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.00604	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.00344	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.00081	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.04377	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.04125	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.03659	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.03835	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.00468	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.00326	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.00656	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.00952	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.00939	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.04830	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.05432	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	0.07049	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.04258	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.03545	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.03772	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.03532	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	0.09762	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	0.06180	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	0.06025	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	0.06084	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	0.06046	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.03933	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.04726	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.04904	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.03904	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.05240	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	0.07005	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	0.08864	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	0.05817	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.02162	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.02226	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	0.27297	1.4700	S_ACU_V
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	0.10250	1.4700	S_ACU_V
Manganese	7439-96-5	I	FLTR	00	1	1	0.01040	0.01040	0.12951	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	01	17	14	0.01021	0.01332	0.16586	0.0803	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Manganese	7439-96-5	I	FLTR	02.01	3	3	0.00421	0.00799	0.09946	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	02.02	12	11	0.00548	0.00889	0.11066	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	02.03	6	6	0.00344	0.00506	0.06304	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	02.04	1	1	0.00119	0.00119	0.01476	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	03.01	13	13	0.05237	0.06435	0.80134	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	03.02	13	13	0.04842	0.06064	0.75517	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	03.03	13	13	0.04410	0.05378	0.66980	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	03.04	15	15	0.04308	0.05637	0.70201	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	04.01	15	14	0.00512	0.00689	0.08575	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	04.02	6	6	0.00348	0.00480	0.05973	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	04.04	9	9	0.00577	0.00965	0.12016	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	07.01	5	4	0.00562	0.01400	0.17433	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	07.02	17	11	0.00744	0.01381	0.17198	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	08	2	1	0.07100	0.07100	0.88418	0.0803	S_CHR_V
Manganese	7439-96-5	I	FLTR	13	46	46	0.07019	0.07984	0.99433	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	00	11	11	0.08064	0.10362	1.29044	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	01	48	47	0.05631	0.06260	0.77952	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	02.01	3	3	0.03933	0.05211	0.64895	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	02.02	21	21	0.04855	0.05545	0.69057	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	02.03	6	6	0.04340	0.05192	0.64658	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	02.04	10	10	0.08106	0.14350	1.78709	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	03.01	33	33	0.08342	0.09084	1.13127	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	03.02	13	13	0.07645	0.08856	1.10290	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	03.03	22	22	0.08226	0.08943	1.11369	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	03.04	15	15	0.08030	0.08887	1.10679	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	04.01	24	24	0.04982	0.05782	0.72000	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	04.02	6	6	0.05388	0.06947	0.86514	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	04.04	9	9	0.06248	0.07209	0.89772	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	07.01	5	5	0.05014	0.05739	0.71464	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	07.02	17	16	0.05716	0.07702	0.95918	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	08	2	2	0.03005	0.10297	1.28236	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	13	57	57	0.11786	0.13031	1.62273	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	18	9	9	0.05973	0.08551	1.06490	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	20.01	9	8	0.02094	0.03178	0.39576	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	20.02	10	9	0.02471	0.03272	0.40743	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	21	18	18	0.24533	0.40127	4.99710	0.0803	S_CHR_V
Manganese	7439-96-5	I	WHOL	22	10	10	0.11785	0.15068	1.87644	0.0803	S_CHR_V
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.03600	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.01537	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.02920	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.30664	0.0002	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.38359	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.11845	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	5.65217	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.01430	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.13596	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.27024	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.06603	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.30000	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.09158	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.55790	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.50295	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.55702	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	1.13265	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.23129	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.19146	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.12714	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.02386	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.01587	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.02935	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.07200	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.30870	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.38908	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.35569	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.30259	0.0002	LCV_ALLO
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.56959	0.0002	LCV_ALLO
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00166	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00071	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00134	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.01411	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.01765	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.00545	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	0.26000	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00066	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.00625	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.01243	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.00304	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.01380	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.00421	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.02566	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.02314	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.02562	0.0050	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.05210	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.01064	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.00881	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.00585	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00110	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00073	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00135	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.00331	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.01420	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.01790	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.01636	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.01392	0.0050	LCV_AQPL
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.02620	0.0050	LCV_AQPL
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00863	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00368	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00700	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.07347	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.09190	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.02838	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	1.35417	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00343	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.03257	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.06474	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.01582	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.07188	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.02194	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.13366	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.12050	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.13345	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.27136	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.05541	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.04587	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.03046	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00572	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00380	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00703	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.01725	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.07396	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.09322	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.08522	0.0010	LCV_DAPH
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.07250	0.0010	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.13646	0.0010	LCV_DAPH
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.03600	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.01537	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.02920	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.30664	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.38359	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.11845	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	5.65217	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.01430	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.13596	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.27024	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.06603	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.30000	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.09158	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.55790	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.50295	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.55702	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	1.13265	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.23129	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.19146	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.12714	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.02386	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.01587	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.02935	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.07200	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.30870	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.38908	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.35569	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.30259	0.0002	LCV_FISH
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.56959	0.0002	LCV_FISH
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00952	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00406	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00772	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.08107	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.10141	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.03131	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	1.49425	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00378	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.03594	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.07144	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.01746	0.0009	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.07931	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.02421	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.14749	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.13296	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.14726	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.29943	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.06114	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.05062	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.03361	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00631	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00420	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00776	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.01904	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.08161	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.10286	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.09403	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.07999	0.0009	LTV_DAPH
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.15058	0.0009	LTV_DAPH
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00952	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00406	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00772	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.08107	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.10141	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.03131	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	1.49425	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00378	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.03594	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.07144	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.01746	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.07931	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.02421	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.14749	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.13296	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.14726	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.29943	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.06114	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.05062	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.03361	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00631	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00420	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00776	0.0009	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.01904	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.08161	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.10286	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.09403	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.07999	0.0009	LTV_FISH
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.15058	0.0009	LTV_FISH
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00345	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00147	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00280	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.02939	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.03676	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.01135	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	0.54167	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00137	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.01303	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.02590	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.00633	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.02875	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.00878	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.05347	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.04820	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.05338	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.10855	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.02217	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.01835	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.01218	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00229	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00152	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00281	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.00690	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.02958	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.03729	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.03409	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.02900	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.05459	0.0024	NAWQ_ACU
Mercury	7439-97-6	I	FLTR	01	38	1	0.00001	0.00001	0.00637	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	02.04	3	1	0.00000	0.00000	0.00272	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	03.01	27	2	0.00001	0.00001	0.00517	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	03.02	27	6	0.00003	0.00007	0.05425	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	03.03	27	3	0.00003	0.00009	0.06787	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	03.04	31	3	0.00001	0.00003	0.02096	0.0013	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Mercury	7439-97-6	I	FLTR	04.02	12	1	0.00130	0.00130	1.00000	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	07.02	34	1	0.00000	0.00000	0.00253	0.0013	S_CHR_V
Mercury	7439-97-6	I	FLTR	13	93	3	0.00002	0.00003	0.02405	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	00	12	2	0.00006	0.00006	0.04781	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	01	71	8	0.00001	0.00002	0.01168	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	02.02	22	1	0.00007	0.00007	0.05308	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	02.04	12	2	0.00001	0.00002	0.01620	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	03.01	67	38	0.00010	0.00013	0.09871	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	03.02	27	13	0.00009	0.00012	0.08898	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	03.03	36	18	0.00010	0.00013	0.09855	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	03.04	31	20	0.00019	0.00026	0.20039	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	04.01	40	8	0.00004	0.00005	0.04092	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	04.02	12	4	0.00003	0.00004	0.03387	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	04.04	20	6	0.00002	0.00003	0.02249	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	07.01	10	2	0.00000	0.00001	0.00422	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	07.02	34	4	0.00000	0.00000	0.00281	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	08	4	1	0.00001	0.00001	0.00519	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	13	106	18	0.00001	0.00002	0.01274	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	18	9	1	0.00007	0.00007	0.05462	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	20.01	9	5	0.00008	0.00009	0.06884	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	20.02	10	3	0.00007	0.00008	0.06293	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	21	18	3	0.00007	0.00007	0.05353	0.0013	S_CHR_V
Mercury	7439-97-6	I	WHOL	22	11	2	0.00011	0.00013	0.10077	0.0013	S_CHR_V
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.01333	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00091	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00178	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00125	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00406	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00811	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00685	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00974	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00281	0.0000	LCV_ALLO
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.00067	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00005	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00009	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00006	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00020	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00041	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00034	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00049	0.0008	LCV_AQPL
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00014	0.0008	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.01333	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00091	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00178	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00125	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00406	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00811	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00685	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00974	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00281	0.0000	LCV_DAPH
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.00103	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00007	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00014	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00010	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00031	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00062	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00053	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00075	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00022	0.0005	LCV_FISH
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.00061	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00004	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00008	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00006	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00019	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00037	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00031	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00045	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00013	0.0009	LTV_DAPH
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.01777	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00122	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00237	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00167	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00542	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.01082	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00913	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.01298	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00374	0.0000	LTV_FISH
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.00463	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.00032	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.00062	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.00043	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.00141	0.0001	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.00282	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.00238	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.00339	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.00098	0.0001	S_ACU_V
Methyl mercury	22967-92-6	I	FLTR	01	18	1	0.00000	0.00000	0.17767	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	FLTR	02.04	1	1	0.00000	0.00000	0.01217	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	FLTR	03.03	13	1	0.00000	0.00000	0.02367	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	02.04	1	1	0.00000	0.00000	0.01667	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	03.01	32	11	0.00000	0.00000	0.05418	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	03.02	12	4	0.00000	0.00000	0.10819	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	03.03	13	4	0.00000	0.00000	0.09132	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	03.04	14	2	0.00000	0.00000	0.12983	0.0000	S_CHR_V
Methyl mercury	22967-92-6	I	WHOL	13	47	3	0.00000	0.00000	0.03740	0.0000	S_CHR_V
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00006	42.6670	LCV_ALLO
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00006	42.6670	LCV_DAPH
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00002	108.0000	LCV_FISH
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00634	0.4100	LTV_FISH
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00010	25.6000	S_ACU_V
Methylene chloride	75-09-2	O	WHOL	20.02	10	1	0.00260	0.00260	0.00116	2.2400	S_CHR_V
Molybdenum	7439-98-7	I	FLTR	01	17	1	0.00220	0.00220	0.00250	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	FLTR	03.01	13	1	0.00120	0.00120	0.00136	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	FLTR	03.02	13	2	0.00114	0.00122	0.00139	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	FLTR	07.01	5	1	0.00120	0.00120	0.00136	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	WHOL	03.01	33	2	0.00110	0.00111	0.00126	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	WHOL	03.02	13	2	0.00104	0.00112	0.00128	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	WHOL	03.04	15	1	0.00205	0.00205	0.00233	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	WHOL	04.01	15	1	0.00180	0.00180	0.00205	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	WHOL	13	48	1	0.00150	0.00150	0.00170	0.8800	LCV_ALLO
Molybdenum	7439-98-7	I	FLTR	01	17	1	0.00220	0.00220	0.00250	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	FLTR	03.01	13	1	0.00120	0.00120	0.00136	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	FLTR	03.02	13	2	0.00114	0.00122	0.00139	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	FLTR	07.01	5	1	0.00120	0.00120	0.00136	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	WHOL	03.01	33	2	0.00110	0.00111	0.00126	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	WHOL	03.02	13	2	0.00104	0.00112	0.00128	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	WHOL	03.04	15	1	0.00205	0.00205	0.00233	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	WHOL	04.01	15	1	0.00180	0.00180	0.00205	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	WHOL	13	48	1	0.00150	0.00150	0.00170	0.8800	LCV_DAPH
Molybdenum	7439-98-7	I	FLTR	01	17	1	0.00220	0.00220	0.00611	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	FLTR	03.01	13	1	0.00120	0.00120	0.00333	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	FLTR	03.02	13	2	0.00114	0.00122	0.00340	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	FLTR	07.01	5	1	0.00120	0.00120	0.00333	0.3600	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Molybdenum	7439-98-7	I	WHOL	03.01	33	2	0.00110	0.00111	0.00309	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	WHOL	03.02	13	2	0.00104	0.00112	0.00312	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	WHOL	03.04	15	1	0.00205	0.00205	0.00569	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	WHOL	04.01	15	1	0.00180	0.00180	0.00500	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	WHOL	13	48	1	0.00150	0.00150	0.00417	0.3600	LTV_DAPH
Molybdenum	7439-98-7	I	FLTR	01	17	1	0.00220	0.00220	0.00022	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	FLTR	03.01	13	1	0.00120	0.00120	0.00012	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	FLTR	03.02	13	2	0.00114	0.00122	0.00012	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	FLTR	07.01	5	1	0.00120	0.00120	0.00012	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	WHOL	03.01	33	2	0.00110	0.00111	0.00011	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	WHOL	03.02	13	2	0.00104	0.00112	0.00011	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	WHOL	03.04	15	1	0.00205	0.00205	0.00020	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	WHOL	04.01	15	1	0.00180	0.00180	0.00018	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	WHOL	13	48	1	0.00150	0.00150	0.00015	10.1000	S_ACU_V
Molybdenum	7439-98-7	I	FLTR	01	17	1	0.00220	0.00220	0.00921	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	FLTR	03.01	13	1	0.00120	0.00120	0.00502	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	FLTR	03.02	13	2	0.00114	0.00122	0.00512	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	FLTR	07.01	5	1	0.00120	0.00120	0.00502	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	WHOL	03.01	33	2	0.00110	0.00111	0.00465	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	WHOL	03.02	13	2	0.00104	0.00112	0.00470	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	WHOL	03.04	15	1	0.00205	0.00205	0.00858	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	WHOL	04.01	15	1	0.00180	0.00180	0.00753	0.2390	S_CHR_V
Molybdenum	7439-98-7	I	WHOL	13	48	1	0.00150	0.00150	0.00628	0.2390	S_CHR_V
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.98000	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.75110	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	2.05409	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.63310	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	1.11951	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.37400	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	1.04312	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.97272	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	1.18405	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.92165	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.74175	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.78718	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	1.16149	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	1.45095	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.90604	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	1.04000	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	1.07645	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	1.10000	0.0050	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.71915	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	2.78928	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.90245	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	1.02375	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.40000	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.93843	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.83537	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.84212	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.85074	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.54344	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.58508	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.73614	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.91605	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.84873	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.58000	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.89122	0.0050	LCV_ALLO
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	4.37735	0.0050	LCV_ALLO
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.98000	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.75110	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	2.05409	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.63310	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	1.11951	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.37400	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	1.04312	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.97272	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	1.18405	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.92165	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.74175	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.78718	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	1.16149	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	1.45095	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.90604	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	1.04000	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	1.07645	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	1.10000	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.71915	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	2.78928	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.90245	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	1.02375	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.40000	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.93843	0.0050	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.83537	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.84212	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.85074	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.54344	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.58508	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.73614	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.91605	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.84873	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.58000	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.89122	0.0050	LCV_AQPL
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	4.37735	0.0050	LCV_AQPL
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.98000	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.75110	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	2.05409	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.63310	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	1.11951	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.37400	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	1.04312	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.97272	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	1.18405	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.92165	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.74175	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.78718	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	1.16149	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	1.45095	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.90604	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	1.04000	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	1.07645	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	1.10000	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.71915	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	2.78928	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.90245	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	1.02375	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.40000	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.93843	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.83537	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.84212	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.85074	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.54344	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.58508	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.73614	0.0050	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.91605	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.84873	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.58000	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.89122	0.0050	LCV_DAPH
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	4.37735	0.0050	LCV_DAPH
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.14000	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.10730	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.29344	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.09044	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.15993	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.05343	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.14902	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.13896	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.16915	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.13166	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.10596	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.11245	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.16593	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.20728	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.12943	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.14857	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.15378	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.15714	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.10274	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.39847	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.12892	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.14625	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.05714	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.13406	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.11934	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.12030	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.12153	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.07763	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.08358	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.10516	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.13086	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.12125	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.08286	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.12732	0.0350	LCV_FISH
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.62534	0.0350	LCV_FISH
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.03816	0.1284	LCV_NDI

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.02925	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.07999	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.02465	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.04359	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.01456	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.04062	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.03788	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.04611	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.03589	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.02888	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.03065	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.04523	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.05650	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.03528	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.04050	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.04192	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.04283	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.02800	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.10862	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.03514	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.03987	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.01558	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.03654	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.03253	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.03279	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.03313	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.02116	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.02278	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.02867	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.03567	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.03305	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.02259	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.03470	0.1284	LCV_NDI
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.17046	0.1284	LCV_NDI
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.10889	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.08346	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.22823	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.07034	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.12439	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.04156	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.11590	0.0450	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.10808	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.13156	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.10241	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.08242	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.08746	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.12905	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.16122	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.10067	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.11556	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.11961	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.12222	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.07991	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.30992	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.10027	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.11375	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.04444	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.10427	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.09282	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.09357	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.09453	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.06038	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.06501	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.08179	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.10178	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.09430	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.06444	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.09902	0.0450	LTV_DAPH
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.48637	0.0450	LTV_DAPH
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.07903	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.06057	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.16565	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.05106	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.09028	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.03016	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.08412	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.07845	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.09549	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.07433	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.05982	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.06348	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.09367	0.0620	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.11701	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.07307	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.08387	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.08681	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.08871	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.05800	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.22494	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.07278	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.08256	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.03226	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.07568	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.06737	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.06791	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.06861	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.04383	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.04718	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.05937	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.07387	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.06845	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.04677	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.07187	0.0620	LTV_FISH
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.35301	0.0620	LTV_FISH
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.00350	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.00268	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.00734	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.00226	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.00400	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.00134	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.00373	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.00347	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.00423	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.00329	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.00265	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.00281	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.00415	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.00518	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.00324	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.00371	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.00384	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.00393	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.00257	1.4000	NAWQ_ACU

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.00996	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.00322	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.00366	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.00143	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.00335	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.00298	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.00301	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.00304	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.00194	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.00209	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.00263	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.00327	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.00303	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.00207	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.00318	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.01563	1.4000	NAWQ_ACU
Nickel	7440-02-0	I	FLTR	00	1	1	0.00490	0.00490	0.03063	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	01	20	16	0.00288	0.00376	0.02347	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	02.01	3	3	0.00486	0.01027	0.06419	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	02.02	13	10	0.00241	0.00317	0.01978	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	02.03	6	6	0.00350	0.00560	0.03498	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	02.04	2	1	0.00187	0.00187	0.01169	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	03.01	14	13	0.00425	0.00522	0.03260	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	03.02	14	13	0.00407	0.00486	0.03040	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	03.03	14	13	0.00444	0.00592	0.03700	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	03.04	16	15	0.00362	0.00461	0.02880	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	04.01	16	14	0.00300	0.00371	0.02318	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	04.02	6	4	0.00277	0.00394	0.02460	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	04.04	10	7	0.00334	0.00581	0.03630	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	07.01	5	4	0.00366	0.00725	0.04534	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	07.02	17	15	0.00308	0.00453	0.02831	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	08	2	1	0.00520	0.00520	0.03250	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	FLTR	13	47	46	0.00457	0.00538	0.03364	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	00	11	1	0.00550	0.00550	0.03438	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	01	51	18	0.00303	0.00360	0.02247	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	02.01	3	2	0.00597	0.01395	0.08716	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	02.02	22	11	0.00339	0.00451	0.02820	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	02.03	6	5	0.00355	0.00512	0.03199	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	02.04	11	1	0.00200	0.00200	0.01250	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	03.01	34	33	0.00440	0.00469	0.02933	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	03.02	14	13	0.00354	0.00418	0.02611	0.1600	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Nickel	7440-02-0	I	WHOL	03.03	23	13	0.00358	0.00421	0.02632	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	03.04	16	15	0.00360	0.00425	0.02659	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	04.01	25	13	0.00228	0.00272	0.01698	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	04.02	6	4	0.00187	0.00293	0.01828	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	04.04	10	7	0.00280	0.00368	0.02300	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	07.01	5	3	0.00326	0.00458	0.02863	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	07.02	17	11	0.00307	0.00424	0.02652	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	08	2	1	0.00290	0.00290	0.01813	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	13	58	49	0.00403	0.00446	0.02785	0.1600	NAWQ_CHR
Nickel	7440-02-0	I	WHOL	21	18	5	0.01661	0.02189	0.13679	0.1600	NAWQ_CHR
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	2.90000	0.0001	LCV_ALLO
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	1.40000	0.0001	LCV_ALLO
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	4.60000	0.0001	LCV_ALLO
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	2.90000	0.0001	LCV_AQPL
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	1.40000	0.0001	LCV_AQPL
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	4.60000	0.0001	LCV_AQPL
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	0.13810	0.0021	LCV_DAPH
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.06667	0.0021	LCV_DAPH
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	0.21905	0.0021	LCV_DAPH
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	0.29000	0.0010	LCV_FISH
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.14000	0.0010	LCV_FISH
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	0.46000	0.0010	LCV_FISH
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	0.36250	0.0008	LCV_NDI
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.17500	0.0008	LCV_NDI
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	0.57500	0.0008	LCV_NDI
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	0.24167	0.0012	LTV_DAPH
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.11667	0.0012	LTV_DAPH
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	0.38333	0.0012	LTV_DAPH
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	0.55769	0.0005	LTV_FISH
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.26923	0.0005	LTV_FISH
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	0.88462	0.0005	LTV_FISH
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	1.38095	0.0002	S_ACU_V
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	0.66667	0.0002	S_ACU_V
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	2.19048	0.0002	S_ACU_V
PCB-1254	11097-69-1	O	WHOL	03.01	12	1	0.00029	0.00029	14.50000	0.0000	S_CHR_V
PCB-1254	11097-69-1	O	WHOL	03.04	14	1	0.00014	0.00014	7.00000	0.0000	S_CHR_V
PCB-1254	11097-69-1	O	WHOL	13	48	1	0.00046	0.00046	23.00000	0.0000	S_CHR_V
PCB-1260	11096-82-5	O	WHOL	13	48	1	0.00102	0.00102	0.78462	0.0013	LCV_ALLO
PCB-1260	11096-82-5	O	WHOL	13	48	1	0.00102	0.00102	0.78462	0.0013	LCV_FISH
PCB-1260	11096-82-5	O	WHOL	13	48	1	0.00102	0.00102	0.48571	0.0021	LTV_FISH
PCB-1260	11096-82-5	O	WHOL	13	48	1	0.00102	0.00102	0.00545	0.1870	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
PCB-1260	11096-82-5	O	WHOL	13	48	1	0.00102	0.00102	0.09714	0.0105	S_CHR_V
Potassium	7440-09-7	I	FLTR	00	1	1	1.67000	1.67000	0.03151	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	01	20	20	1.41756	1.48258	0.02797	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	02.01	3	3	1.34308	1.59963	0.03018	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	02.02	13	13	1.41077	1.44849	0.02733	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	02.03	6	6	1.36383	1.44755	0.02731	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	02.04	2	2	1.60785	2.50534	0.04727	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	03.01	14	14	1.79043	2.12528	0.04010	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	03.02	14	14	1.72506	1.97964	0.03735	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	03.03	14	14	1.73318	1.99634	0.03767	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	03.04	16	15	1.61341	1.83094	0.03455	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	04.01	16	16	1.58915	1.71765	0.03241	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	04.02	6	6	1.35183	1.39260	0.02628	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	04.04	10	10	1.40466	1.50059	0.02831	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	05	4	4	1.46500	1.63043	0.03076	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	07.01	5	5	1.44200	1.57122	0.02965	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	07.02	17	16	1.38676	1.43296	0.02704	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	08	2	2	1.42500	1.58284	0.02986	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	10	2	2	1.77500	2.18539	0.04123	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	13	47	47	1.75250	1.89152	0.03569	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	22	1	1	1.31000	1.31000	0.02472	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	00	10	4	1.65325	1.81952	0.03433	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	01	48	34	1.59440	1.68669	0.03182	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	02.01	3	3	1.43667	1.64268	0.03099	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	02.02	21	16	1.53175	1.62660	0.03069	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	02.03	6	6	1.46333	1.54455	0.02914	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	02.04	10	3	1.50000	1.67978	0.03169	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	03.01	34	33	1.53647	1.68059	0.03171	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	03.02	14	14	1.77643	2.02386	0.03819	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	03.03	22	19	1.88118	2.09027	0.03944	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	03.04	16	15	1.66094	1.88777	0.03562	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	04.01	24	19	1.61013	1.73138	0.03267	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	04.02	6	6	1.41500	1.46722	0.02768	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	04.04	10	10	1.41150	1.48039	0.02793	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	05	4	4	1.46500	1.74568	0.03294	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	07.01	5	5	1.49200	1.61472	0.03047	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	07.02	17	17	1.45451	1.49196	0.02815	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	08	2	2	1.51500	1.73598	0.03275	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	10	2	2	1.62000	1.74628	0.03295	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	13	57	51	1.79530	1.92475	0.03632	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	18	8	2	1.64750	1.91693	0.03617	53.0000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Potassium	7440-09-7	I	WHOL	20.01	8	5	3.14250	4.12071	0.07775	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	20.02	9	6	2.24889	2.57242	0.04854	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	21	16	10	2.53938	2.95569	0.05577	53.0000	LCV_ALLO
Potassium	7440-09-7	I	WHOL	22	10	5	1.88600	2.29774	0.04335	53.0000	LCV_ALLO
Potassium	7440-09-7	I	FLTR	00	1	1	1.67000	1.67000	0.03151	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	01	20	20	1.41756	1.48258	0.02797	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	02.01	3	3	1.34308	1.59963	0.03018	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	02.02	13	13	1.41077	1.44849	0.02733	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	02.03	6	6	1.36383	1.44755	0.02731	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	02.04	2	2	1.60785	2.50534	0.04727	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	03.01	14	14	1.79043	2.12528	0.04010	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	03.02	14	14	1.72506	1.97964	0.03735	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	03.03	14	14	1.73318	1.99634	0.03767	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	03.04	16	15	1.61341	1.83094	0.03455	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	04.01	16	16	1.58915	1.71765	0.03241	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	04.02	6	6	1.35183	1.39260	0.02628	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	04.04	10	10	1.40466	1.50059	0.02831	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	05	4	4	1.46500	1.63043	0.03076	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	07.01	5	5	1.44200	1.57122	0.02965	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	07.02	17	16	1.38676	1.43296	0.02704	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	08	2	2	1.42500	1.58284	0.02986	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	10	2	2	1.77500	2.18539	0.04123	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	13	47	47	1.75250	1.89152	0.03569	53.0000	LCV_DAPH
Potassium	7440-09-7	I	FLTR	22	1	1	1.31000	1.31000	0.02472	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	00	10	4	1.65325	1.81952	0.03433	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	01	48	34	1.59440	1.68669	0.03182	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	02.01	3	3	1.43667	1.64268	0.03099	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	02.02	21	16	1.53175	1.62660	0.03069	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	02.03	6	6	1.46333	1.54455	0.02914	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	02.04	10	3	1.50000	1.67978	0.03169	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	03.01	34	33	1.53647	1.68059	0.03171	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	03.02	14	14	1.77643	2.02386	0.03819	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	03.03	22	19	1.88118	2.09027	0.03944	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	03.04	16	15	1.66094	1.88777	0.03562	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	04.01	24	19	1.61013	1.73138	0.03267	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	04.02	6	6	1.41500	1.46722	0.02768	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	04.04	10	10	1.41150	1.48039	0.02793	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	05	4	4	1.46500	1.74568	0.03294	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	07.01	5	5	1.49200	1.61472	0.03047	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	07.02	17	17	1.45451	1.49196	0.02815	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	08	2	2	1.51500	1.73598	0.03275	53.0000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Potassium	7440-09-7	I	WHOL	10	2	2	1.62000	1.74628	0.03295	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	13	57	51	1.79530	1.92475	0.03632	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	18	8	2	1.64750	1.91693	0.03617	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	20.01	8	5	3.14250	4.12071	0.07775	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	20.02	9	6	2.24889	2.57242	0.04854	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	21	16	10	2.53938	2.95569	0.05577	53.0000	LCV_DAPH
Potassium	7440-09-7	I	WHOL	22	10	5	1.88600	2.29774	0.04335	53.0000	LCV_DAPH
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.01853	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.03623	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.05661	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.05236	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.04369	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.03736	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.02032	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.03736	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.01812	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.04596	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.04755	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.01756	0.0883	LCV_ALLO
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.01245	0.0883	LCV_ALLO
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.01359	0.0883	LCV_ALLO
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.01637	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.03200	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.05000	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.04624	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.03858	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.03300	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.01794	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.03300	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.01600	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.04059	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.04200	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.01551	0.1000	LCV_AQPL
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.01100	0.1000	LCV_AQPL
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.01200	0.1000	LCV_AQPL
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.01786	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.03492	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.05456	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.05046	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.04210	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.03601	0.0917	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.01958	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.03601	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.01746	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.04429	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.04583	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.01692	0.0917	LCV_DAPH
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.01200	0.0917	LCV_DAPH
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.01309	0.0917	LCV_DAPH
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.01853	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.03623	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.05661	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.05236	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.04369	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.03736	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.02032	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.03736	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.01812	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.04596	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.04755	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.01756	0.0883	LCV_FISH
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.01245	0.0883	LCV_FISH
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.01359	0.0883	LCV_FISH
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.06547	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.12800	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.20000	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.18498	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.15434	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.13200	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.07177	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.13200	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.06400	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.16235	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.16800	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.06205	0.0250	LTV_DAPH
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.04400	0.0250	LTV_DAPH
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.04800	0.0250	LTV_DAPH
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.04092	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.08000	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.12500	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.11561	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.09646	0.0400	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.08250	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.04486	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.08250	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.04000	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.10147	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.10500	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.03878	0.0400	LTV_FISH
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.02750	0.0400	LTV_FISH
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.03000	0.0400	LTV_FISH
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.00630	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.01231	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.01923	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.01779	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.01484	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.01269	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.00690	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.01269	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.00615	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.01561	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.01615	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.00597	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.00423	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.00462	0.2600	NAWQ_ACU
Selenium	7782-49-2	I	FLTR	01	20	2	0.00136	0.00164	0.04677	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	02.01	3	1	0.00320	0.00320	0.09143	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	02.03	6	1	0.00500	0.00500	0.14286	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	03.01	14	2	0.00461	0.00462	0.13213	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	03.02	14	2	0.00368	0.00386	0.11024	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	03.04	16	1	0.00330	0.00330	0.09429	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	04.01	16	4	0.00134	0.00179	0.05127	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	04.02	6	1	0.00330	0.00330	0.09429	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	04.04	11	1	0.00160	0.00160	0.04571	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	07.02	17	2	0.00345	0.00406	0.11597	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	08	2	1	0.00420	0.00420	0.12000	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	FLTR	13	47	5	0.00133	0.00155	0.04432	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	WHOL	07.02	17	1	0.00110	0.00110	0.03143	0.0350	NAWQ_CHR
Selenium	7782-49-2	I	WHOL	13	58	1	0.00120	0.00120	0.03429	0.0350	NAWQ_CHR
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	108.33333	0.0001	LCV_ALLO
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	13.33333	0.0001	LCV_ALLO
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	12.50000	0.0001	LCV_ALLO
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	40.00000	0.0001	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	13.33333	0.0001	LCV_ALLO
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	91.66667	0.0001	LCV_ALLO
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	0.43333	0.0300	LCV_AQPL
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	0.05333	0.0300	LCV_AQPL
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	0.05000	0.0300	LCV_AQPL
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	0.16000	0.0300	LCV_AQPL
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	0.05333	0.0300	LCV_AQPL
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	0.36667	0.0300	LCV_AQPL
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	5.00000	0.0026	LCV_DAPH
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	0.61538	0.0026	LCV_DAPH
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	0.57692	0.0026	LCV_DAPH
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	1.84615	0.0026	LCV_DAPH
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	0.61538	0.0026	LCV_DAPH
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	4.23077	0.0026	LCV_DAPH
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	108.33333	0.0001	LCV_FISH
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	13.33333	0.0001	LCV_FISH
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	12.50000	0.0001	LCV_FISH
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	40.00000	0.0001	LCV_FISH
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	13.33333	0.0001	LCV_FISH
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	91.66667	0.0001	LCV_FISH
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	23.21429	0.0006	LTV_DAPH
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	2.85714	0.0006	LTV_DAPH
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	2.67857	0.0006	LTV_DAPH
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	8.57143	0.0006	LTV_DAPH
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	2.85714	0.0006	LTV_DAPH
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	19.64286	0.0006	LTV_DAPH
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	65.00000	0.0002	LTV_FISH
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	8.00000	0.0002	LTV_FISH
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	7.50000	0.0002	LTV_FISH
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	24.00000	0.0002	LTV_FISH
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	8.00000	0.0002	LTV_FISH
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	55.00000	0.0002	LTV_FISH
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	3.17073	0.0041	NAWQ_ACU
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	0.39024	0.0041	NAWQ_ACU
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	0.36585	0.0041	NAWQ_ACU
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	1.17073	0.0041	NAWQ_ACU
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	0.39024	0.0041	NAWQ_ACU
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	2.68293	0.0041	NAWQ_ACU
Silver	7440-22-4	I	FLTR	03.02	14	1	0.01300	0.01300	36.11111	0.0004	S_CHR_V
Silver	7440-22-4	I	FLTR	07.01	5	1	0.00160	0.00160	4.44444	0.0004	S_CHR_V
Silver	7440-22-4	I	FLTR	13	47	1	0.00150	0.00150	4.16667	0.0004	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Silver	7440-22-4	I	WHOL	03.01	34	1	0.00480	0.00480	13.33333	0.0004	S_CHR_V
Silver	7440-22-4	I	WHOL	13	58	1	0.00160	0.00160	4.44444	0.0004	S_CHR_V
Silver	7440-22-4	I	WHOL	21	18	1	0.01100	0.01100	30.55556	0.0004	S_CHR_V
Sodium	7440-23-5	I	FLTR	00	1	1	5.37000	5.37000	0.00790	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	01	20	20	3.81784	4.23513	0.00623	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	02.01	3	3	3.90369	5.73250	0.00843	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	02.02	13	13	3.52154	3.85078	0.00566	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	02.03	6	6	3.43317	4.24583	0.00624	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	02.04	2	2	4.86560	7.10319	0.01045	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	03.01	14	14	4.00665	4.79285	0.00705	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	03.02	14	14	4.70534	5.69583	0.00838	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	03.03	14	14	4.17325	4.89238	0.00719	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	03.04	16	15	3.77357	4.43543	0.00652	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	04.01	16	16	3.74281	4.23494	0.00623	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	04.02	6	6	3.41617	3.63508	0.00535	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	04.04	10	10	3.63759	4.37274	0.00643	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	05	4	4	4.71500	5.11421	0.00752	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	07.01	5	5	2.84400	3.60640	0.00530	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	07.02	17	17	3.10493	3.46568	0.00510	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	08	2	2	3.33500	3.93481	0.00579	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	10	2	2	5.00000	5.37883	0.00791	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	13	47	47	3.18330	3.38586	0.00498	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	22	1	1	5.91000	5.91000	0.00869	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	00	11	11	4.36818	5.14982	0.00757	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	01	51	51	4.42220	4.71273	0.00693	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	02.01	3	3	5.43333	8.62140	0.01268	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	02.02	22	22	4.76864	5.26801	0.00775	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	02.03	6	6	5.01833	5.78598	0.00851	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	02.04	11	11	4.15136	4.54272	0.00668	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	03.01	34	33	4.46867	4.93115	0.00725	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	03.02	14	14	5.16214	6.14328	0.00903	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	03.03	23	23	5.11087	5.77646	0.00849	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	03.04	16	15	4.64781	5.44520	0.00801	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	04.01	25	25	4.16660	4.64324	0.00683	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	04.02	6	6	3.86333	4.57387	0.00673	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	04.04	10	10	4.10600	4.87618	0.00717	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	05	4	4	4.65000	5.12399	0.00754	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	07.01	5	5	4.46400	6.07541	0.00893	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	07.02	17	17	4.31486	4.89274	0.00720	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	08	2	2	5.08000	15.81338	0.02325	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	10	2	2	4.96500	5.37539	0.00790	680.0000	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Sodium	7440-23-5	I	WHOL	13	58	58	3.93608	4.20795	0.00619	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	18	9	9	5.79000	7.55516	0.01111	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	20.01	9	9	12.66333	16.27140	0.02393	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	20.02	10	10	4.80800	6.16425	0.00907	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	21	18	18	5.24444	6.16665	0.00907	680.0000	LCV_ALLO
Sodium	7440-23-5	I	WHOL	22	11	11	12.51273	15.57959	0.02291	680.0000	LCV_ALLO
Sodium	7440-23-5	I	FLTR	00	1	1	5.37000	5.37000	0.00790	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	01	20	20	3.81784	4.23513	0.00623	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	02.01	3	3	3.90369	5.73250	0.00843	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	02.02	13	13	3.52154	3.85078	0.00566	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	02.03	6	6	3.43317	4.24583	0.00624	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	02.04	2	2	4.86560	7.10319	0.01045	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	03.01	14	14	4.00665	4.79285	0.00705	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	03.02	14	14	4.70534	5.69583	0.00838	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	03.03	14	14	4.17325	4.89238	0.00719	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	03.04	16	15	3.77357	4.43543	0.00652	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	04.01	16	16	3.74281	4.23494	0.00623	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	04.02	6	6	3.41617	3.63508	0.00535	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	04.04	10	10	3.63759	4.37274	0.00643	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	05	4	4	4.71500	5.11421	0.00752	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	07.01	5	5	2.84400	3.60640	0.00530	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	07.02	17	17	3.10493	3.46568	0.00510	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	08	2	2	3.33500	3.93481	0.00579	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	10	2	2	5.00000	5.37883	0.00791	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	13	47	47	3.18330	3.38586	0.00498	680.0000	LCV_DAPH
Sodium	7440-23-5	I	FLTR	22	1	1	5.91000	5.91000	0.00869	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	00	11	11	4.36818	5.14982	0.00757	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	01	51	51	4.42220	4.71273	0.00693	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	02.01	3	3	5.43333	8.62140	0.01268	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	02.02	22	22	4.76864	5.26801	0.00775	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	02.03	6	6	5.01833	5.78598	0.00851	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	02.04	11	11	4.15136	4.54272	0.00668	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	03.01	34	33	4.46867	4.93115	0.00725	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	03.02	14	14	5.16214	6.14328	0.00903	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	03.03	23	23	5.11087	5.77646	0.00849	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	03.04	16	15	4.64781	5.44520	0.00801	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	04.01	25	25	4.16660	4.64324	0.00683	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	04.02	6	6	3.86333	4.57387	0.00673	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	04.04	10	10	4.10600	4.87618	0.00717	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	05	4	4	4.65000	5.12399	0.00754	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	07.01	5	5	4.46400	6.07541	0.00893	680.0000	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Sodium	7440-23-5	I	WHOL	07.02	17	17	4.31486	4.89274	0.00720	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	08	2	2	5.08000	15.81338	0.02325	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	10	2	2	4.96500	5.37539	0.00790	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	13	58	58	3.93608	4.20795	0.00619	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	18	9	9	5.79000	7.55516	0.01111	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	20.01	9	9	12.66333	16.27140	0.02393	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	20.02	10	10	4.80800	6.16425	0.00907	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	21	18	18	5.24444	6.16665	0.00907	680.0000	LCV_DAPH
Sodium	7440-23-5	I	WHOL	22	11	11	12.51273	15.57959	0.02291	680.0000	LCV_DAPH
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00178	0.7500	LCV_ALLO
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00000	816.0000	LCV_AQPL
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00178	0.7500	LCV_DAPH
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00159	0.8400	LCV_FISH
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00262	0.5100	LTV_DAPH
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00267	0.5000	LTV_FISH
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.00134	0.9980	S_ACU_V
Tetrachloroethene	127-18-4	O	WHOL	21	18	2	0.00125	0.00134	0.01070	0.1250	S_CHR_V
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	19.29825	0.0570	LCV_ALLO
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.12281	0.0570	LCV_ALLO
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.09825	0.0570	LCV_ALLO
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	11.00000	0.1000	LCV_AQPL
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.07000	0.1000	LCV_AQPL
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.05600	0.1000	LCV_AQPL
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	8.46154	0.1300	LCV_DAPH
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.05385	0.1300	LCV_DAPH
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.04308	0.1300	LCV_DAPH
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	19.29825	0.0570	LCV_FISH
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.12281	0.0570	LCV_FISH
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.09825	0.0570	LCV_FISH
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	17.18750	0.0640	LTV_DAPH
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.10938	0.0640	LTV_DAPH
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.08750	0.0640	LTV_DAPH
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	13.58025	0.0810	LTV_FISH
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.08642	0.0810	LTV_FISH
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.06914	0.0810	LTV_FISH
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	6.70732	0.1640	S_ACU_V
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.04268	0.1640	S_ACU_V
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.03415	0.1640	S_ACU_V
Thallium	7440-28-0	I	WHOL	01	48	1	1.10000	1.10000	61.11111	0.0180	S_CHR_V
Thallium	7440-28-0	I	WHOL	03.03	22	1	0.00700	0.00700	0.38889	0.0180	S_CHR_V
Thallium	7440-28-0	I	WHOL	20.02	9	1	0.00560	0.00560	0.31111	0.0180	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00079	1.2690	LCV_ALLO
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00000	245.0000	LCV_AQPL
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00004	25.2290	LCV_DAPH
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00079	1.2690	LCV_FISH
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.03846	0.0260	LTV_FISH
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00032	3.1500	S_ACU_V
Toluene	108-88-3	O	WHOL	02.04	9	1	0.00100	0.00100	0.00568	0.1760	S_CHR_V
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00041	7.2570	LCV_ALLO
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.00353	7.2570	LCV_ALLO
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00041	7.2570	LCV_DAPH
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.00353	7.2570	LCV_DAPH
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00020	14.8670	LCV_FISH
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.00173	14.8670	LCV_FISH
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00052	5.7580	LTV_FISH
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.00445	5.7580	LTV_FISH
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00069	4.3500	S_ACU_V
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.00590	4.3500	S_ACU_V
Trichloroethene	79-01-6	O	WHOL	02.02	9	1	0.00300	0.00300	0.00645	0.4650	S_CHR_V
Trichloroethene	79-01-6	O	WHOL	21	18	8	0.01967	0.02565	0.05516	0.4650	S_CHR_V
Uranium	7440-61-1	I	FLTR	02.02	12	1	0.00310	0.00310	0.02183	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	03.01	13	8	0.00159	0.00180	0.01270	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	03.02	13	12	0.00220	0.00255	0.01793	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	03.03	13	10	0.00205	0.00231	0.01626	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	03.04	15	11	0.00178	0.00206	0.01451	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	04.01	15	3	0.00117	0.00126	0.00890	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	00	10	6	0.00018	0.00028	0.00198	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	01	45	17	0.00032	0.00042	0.00298	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	02.02	20	4	0.00035	0.00068	0.00480	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	02.04	9	5	0.00022	0.00038	0.00267	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	03.01	33	24	0.00270	0.00327	0.02303	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	03.02	13	13	0.00236	0.00270	0.01899	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	03.03	21	18	0.00249	0.00306	0.02158	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	03.04	15	12	0.00195	0.00224	0.01581	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	04.01	23	10	0.00048	0.00071	0.00501	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	07.01	5	1	0.00210	0.00210	0.01479	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	07.02	17	1	0.00540	0.00540	0.03803	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	13	56	3	0.00020	0.00026	0.00185	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	18	8	3	0.00030	0.00052	0.00364	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	20.01	8	7	0.00816	0.01031	0.07258	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	20.02	9	8	0.02211	0.02658	0.18717	0.1420	LCV_ALLO
Uranium	7440-61-1	I	WHOL	21	16	10	0.00629	0.00933	0.06574	0.1420	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Uranium	7440-61-1	I	WHOL	22	9	9	0.00315	0.00491	0.03458	0.1420	LCV_ALLO
Uranium	7440-61-1	I	FLTR	02.02	12	1	0.00310	0.00310	0.02183	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	03.01	13	8	0.00159	0.00180	0.01270	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	03.02	13	12	0.00220	0.00255	0.01793	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	03.03	13	10	0.00205	0.00231	0.01626	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	03.04	15	11	0.00178	0.00206	0.01451	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	04.01	15	3	0.00117	0.00126	0.00890	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	00	10	6	0.00018	0.00028	0.00198	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	01	45	17	0.00032	0.00042	0.00298	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	02.02	20	4	0.00035	0.00068	0.00480	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	02.04	9	5	0.00022	0.00038	0.00267	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	03.01	33	24	0.00270	0.00327	0.02303	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	03.02	13	13	0.00236	0.00270	0.01899	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	03.03	21	18	0.00249	0.00306	0.02158	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	03.04	15	12	0.00195	0.00224	0.01581	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	04.01	23	10	0.00048	0.00071	0.00501	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	07.01	5	1	0.00210	0.00210	0.01479	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	07.02	17	1	0.00540	0.00540	0.03803	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	13	56	3	0.00020	0.00026	0.00185	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	18	8	3	0.00030	0.00052	0.00364	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	20.01	8	7	0.00816	0.01031	0.07258	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	20.02	9	8	0.02211	0.02658	0.18717	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	21	16	10	0.00629	0.00933	0.06574	0.1420	LCV_FISH
Uranium	7440-61-1	I	WHOL	22	9	9	0.00315	0.00491	0.03458	0.1420	LCV_FISH
Uranium	7440-61-1	I	FLTR	02.02	12	1	0.00310	0.00310	0.00681	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	03.01	13	8	0.00159	0.00180	0.00396	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	03.02	13	12	0.00220	0.00255	0.00559	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	03.03	13	10	0.00205	0.00231	0.00507	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	03.04	15	11	0.00178	0.00206	0.00453	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	04.01	15	3	0.00117	0.00126	0.00278	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	00	10	6	0.00018	0.00028	0.00062	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	01	45	17	0.00032	0.00042	0.00093	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	02.02	20	4	0.00035	0.00068	0.00150	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	02.04	9	5	0.00022	0.00038	0.00083	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	03.01	33	24	0.00270	0.00327	0.00719	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	03.02	13	13	0.00236	0.00270	0.00593	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	03.03	21	18	0.00249	0.00306	0.00673	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	03.04	15	12	0.00195	0.00224	0.00493	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	04.01	23	10	0.00048	0.00071	0.00156	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	07.01	5	1	0.00210	0.00210	0.00462	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	07.02	17	1	0.00540	0.00540	0.01187	0.4550	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Uranium	7440-61-1	I	WHOL	13	56	3	0.00020	0.00026	0.00058	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	18	8	3	0.00030	0.00052	0.00114	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	20.01	8	7	0.00816	0.01031	0.02265	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	20.02	9	8	0.02211	0.02658	0.05841	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	21	16	10	0.00629	0.00933	0.02052	0.4550	LTV_FISH
Uranium	7440-61-1	I	WHOL	22	9	9	0.00315	0.00491	0.01079	0.4550	LTV_FISH
Uranium	7440-61-1	I	FLTR	02.02	12	1	0.00310	0.00310	0.09254	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	03.01	13	8	0.00159	0.00180	0.05382	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	03.02	13	12	0.00220	0.00255	0.07599	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	03.03	13	10	0.00205	0.00231	0.06893	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	03.04	15	11	0.00178	0.00206	0.06151	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	04.01	15	3	0.00117	0.00126	0.03772	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	00	10	6	0.00018	0.00028	0.00841	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	01	45	17	0.00032	0.00042	0.01264	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	02.02	20	4	0.00035	0.00068	0.02035	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	02.04	9	5	0.00022	0.00038	0.01133	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	03.01	33	24	0.00270	0.00327	0.09763	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	03.02	13	13	0.00236	0.00270	0.08047	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	03.03	21	18	0.00249	0.00306	0.09146	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	03.04	15	12	0.00195	0.00224	0.06700	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	04.01	23	10	0.00048	0.00071	0.02123	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	07.01	5	1	0.00210	0.00210	0.06269	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	07.02	17	1	0.00540	0.00540	0.16119	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	13	56	3	0.00020	0.00026	0.00784	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	18	8	3	0.00030	0.00052	0.01543	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	20.01	8	7	0.00816	0.01031	0.30765	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	20.02	9	8	0.02211	0.02658	0.79336	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	21	16	10	0.00629	0.00933	0.27864	0.0335	S_ACU_V
Uranium	7440-61-1	I	WHOL	22	9	9	0.00315	0.00491	0.14659	0.0335	S_ACU_V
Uranium	7440-61-1	I	FLTR	02.02	12	1	0.00310	0.00310	1.65775	0.0019	S_CHR_V
Uranium	7440-61-1	I	FLTR	03.01	13	8	0.00159	0.00180	0.96420	0.0019	S_CHR_V
Uranium	7440-61-1	I	FLTR	03.02	13	12	0.00220	0.00255	1.36130	0.0019	S_CHR_V
Uranium	7440-61-1	I	FLTR	03.03	13	10	0.00205	0.00231	1.23479	0.0019	S_CHR_V
Uranium	7440-61-1	I	FLTR	03.04	15	11	0.00178	0.00206	1.10195	0.0019	S_CHR_V
Uranium	7440-61-1	I	FLTR	04.01	15	3	0.00117	0.00126	0.67567	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	00	10	6	0.00018	0.00028	0.15059	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	01	45	17	0.00032	0.00042	0.22647	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	02.02	20	4	0.00035	0.00068	0.36448	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	02.04	9	5	0.00022	0.00038	0.20289	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	03.01	33	24	0.00270	0.00327	1.74904	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	03.02	13	13	0.00236	0.00270	1.44166	0.0019	S_CHR_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Uranium	7440-61-1	I	WHOL	03.03	21	18	0.00249	0.00306	1.63844	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	03.04	15	12	0.00195	0.00224	1.20028	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	04.01	23	10	0.00048	0.00071	0.38029	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	07.01	5	1	0.00210	0.00210	1.12299	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	07.02	17	1	0.00540	0.00540	2.88770	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	13	56	3	0.00020	0.00026	0.14037	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	18	8	3	0.00030	0.00052	0.27650	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	20.01	8	7	0.00816	0.01031	5.51139	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	20.02	9	8	0.02211	0.02658	14.21261	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	21	16	10	0.00629	0.00933	4.99173	0.0019	S_CHR_V
Uranium	7440-61-1	I	WHOL	22	9	9	0.00315	0.00491	2.62602	0.0019	S_CHR_V
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.01622	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.01500	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.10847	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.03513	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.02162	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.03000	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.01734	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.01592	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.02315	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.01956	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.02021	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.01500	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.01655	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.01935	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.01286	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.01663	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.08250	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.02500	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.11990	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.06673	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.03893	0.0800	LCV_ALLO
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.00138	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.00128	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.00923	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.00299	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.00184	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.00255	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.00148	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.00136	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.00197	0.9400	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.00166	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.00172	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.00128	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.00141	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.00165	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.00109	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.00141	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.00702	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.00213	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.01020	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.00568	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.00331	0.9400	LCV_DAPH
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.01622	0.0800	LCV_FISH
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.01500	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.10847	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.03513	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.02162	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.03000	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.01734	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.01592	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.02315	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.01956	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.02021	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.01500	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.01655	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.01935	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.01286	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.01663	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.08250	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.02500	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.11990	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.06673	0.0800	LCV_FISH
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.03893	0.0800	LCV_FISH
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.00302	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.00279	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.02018	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.00654	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.00402	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.00558	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.00323	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.00296	0.4300	LTV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.00431	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.00364	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.00376	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.00279	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.00308	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.00360	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.00239	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.00309	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.01535	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.00465	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.02231	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.01241	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.00724	0.4300	LTV_DAPH
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.03164	0.0410	LTV_FISH
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.02927	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.21165	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.06855	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.04219	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.05854	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.03383	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.03107	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.04516	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.03816	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.03942	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.02927	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.03228	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.03777	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.02508	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.03244	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.16098	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.04878	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.23394	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.13020	0.0410	LTV_FISH
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.07597	0.0410	LTV_FISH
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.00457	0.2840	S_ACU_V
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.00423	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.03055	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.00990	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.00609	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.00845	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.00488	0.2840	S_ACU_V

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.00449	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.00652	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.00551	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.00569	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.00423	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.00466	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.00545	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.00362	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.00468	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.02324	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.00704	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.03377	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.01880	0.2840	S_ACU_V
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.01097	0.2840	S_ACU_V
Vanadium	7440-62-2	I	FLTR	07.01	5	3	0.00124	0.00130	0.06792	0.0191	S_CHR_V
Vanadium	7440-62-2	I	FLTR	07.02	17	1	0.00120	0.00120	0.06283	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	00	11	3	0.00456	0.00868	0.45432	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	01	48	11	0.00201	0.00281	0.14716	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	02.02	21	8	0.00149	0.00173	0.09057	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	02.04	10	2	0.00240	0.00240	0.12565	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	03.01	33	17	0.00127	0.00139	0.07261	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	03.02	13	3	0.00117	0.00127	0.06669	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	03.03	22	8	0.00154	0.00185	0.09695	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	03.04	15	5	0.00128	0.00156	0.08192	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	04.01	24	5	0.00140	0.00162	0.08463	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	04.02	6	3	0.00120	0.00120	0.06283	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	04.04	9	6	0.00121	0.00132	0.06930	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	07.01	5	4	0.00142	0.00155	0.08107	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	07.02	17	3	0.00101	0.00103	0.05385	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	13	57	25	0.00123	0.00133	0.06964	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	18	9	1	0.00660	0.00660	0.34555	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	20.01	9	1	0.00200	0.00200	0.10471	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	20.02	10	2	0.00455	0.00959	0.50218	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	21	18	6	0.00369	0.00534	0.27950	0.0191	S_CHR_V
Vanadium	7440-62-2	I	WHOL	22	10	9	0.00277	0.00311	0.16307	0.0191	S_CHR_V
Vinyl chloride	75-01-4	O	WHOL	21	18	4	0.00360	0.00498	0.00017	28.8790	LCV_ALLO
Vinyl chloride	75-01-4	O	WHOL	21	18	4	0.00360	0.00498	0.00017	28.8790	LCV_FISH
Vinyl chloride	75-01-4	O	WHOL	21	18	4	0.00360	0.00498	0.00034	14.5200	LTV_FISH
Vinyl chloride	75-01-4	O	WHOL	21	18	4	0.00360	0.00498	0.00317	1.5700	S_ACU_V
Vinyl chloride	75-01-4	O	WHOL	21	18	4	0.00360	0.00498	0.05671	0.0878	S_CHR_V
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.10000	0.0300	LCV_ALLO

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.32719	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.50448	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.13752	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.17480	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.31367	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.28626	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.30527	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.27095	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.90569	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	1.22864	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.23604	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.35694	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.23762	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.17213	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.20000	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.70000	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.23047	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.66667	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.50815	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.58348	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.66125	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.49812	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.64591	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.57696	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.57493	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.40563	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.45887	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.60610	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	1.38840	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.28140	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.57045	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.75751	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.44933	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	3.92524	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.43599	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.35260	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.50658	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.99011	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	1.05820	0.0300	LCV_ALLO
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.88290	0.0300	LCV_ALLO
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.10000	0.0300	LCV_AQPL

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.32719	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.50448	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.13752	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.17480	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.31367	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.28626	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.30527	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.27095	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.90569	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	1.22864	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.23604	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.35694	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.23762	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.17213	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.20000	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.70000	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.23047	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.66667	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.50815	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.58348	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.66125	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.49812	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.64591	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.57696	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.57493	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.40563	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.45887	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.60610	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	1.38840	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.28140	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.57045	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.75751	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.44933	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	3.92524	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.43599	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.35260	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.50658	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.99011	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	1.05820	0.0300	LCV_AQPL
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.88290	0.0300	LCV_AQPL
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.06420	0.0467	LCV_DAPH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.21005	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.32387	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.08829	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.11222	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.20137	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.18377	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.19598	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.17395	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.58144	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	0.78877	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.15154	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.22915	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.15255	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.11050	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.12840	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.44939	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.14796	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.42799	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.32622	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.37459	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.42451	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.31978	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.41467	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.37040	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.36910	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.26041	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.29459	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.38911	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	0.89133	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.18066	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.36622	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.48631	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.28846	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	2.51995	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.27990	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.22636	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.32522	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.63564	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.67935	0.0467	LCV_DAPH
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.56681	0.0467	LCV_DAPH
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.08239	0.0364	LCV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.26959	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.41566	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.11331	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.14403	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.25845	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.23586	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.25153	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.22325	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.74624	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	1.01234	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.19449	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.29410	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.19578	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.14182	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.16479	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.57676	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.18990	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.54930	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.41869	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.48076	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.54483	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.41042	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.53220	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.47538	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.47371	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.33422	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.37809	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.49939	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	1.14397	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.23186	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.47002	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.62415	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.37023	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	3.23420	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.35923	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.29052	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.41739	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.81580	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.87190	0.0364	LCV_FISH
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.72747	0.0364	LCV_FISH
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.00057	5.2430	LCV_NDI

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.00187	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.00289	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.00079	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.00100	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.00179	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.00164	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.00175	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.00155	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.00518	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	0.00703	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.00135	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.00204	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.00136	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.00098	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.00114	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.00401	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.00132	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.00381	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.00291	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.00334	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.00378	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.00285	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.00370	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.00330	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.00329	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.00232	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.00263	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.00347	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	0.00794	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.00161	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.00326	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.00433	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.00257	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	0.02246	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.00249	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.00202	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.00290	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.00567	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.00605	5.2430	LCV_NDI
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.00505	5.2430	LCV_NDI
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.06383	0.0470	LTV_FISH

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.20884	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.32201	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.08778	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.11158	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.20021	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.18272	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.19485	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.17295	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.57810	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	0.78424	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.15067	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.22783	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.15167	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.10987	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.12766	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.44681	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.14711	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.42553	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.32435	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.37243	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.42207	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.31795	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.41228	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.36827	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.36698	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.25891	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.29290	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.38687	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	0.88621	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.17962	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.36412	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.48352	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.28681	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	2.50547	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.27829	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.22506	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.32335	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.63198	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.67544	0.0470	LTV_FISH
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.56356	0.0470	LTV_FISH
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.02500	0.1200	NAWQ_ACU

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.08180	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.12612	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.03438	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.04370	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.07842	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.07156	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.07632	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.06774	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.22642	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	0.30716	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.05901	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.08923	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.05940	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.04303	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.05000	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.17500	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.05762	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.16667	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.12704	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.14587	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.16531	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.12453	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.16148	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.14424	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.14373	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.10141	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.11472	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.15152	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	0.34710	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.07035	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.14261	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.18938	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.11233	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	0.98131	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.10900	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.08815	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.12664	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.24753	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.26455	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.22073	0.1200	NAWQ_ACU
Zinc	7440-66-6	I	FLTR	00	1	1	0.00300	0.00300	0.02727	0.1100	NAWQ_CHR

Table F2.1 (continued)

Parameter	CAS No.	Type	Media	Sub reach	Total obs.	Detects	Mean	UCB concentration	UCB quotient	Benchmark value	Benchmark type
Zinc	7440-66-6	I	FLTR	01	20	16	0.00741	0.00982	0.08923	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	02.01	3	3	0.00725	0.01513	0.13758	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	02.02	13	7	0.00368	0.00413	0.03751	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	02.03	6	5	0.00450	0.00524	0.04767	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	02.04	2	1	0.00941	0.00941	0.08555	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	03.01	14	13	0.00724	0.00859	0.07807	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	03.02	14	13	0.00740	0.00916	0.08326	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	03.03	14	12	0.00598	0.00813	0.07390	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	03.04	16	14	0.01366	0.02717	0.24701	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	04.01	16	14	0.01950	0.03686	0.33508	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	04.02	6	6	0.00510	0.00708	0.06438	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	04.04	10	9	0.00691	0.01071	0.09735	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	07.01	5	4	0.00463	0.00713	0.06480	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	07.02	17	12	0.00416	0.00516	0.04694	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	08	2	1	0.00600	0.00600	0.05455	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	10	2	1	0.02100	0.02100	0.19091	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	13	47	46	0.00598	0.00691	0.06286	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	FLTR	22	1	1	0.02000	0.02000	0.18182	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	00	11	4	0.00965	0.01524	0.13859	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	01	51	27	0.01121	0.01750	0.15913	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	02.01	3	3	0.01020	0.01984	0.18034	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	02.02	22	13	0.01129	0.01494	0.13585	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	02.03	6	6	0.01372	0.01938	0.17616	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	02.04	11	5	0.00895	0.01731	0.15735	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	03.01	34	33	0.01467	0.01725	0.15680	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	03.02	14	13	0.00987	0.01217	0.11063	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	03.03	23	18	0.01108	0.01377	0.12515	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	03.04	16	14	0.01398	0.01818	0.16530	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	04.01	25	16	0.02340	0.04165	0.37865	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	04.02	6	6	0.00578	0.00844	0.07675	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	04.04	10	9	0.01132	0.01711	0.15558	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	07.01	5	5	0.01420	0.02273	0.20659	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	07.02	17	15	0.00993	0.01348	0.12255	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	08	2	2	0.01800	0.11776	1.07052	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	13	58	51	0.01128	0.01308	0.11891	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	18	9	3	0.00781	0.01058	0.09616	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	20.01	9	6	0.01126	0.01520	0.13816	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	20.02	10	3	0.01847	0.02970	0.27003	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	21	18	10	0.01812	0.03175	0.28860	0.1100	NAWQ_CHR
Zinc	7440-66-6	I	WHOL	22	11	10	0.02288	0.02649	0.24079	0.1100	NAWQ_CHR

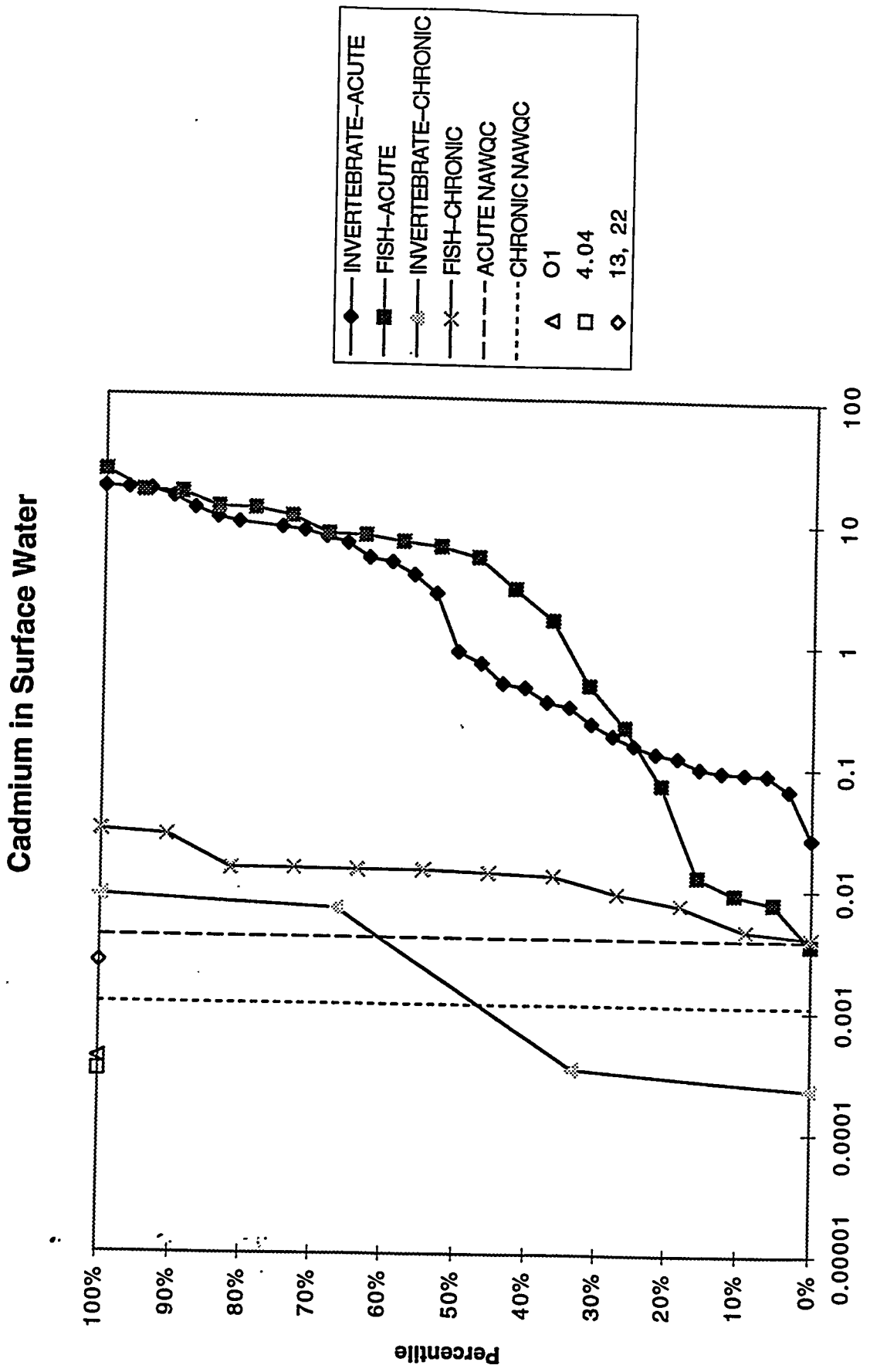


Fig. F2.1. Empirical distribution functions for acute toxicity and chronic toxicity of cadmium to fish and invertebrates and individual measurements of cadmium in reaches for which potentially significant concentrations were reported.

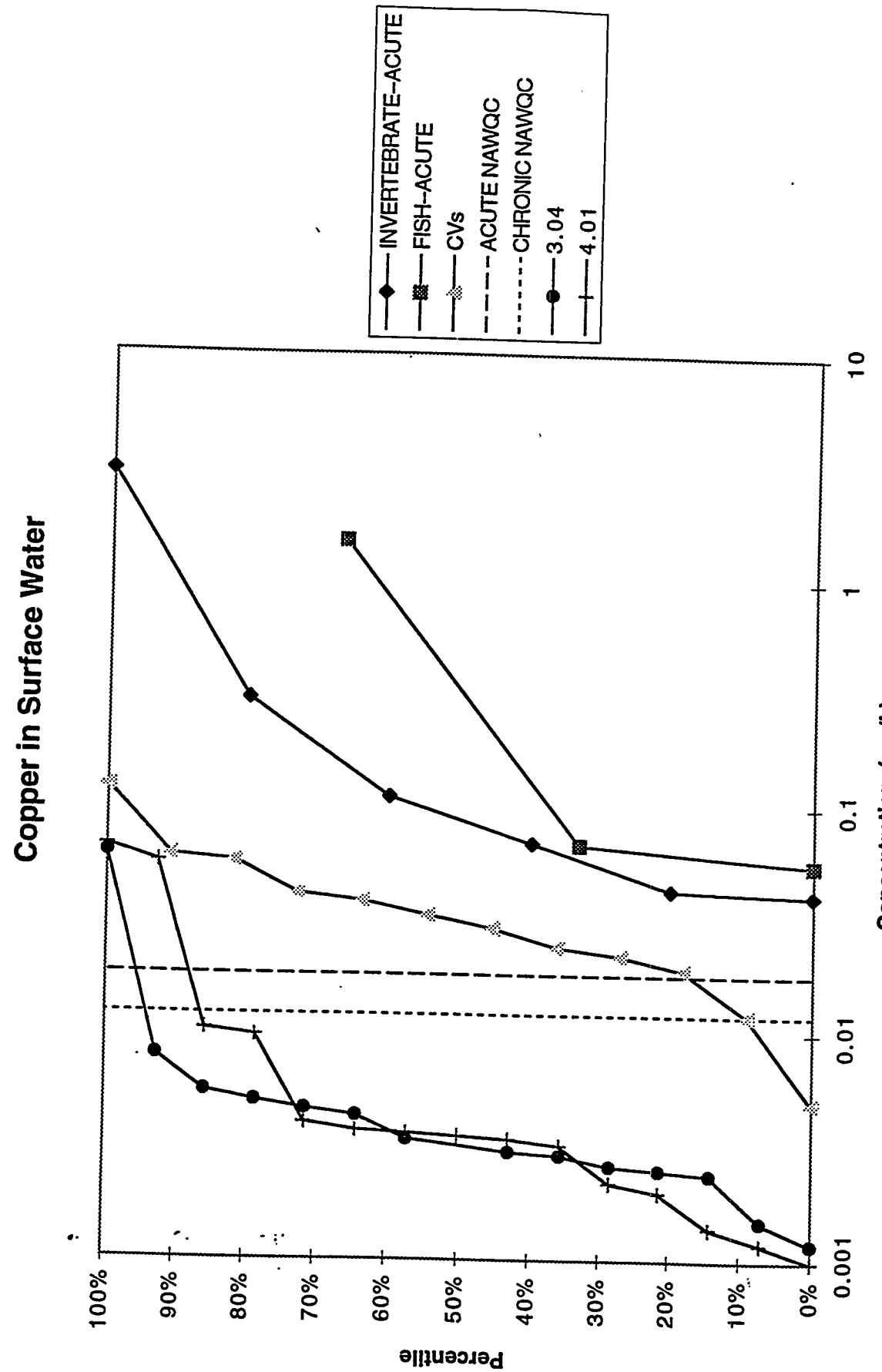


Fig. F2.2. Empirical distribution functions for acute toxicity and chronic toxicity of copper to fish and invertebrates and individual measurements of copper in reaches for which potentially significant concentrations were reported.

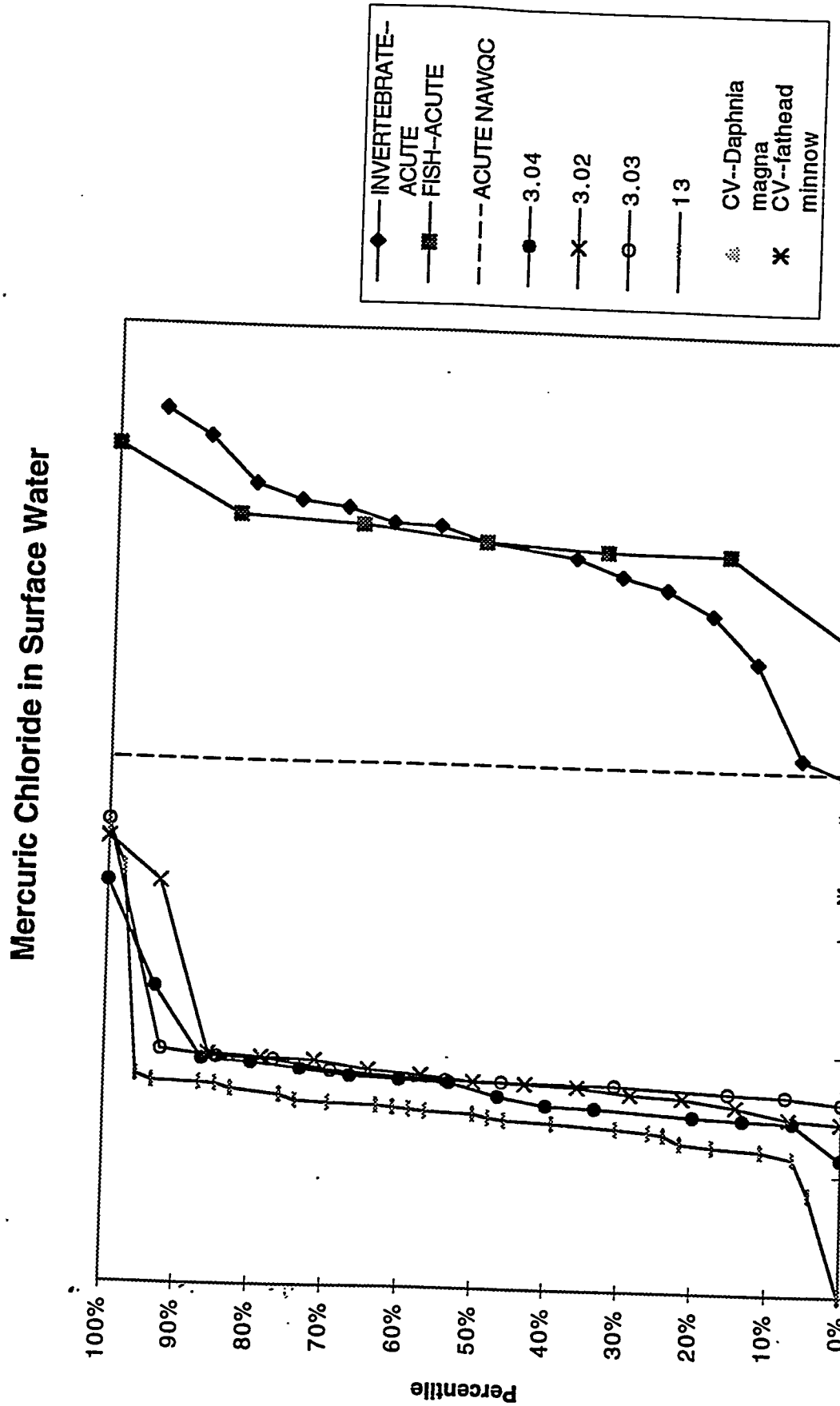


Fig. F2.3. Empirical distribution functions for acute toxicity and chronic toxicity of inorganic mercury to fish and invertebrates and individual measurements of mercury in reaches for which potentially significant concentrations were reported.

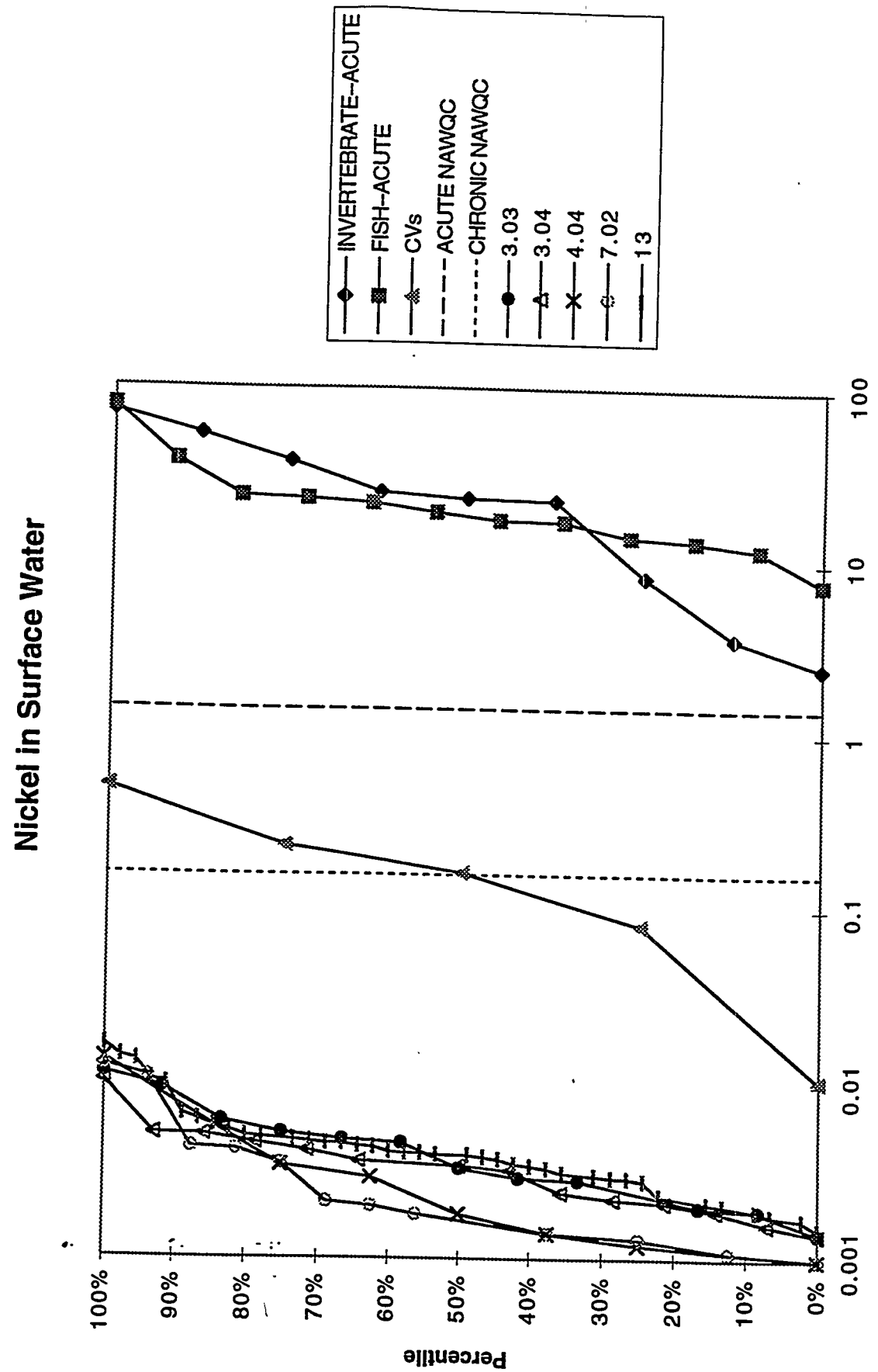


Fig. F2.4. Empirical distribution functions for acute toxicity and chronic toxicity of nickel to fish and invertebrates and individual measurements of nickel in reaches for which potentially significant concentrations were reported.

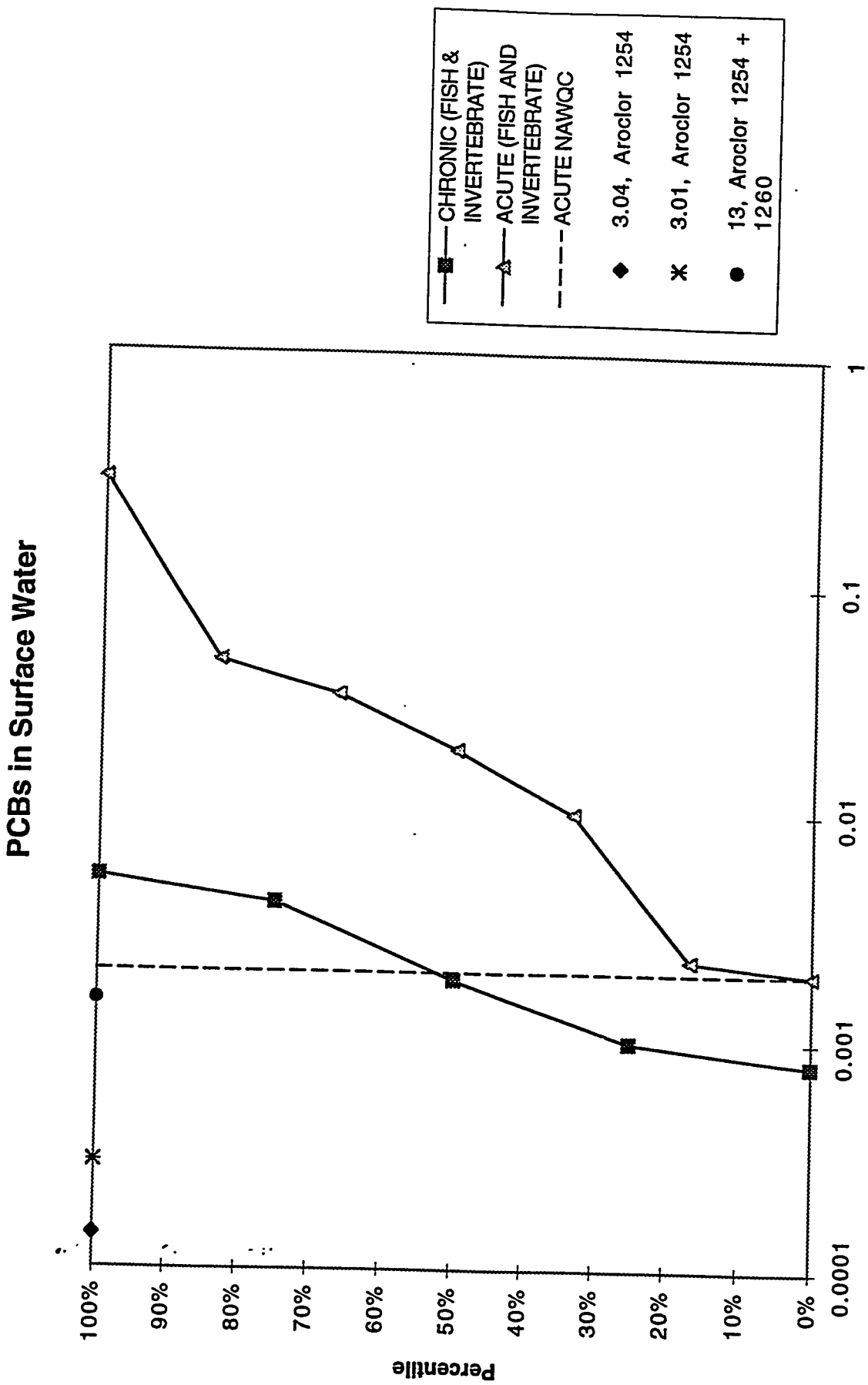


Fig. F2.5. Empirical distribution functions for acute toxicity and chronic toxicity of PCBs to fish and invertebrates and individual measurements of PCBs in reaches for which potentially significant concentrations were reported.

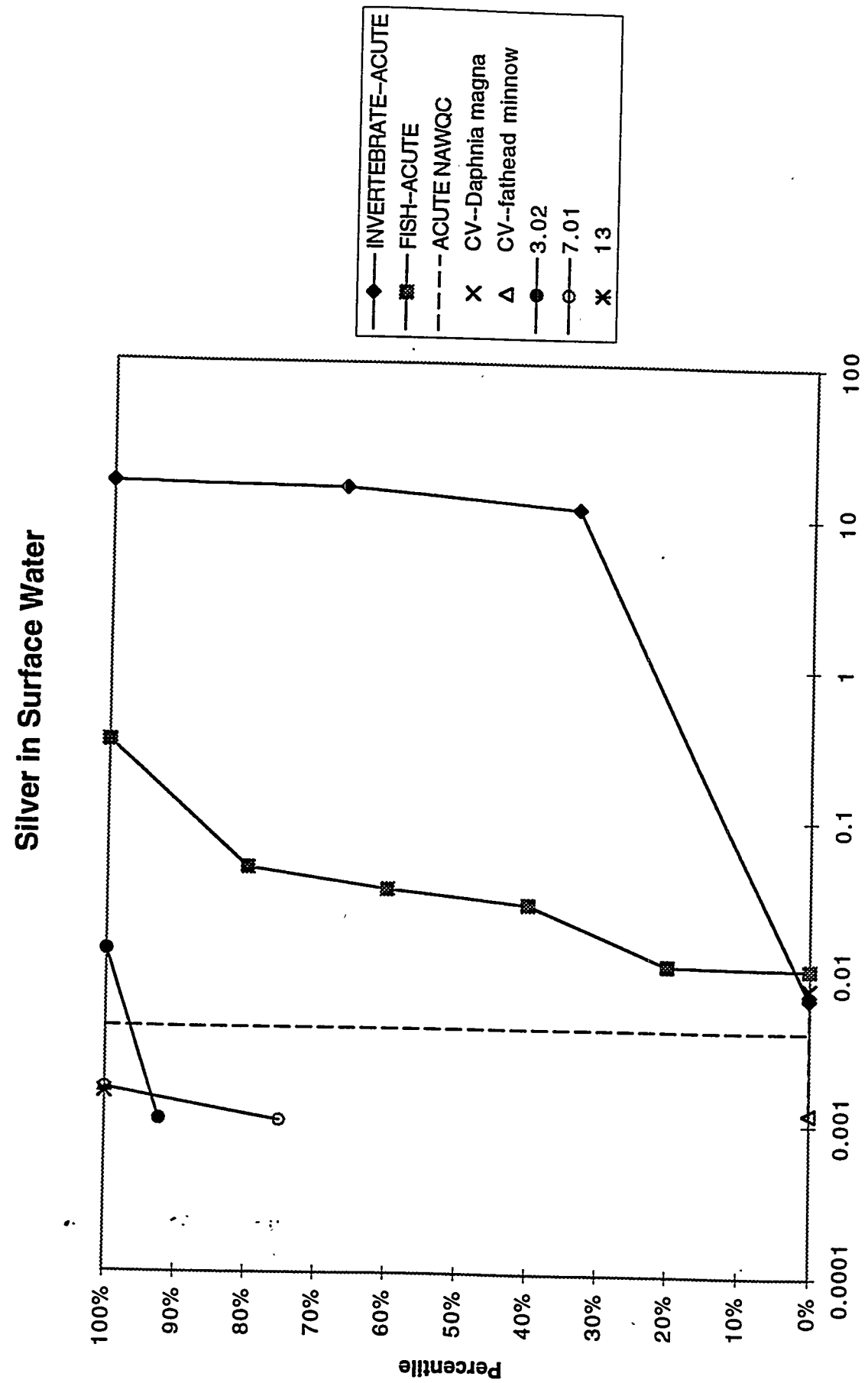


Fig. F2.6. Empirical distribution functions for acute toxicity and chronic toxicity of silver to fish and invertebrates and individual measurements of silver in reaches for which potentially significant concentrations were reported.

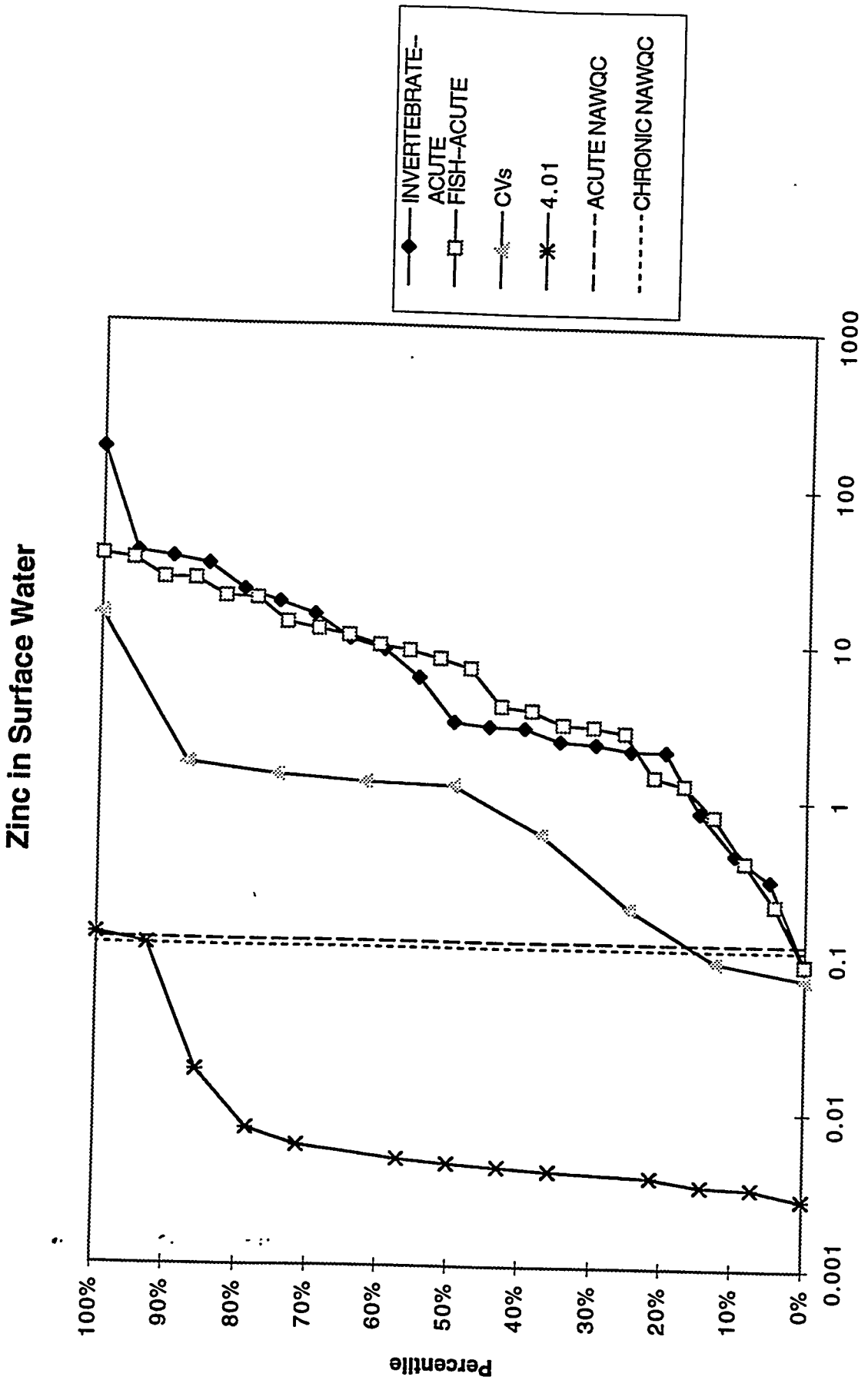


Fig. F2.7. Empirical distribution functions for acute toxicity and chronic toxicity of zinc to fish and invertebrates and individual measurements of zinc in reaches for which potentially significant concentrations were reported.

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Appendix F3

BENTHIC MACROINVERTEBRATES

Table F3.1. Median and maximum concentrations[a] of the contaminants of potential ecological concern in whole sediment, sediment ecotoxicological benchmarks (BMK name) and their values (BMK value) for each chemical, and the quotients (HQ max) of maximum/BMK value

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Arsenic	0	5	5	3.81E+00	5.10E+00	LEL_MOE	6.00E+00	0.85
Arsenic	0	5	5	3.81E+00	5.10E+00	REG_IV	8.00E+00	0.64
Arsenic	0	5	5	3.81E+00	5.10E+00	ER_L	8.20E+00	0.62
Arsenic	0	5	5	3.81E+00	5.10E+00	ER_M	7.00E+01	0.07
Arsenic	**1**	**2**	**2**	**7.44E+00**	**1.04E+01**	**LEL_MOE**	**6.00E+00**	**1.73**
Arsenic	**1**	**2**	**2**	**7.44E+00**	**1.04E+01**	**REG_IV**	**8.00E+00**	**1.29**
Arsenic	**1**	**2**	**2**	**7.44E+00**	**1.04E+01**	**ER_L**	**8.20E+00**	**1.26**
Arsenic	1	2	2	7.44E+00	1.04E+01	ER_M	7.00E+01	0.15
Arsenic	2.01	1	1	1.80E+00	1.80E+00	LEL_MOE	6.00E+00	0.30
Arsenic	2.01	1	1	1.80E+00	1.80E+00	REG_IV	8.00E+00	0.23
Arsenic	2.01	1	1	1.80E+00	1.80E+00	ER_L	8.20E+00	0.22
Arsenic	2.01	1	1	1.80E+00	1.80E+00	ER_M	7.00E+01	0.03
Arsenic	2.02	1	1	3.09E+00	3.09E+00	LEL_MOE	6.00E+00	0.52
Arsenic	2.02	1	1	3.09E+00	3.09E+00	REG_IV	8.00E+00	0.39
Arsenic	2.02	1	1	3.09E+00	3.09E+00	ER_L	8.20E+00	0.38
Arsenic	2.02	1	1	3.09E+00	3.09E+00	ER_M	7.00E+01	0.04
Arsenic	2.03	1	1	2.04E+00	2.04E+00	LEL_MOE	6.00E+00	0.34
Arsenic	2.03	1	1	2.04E+00	2.04E+00	REG_IV	8.00E+00	0.25
Arsenic	2.03	1	1	2.04E+00	2.04E+00	ER_L	8.20E+00	0.25
Arsenic	2.03	1	1	2.04E+00	2.04E+00	ER_M	7.00E+01	0.03
Arsenic	**2.04**	**8**	**8**	**5.22E+00**	**1.02E+01**	**LEL_MOE**	**6.00E+00**	**1.70**
Arsenic	**2.04**	**8**	**8**	**5.22E+00**	**1.02E+01**	**REG_IV**	**8.00E+00**	**1.28**
Arsenic	**2.04**	**8**	**8**	**5.22E+00**	**1.02E+01**	**ER_L**	**8.20E+00**	**1.25**
Arsenic	2.04	8	8	5.22E+00	1.02E+01	ER_M	7.00E+01	0.15

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Arsenic	3.01	2	2	2.85E+00	4.10E+00	LEL_MOE	6.00E+00	0.68
Arsenic	3.01	2	2	2.85E+00	4.10E+00	REG_IV	8.00E+00	0.51
Arsenic	3.01	2	2	2.85E+00	4.10E+00	ER_L	8.20E+00	0.50
Arsenic	3.01	2	2	2.85E+00	4.10E+00	ER_M	7.00E+01	0.06
Arsenic	**3.02**	**9**	**9**	**3.60E+00**	**1.78E+01**	**LEL_MOE**	**6.00E+00**	**2.97**
Arsenic	**3.02**	**9**	**9**	**3.60E+00**	**1.78E+01**	**REG_IV**	**8.00E+00**	**2.23**
Arsenic	**3.02**	**9**	**9**	**3.60E+00**	**1.78E+01**	**ER_L**	**8.20E+00**	**2.17**
Arsenic	3.02	9	9	3.60E+00	1.78E+01	ER_M	7.00E+01	0.25
Arsenic	**3.03**	**9**	**9**	**4.30E+00**	**1.07E+01**	**LEL_MOE**	**6.00E+00**	**1.78**
Arsenic	**3.03**	**9**	**9**	**4.30E+00**	**1.07E+01**	**REG_IV**	**8.00E+00**	**1.34**
Arsenic	**3.03**	**9**	**9**	**4.30E+00**	**1.07E+01**	**ER_L**	**8.20E+00**	**1.30**
Arsenic	3.03	9	9	4.30E+00	1.07E+01	ER_M	7.00E+01	0.15
Arsenic	**3.04**	**7**	**7**	**1.21E+01**	**6.43E+01**	**LEL_MOE**	**6.00E+00**	**10.72**
Arsenic	**3.04**	**7**	**7**	**1.21E+01**	**6.43E+01**	**REG_IV**	**8.00E+00**	**8.04**
Arsenic	**3.04**	**7**	**7**	**1.21E+01**	**6.43E+01**	**ER_L**	**8.20E+00**	**7.84**
Arsenic	3.04	7	7	1.21E+01	6.43E+01	ER_M	7.00E+01	0.92
Arsenic	**4.01**	**10**	**10**	**3.39E+00**	**6.20E+00**	**LEL_MOE**	**6.00E+00**	**1.03**
Arsenic	4.01	10	10	3.39E+00	6.20E+00	REG_IV	8.00E+00	0.78
Arsenic	4.01	10	10	3.39E+00	6.20E+00	ER_L	8.20E+00	0.76
Arsenic	4.01	10	10	3.39E+00	6.20E+00	ER_M	7.00E+01	0.09
Arsenic	**4.02**	**6**	**6**	**3.76E+00**	**1.12E+01**	**LEL_MOE**	**6.00E+00**	**1.87**
Arsenic	**4.02**	**6**	**6**	**3.76E+00**	**1.12E+01**	**REG_IV**	**8.00E+00**	**1.40**
Arsenic	**4.02**	**6**	**6**	**3.76E+00**	**1.12E+01**	**ER_L**	**8.20E+00**	**1.37**
Arsenic	4.02	6	6	3.76E+00	1.12E+01	ER_M	7.00E+01	0.16
Arsenic	**4.03**	**7**	**7**	**8.19E+00**	**1.30E+01**	**LEL_MOE**	**6.00E+00**	**2.17**
Arsenic	**4.03**	**7**	**7**	**8.19E+00**	**1.30E+01**	**REG_IV**	**8.00E+00**	**1.63**
Arsenic	**4.03**	**7**	**7**	**8.19E+00**	**1.30E+01**	**ER_L**	**8.20E+00**	**1.59**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Arsenic	4.03	7	7	8.19E+00	1.30E+01	ER_M	7.00E+01	0.19
Arsenic	**4.04**	**12**	**12**	**8.20E+00**	**1.68E+01**	**LEL_MOE**	**6.00E+00**	**2.80**
Arsenic	**4.04**	**12**	**12**	**8.20E+00**	**1.68E+01**	**REG_IV**	**8.00E+00**	**2.10**
Arsenic	4.04	12	12	8.20E+00	1.68E+01	ER_L	8.20E+00	2.05
Arsenic	**5**	**4**	**4**	**1.02E+01**	**1.14E+01**	**LEL_MOE**	**6.00E+00**	**1.89**
Arsenic	**5**	**4**	**4**	**1.02E+01**	**1.14E+01**	**REG_IV**	**8.00E+00**	**1.42**
Arsenic	5	4	4	1.02E+01	1.14E+01	ER_L	8.20E+00	1.38
Arsenic	**7.01**	**1**	**1**	**9.71E+01**	**9.71E+01**	**LEL_MOE**	**6.00E+00**	**16.19**
Arsenic	**7.01**	**1**	**1**	**9.71E+01**	**9.71E+01**	**REG_IV**	**8.00E+00**	**12.14**
Arsenic	**7.01**	**1**	**1**	**9.71E+01**	**9.71E+01**	**ER_L**	**8.20E+00**	**11.84**
Arsenic	**7.02**	**9**	**9**	**1.27E+01**	**2.14E+01**	**LEL_MOE**	**6.00E+00**	**3.57**
Arsenic	**7.02**	**9**	**9**	**1.27E+01**	**2.14E+01**	**REG_IV**	**8.00E+00**	**2.68**
Arsenic	7.02	9	9	1.27E+01	2.14E+01	ER_L	8.20E+00	2.61
Arsenic	**8**	**1**	**1**	**7.90E+00**	**7.90E+00**	**LEL_MOE**	**6.00E+00**	**1.32**
Arsenic	8	1	1	7.90E+00	7.90E+00	REG_IV	8.00E+00	0.99
Arsenic	8	1	1	7.90E+00	7.90E+00	ER_L	8.20E+00	0.96
Arsenic	**10**	**1**	**1**	**6.87E+00**	**6.87E+00**	**LEL_MOE**	**6.00E+00**	**1.15**
Arsenic	10	1	1	6.87E+00	6.87E+00	REG_IV	8.00E+00	0.86
Arsenic	10	1	1	6.87E+00	6.87E+00	ER_L	8.20E+00	0.84
Arsenic	13	5	5	3.80E+00	4.10E+00	LEL_MOE	6.00E+00	0.68
Arsenic	13	5	5	3.80E+00	4.10E+00	REG_IV	8.00E+00	0.51

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Arsenic	13	5	5	3.80E+00	4.10E+00	ER_L	8.20E+00	0.50
Arsenic	13	5	5	3.80E+00	4.10E+00	ER_M	7.00E+01	0.06
Arsenic	18	3	3	4.92E+00	5.36E+00	LEL_MOE	6.00E+00	0.89
Arsenic	18	3	3	4.92E+00	5.36E+00	REG_IV	8.00E+00	0.67
Arsenic	18	3	3	4.92E+00	5.36E+00	ER_L	8.20E+00	0.65
Arsenic	18	3	3	4.92E+00	5.36E+00	ER_M	7.00E+01	0.08
Arsenic	22	1	1	3.86E+00	3.86E+00	LEL_MOE	6.00E+00	0.64
Arsenic	22	1	1	3.86E+00	3.86E+00	REG_IV	8.00E+00	0.48
Arsenic	22	1	1	3.86E+00	3.86E+00	ER_L	8.20E+00	0.47
Arsenic	22	1	1	3.86E+00	3.86E+00	ER_M	7.00E+01	0.06
Barium	**0**	**5**	**5**	**6.55E+01**	**7.36E+01**	**EPA_REGV**	**2.00E+01**	**3.68**
Barium	**2.01**	**1**	**1**	**4.26E+01**	**4.26E+01**	**EPA_REGV**	**2.00E+01**	**2.13**
Barium	**2.03**	**1**	**1**	**8.86E+01**	**8.86E+01**	**EPA_REGV**	**2.00E+01**	**4.43**
Barium	**2.04**	**7**	**7**	**1.25E+02**	**1.92E+02**	**EPA_REGV**	**2.00E+01**	**9.59**
Barium	**3.01**	**2**	**2**	**8.19E+01**	**8.60E+01**	**EPA_REGV**	**2.00E+01**	**4.30**
Barium	**3.02**	**8**	**8**	**9.93E+01**	**1.92E+02**	**EPA_REGV**	**2.00E+01**	**9.60**
Barium	**3.03**	**9**	**9**	**9.34E+01**	**1.29E+02**	**EPA_REGV**	**2.00E+01**	**6.45**
Barium	**3.04**	**6**	**6**	**1.06E+02**	**2.08E+02**	**EPA_REGV**	**2.00E+01**	**10.40**
Barium	**4.01**	**9**	**9**	**5.40E+01**	**1.16E+02**	**EPA_REGV**	**2.00E+01**	**5.80**
Barium	**4.02**	**6**	**6**	**6.74E+01**	**1.07E+02**	**EPA_REGV**	**2.00E+01**	**5.35**
Barium	**4.03**	**7**	**7**	**6.45E+01**	**1.23E+02**	**EPA_REGV**	**2.00E+01**	**6.13**
Barium	**4.04**	**11**	**11**	**1.03E+02**	**1.68E+02**	**EPA_REGV**	**2.00E+01**	**8.40**
Barium	**7.01**	**1**	**1**	**1.60E+02**	**1.60E+02**	**EPA_REGV**	**2.00E+01**	**7.99**
Barium	**7.02**	**1**	**1**	**1.57E+02**	**1.57E+02**	**EPA_REGV**	**2.00E+01**	**7.85**
Barium	**8**	**1**	**1**	**1.23E+02**	**1.23E+02**	**EPA_REGV**	**2.00E+01**	**6.15**
Barium	**13**	**5**	**5**	**8.49E+01**	**1.22E+02**	**EPA_REGV**	**2.00E+01**	**6.10**
Barium	**18**	**3**	**3**	**1.17E+02**	**1.24E+02**	**EPA_REGV**	**2.00E+01**	**6.19**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Cadmium	0	5	5	2.66E-01	2.90E-01	LEL_MOE	6.00E-01	0.48
Cadmium	0	5	5	2.66E-01	2.90E-01	REG_IV	1.00E+00	0.29
Cadmium	0	5	5	2.66E-01	2.90E-01	ER_L	1.20E+00	0.24
Cadmium	0	5	5	2.66E-01	2.90E-01	ER_M	9.60E+00	0.03
Cadmium	**1**	**2**	**2**	**6.99E-01**	**8.12E-01**	**LEL_MOE**	**6.00E-01**	**1.35**
Cadmium	1	2	2	6.99E-01	8.12E-01	REG_IV	1.00E+00	0.81
Cadmium	1	2	2	6.99E-01	8.12E-01	ER_L	1.20E+00	0.68
Cadmium	1	2	2	6.99E-01	8.12E-01	ER_M	9.60E+00	0.08
Cadmium	2.01	1	1	1.10E-01	1.10E-01	LEL_MOE	6.00E-01	0.18
Cadmium	2.01	1	1	1.10E-01	1.10E-01	REG_IV	1.00E+00	0.11
Cadmium	2.01	1	1	1.10E-01	1.10E-01	ER_L	1.20E+00	0.09
Cadmium	2.01	1	1	1.10E-01	1.10E-01	ER_M	9.60E+00	0.01
Cadmium	2.03	1	1	1.88E-01	1.88E-01	LEL_MOE	6.00E-01	0.31
Cadmium	2.03	1	1	1.88E-01	1.88E-01	REG_IV	1.00E+00	0.19
Cadmium	2.03	1	1	1.88E-01	1.88E-01	ER_L	1.20E+00	0.16
Cadmium	2.03	1	1	1.88E-01	1.88E-01	ER_M	9.60E+00	0.02
Cadmium	2.04	8	8	2.91E-01	5.07E-01	LEL_MOE	6.00E-01	0.84
Cadmium	2.04	8	8	2.91E-01	5.07E-01	REG_IV	1.00E+00	0.51
Cadmium	2.04	8	8	2.91E-01	5.07E-01	ER_L	1.20E+00	0.42
Cadmium	2.04	8	8	2.91E-01	5.07E-01	ER_M	9.60E+00	0.05
Cadmium	**3.01**	**2**	**2**	**1.12E+00**	**2.10E+00**	**LEL_MOE**	**6.00E-01**	**3.50**
Cadmium	**3.01**	**2**	**2**	**1.12E+00**	**2.10E+00**	**REG_IV**	**1.00E+00**	**2.10**
Cadmium	**3.01**	**2**	**2**	**1.12E+00**	**2.10E+00**	**ER_L**	**1.20E+00**	**1.75**
Cadmium	3.01	2	2	1.12E+00	2.10E+00	ER_M	9.60E+00	0.22
Cadmium	**3.02**	**9**	**9**	**7.84E-01**	**5.30E+00**	**LEL_MOE**	**6.00E-01**	**8.83**
Cadmium	**3.02**	**9**	**9**	**7.84E-01**	**5.30E+00**	**REG_IV**	**1.00E+00**	**5.30**
Cadmium	**3.02**	**9**	**9**	**7.84E-01**	**5.30E+00**	**ER_L**	**1.20E+00**	**4.42**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Cadmium	3.02	9	9	7.84E-01	5.30E+00	ER_M	9.60E+00	0.55
Cadmium	**3.03**	**9**	**9**	**1.00E+00**	**3.50E+00**	**LEL_MOE**	**6.00E-01**	**5.83**
Cadmium	**3.03**	**9**	**9**	**1.00E+00**	**3.50E+00**	**REG_IV**	**1.00E+00**	**3.50**
Cadmium	**3.03**	**9**	**9**	**1.00E+00**	**3.50E+00**	**ER_L**	**1.20E+00**	**2.91**
Cadmium	3.03	9	9	1.00E+00	3.50E+00	ER_M	9.60E+00	0.36
Cadmium	**3.04**	**7**	**7**	**1.20E+00**	**5.63E+00**	**LEL_MOE**	**6.00E-01**	**9.39**
Cadmium	**3.04**	**7**	**7**	**1.20E+00**	**5.63E+00**	**REG_IV**	**1.00E+00**	**5.63**
Cadmium	**3.04**	**7**	**7**	**1.20E+00**	**5.63E+00**	**ER_L**	**1.20E+00**	**4.70**
Cadmium	3.04	7	7	1.20E+00	5.63E+00	ER_M	9.60E+00	0.59
Cadmium	4.01	10	10	2.50E-01	5.48E-01	LEL_MOE	6.00E-01	0.91
Cadmium	4.01	10	10	2.50E-01	5.48E-01	REG_IV	1.00E+00	0.55
Cadmium	4.01	10	10	2.50E-01	5.48E-01	ER_L	1.20E+00	0.46
Cadmium	4.01	10	10	2.50E-01	5.48E-01	ER_M	9.60E+00	0.06
Cadmium	4.02	6	6	1.75E-01	5.10E-01	LEL_MOE	6.00E-01	0.85
Cadmium	4.02	6	6	1.75E-01	5.10E-01	REG_IV	1.00E+00	0.51
Cadmium	4.02	6	6	1.75E-01	5.10E-01	ER_L	1.20E+00	0.43
Cadmium	4.02	6	6	1.75E-01	5.10E-01	ER_M	9.60E+00	0.05
Cadmium	4.03	7	7	4.40E-01	5.56E-01	LEL_MOE	6.00E-01	0.93
Cadmium	4.03	7	7	4.40E-01	5.56E-01	REG_IV	1.00E+00	0.56
Cadmium	4.03	7	7	4.40E-01	5.56E-01	ER_L	1.20E+00	0.46
Cadmium	4.03	7	7	4.40E-01	5.56E-01	ER_M	9.60E+00	0.06
Cadmium	**4.04**	**12**	**12**	**4.60E-01**	**1.28E+00**	**LEL_MOE**	**6.00E-01**	**2.14**
Cadmium	**4.04**	**12**	**12**	**4.60E-01**	**1.28E+00**	**REG_IV**	**1.00E+00**	**1.28**
Cadmium	**4.04**	**12**	**12**	**4.60E-01**	**1.28E+00**	**ER_L**	**1.20E+00**	**1.07**
Cadmium	4.04	12	12	4.60E-01	1.28E+00	ER_M	9.60E+00	0.13
Cadmium	**5**	**4**	**4**	**1.29E+00**	**7.04E+00**	**LEL_MOE**	**6.00E-01**	**11.74**
Cadmium	**5**	**4**	**4**	**1.29E+00**	**7.04E+00**	**REG_IV**	**1.00E+00**	**7.04**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Cadmium	**5**	**4**	**4**	**1.29E+00**	**7.04E+00**	**ER_L**	**1.20E+00**	**5.87**
Cadmium	5	4	4	1.29E+00	7.04E+00	ER_M	9.60E+00	0.73
Cadmium	7.01	1	1	4.98E-01	4.98E-01	LEL_MOE	6.00E-01	0.83
Cadmium	7.01	1	1	4.98E-01	4.98E-01	REG_IV	1.00E+00	0.50
Cadmium	7.01	1	1	4.98E-01	4.98E-01	ER_L	1.20E+00	0.42
Cadmium	7.01	1	1	4.98E-01	4.98E-01	ER_M	9.60E+00	0.05
Cadmium	**7.02**	**2**	**9**	**3.60E-01**	**9.36E-01**	**LEL_MOE**	**6.00E-01**	**1.56**
Cadmium	7.02	2	9	3.60E-01	9.36E-01	REG_IV	1.00E+00	0.94
Cadmium	7.02	2	9	3.60E-01	9.36E-01	ER_L	1.20E+00	0.78
Cadmium	7.02	2	9	3.60E-01	9.36E-01	ER_M	9.60E+00	0.10
Cadmium	8	1	1	2.80E-01	2.80E-01	LEL_MOE	6.00E-01	0.47
Cadmium	8	1	1	2.80E-01	2.80E-01	REG_IV	1.00E+00	0.28
Cadmium	8	1	1	2.80E-01	2.80E-01	ER_L	1.20E+00	0.23
Cadmium	8	1	1	2.80E-01	2.80E-01	ER_M	9.60E+00	0.03
Cadmium	13	5	5	1.80E-01	4.30E-01	LEL_MOE	6.00E-01	0.72
Cadmium	13	5	5	1.80E-01	4.30E-01	REG_IV	1.00E+00	0.43
Cadmium	13	5	5	1.80E-01	4.30E-01	ER_L	1.20E+00	0.36
Cadmium	13	5	5	1.80E-01	4.30E-01	ER_M	9.60E+00	0.04
Cadmium	18	3	3	4.48E-01	4.53E-01	LEL_MOE	6.00E-01	0.75
Cadmium	18	3	3	4.48E-01	4.53E-01	REG_IV	1.00E+00	0.45
Cadmium	18	3	3	4.48E-01	4.53E-01	ER_L	1.20E+00	0.38
Cadmium	18	3	3	4.48E-01	4.53E-01	ER_M	9.60E+00	0.05
Cadmium	**22**	**1**	**1**	**3.54E+00**	**3.54E+00**	**LEL_MOE**	**6.00E-01**	**5.89**
Cadmium	**22**	**1**	**1**	**3.54E+00**	**3.54E+00**	**REG_IV**	**1.00E+00**	**3.54**
Cadmium	**22**	**1**	**1**	**3.54E+00**	**3.54E+00**	**ER_L**	**1.20E+00**	**2.95**
Cadmium	22	1	1	3.54E+00	3.54E+00	ER_M	9.60E+00	0.37
Chromium	0	5	5	1.03E+01	1.28E+01	REG_IV	3.30E+01	0.39

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Chromium	0	5	5	1.03E+01	1.28E+01	ER_L	8.10E+01	0.16
Chromium	0	5	5	1.03E+01	1.28E+01	ER_M	3.70E+02	0.03
Chromium	1	2	2	1.26E+01	1.63E+01	REG_IV	3.30E+01	0.49
Chromium	1	2	2	1.26E+01	1.63E+01	ER_L	8.10E+01	0.20
Chromium	1	2	2	1.26E+01	1.63E+01	ER_M	3.70E+02	0.04
Chromium	2.01	1	1	7.80E+00	7.80E+00	REG_IV	3.30E+01	0.24
Chromium	2.01	1	1	7.80E+00	7.80E+00	ER_L	8.10E+01	0.10
Chromium	2.01	1	1	7.80E+00	7.80E+00	ER_M	3.70E+02	0.02
Chromium	2.02	1	1	6.94E+00	6.94E+00	REG_IV	3.30E+01	0.21
Chromium	2.02	1	1	6.94E+00	6.94E+00	ER_L	8.10E+01	0.09
Chromium	2.02	1	1	6.94E+00	6.94E+00	ER_M	3.70E+02	0.02
Chromium	2.03	1	1	1.26E+01	1.26E+01	REG_IV	3.30E+01	0.38
Chromium	2.03	1	1	1.26E+01	1.26E+01	ER_L	8.10E+01	0.16
Chromium	2.03	1	1	1.26E+01	1.26E+01	ER_M	3.70E+02	0.03
Chromium	2.04	8	8	1.38E+01	2.07E+01	REG_IV	3.30E+01	0.63
Chromium	2.04	8	8	1.38E+01	2.07E+01	ER_L	8.10E+01	0.26
Chromium	2.04	8	8	1.38E+01	2.07E+01	ER_M	3.70E+02	0.06
Chromium	3.01	2	2	1.63E+01	2.06E+01	REG_IV	3.30E+01	0.62
Chromium	3.01	2	2	1.63E+01	2.06E+01	ER_L	8.10E+01	0.25
Chromium	3.01	2	2	1.63E+01	2.06E+01	ER_M	3.70E+02	0.06
Chromium	**3.02**	**9**	**9**	**2.57E+01**	**2.33E+02**	**REG_IV**	**3.30E+01**	**7.06**
Chromium	**3.02**	**9**	**9**	**2.57E+01**	**2.33E+02**	**ER_L**	**8.10E+01**	**2.88**
Chromium	3.02	9	9	2.57E+01	2.33E+02	ER_M	3.70E+02	0.63
Chromium	**3.03**	**9**	**9**	**3.04E+01**	**1.17E+02**	**REG_IV**	**3.30E+01**	**3.56**
Chromium	**3.03**	**9**	**9**	**3.04E+01**	**1.17E+02**	**ER_L**	**8.10E+01**	**1.45**
Chromium	3.03	9	9	3.04E+01	1.17E+02	ER_M	3.70E+02	0.32
Chromium	**3.04**	**7**	**7**	**2.56E+01**	**5.65E+01**	**REG_IV**	**3.30E+01**	**1.71**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Chromium	3.04	7	7	2.56E+01	5.65E+01	ER_L	8.10E+01	0.70
Chromium	3.04	7	7	2.56E+01	5.65E+01	ER_M	3.70E+02	0.15
Chromium	4.01	10	10	1.68E+01	2.06E+01	REG_IV	3.30E+01	0.62
Chromium	4.01	10	10	1.68E+01	2.06E+01	ER_L	8.10E+01	0.25
Chromium	4.01	10	10	1.68E+01	2.06E+01	ER_M	3.70E+02	0.06
Chromium	4.02	6	6	1.49E+01	1.93E+01	REG_IV	3.30E+01	0.58
Chromium	4.02	6	6	1.49E+01	1.93E+01	ER_L	8.10E+01	0.24
Chromium	4.02	6	6	1.49E+01	1.93E+01	ER_M	3.70E+02	0.05
Chromium	**4.03**	**7**	**7**	**2.91E+01**	**5.14E+01**	**REG_IV**	**3.30E+01**	**1.56**
Chromium	4.03	7	7	2.91E+01	5.14E+01	ER_L	8.10E+01	0.63
Chromium	4.03	7	7	2.91E+01	5.14E+01	ER_M	3.70E+02	0.14
Chromium	4.04	12	12	1.79E+01	3.05E+01	REG_IV	3.30E+01	0.92
Chromium	4.04	12	12	1.79E+01	3.05E+01	ER_L	8.10E+01	0.38
Chromium	4.04	12	12	1.79E+01	3.05E+01	ER_M	3.70E+02	0.08
Chromium	5	4	4	3.02E+01	3.18E+01	REG_IV	3.30E+01	0.96
Chromium	5	4	4	3.02E+01	3.18E+01	ER_L	8.10E+01	0.39
Chromium	5	4	4	3.02E+01	3.18E+01	ER_M	3.70E+02	0.09
Chromium	7.01	1	1	2.54E+01	2.54E+01	REG_IV	3.30E+01	0.77
Chromium	7.01	1	1	2.54E+01	2.54E+01	ER_L	8.10E+01	0.31
Chromium	7.01	1	1	2.54E+01	2.54E+01	ER_M	3.70E+02	0.07
Chromium	**7.02**	**9**	**9**	**2.31E+01**	**5.86E+01**	**REG_IV**	**3.30E+01**	**1.78**
Chromium	7.02	9	9	2.31E+01	5.86E+01	ER_L	8.10E+01	0.72
Chromium	7.02	9	9	2.31E+01	5.86E+01	ER_M	3.70E+02	0.16
Chromium	8	1	1	2.13E+01	2.13E+01	REG_IV	3.30E+01	0.65
Chromium	8	1	1	2.13E+01	2.13E+01	ER_L	8.10E+01	0.26
Chromium	8	1	1	2.13E+01	2.13E+01	ER_M	3.70E+02	0.06
Chromium	10	1	1	2.58E+01	2.58E+01	REG_IV	3.30E+01	0.78

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[b]
Chromium	10	1	1	2.58E+01	2.58E+01	ER_L	8.10E+01	0.32
Chromium	10	1	1	2.58E+01	2.58E+01	ER_M	3.70E+02	0.07
Chromium	13	5	5	1.51E+01	1.67E+01	REG_IV	3.30E+01	0.51
Chromium	13	5	5	1.51E+01	1.67E+01	ER_L	8.10E+01	0.21
Chromium	13	5	5	1.51E+01	1.67E+01	ER_M	3.70E+02	0.05
Chromium	18	3	3	1.73E+01	1.77E+01	REG_IV	3.30E+01	0.54
Chromium	18	3	3	1.73E+01	1.77E+01	ER_L	8.10E+01	0.22
Chromium	18	3	3	1.73E+01	1.77E+01	ER_M	3.70E+02	0.05
Chromium	**22**	**1**	**1**	**9.76E+01**	**9.76E+01**	**REG_IV**	**3.30E+01**	**2.96**
Chromium	**22**	**1**	**1**	**9.76E+01**	**9.76E+01**	**ER_L**	**8.10E+01**	**1.20**
Chromium	22	1	1	9.76E+01	9.76E+01	ER_M	3.70E+02	0.26
Copper	0	5	5	9.00E+00	1.04E+01	REG_IV	2.80E+01	0.37
Copper	0	5	5	9.00E+00	1.04E+01	ER_L	3.40E+01	0.31
Copper	0	5	5	9.00E+00	1.04E+01	ER_M	2.70E+02	0.04
Copper	**1**	**2**	**2**	**3.45E+01**	**3.48E+01**	**REG_IV**	**2.80E+01**	**1.24**
Copper	**1**	**2**	**2**	**3.45E+01**	**3.48E+01**	**ER_L**	**3.40E+01**	**1.02**
Copper	1	2	2	3.45E+01	3.48E+01	ER_M	2.70E+02	0.13
Copper	2.01	1	1	4.20E+00	4.20E+00	REG_IV	2.80E+01	0.15
Copper	2.01	1	1	4.20E+00	4.20E+00	ER_L	3.40E+01	0.12
Copper	2.01	1	1	4.20E+00	4.20E+00	ER_M	2.70E+02	0.02
Copper	2.02	1	1	9.07E+00	9.07E+00	REG_IV	2.80E+01	0.32
Copper	2.02	1	1	9.07E+00	9.07E+00	ER_L	3.40E+01	0.27
Copper	2.02	1	1	9.07E+00	9.07E+00	ER_M	2.70E+02	0.03
Copper	2.03	1	1	7.67E+00	7.67E+00	REG_IV	2.80E+01	0.27
Copper	2.03	1	1	7.67E+00	7.67E+00	ER_L	3.40E+01	0.23
Copper	2.03	1	1	7.67E+00	7.67E+00	ER_M	2.70E+02	0.03
Copper	2.04	8	8	1.07E+01	1.24E+01	REG_IV	2.80E+01	0.44

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Copper	2.04	8	8	1.07E+01	1.24E+01	ER_L	3.40E+01	0.37
Copper	2.04	8	8	1.07E+01	1.24E+01	ER_M	2.70E+02	0.05
Copper	3.01	2	2	1.64E+01	2.64E+01	REG_IV	2.80E+01	0.94
Copper	3.01	2	2	1.64E+01	2.64E+01	ER_L	3.40E+01	0.78
Copper	3.01	2	2	1.64E+01	2.64E+01	ER_M	2.70E+02	0.10
Copper	**3.02**	**9**	**9**	**2.86E+01**	**1.42E+02**	**REG_IV**	**2.80E+01**	**5.07**
Copper	**3.02**	**9**	**9**	**2.86E+01**	**1.42E+02**	**ER_L**	**3.40E+01**	**4.18**
Copper	3.02	9	9	2.86E+01	1.42E+02	ER_M	2.70E+02	0.53
Copper	**3.03**	**9**	**9**	**2.44E+01**	**5.89E+01**	**REG_IV**	**2.80E+01**	**2.10**
Copper	**3.03**	**9**	**9**	**2.44E+01**	**5.89E+01**	**ER_L**	**3.40E+01**	**1.73**
Copper	3.03	9	9	2.44E+01	5.89E+01	ER_M	2.70E+02	0.22
Copper	**3.04**	**7**	**7**	**3.83E+01**	**9.03E+01**	**REG_IV**	**2.80E+01**	**3.23**
Copper	**3.04**	**7**	**7**	**3.83E+01**	**9.03E+01**	**ER_L**	**3.40E+01**	**2.66**
Copper	3.04	7	7	3.83E+01	9.03E+01	ER_M	2.70E+02	0.33
Copper	4.01	10	10	7.75E+00	1.77E+01	REG_IV	2.80E+01	0.63
Copper	4.01	10	10	7.75E+00	1.77E+01	ER_L	3.40E+01	0.52
Copper	4.01	10	10	7.75E+00	1.77E+01	ER_M	2.70E+02	0.07
Copper	4.02	6	6	7.46E+00	1.66E+01	REG_IV	2.80E+01	0.59
Copper	4.02	6	6	7.46E+00	1.66E+01	ER_L	3.40E+01	0.49
Copper	4.02	6	6	7.46E+00	1.66E+01	ER_M	2.70E+02	0.06
Copper	**4.03**	**7**	**7**	**2.27E+01**	**3.88E+01**	**REG_IV**	**2.80E+01**	**1.39**
Copper	**4.03**	**7**	**7**	**2.27E+01**	**3.88E+01**	**ER_L**	**3.40E+01**	**1.14**
Copper	4.03	7	7	2.27E+01	3.88E+01	ER_M	2.70E+02	0.14
Copper	**4.04**	**12**	**12**	**2.98E+01**	**6.09E+01**	**REG_IV**	**2.80E+01**	**2.18**
Copper	**4.04**	**12**	**12**	**2.98E+01**	**6.09E+01**	**ER_L**	**3.40E+01**	**1.79**
Copper	4.04	12	12	2.98E+01	6.09E+01	ER_M	2.70E+02	0.23
Copper	**5**	**4**	**4**	**3.85E+01**	**4.32E+01**	**REG_IV**	**2.80E+01**	**1.54**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Copper	**5**	**4**	**4**	**3.85E+01**	**4.32E+01**	**ER_L**	**3.40E+01**	**1.27**
Copper	5	4	4	3.85E+01	4.32E+01	ER_M	2.70E+02	0.16
Copper	7.01	1	1	2.60E+01	2.60E+01	REG_IV	2.80E+01	0.93
Copper	7.01	1	1	2.60E+01	2.60E+01	ER_L	3.40E+01	0.76
Copper	7.01	1	1	2.60E+01	2.60E+01	ER_M	2.70E+02	0.10
Copper	**7.02**	**9**	**9**	**2.77E+01**	**4.34E+01**	**REG_IV**	**2.80E+01**	**1.55**
Copper	**7.02**	**9**	**9**	**2.77E+01**	**4.34E+01**	**ER_L**	**3.40E+01**	**1.28**
Copper	7.02	9	9	2.77E+01	4.34E+01	ER_M	2.70E+02	0.16
Copper	8	1	1	2.26E+01	2.26E+01	REG_IV	2.80E+01	0.81
Copper	8	1	1	2.26E+01	2.26E+01	ER_L	3.40E+01	0.66
Copper	8	1	1	2.26E+01	2.26E+01	ER_M	2.70E+02	0.08
Copper	**10**	**1**	**1**	**4.55E+01**	**4.55E+01**	**REG_IV**	**2.80E+01**	**1.62**
Copper	**10**	**1**	**1**	**4.55E+01**	**4.55E+01**	**ER_L**	**3.40E+01**	**1.34**
Copper	10	1	1	4.55E+01	4.55E+01	ER_M	2.70E+02	0.17
Copper	13	5	5	1.04E+01	1.50E+01	REG_IV	2.80E+01	0.54
Copper	13	5	5	1.04E+01	1.50E+01	ER_L	3.40E+01	0.44
Copper	13	5	5	1.04E+01	1.50E+01	ER_M	2.70E+02	0.06
Copper	18	3	3	1.74E+01	1.98E+01	REG_IV	2.80E+01	0.71
Copper	18	3	3	1.74E+01	1.98E+01	ER_L	3.40E+01	0.58
Copper	18	3	3	1.74E+01	1.98E+01	ER_M	2.70E+02	0.07
Copper	**22**	**1**	**1**	**4.12E+01**	**4.12E+01**	**REG_IV**	**2.80E+01**	**1.47**
Copper	**22**	**1**	**1**	**4.12E+01**	**4.12E+01**	**ER_L**	**3.40E+01**	**1.21**
Copper	22	1	1	4.12E+01	4.12E+01	ER_M	2.70E+02	0.15
Iron	0	5	5	1.40E+04	1.48E+04	LEL_MOE	3.00E+04	0.49
Iron	2.01	1	1	8.40E+03	8.40E+03	LEL_MOE	3.00E+04	0.28
Iron	2.03	1	1	1.54E+04	1.54E+04	LEL_MOE	3.00E+04	0.51
Iron	2.04	7	7	1.76E+04	2.64E+04	LEL_MOE	3.00E+04	0.88

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Iron	3.01	2	2	1.56E+04	1.77E+04	LEL_MOE	3.00E+04	0.59
Iron	3.02	8	8	1.93E+04	2.42E+04	LEL_MOE	3.00E+04	0.81
Iron	**3.03**	**9**	**9**	**1.92E+04**	**3.29E+04**	**LEL_MOE**	**3.00E+04**	**1.10**
Iron	3.04	6	6	1.96E+04	2.41E+04	LEL_MOE	3.00E+04	0.80
Iron	4.01	9	9	1.09E+04	1.95E+04	LEL_MOE	3.00E+04	0.65
Iron	4.02	6	6	1.27E+04	1.65E+04	LEL_MOE	3.00E+04	0.55
Iron	4.03	7	7	1.82E+04	2.39E+04	LEL_MOE	3.00E+04	0.80
Iron	**4.04**	**11**	**11**	**2.06E+04**	**3.24E+04**	**LEL_MOE**	**3.00E+04**	**1.08**
Iron	**7.01**	**1**	**1**	**3.08E+04**	**3.08E+04**	**LEL_MOE**	**3.00E+04**	**1.03**
Iron	**7.02**	**1**	**1**	**3.04E+04**	**3.04E+04**	**LEL_MOE**	**3.00E+04**	**1.01**
Iron	8	1	1	2.89E+04	2.89E+04	LEL_MOE	3.00E+04	0.96
Iron	13	5	5	1.58E+04	1.84E+04	LEL_MOE	3.00E+04	0.61
Iron	18	3	3	1.91E+04	2.02E+04	LEL_MOE	3.00E+04	0.67
Lead	**0**	**5**	**5**	**2.16E+01**	**2.60E+01**	**REG_IV**	**2.10E+01**	**1.24**
Lead	0	5	5	2.16E+01	2.60E+01	ER_L	4.70E+01	0.55
Lead	0	5	5	2.16E+01	2.60E+01	ER_M	2.18E+02	0.12
Lead	**1**	**2**	**2**	**3.14E+01**	**3.80E+01**	**REG_IV**	**2.10E+01**	**1.81**
Lead	1	2	2	3.14E+01	3.80E+01	ER_L	4.70E+01	0.81
Lead	1	2	2	3.14E+01	3.80E+01	ER_M	2.18E+02	0.17
Lead	2.01	1	1	5.40E+00	5.40E+00	REG_IV	2.10E+01	0.26
Lead	2.01	1	1	5.40E+00	5.40E+00	ER_L	4.70E+01	0.11
Lead	2.01	1	1	5.40E+00	5.40E+00	ER_M	2.18E+02	0.02
Lead	2.02	1	1	9.73E+00	9.73E+00	REG_IV	2.10E+01	0.46
Lead	2.02	1	1	9.73E+00	9.73E+00	ER_L	4.70E+01	0.21
Lead	2.02	1	1	9.73E+00	9.73E+00	ER_M	2.18E+02	0.04
Lead	2.03	1	1	8.57E+00	8.57E+00	REG_IV	2.10E+01	0.41
Lead	2.03	1	1	8.57E+00	8.57E+00	ER_L	4.70E+01	0.18

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Lead	2.03	1	1	8.57E+00	8.57E+00	ER_M	2.18E+02	0.04
Lead	**2.04**	**8**	**8**	**2.02E+01**	**6.47E+01**	**REG_IV**	**2.10E+01**	**3.08**
Lead	**2.04**	**8**	**8**	**2.02E+01**	**6.47E+01**	**ER_L**	**4.70E+01**	**1.38**
Lead	2.04	8	8	2.02E+01	6.47E+01	ER_M	2.18E+02	0.30
Lead	3.01	2	2	1.42E+01	1.89E+01	REG_IV	2.10E+01	0.90
Lead	3.01	2	2	1.42E+01	1.89E+01	ER_L	4.70E+01	0.40
Lead	3.01	2	2	1.42E+01	1.89E+01	ER_M	2.18E+02	0.09
Lead	**3.02**	**9**	**9**	**1.75E+01**	**5.33E+01**	**REG_IV**	**2.10E+01**	**2.54**
Lead	**3.02**	**9**	**9**	**1.75E+01**	**5.33E+01**	**ER_L**	**4.70E+01**	**1.13**
Lead	3.02	9	9	1.75E+01	5.33E+01	ER_M	2.18E+02	0.24
Lead	**3.03**	**9**	**9**	**2.26E+01**	**3.76E+01**	**REG_IV**	**2.10E+01**	**1.79**
Lead	3.03	9	9	2.26E+01	3.76E+01	ER_L	4.70E+01	0.80
Lead	3.03	9	9	2.26E+01	3.76E+01	ER_M	2.18E+02	0.17
Lead	**3.04**	**7**	**7**	**2.03E+01**	**3.09E+01**	**REG_IV**	**2.10E+01**	**1.47**
Lead	3.04	7	7	2.03E+01	3.09E+01	ER_L	4.70E+01	0.66
Lead	3.04	7	7	2.03E+01	3.09E+01	ER_M	2.18E+02	0.14
Lead	**4.01**	**10**	**10**	**1.29E+01**	**4.79E+01**	**REG_IV**	**2.10E+01**	**2.28**
Lead	**4.01**	**10**	**10**	**1.29E+01**	**4.79E+01**	**ER_L**	**4.70E+01**	**1.02**
Lead	4.01	10	10	1.29E+01	4.79E+01	ER_M	2.18E+02	0.22
Lead	**4.02**	**6**	**6**	**1.85E+01**	**3.29E+01**	**REG_IV**	**2.10E+01**	**1.57**
Lead	4.02	6	6	1.85E+01	3.29E+01	ER_L	4.70E+01	0.70
Lead	4.02	6	6	1.85E+01	3.29E+01	ER_M	2.18E+02	0.15
Lead	**4.03**	**7**	**7**	**3.09E+01**	**7.07E+01**	**REG_IV**	**2.10E+01**	**3.37**
Lead	**4.03**	**7**	**7**	**3.09E+01**	**7.07E+01**	**ER_L**	**4.70E+01**	**1.50**
Lead	4.03	7	7	3.09E+01	7.07E+01	ER_M	2.18E+02	0.32
Lead	**4.04**	**12**	**12**	**2.50E+01**	**5.99E+01**	**REG_IV**	**2.10E+01**	**2.85**
Lead	**4.04**	**12**	**12**	**2.50E+01**	**5.99E+01**	**ER_L**	**4.70E+01**	**1.27**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Lead	4.04	12	12	2.50E+01	5.99E+01	ER_M	2.18E+02	0.27
Lead	**5**	**4**	**4**	**4.09E+01**	**4.75E+01**	**REG_IV**	**2.10E+01**	**2.26**
Lead	**5**	**4**	**4**	**4.09E+01**	**4.75E+01**	**ER_L**	**4.70E+01**	**1.01**
Lead	5	4	4	4.09E+01	4.75E+01	ER_M	2.18E+02	0.22
Lead	7.01	1	1	1.64E+01	1.64E+01	REG_IV	2.10E+01	0.78
Lead	7.01	1	1	1.64E+01	1.64E+01	ER_L	4.70E+01	0.35
Lead	7.01	1	1	1.64E+01	1.64E+01	ER_M	2.18E+02	0.08
Lead	**7.02**	**9**	**9**	**1.90E+01**	**3.34E+01**	**REG_IV**	**2.10E+01**	**1.59**
Lead	7.02	9	9	1.90E+01	3.34E+01	ER_L	4.70E+01	0.71
Lead	7.02	9	9	1.90E+01	3.34E+01	ER_M	2.18E+02	0.15
Lead	**8**	**1**	**1**	**2.77E+01**	**2.77E+01**	**REG_IV**	**2.10E+01**	**1.32**
Lead	8	1	1	2.77E+01	2.77E+01	ER_L	4.70E+01	0.59
Lead	8	1	1	2.77E+01	2.77E+01	ER_M	2.18E+02	0.13
Lead	**10**	**1**	**1**	**3.80E+01**	**3.80E+01**	**REG_IV**	**2.10E+01**	**1.81**
Lead	10	1	1	3.80E+01	3.80E+01	ER_L	4.70E+01	0.81
Lead	10	1	1	3.80E+01	3.80E+01	ER_M	2.18E+02	0.17
Lead	13	5	5	1.54E+01	1.82E+01	REG_IV	2.10E+01	0.87
Lead	13	5	5	1.54E+01	1.82E+01	ER_L	4.70E+01	0.39
Lead	13	5	5	1.54E+01	1.82E+01	ER_M	2.18E+02	0.08
Lead	**18**	**3**	**3**	**2.31E+01**	**2.67E+01**	**REG_IV**	**2.10E+01**	**1.27**
Lead	18	3	3	2.31E+01	2.67E+01	ER_L	4.70E+01	0.57
Lead	18	3	3	2.31E+01	2.67E+01	ER_M	2.18E+02	0.12
Lead	**22**	**1**	**1**	**1.20E+02**	**1.20E+02**	**REG_IV**	**2.10E+01**	**5.72**
Lead	**22**	**1**	**1**	**1.20E+02**	**1.20E+02**	**ER_L**	**4.70E+01**	**2.56**
Lead	22	1	1	1.20E+02	1.20E+02	ER_M	2.18E+02	0.55
Manganese	**0**	**5**	**5**	**1.09E+03**	**2.12E+03**	**LEL_MOE**	**4.60E+02**	**4.61**
Manganese	2.01	1	1	2.72E+02	2.72E+02	LEL_MOE	4.60E+02	0.59

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Manganese	**2.03**	**1**	**1**	**5.51E+02**	**5.51E+02**	**LEL_MOE**	**4.60E+02**	**1.20**
Manganese	**2.04**	**7**	**7**	**1.27E+03**	**4.48E+03**	**LEL_MOE**	**4.60E+02**	**9.75**
Manganese	**3.01**	**2**	**2**	**4.98E+02**	**6.12E+02**	**LEL_MOE**	**4.60E+02**	**1.33**
Manganese	**3.02**	**8**	**8**	**5.82E+02**	**1.08E+03**	**LEL_MOE**	**4.60E+02**	**2.35**
Manganese	**3.03**	**9**	**9**	**6.22E+02**	**1.40E+03**	**LEL_MOE**	**4.60E+02**	**3.04**
Manganese	**3.04**	**6**	**6**	**6.19E+02**	**8.44E+02**	**LEL_MOE**	**4.60E+02**	**1.83**
Manganese	**4.01**	**9**	**9**	**5.51E+02**	**8.02E+02**	**LEL_MOE**	**4.60E+02**	**1.74**
Manganese	**4.02**	**6**	**6**	**3.99E+02**	**1.24E+03**	**LEL_MOE**	**4.60E+02**	**2.70**
Manganese	**4.03**	**7**	**7**	**8.34E+02**	**1.97E+03**	**LEL_MOE**	**4.60E+02**	**4.29**
Manganese	**4.04**	**11**	**11**	**1.34E+03**	**1.97E+03**	**LEL_MOE**	**4.60E+02**	**4.28**
Manganese	**7.01**	**1**	**1**	**1.64E+03**	**1.64E+03**	**LEL_MOE**	**4.60E+02**	**3.57**
Manganese	**7.02**	**1**	**1**	**2.94E+03**	**2.94E+03**	**LEL_MOE**	**4.60E+02**	**6.39**
Manganese	**8**	**1**	**1**	**2.01E+03**	**2.01E+03**	**LEL_MOE**	**4.60E+02**	**4.37**
Manganese	**13**	**5**	**5**	**4.22E+02**	**8.08E+02**	**LEL_MOE**	**4.60E+02**	**1.76**
Manganese	**18**	**3**	**3**	**1.85E+03**	**2.02E+03**	**LEL_MOE**	**4.60E+02**	**4.40**
Mercury	0	5	5	4.94E-02	6.86E-02	REG_IV	1.00E-01	0.69
Mercury	0	5	5	4.94E-02	6.86E-02	ER_L	1.50E-01	0.46
Mercury	0	5	5	4.94E-02	6.86E-02	ER_M	7.10E-01	0.10
Mercury	**1**	**2**	**2**	**1.03E-01**	**1.54E-01**	**REG_IV**	**1.00E-01**	**1.54**
Mercury	**1**	**2**	**2**	**1.03E-01**	**1.54E-01**	**ER_L**	**1.50E-01**	**1.03**
Mercury	1	2	2	1.03E-01	1.54E-01	ER_M	7.10E-01	0.22
Mercury	**2.01**	**1**	**1**	**2.37E-01**	**2.37E-01**	**REG_IV**	**1.00E-01**	**2.37**
Mercury	**2.01**	**1**	**1**	**2.37E-01**	**2.37E-01**	**ER_L**	**1.50E-01**	**1.58**
Mercury	2.01	1	1	2.37E-01	2.37E-01	ER_M	7.10E-01	0.33
Mercury	2.03	1	1	2.59E-02	2.59E-02	REG_IV	1.00E-01	0.26
Mercury	2.03	1	1	2.59E-02	2.59E-02	ER_L	1.50E-01	0.17
Mercury	2.03	1	1	2.59E-02	2.59E-02	ER_M	7.10E-01	0.04

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Mercury	2.04	9	9	9.31E-02	6.19E-01	REG_IV	1.00E-01	6.19
Mercury	2.04	9	9	9.31E-02	6.19E-01	ER_L	1.50E-01	4.13
Mercury	2.04	9	9	9.31E-02	6.19E-01	ER_M	7.10E-01	0.87
Mercury	3.01	2	2	2.32E+00	4.61E+00	REG_IV	1.00E-01	46.06
Mercury	3.01	2	2	2.32E+00	4.61E+00	ER_L	1.50E-01	30.71
Mercury	3.01	2	2	2.32E+00	4.61E+00	ER_M	7.10E-01	6.49
Mercury	3.02	9	9	8.36E+00	3.70E+01	REG_IV	1.00E-01	369.56
Mercury	3.02	9	9	8.36E+00	3.70E+01	ER_L	1.50E-01	246.37
Mercury	3.02	9	9	8.36E+00	3.70E+01	ER_M	7.10E-01	52.05
Mercury	3.03	9	9	4.98E+00	1.21E+01	REG_IV	1.00E-01	121.35
Mercury	3.03	9	9	4.98E+00	1.21E+01	ER_L	1.50E-01	80.90
Mercury	3.03	9	9	4.98E+00	1.21E+01	ER_M	7.10E-01	17.09
Mercury	3.04	8	8	5.07E+00	1.39E+02	REG_IV	1.00E-01	1394.09
Mercury	3.04	8	8	5.07E+00	1.39E+02	ER_L	1.50E-01	929.39
Mercury	3.04	8	8	5.07E+00	1.39E+02	ER_M	7.10E-01	196.35
Mercury	4.01	10	10	8.48E-01	6.95E+00	REG_IV	1.00E-01	69.46
Mercury	4.01	10	10	8.48E-01	6.95E+00	ER_L	1.50E-01	46.31
Mercury	4.01	10	10	8.48E-01	6.95E+00	ER_M	7.10E-01	9.78
Mercury	4.02	6	6	9.48E-01	2.94E+00	REG_IV	1.00E-01	29.39
Mercury	4.02	6	6	9.48E-01	2.94E+00	ER_L	1.50E-01	19.59
Mercury	4.02	6	6	9.48E-01	2.94E+00	ER_M	7.10E-01	4.14
Mercury	4.03	7	7	1.79E+00	5.28E+00	REG_IV	1.00E-01	52.84
Mercury	4.03	7	7	1.79E+00	5.28E+00	ER_L	1.50E-01	35.22
Mercury	4.03	7	7	1.79E+00	5.28E+00	ER_M	7.10E-01	7.44
Mercury	4.04	12	12	1.67E+00	2.20E+00	REG_IV	1.00E-01	22.00
Mercury	4.04	12	12	1.67E+00	2.20E+00	ER_L	1.50E-01	14.67
Mercury	4.04	12	12	1.67E+00	2.20E+00	ER_M	7.10E-01	3.10

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Mercury	**5**	**4**	**4**	**5.33E-01**	**1.26E+00**	**REG_IV**	**1.00E-01**	**12.60**
Mercury	**5**	**4**	**4**	**5.33E-01**	**1.26E+00**	**ER_L**	**1.50E-01**	**8.40**
Mercury	**5**	**4**	**4**	**5.33E-01**	**1.26E+00**	**ER_M**	**7.10E-01**	**1.77**
Mercury	**7.01**	**1**	**1**	**1.60E-01**	**1.60E-01**	**REG_IV**	**1.00E-01**	**1.60**
Mercury	**7.01**	**1**	**1**	**1.60E-01**	**1.60E-01**	**ER_L**	**1.50E-01**	**1.07**
Mercury	7.01	1	1	1.60E-01	1.60E-01	ER_M	7.10E-01	0.23
Mercury	**7.02**	**1**	**9**	**1.09E-01**	**1.09E-01**	**REG_IV**	**1.00E-01**	**1.09**
Mercury	7.02	1	9	1.09E-01	1.09E-01	ER_L	1.50E-01	0.73
Mercury	7.02	1	9	1.09E-01	1.09E-01	ER_M	7.10E-01	0.15
Mercury	**8**	**1**	**1**	**7.64E-01**	**7.64E-01**	**REG_IV**	**1.00E-01**	**7.64**
Mercury	**8**	**1**	**1**	**7.64E-01**	**7.64E-01**	**ER_L**	**1.50E-01**	**5.09**
Mercury	**8**	**1**	**1**	**7.64E-01**	**7.64E-01**	**ER_M**	**7.10E-01**	**1.08**
Mercury	10	1	1	6.97E-02	6.97E-02	REG_IV	1.00E-01	0.70
Mercury	10	1	1	6.97E-02	6.97E-02	ER_L	1.50E-01	0.46
Mercury	10	1	1	6.97E-02	6.97E-02	ER_M	7.10E-01	0.10
Mercury	**13**	**5**	**5**	**1.85E-01**	**1.22E+00**	**REG_IV**	**1.00E-01**	**12.19**
Mercury	**13**	**5**	**5**	**1.85E-01**	**1.22E+00**	**ER_L**	**1.50E-01**	**8.13**
Mercury	**13**	**5**	**5**	**1.85E-01**	**1.22E+00**	**ER_M**	**7.10E-01**	**1.72**
Mercury	**18**	**3**	**3**	**9.83E-02**	**1.11E-01**	**REG_IV**	**1.00E-01**	**1.11**
Mercury	18	3	3	9.83E-02	1.11E-01	ER_L	1.50E-01	0.74
Mercury	18	3	3	9.83E-02	1.11E-01	ER_M	7.10E-01	0.16
Mercury	**22**	**1**	**1**	**1.14E+02**	**1.14E+02**	**REG_IV**	**1.00E-01**	**1140.73**
Mercury	**22**	**1**	**1**	**1.14E+02**	**1.14E+02**	**ER_L**	**1.50E-01**	**760.49**
Mercury	**22**	**1**	**1**	**1.14E+02**	**1.14E+02**	**ER_M**	**7.10E-01**	**160.67**
Nickel	0	5	5	1.35E+01	1.49E+01	REG_IV	2.09E+01	0.71
Nickel	0	5	5	1.35E+01	1.49E+01	ER_L	2.10E+01	0.71
Nickel	0	5	5	1.35E+01	1.49E+01	ER_M	5.16E+01	0.29

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Nickel	1	2	2	1.60E+01	2.01E+01	REG_IV	2.09E+01	0.96
Nickel	1	2	2	1.60E+01	2.01E+01	ER_L	2.10E+01	0.96
Nickel	1	2	2	1.60E+01	2.01E+01	ER_M	5.16E+01	0.39
Nickel	2.01	1	1	9.70E+00	9.70E+00	REG_IV	2.09E+01	0.46
Nickel	2.01	1	1	9.70E+00	9.70E+00	ER_L	2.10E+01	0.46
Nickel	2.01	1	1	9.70E+00	9.70E+00	ER_M	5.16E+01	0.19
Nickel	2.02	1	1	4.69E+00	4.69E+00	REG_IV	2.09E+01	0.22
Nickel	2.02	1	1	4.69E+00	4.69E+00	ER_L	2.10E+01	0.22
Nickel	2.02	1	1	4.69E+00	4.69E+00	ER_M	5.16E+01	0.09
Nickel	2.03	1	1	1.75E+01	1.75E+01	REG_IV	2.09E+01	0.84
Nickel	2.03	1	1	1.75E+01	1.75E+01	ER_L	2.10E+01	0.83
Nickel	2.03	1	1	1.75E+01	1.75E+01	ER_M	5.16E+01	0.34
Nickel	**2.04**	**8**	**8**	**1.41E+01**	**2.53E+01**	**REG_IV**	**2.09E+01**	**1.21**
Nickel	**2.04**	**8**	**8**	**1.41E+01**	**2.53E+01**	**ER_L**	**2.10E+01**	**1.20**
Nickel	2.04	8	8	1.41E+01	2.53E+01	ER_M	5.16E+01	0.49
Nickel	**3.01**	**2**	**2**	**2.04E+01**	**2.88E+01**	**REG_IV**	**2.09E+01**	**1.38**
Nickel	**3.01**	**2**	**2**	**2.04E+01**	**2.88E+01**	**ER_L**	**2.10E+01**	**1.37**
Nickel	3.01	2	2	2.04E+01	2.88E+01	ER_M	5.16E+01	0.56
Nickel	**3.02**	**9**	**9**	**4.80E+01**	**2.28E+02**	**REG_IV**	**2.09E+01**	**10.91**
Nickel	**3.02**	**9**	**9**	**4.80E+01**	**2.28E+02**	**ER_L**	**2.10E+01**	**10.86**
Nickel	**3.02**	**9**	**9**	**4.80E+01**	**2.28E+02**	**ER_M**	**5.16E+01**	**4.42**
Nickel	**3.03**	**9**	**9**	**4.42E+01**	**8.57E+01**	**REG_IV**	**2.09E+01**	**4.10**
Nickel	**3.03**	**9**	**9**	**4.42E+01**	**8.57E+01**	**ER_L**	**2.10E+01**	**4.08**
Nickel	**3.03**	**9**	**9**	**4.42E+01**	**8.57E+01**	**ER_M**	**5.16E+01**	**1.66**
Nickel	**3.04**	**7**	**7**	**3.67E+01**	**6.96E+01**	**REG_IV**	**2.09E+01**	**3.33**
Nickel	**3.04**	**7**	**7**	**3.67E+01**	**6.96E+01**	**ER_L**	**2.10E+01**	**3.31**
Nickel	**3.04**	**7**	**7**	**3.67E+01**	**6.96E+01**	**ER_M**	**5.16E+01**	**1.35**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Nickel	**4.01**	**10**	**10**	**1.33E+01**	**2.58E+01**	**REG_IV**	**2.09E+01**	**1.23**
Nickel	**4.01**	**10**	**10**	**1.33E+01**	**2.58E+01**	**ER_L**	**2.10E+01**	**1.23**
Nickel	4.01	10	10	1.33E+01	2.58E+01	ER_M	5.16E+01	0.50
Nickel	**4.02**	**6**	**6**	**1.27E+01**	**2.11E+01**	**REG_IV**	**2.09E+01**	**1.01**
Nickel	**4.02**	**6**	**6**	**1.27E+01**	**2.11E+01**	**ER_L**	**2.10E+01**	**1.00**
Nickel	4.02	6	6	1.27E+01	2.11E+01	ER_M	5.16E+01	0.41
Nickel	**4.03**	**7**	**7**	**2.82E+01**	**4.39E+01**	**REG_IV**	**2.09E+01**	**2.10**
Nickel	**4.03**	**7**	**7**	**2.82E+01**	**4.39E+01**	**ER_L**	**2.10E+01**	**2.09**
Nickel	4.03	7	7	2.82E+01	4.39E+01	ER_M	5.16E+01	0.85
Nickel	**4.04**	**12**	**12**	**2.55E+01**	**4.22E+01**	**REG_IV**	**2.09E+01**	**2.02**
Nickel	**4.04**	**12**	**12**	**2.55E+01**	**4.22E+01**	**ER_L**	**2.10E+01**	**2.01**
Nickel	4.04	12	12	2.55E+01	4.22E+01	ER_M	5.16E+01	0.82
Nickel	**5**	**4**	**4**	**2.29E+01**	**3.19E+01**	**REG_IV**	**2.09E+01**	**1.52**
Nickel	**5**	**4**	**4**	**2.29E+01**	**3.19E+01**	**ER_L**	**2.10E+01**	**1.52**
Nickel	5	4	4	2.29E+01	3.19E+01	ER_M	5.16E+01	0.62
Nickel	**7.01**	**1**	**1**	**2.67E+01**	**2.67E+01**	**REG_IV**	**2.09E+01**	**1.28**
Nickel	**7.01**	**1**	**1**	**2.67E+01**	**2.67E+01**	**ER_L**	**2.10E+01**	**1.27**
Nickel	7.01	1	1	2.67E+01	2.67E+01	ER_M	5.16E+01	0.52
Nickel	**7.02**	**9**	**9**	**2.54E+01**	**4.10E+01**	**REG_IV**	**2.09E+01**	**1.96**
Nickel	**7.02**	**9**	**9**	**2.54E+01**	**4.10E+01**	**ER_L**	**2.10E+01**	**1.95**
Nickel	7.02	9	9	2.54E+01	4.10E+01	ER_M	5.16E+01	0.80
Nickel	**8**	**1**	**1**	**2.44E+01**	**2.44E+01**	**REG_IV**	**2.09E+01**	**1.17**
Nickel	**8**	**1**	**1**	**2.44E+01**	**2.44E+01**	**ER_L**	**2.10E+01**	**1.16**
Nickel	8	1	1	2.44E+01	2.44E+01	ER_M	5.16E+01	0.47
Nickel	**10**	**1**	**1**	**2.30E+01**	**2.30E+01**	**REG_IV**	**2.09E+01**	**1.10**
Nickel	**10**	**1**	**1**	**2.30E+01**	**2.30E+01**	**ER_L**	**2.10E+01**	**1.09**
Nickel	10	1	1	2.30E+01	2.30E+01	ER_M	5.16E+01	0.44

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Nickel	**13**	**5**	**5**	**1.91E+01**	**2.92E+01**	**REG_IV**	**2.09E+01**	**1.40**
Nickel	**13**	**5**	**5**	**1.91E+01**	**2.92E+01**	**ER_L**	**2.10E+01**	**1.39**
Nickel	13	5	5	1.91E+01	2.92E+01	ER_M	5.16E+01	0.57
Nickel	18	3	3	1.26E+01	1.40E+01	REG_IV	2.09E+01	0.67
Nickel	18	3	3	1.26E+01	1.40E+01	ER_L	2.10E+01	0.67
Nickel	18	3	3	1.26E+01	1.40E+01	ER_M	5.16E+01	0.27
Nickel	**22**	**1**	**1**	**2.38E+01**	**2.38E+01**	**REG_IV**	**2.09E+01**	**1.14**
Nickel	**22**	**1**	**1**	**2.38E+01**	**2.38E+01**	**ER_L**	**2.10E+01**	**1.13**
Nickel	22	1	1	2.38E+01	2.38E+01	ER_M	5.16E+01	0.46
Silver	0	4	5	5.18E-02	7.41E-01	ER_L	1.00E+00	0.74
Silver	0	4	5	5.18E-02	7.41E-01	REG_IV	2.00E+00	0.37
Silver	0	4	5	5.18E-02	7.41E-01	ER_M	3.70E+00	0.20
Silver	1	2	2	2.78E-01	3.29E-01	ER_L	1.00E+00	0.33
Silver	1	2	2	2.78E-01	3.29E-01	REG_IV	2.00E+00	0.16
Silver	1	2	2	2.78E-01	3.29E-01	ER_M	3.70E+00	0.09
Silver	2.01	1	1	3.00E-02	3.00E-02	ER_L	1.00E+00	0.03
Silver	2.01	1	1	3.00E-02	3.00E-02	REG_IV	2.00E+00	0.02
Silver	2.01	1	1	3.00E-02	3.00E-02	ER_M	3.70E+00	0.01
Silver	2.03	1	1	5.35E-02	5.35E-02	ER_L	1.00E+00	0.05
Silver	2.03	1	1	5.35E-02	5.35E-02	REG_IV	2.00E+00	0.03
Silver	2.03	1	1	5.35E-02	5.35E-02	ER_M	3.70E+00	0.01
Silver	2.04	7	8	6.64E-02	5.97E-01	ER_L	1.00E+00	0.60
Silver	2.04	7	8	6.64E-02	5.97E-01	REG_IV	2.00E+00	0.30
Silver	2.04	7	8	6.64E-02	5.97E-01	ER_M	3.70E+00	0.16
Silver	3.01	2	2	2.70E-01	5.00E-01	ER_L	1.00E+00	0.50
Silver	3.01	2	2	2.70E-01	5.00E-01	REG_IV	2.00E+00	0.25
Silver	3.01	2	2	2.70E-01	5.00E-01	ER_M	3.70E+00	0.14

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Silver	**3.02**	**9**	**9**	**4.30E-01**	**5.60E+00**	**ER_L**	**1.00E+00**	**5.60**
Silver	**3.02**	**9**	**9**	**4.30E-01**	**5.60E+00**	**REG_IV**	**2.00E+00**	**2.80**
Silver	**3.02**	**9**	**9**	**4.30E-01**	**5.60E+00**	**ER_M**	**3.70E+00**	**1.51**
Silver	**3.03**	**9**	**9**	**5.80E-01**	**4.90E+00**	**ER_L**	**1.00E+00**	**4.90**
Silver	**3.03**	**9**	**9**	**5.80E-01**	**4.90E+00**	**REG_IV**	**2.00E+00**	**2.45**
Silver	**3.03**	**9**	**9**	**5.80E-01**	**4.90E+00**	**ER_M**	**3.70E+00**	**1.32**
Silver	**3.04**	**6**	**6**	**9.50E-01**	**1.55E+00**	**ER_L**	**1.00E+00**	**1.55**
Silver	3.04	6	6	9.50E-01	1.55E+00	REG_IV	2.00E+00	0.78
Silver	3.04	6	6	9.50E-01	1.55E+00	ER_M	3.70E+00	0.42
Silver	4.01	9	9	9.00E-02	3.10E-01	ER_L	1.00E+00	0.31
Silver	4.01	9	9	9.00E-02	3.10E-01	REG_IV	2.00E+00	0.16
Silver	4.01	9	9	9.00E-02	3.10E-01	ER_M	3.70E+00	0.08
Silver	4.02	6	6	5.30E-02	1.80E-01	ER_L	1.00E+00	0.18
Silver	4.02	6	6	5.30E-02	1.80E-01	REG_IV	2.00E+00	0.09
Silver	4.02	6	6	5.30E-02	1.80E-01	ER_M	3.70E+00	0.05
Silver	4.03	7	7	2.10E-01	3.58E-01	ER_L	1.00E+00	0.36
Silver	4.03	7	7	2.10E-01	3.58E-01	REG_IV	2.00E+00	0.18
Silver	4.03	7	7	2.10E-01	3.58E-01	ER_M	3.70E+00	0.10
Silver	**4.04**	**11**	**11**	**2.30E-01**	**2.70E+00**	**ER_L**	**1.00E+00**	**2.70**
Silver	**4.04**	**11**	**11**	**2.30E-01**	**2.70E+00**	**REG_IV**	**2.00E+00**	**1.35**
Silver	4.04	11	11	2.30E-01	2.70E+00	ER_M	3.70E+00	0.73
Silver	5	4	4	2.81E-01	9.11E-01	ER_L	1.00E+00	0.91
Silver	5	4	4	2.81E-01	9.11E-01	REG_IV	2.00E+00	0.46
Silver	5	4	4	2.81E-01	9.11E-01	ER_M	3.70E+00	0.25
Silver	7.02	6	9	7.65E-02	2.61E-01	ER_L	1.00E+00	0.26
Silver	7.02	6	9	7.65E-02	2.61E-01	REG_IV	2.00E+00	0.13
Silver	7.02	6	9	7.65E-02	2.61E-01	ER_M	3.70E+00	0.07

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Silver	8	1	1	8.00E-02	8.00E-02	ER_L	1.00E+00	0.08
Silver	8	1	1	8.00E-02	8.00E-02	REG_IV	2.00E+00	0.04
Silver	8	1	1	8.00E-02	8.00E-02	ER_M	3.70E+00	0.02
Silver	13	4	5	5.00E-02	1.60E-01	ER_L	1.00E+00	0.16
Silver	13	4	5	5.00E-02	1.60E-01	REG_IV	2.00E+00	0.08
Silver	13	4	5	5.00E-02	1.60E-01	ER_M	3.70E+00	0.04
Silver	18	3	3	1.41E-01	1.88E-01	ER_L	1.00E+00	0.19
Silver	18	3	3	1.41E-01	1.88E-01	REG_IV	2.00E+00	0.09
Silver	18	3	3	1.41E-01	1.88E-01	ER_M	3.70E+00	0.05
Silver	**22**	**1**	**1**	**1.67E+01**	**1.67E+01**	**ER_L**	**1.00E+00**	**16.72**
Silver	**22**	**1**	**1**	**1.67E+01**	**1.67E+01**	**REG_IV**	**2.00E+00**	**8.36**
Silver	**22**	**1**	**1**	**1.67E+01**	**1.67E+01**	**ER_M**	**3.70E+00**	**4.52**
Zinc	**0**	**5**	**5**	**6.41E+01**	**8.89E+01**	**REG_IV**	**6.80E+01**	**1.31**
Zinc	0	5	5	6.41E+01	8.89E+01	ER_L	1.50E+02	0.59
Zinc	0	5	5	6.41E+01	8.89E+01	ER_M	4.10E+02	0.22
Zinc	**1**	**2**	**2**	**8.42E+01**	**1.08E+02**	**REG_IV**	**6.80E+01**	**1.58**
Zinc	1	2	2	8.42E+01	1.08E+02	ER_L	1.50E+02	0.72
Zinc	1	2	2	8.42E+01	1.08E+02	ER_M	4.10E+02	0.26
Zinc	2.01	1	1	2.99E+01	2.99E+01	REG_IV	6.80E+01	0.44
Zinc	2.01	1	1	2.99E+01	2.99E+01	ER_L	1.50E+02	0.20
Zinc	2.01	1	1	2.99E+01	2.99E+01	ER_M	4.10E+02	0.07
Zinc	2.02	1	1	4.02E+01	4.02E+01	REG_IV	6.80E+01	0.59
Zinc	2.02	1	1	4.02E+01	4.02E+01	ER_L	1.50E+02	0.27
Zinc	2.02	1	1	4.02E+01	4.02E+01	ER_M	4.10E+02	0.10
Zinc	2.03	1	1	5.28E+01	5.28E+01	REG_IV	6.80E+01	0.78
Zinc	2.03	1	1	5.28E+01	5.28E+01	ER_L	1.50E+02	0.35
Zinc	2.03	1	1	5.28E+01	5.28E+01	ER_M	4.10E+02	0.13

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Zinc	**2.04**	**8**	**8**	**5.95E+01**	**8.24E+01**	**REG_IV**	**6.80E+01**	**1.21**
Zinc	2.04	8	8	5.95E+01	8.24E+01	ER_L	1.50E+02	0.55
Zinc	2.04	8	8	5.95E+01	8.24E+01	ER_M	4.10E+02	0.20
Zinc	**3.01**	**2**	**2**	**5.54E+01**	**7.70E+01**	**REG_IV**	**6.80E+01**	**1.13**
Zinc	3.01	2	2	5.54E+01	7.70E+01	ER_L	1.50E+02	0.51
Zinc	3.01	2	2	5.54E+01	7.70E+01	ER_M	4.10E+02	0.19
Zinc	**3.02**	**9**	**9**	**8.11E+01**	**2.43E+02**	**REG_IV**	**6.80E+01**	**3.57**
Zinc	**3.02**	**9**	**9**	**8.11E+01**	**2.43E+02**	**ER_L**	**1.50E+02**	**1.62**
Zinc	3.02	9	9	8.11E+01	2.43E+02	ER_M	4.10E+02	0.59
Zinc	**3.03**	**9**	**9**	**8.26E+01**	**1.49E+02**	**REG_IV**	**6.80E+01**	**2.19**
Zinc	3.03	9	9	8.26E+01	1.49E+02	ER_L	1.50E+02	0.99
Zinc	3.03	9	9	8.26E+01	1.49E+02	ER_M	4.10E+02	0.36
Zinc	**3.04**	**7**	**7**	**8.53E+01**	**1.13E+02**	**REG_IV**	**6.80E+01**	**1.66**
Zinc	3.04	7	7	8.53E+01	1.13E+02	ER_L	1.50E+02	0.75
Zinc	3.04	7	7	8.53E+01	1.13E+02	ER_M	4.10E+02	0.28
Zinc	4.01	10	10	4.47E+01	6.65E+01	REG_IV	6.80E+01	0.98
Zinc	4.01	10	10	4.47E+01	6.65E+01	ER_L	1.50E+02	0.44
Zinc	4.01	10	10	4.47E+01	6.65E+01	ER_M	4.10E+02	0.16
Zinc	**4.02**	**6**	**6**	**4.77E+01**	**7.99E+01**	**REG_IV**	**6.80E+01**	**1.18**
Zinc	4.02	6	6	4.77E+01	7.99E+01	ER_L	1.50E+02	0.53
Zinc	4.02	6	6	4.77E+01	7.99E+01	ER_M	4.10E+02	0.19
Zinc	**4.03**	**7**	**7**	**7.69E+01**	**1.09E+02**	**REG_IV**	**6.80E+01**	**1.60**
Zinc	4.03	7	7	7.69E+01	1.09E+02	ER_L	1.50E+02	0.73
Zinc	4.03	7	7	7.69E+01	1.09E+02	ER_M	4.10E+02	0.27
Zinc	**4.04**	**12**	**12**	**1.18E+02**	**1.72E+02**	**REG_IV**	**6.80E+01**	**2.53**
Zinc	**4.04**	**12**	**12**	**1.18E+02**	**1.72E+02**	**ER_L**	**1.50E+02**	**1.15**
Zinc	4.04	12	12	1.18E+02	1.72E+02	ER_M	4.10E+02	0.42

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Zinc	**5**	**4**	**4**	**2.13E+02**	**2.67E+02**	**REG_IV**	**6.80E+01**	**3.92**
Zinc	**5**	**4**	**4**	**2.13E+02**	**2.67E+02**	**ER_L**	**1.50E+02**	**1.78**
Zinc	5	4	4	2.13E+02	2.67E+02	ER_M	4.10E+02	0.65
Zinc	**7.01**	**1**	**1**	**9.75E+01**	**9.75E+01**	**REG_IV**	**6.80E+01**	**1.43**
Zinc	7.01	1	1	9.75E+01	9.75E+01	ER_L	1.50E+02	0.65
Zinc	7.01	1	1	9.75E+01	9.75E+01	ER_M	4.10E+02	0.24
Zinc	**7.02**	**9**	**9**	**7.24E+01**	**1.09E+02**	**REG_IV**	**6.80E+01**	**1.60**
Zinc	7.02	9	9	7.24E+01	1.09E+02	ER_L	1.50E+02	0.73
Zinc	7.02	9	9	7.24E+01	1.09E+02	ER_M	4.10E+02	0.27
Zinc	**8**	**1**	**1**	**9.17E+01**	**9.17E+01**	**REG_IV**	**6.80E+01**	**1.35**
Zinc	8	1	1	9.17E+01	9.17E+01	ER_L	1.50E+02	0.61
Zinc	8	1	1	9.17E+01	9.17E+01	ER_M	4.10E+02	0.22
Zinc	**10**	**1**	**1**	**9.88E+01**	**9.88E+01**	**REG_IV**	**6.80E+01**	**1.45**
Zinc	10	1	1	9.88E+01	9.88E+01	ER_L	1.50E+02	0.66
Zinc	10	1	1	9.88E+01	9.88E+01	ER_M	4.10E+02	0.24
Zinc	**13**	**5**	**5**	**5.72E+01**	**9.21E+01**	**REG_IV**	**6.80E+01**	**1.35**
Zinc	13	5	5	5.72E+01	9.21E+01	ER_L	1.50E+02	0.61
Zinc	13	5	5	5.72E+01	9.21E+01	ER_M	4.10E+02	0.22
Zinc	**18**	**3**	**3**	**1.29E+02**	**1.32E+02**	**REG_IV**	**6.80E+01**	**1.94**
Zinc	18	3	3	1.29E+02	1.32E+02	ER_L	1.50E+02	0.88
Zinc	18	3	3	1.29E+02	1.32E+02	ER_M	4.10E+02	0.32
Zinc	**22**	**1**	**1**	**1.13E+02**	**1.13E+02**	**REG_IV**	**6.80E+01**	**1.66**
Zinc	22	1	1	1.13E+02	1.13E+02	ER_L	1.50E+02	0.75
Zinc	22	1	1	1.13E+02	1.13E+02	ER_M	4.10E+02	0.28
2-Methylnaphthalene	**0**	**5**	**5**	**5.40E-02**	**6.70E-01**	**ER_L**	**7.00E-02**	**9.57**
2-Methylnaphthalene	**0**	**5**	**5**	**5.40E-02**	**6.70E-01**	**REG_IV**	**3.30E-01**	**2.03**
2-Methylnaphthalene	**0**	**5**	**5**	**5.40E-02**	**6.70E-01**	**ER_M**	**6.70E-01**	**1.00**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
2-Methylnaphthalene	**2.04**	**5**	**8**	**4.00E-02**	**6.50E-01**	**ER_L**	**7.00E-02**	**9.29**
2-Methylnaphthalene	**2.04**	**5**	**8**	**4.00E-02**	**6.50E-01**	**REG_IV**	**3.30E-01**	**1.97**
2-Methylnaphthalene	2.04	5	8	4.00E-02	6.50E-01	ER_M	6.70E-01	0.97
2-Methylnaphthalene	3.01	1	2	1.80E-02	1.80E-02	ER_L	7.00E-02	0.26
2-Methylnaphthalene	3.01	1	2	1.80E-02	1.80E-02	REG_IV	3.30E-01	0.05
2-Methylnaphthalene	3.01	1	2	1.80E-02	1.80E-02	ER_M	6.70E-01	0.03
2-Methylnaphthalene	**3.02**	**8**	**9**	**1.45E-01**	**3.40E-01**	**ER_L**	**7.00E-02**	**4.86**
2-Methylnaphthalene	**3.02**	**8**	**9**	**1.45E-01**	**3.40E-01**	**REG_IV**	**3.30E-01**	**1.03**
2-Methylnaphthalene	3.02	8	9	1.45E-01	3.40E-01	ER_M	6.70E-01	0.51
2-Methylnaphthalene	**3.03**	**9**	**9**	**1.20E-01**	**5.10E-01**	**ER_L**	**7.00E-02**	**7.29**
2-Methylnaphthalene	**3.03**	**9**	**9**	**1.20E-01**	**5.10E-01**	**REG_IV**	**3.30E-01**	**1.55**
2-Methylnaphthalene	3.03	9	9	1.20E-01	5.10E-01	ER_M	6.70E-01	0.76
2-Methylnaphthalene	**3.04**	**7**	**7**	**1.20E-01**	**2.75E-01**	**ER_L**	**7.00E-02**	**3.93**
2-Methylnaphthalene	3.04	7	7	1.20E-01	2.75E-01	REG_IV	3.30E-01	0.83
2-Methylnaphthalene	3.04	7	7	1.20E-01	2.75E-01	ER_M	6.70E-01	0.41
2-Methylnaphthalene	**4.01**	**7**	**10**	**5.50E-02**	**7.20E-02**	**ER_L**	**7.00E-02**	**1.03**
2-Methylnaphthalene	4.01	7	10	5.50E-02	7.20E-02	REG_IV	3.30E-01	0.22
2-Methylnaphthalene	4.01	7	10	5.50E-02	7.20E-02	ER_M	6.70E-01	0.11
2-Methylnaphthalene	**4.02**	**4**	**5**	**5.80E-02**	**2.50E-01**	**ER_L**	**7.00E-02**	**3.57**
2-Methylnaphthalene	4.02	4	5	5.80E-02	2.50E-01	REG_IV	3.30E-01	0.76
2-Methylnaphthalene	4.02	4	5	5.80E-02	2.50E-01	ER_M	6.70E-01	0.37
2-Methylnaphthalene	**4.03**	**7**	**7**	**1.10E-01**	**2.40E-01**	**ER_L**	**7.00E-02**	**3.43**
2-Methylnaphthalene	4.03	7	7	1.10E-01	2.40E-01	REG_IV	3.30E-01	0.73
2-Methylnaphthalene	4.03	7	7	1.10E-01	2.40E-01	ER_M	6.70E-01	0.36
2-Methylnaphthalene	**4.04**	**10**	**12**	**1.30E-01**	**1.60E-01**	**ER_L**	**7.00E-02**	**2.29**
2-Methylnaphthalene	4.04	10	12	1.30E-01	1.60E-01	REG_IV	3.30E-01	0.48
2-Methylnaphthalene	4.04	10	12	1.30E-01	1.60E-01	ER_M	6.70E-01	0.24

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
2-Methylnaphthalene	**7.02**	**1**	**1**	**1.10E-01**	**1.10E-01**	**ER_L**	**7.00E-02**	**1.57**
2-Methylnaphthalene	7.02	1	1	1.10E-01	1.10E-01	REG_IV	3.30E-01	0.33
2-Methylnaphthalene	7.02	1	1	1.10E-01	1.10E-01	ER_M	6.70E-01	0.16
2-Methylnaphthalene	8	1	1	4.00E-02	4.00E-02	ER_L	7.00E-02	0.57
2-Methylnaphthalene	8	1	1	4.00E-02	4.00E-02	REG_IV	3.30E-01	0.12
2-Methylnaphthalene	8	1	1	4.00E-02	4.00E-02	ER_M	6.70E-01	0.06
2-Methylnaphthalene	**13**	**5**	**5**	**2.50E-01**	**1.10E+01**	**ER_L**	**7.00E-02**	**157.14**
2-Methylnaphthalene	**13**	**5**	**5**	**2.50E-01**	**1.10E+01**	**REG_IV**	**3.30E-01**	**33.33**
2-Methylnaphthalene	**13**	**5**	**5**	**2.50E-01**	**1.10E+01**	**ER_M**	**6.70E-01**	**16.42**
4,4'-DDD	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**EQ_PART**	**1.10E-01**	**2.58**
4,4'-DDD	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**ER_L**	**2.00E-03**	**141.84**
4,4'-DDD	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**ER_M**	**2.00E-02**	**14.18**
4,4'-DDT	1	1	2	2.84E-01	2.84E-01	EQ_PART	1.30E-00	0.22
4,4'-DDT	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**ER_L**	**1.60E-03**	**177.30**
4,4'-DDT	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**REG_IV**	**3.30E-03**	**85.96**
4,4'-DDT	**1**	**1**	**2**	**2.84E-01**	**2.84E-01**	**ER_M**	**4.61E-02**	**6.15**
Acenaphthene	**0**	**1**	**5**	**2.00E-02**	**2.00E-02**	**ER_L**	**1.60E-02**	**1.25**
Acenaphthene	0	1	5	2.00E-02	2.00E-02	REG_IV	3.30E-01	0.06
Acenaphthene	0	1	5	2.00E-02	2.00E-02	ER_M	5.00E-01	0.04
Acenaphthene	0	1	5	2.00E-02	2.00E-02	EPASQC	1.86E+00	0.01
Acenaphthene	**3.02**	**5**	**9**	**4.90E-02**	**7.60E-02**	**ER_L**	**1.60E-02**	**4.75**
Acenaphthene	3.02	5	9	4.90E-02	7.60E-02	REG_IV	3.30E-01	0.23
Acenaphthene	3.02	5	9	4.90E-02	7.60E-02	ER_M	5.00E-01	0.15
Acenaphthene	3.02	5	9	4.90E-02	7.60E-02	EPASQC	8.14E+00	0.01
Acenaphthene	**3.03**	**7**	**9**	**2.70E-02**	**1.39E-01**	**ER_L**	**1.60E-02**	**8.66**
Acenaphthene	3.03	7	9	2.70E-02	1.39E-01	REG_IV	3.30E-01	0.42
Acenaphthene	3.03	7	9	2.70E-02	1.39E-01	ER_M	5.00E-01	0.28

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Acenaphthene	3.03	7	9	2.70E-02	1.39E-01	EPASQC	2.39E+00	0.06
Acenaphthene	**3.04**	**2**	**7**	**8.43E-02**	**1.52E-01**	**ER_L**	**1.60E-02**	**9.47**
Acenaphthene	3.04	2	7	8.43E-02	1.52E-01	REG_IV	3.30E-01	0.46
Acenaphthene	3.04	2	7	8.43E-02	1.52E-01	ER_M	5.00E-01	0.30
Acenaphthene	3.04	2	7	8.43E-02	1.52E-01	EPASQC	1.18E+00	0.13
Acenaphthene	**4.01**	**1**	**10**	**1.14E-01**	**1.14E-01**	**ER_L**	**1.60E-02**	**7.10**
Acenaphthene	4.01	1	10	1.14E-01	1.14E-01	REG_IV	3.30E-01	0.34
Acenaphthene	4.01	1	10	1.14E-01	1.14E-01	ER_M	5.00E-01	0.23
Acenaphthene	4.01	1	10	1.14E-01	1.14E-01	EPASQC	1.09E+00	0.10
Acenaphthene	**13**	**1**	**5**	**1.90E-01**	**1.90E-01**	**ER_L**	**1.60E-02**	**11.88**
Acenaphthene	13	1	5	1.90E-01	1.90E-01	REG_IV	3.30E-01	0.58
Acenaphthene	13	1	5	1.90E-01	1.90E-01	ER_M	5.00E-01	0.38
Acenaphthene	13	1	5	1.90E-01	1.90E-01	EPASQC	4.13E+00	0.05
Anthracene	**3.02**	**5**	**9**	**5.60E-02**	**1.00E-01**	**EQ_PART**	**1.88E-03**	**53.21**
Anthracene	**3.02**	**5**	**9**	**5.60E-02**	**1.00E-01**	**ER_L**	**8.50E-02**	**1.18**
Anthracene	3.02	5	9	5.60E-02	1.00E-01	REG_IV	3.30E-01	0.30
Anthracene	3.02	5	9	5.60E-02	1.00E-01	ER_M	1.10E+00	0.09
Anthracene	**3.03**	**7**	**9**	**4.00E-02**	**2.10E-01**	**EQ_PART**	**5.51E-04**	**381.47**
Anthracene	**3.03**	**7**	**9**	**4.00E-02**	**2.10E-01**	**ER_L**	**8.50E-02**	**2.47**
Anthracene	3.03	7	9	4.00E-02	2.10E-01	REG_IV	3.30E-01	0.64
Anthracene	3.03	7	9	4.00E-02	2.10E-01	ER_M	1.10E+00	0.19
Anthracene	**3.04**	**3**	**7**	**1.24E-01**	**1.51E-01**	**EQ_PART**	**2.73E-04**	**551.13**
Anthracene	**3.04**	**3**	**7**	**1.24E-01**	**1.51E-01**	**ER_L**	**8.50E-02**	**1.77**
Anthracene	3.04	3	7	1.24E-01	1.51E-01	REG_IV	3.30E-01	0.46
Anthracene	3.04	3	7	1.24E-01	1.51E-01	ER_M	1.10E+00	0.14
Anthracene	**4.01**	**1**	**10**	**1.13E-01**	**1.13E-01**	**EQ_PART**	**2.51E-04**	**450.76**
Anthracene	**4.01**	**1**	**10**	**1.13E-01**	**1.13E-01**	**ER_L**	**8.50E-02**	**1.33**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Anthracene	4.01	1	10	1.13E-01	1.13E-01	REG_IV	3.30E-01	0.34
Anthracene	4.01	1	10	1.13E-01	1.13E-01	ER_M	1.10E+00	0.10
Anthracene	**4.02**	**1**	**5**	**2.00E-02**	**2.00E-02**	**EQ_PART**	**3.38E-04**	**59.15**
Anthracene	4.02	1	5	2.00E-02	2.00E-02	ER_L	8.50E-02	0.24
Anthracene	4.02	1	5	2.00E-02	2.00E-02	REG_IV	3.30E-01	0.06
Anthracene	4.02	1	5	2.00E-02	2.00E-02	ER_M	1.10E+00	0.02
Anthracene	**13**	**1**	**5**	**1.80E-02**	**1.80E-02**	**EQ_PART**	**9.53E-04**	**18.89**
Anthracene	13	1	5	1.80E-02	1.80E-02	ER_L	8.50E-02	0.21
Anthracene	13	1	5	1.80E-02	1.80E-02	REG_IV	3.30E-01	0.05
Anthracene	13	1	5	1.80E-02	1.80E-02	ER_M	1.10E+00	0.02
Benzo(a)anthracene	0	2	5	9.10E-02	1.10E-01	EQ_PART	1.54E-01	0.71
Benzo(a)anthracene	0	2	5	9.10E-02	1.10E-01	ER_L	2.60E-01	0.42
Benzo(a)anthracene	0	2	5	9.10E-02	1.10E-01	REG_IV	3.30E-01	0.33
Benzo(a)anthracene	0	2	5	9.10E-02	1.10E-01	ER_M	1.60E+00	0.07
Benzo(a)anthracene	2.04	2	8	8.85E-02	1.10E-01	EQ_PART	1.64E-01	0.65
Benzo(a)anthracene	2.04	2	8	8.85E-02	1.07E-01	ER_L	2.60E-01	0.41
Benzo(a)anthracene	2.04	2	8	8.85E-02	1.07E-01	REG_IV	3.30E-01	0.32
Benzo(a)anthracene	2.04	2	8	8.85E-02	1.07E-01	ER_M	1.60E+00	0.07
Benzo(a)anthracene	**3.01**	**1**	**2**	**1.00E-01**	**1.00E-01**	**EQ_PART**	**9.64E-02**	**1.04**
Benzo(a)anthracene	3.01	1	2	1.00E-01	1.00E-01	ER_L	2.60E-01	0.38
Benzo(a)anthracene	3.01	1	2	1.00E-01	1.00E-01	REG_IV	3.30E-01	0.30
Benzo(a)anthracene	3.01	1	2	1.00E-01	1.00E-01	ER_M	1.60E+00	0.06
Benzo(a)anthracene	3.02	7	9	1.80E-01	5.00E-01	EQ_PART	6.77E-01	0.74
Benzo(a)anthracene	**3.02**	**7**	**9**	**1.80E-01**	**5.00E-01**	**ER_L**	**2.60E-01**	**1.92**
Benzo(a)anthracene	**3.02**	**7**	**9**	**1.80E-01**	**5.00E-01**	**REG_IV**	**3.30E-01**	**1.52**
Benzo(a)anthracene	3.02	7	9	1.80E-01	5.00E-01	ER_M	1.60E+00	0.31
Benzo(a)anthracene	**3.03**	**9**	**9**	**1.70E-01**	**8.70E-01**	**EQ_PART**	**1.98E-01**	**4.39**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Benzo(a)anthracene	**3.03**	**9**	**9**	**1.70E-01**	**8.70E-01**	**ER_L**	**2.60E-01**	**3.35**
Benzo(a)anthracene	**3.03**	**9**	**9**	**1.70E-01**	**8.70E-01**	**REG_IV**	**3.30E-01**	**2.64**
Benzo(a)anthracene	3.03	9	9	1.70E-01	8.70E-01	ER_M	1.60E+00	0.54
Benzo(a)anthracene	**3.04**	**5**	**7**	**1.30E-01**	**1.80E-01**	**EQ_PART**	**9.83E-02**	**1.83**
Benzo(a)anthracene	3.04	5	7	1.30E-01	1.80E-01	ER_L	2.60E-01	0.69
Benzo(a)anthracene	3.04	5	7	1.30E-01	1.80E-01	REG_IV	3.30E-01	0.55
Benzo(a)anthracene	3.04	5	7	1.30E-01	1.80E-01	ER_M	1.60E+00	0.11
Benzo(a)anthracene	**4.01**	**5**	**10**	**4.90E-02**	**9.70E-02**	**EQ_PART**	**9.02E-02**	**1.07**
Benzo(a)anthracene	4.01	5	10	4.90E-02	9.70E-02	ER_L	2.60E-01	0.37
Benzo(a)anthracene	4.01	5	10	4.90E-02	9.70E-02	REG_IV	3.30E-01	0.29
Benzo(a)anthracene	4.01	5	10	4.90E-02	9.70E-02	ER_M	1.60E+00	0.06
Benzo(a)anthracene	**4.02**	**4**	**5**	**7.75E-02**	**1.40E-01**	**EQ_PART**	**1.22E-01**	**1.15**
Benzo(a)anthracene	4.02	4	5	7.75E-02	1.40E-01	ER_L	2.60E-01	0.54
Benzo(a)anthracene	4.02	4	5	7.75E-02	1.40E-01	REG_IV	3.30E-01	0.42
Benzo(a)anthracene	4.02	4	5	7.75E-02	1.40E-01	ER_M	1.60E+00	0.09
Benzo(a)anthracene	4.03	7	7	5.70E-02	9.30E-02	EQ_PART	1.72E-01	0.54
Benzo(a)anthracene	4.03	7	7	5.70E-02	9.30E-02	ER_L	2.60E-01	0.36
Benzo(a)anthracene	4.03	7	7	5.70E-02	9.30E-02	REG_IV	3.30E-01	0.28
Benzo(a)anthracene	4.03	7	7	5.70E-02	9.30E-02	ER_M	1.60E+00	0.06
Benzo(a)anthracene	4.04	10	12	8.75E-02	2.00E-01	EQ_PART	2.66E-01	0.75
Benzo(a)anthracene	4.04	10	12	8.75E-02	2.00E-01	ER_L	2.60E-01	0.77
Benzo(a)anthracene	4.04	10	12	8.75E-02	2.00E-01	REG_IV	3.30E-01	0.61
Benzo(a)anthracene	4.04	10	12	8.75E-02	2.00E-01	ER_M	1.60E+00	0.13
Benzo(a)anthracene	7.01	1	1	3.30E-02	3.30E-02	EQ_PART	1.89E-01	0.17
Benzo(a)anthracene	7.01	1	1	3.30E-02	3.30E-02	ER_L	2.60E-01	0.13
Benzo(a)anthracene	7.01	1	1	3.30E-02	3.30E-02	REG_IV	3.30E-01	0.10
Benzo(a)anthracene	7.01	1	1	3.30E-02	3.30E-02	ER_M	1.60E+00	0.02

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Benzo(a)anthracene	7.02	1	1	2.90E-02	2.90E-02	EQ_PART	1.89E-01	0.15
Benzo(a)anthracene	7.02	1	1	2.90E-02	2.90E-02	ER_L	2.60E-01	0.11
Benzo(a)anthracene	7.02	1	1	2.90E-02	2.90E-02	REG_IV	3.30E-01	0.09
Benzo(a)anthracene	7.02	1	1	2.90E-02	2.90E-02	ER_M	1.60E+00	0.02
Benzo(a)anthracene	13	3	5	1.00E-01	1.70E-01	EQ_PART	3.43E-01	0.50
Benzo(a)anthracene	13	3	5	1.00E-01	1.70E-01	ER_L	2.60E-01	0.65
Benzo(a)anthracene	13	3	5	1.00E-01	1.70E-01	REG_IV	3.30E-01	0.52
Benzo(a)anthracene	13	3	5	1.00E-01	1.70E-01	ER_M	1.60E+00	0.11
Benzo(a)anthracene	**18**	**3**	**3**	**2.10E-01**	**6.75E-01**	**EQ_PART**	**1.78E-01**	**3.80**
Benzo(a)anthracene	**18**	**3**	**3**	**2.10E-01**	**6.75E-01**	**ER_L**	**2.60E-01**	**2.60**
Benzo(a)anthracene	**18**	**3**	**3**	**2.10E-01**	**6.75E-01**	**REG_IV**	**3.30E-01**	**2.05**
Benzo(a)anthracene	18	3	3	2.10E-01	6.75E-01	ER_M	1.60E+00	0.42
Benzo(a)pyrene	0	2	5	8.05E-02	8.80E-02	EQ_PART	2.00E-01	0.44
Benzo(a)pyrene	0	2	5	8.05E-02	8.80E-02	REG_IV	3.30E-01	0.27
Benzo(a)pyrene	0	2	5	8.05E-02	8.80E-02	ER_L	4.30E-01	0.20
Benzo(a)pyrene	0	2	5	8.05E-02	8.80E-02	ER_M	1.60E+00	0.06
Benzo(a)pyrene	**2.04**	**4**	**8**	**2.10E-02**	**3.70E-01**	**EQ_PART**	**2.13E-01**	**1.74**
Benzo(a)pyrene	**2.04**	**4**	**8**	**2.10E-02**	**3.70E-01**	**REG_IV**	**3.30E-01**	**1.12**
Benzo(a)pyrene	2.04	4	8	2.10E-02	3.70E-01	ER_L	4.30E-01	0.86
Benzo(a)pyrene	2.04	4	8	2.10E-02	3.70E-01	ER_M	1.60E+00	0.23
Benzo(a)pyrene	3.01	1	2	6.50E-02	6.50E-02	EQ_PART	1.25E-01	0.52
Benzo(a)pyrene	3.01	1	2	6.50E-02	6.50E-02	REG_IV	3.30E-01	0.20
Benzo(a)pyrene	3.01	1	2	6.50E-02	6.50E-02	ER_L	4.30E-01	0.15
Benzo(a)pyrene	3.01	1	2	6.50E-02	6.50E-02	ER_M	1.60E+00	0.04
Benzo(a)pyrene	3.02	8	9	1.70E-01	3.80E-01	EQ_PART	8.77E-01	0.43
Benzo(a)pyrene	**3.02**	**8**	**9**	**1.70E-01**	**3.80E-01**	**REG_IV**	**3.30E-01**	**1.15**
Benzo(a)pyrene	3.02	8	9	1.70E-01	3.80E-01	ER_L	4.30E-01	0.88

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Benzo(a)pyrene	3.02	8	9	1.70E-01	3.80E-01	ER_M	1.60E+00	0.24
Benzo(a)pyrene	**3.03**	**9**	**9**	**1.25E-01**	**6.70E-01**	**EQ_PART**	**2.57E-01**	**2.61**
Benzo(a)pyrene	**3.03**	**9**	**9**	**1.25E-01**	**6.70E-01**	**REG_IV**	**3.30E-01**	**2.03**
Benzo(a)pyrene	**3.03**	**9**	**9**	**1.25E-01**	**6.70E-01**	**ER_L**	**4.30E-01**	**1.56**
Benzo(a)pyrene	3.03	9	9	1.25E-01	6.70E-01	ER_M	1.60E+00	0.42
Benzo(a)pyrene	**3.04**	**6**	**7**	**1.00E-01**	**1.80E-01**	**EQ_PART**	**1.27E-01**	**1.41**
Benzo(a)pyrene	3.04	6	7	1.00E-01	1.80E-01	REG_IV	3.30E-01	0.55
Benzo(a)pyrene	3.04	6	7	1.00E-01	1.80E-01	ER_L	4.30E-01	0.42
Benzo(a)pyrene	3.04	6	7	1.00E-01	1.80E-01	ER_M	1.60E+00	0.11
Benzo(a)pyrene	4.01	6	10	3.45E-02	7.60E-01	EQ_PART	1.17E-01	0.65
Benzo(a)pyrene	4.01	6	10	3.45E-02	7.60E-02	REG_IV	3.30E-01	0.23
Benzo(a)pyrene	4.01	6	10	3.45E-02	7.60E-02	ER_L	4.30E-01	0.18
Benzo(a)pyrene	4.01	6	10	3.45E-02	7.60E-02	ER_M	1.60E+00	0.05
Benzo(a)pyrene	**4.02**	**4**	**5**	**3.00E-02**	**3.10E-01**	**EQ_PART**	**1.58E-01**	**1.96**
Benzo(a)pyrene	4.02	4	5	3.00E-02	3.10E-01	REG_IV	3.30E-01	0.94
Benzo(a)pyrene	4.02	4	5	3.00E-02	3.10E-01	ER_L	4.30E-01	0.72
Benzo(a)pyrene	4.02	4	5	3.00E-02	3.10E-01	ER_M	1.60E+00	0.19
Benzo(a)pyrene	**4.03**	**7**	**7**	**1.80E-01**	**1.10E-00**	**EQ_PART**	**2.23E-01**	**4.93**
Benzo(a)pyrene	**4.03**	**7**	**7**	**1.80E-01**	**1.10E+00**	**REG_IV**	**3.30E-01**	**3.33**
Benzo(a)pyrene	**4.03**	**7**	**7**	**1.80E-01**	**1.10E+00**	**ER_L**	**4.30E-01**	**2.56**
Benzo(a)pyrene	4.03	7	7	1.80E-01	1.10E+00	ER_M	1.60E+00	0.69
Benzo(a)pyrene	**4.04**	**8**	**12**	**5.85E-01**	**8.60E-01**	**EQ_PART**	**3.44E-01**	**2.50**
Benzo(a)pyrene	**4.04**	**8**	**12**	**5.85E-01**	**8.60E-01**	**REG_IV**	**3.30E-01**	**2.61**
Benzo(a)pyrene	**4.04**	**8**	**12**	**5.85E-01**	**8.60E-01**	**ER_L**	**4.30E-01**	**2.00**
Benzo(a)pyrene	4.04	8	12	5.85E-01	8.60E-01	ER_M	1.60E+00	0.54
Benzo(a)pyrene	**7.01**	**1**	**1**	**3.90E-01**	**3.90E-01**	**EQ_PART**	**2.45E-01**	**1.59**
Benzo(a)pyrene	**7.01**	**1**	**1**	**3.90E-01**	**3.90E-01**	**REG_IV**	**3.30E-01**	**1.18**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Benzo(a)pyrene	7.01	1	1	3.90E-01	3.90E-01	ER_L	4.30E-01	0.91
Benzo(a)pyrene	7.01	1	1	3.90E-01	3.90E-01	ER_M	1.60E+00	0.24
Benzo(a)pyrene	**7.02**	**1**	**1**	**6.40E-01**	**6.40E-01**	**EQ_PART**	**2.45E-01**	**2.62**
Benzo(a)pyrene	**7.02**	**1**	**1**	**6.40E-01**	**6.40E-01**	**REG_IV**	**3.30E-01**	**1.94**
Benzo(a)pyrene	**7.02**	**1**	**1**	**6.40E-01**	**6.40E-01**	**ER_L**	**4.30E-01**	**1.49**
Benzo(a)pyrene	7.02	1	1	6.40E-01	6.40E-01	ER_M	1.60E+00	0.40
Benzo(a)pyrene	**8**	**1**	**1**	**5.50E-01**	**5.50E-01**	**EQ_PART**	**2.45E-01**	**2.25**
Benzo(a)pyrene	**8**	**1**	**1**	**5.50E-01**	**5.50E-01**	**REG_IV**	**3.30E-01**	**1.67**
Benzo(a)pyrene	**8**	**1**	**1**	**5.50E-01**	**5.50E-01**	**ER_L**	**4.30E-01**	**1.28**
Benzo(a)pyrene	8	1	1	5.50E-01	5.50E-01	ER_M	1.60E+00	0.34
Benzo(a)pyrene	13	4	5	1.37E-01	3.30E-01	EQ_PART	4.45E-01	0.74
Benzo(a)pyrene	**13**	**4**	**5**	**1.37E-01**	**3.30E-01**	**REG_IV**	**3.30E-01**	**1.00**
Benzo(a)pyrene	13	4	5	1.37E-01	3.30E-01	ER_L	4.30E-01	0.77
Benzo(a)pyrene	13	4	5	1.37E-01	3.30E-01	ER_M	1.60E+00	0.21
Benzo(a)pyrene	18	3	3	1.50E-01	1.60E-01	EQ_PART	2.30E-01	0.69
Benzo(a)pyrene	18	3	3	1.50E-01	1.60E-01	REG_IV	3.30E-01	0.48
Benzo(a)pyrene	18	3	3	1.50E-01	1.60E-01	ER_L	4.30E-01	0.37
Benzo(a)pyrene	18	3	3	1.50E-01	1.60E-01	ER_M	1.60E+00	0.10
Chrysene	0	4	5	6.55E-02	1.30E-01	REG_IV	3.30E-01	0.39
Chrysene	0	4	5	6.55E-02	1.30E-01	ER_L	3.80E-01	0.34
Chrysene	0	4	5	6.55E-02	1.30E-01	ER_M	2.80E+00	0.05
Chrysene	2.04	6	8	5.05E-02	1.06E-01	REG_IV	3.30E-01	0.32
Chrysene	2.04	6	8	5.05E-02	1.06E-01	ER_L	3.80E-01	0.28
Chrysene	2.04	6	8	5.05E-02	1.06E-01	ER_M	2.80E+00	0.04
Chrysene	3.01	2	2	5.05E-02	8.80E-02	REG_IV	3.30E-01	0.27
Chrysene	3.01	2	2	5.05E-02	8.80E-02	ER_L	3.80E-01	0.23
Chrysene	3.01	2	2	5.05E-02	8.80E-02	ER_M	2.80E+00	0.03

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Chrysene	**3.02**	**7**	**9**	**1.70E-01**	**4.00E-01**	**REG_IV**	**3.30E-01**	**1.21**
Chrysene	**3.02**	**7**	**9**	**1.70E-01**	**4.00E-01**	**ER_L**	**3.80E-01**	**1.05**
Chrysene	3.02	7	9	1.70E-01	4.00E-01	ER_M	2.80E+00	0.14
Chrysene	**3.03**	**9**	**9**	**1.80E-01**	**7.30E-01**	**REG_IV**	**3.30E-01**	**2.21**
Chrysene	**3.03**	**9**	**9**	**1.80E-01**	**7.30E-01**	**ER_L**	**3.80E-01**	**1.92**
Chrysene	3.03	9	9	1.80E-01	7.30E-01	ER_M	2.80E+00	0.26
Chrysene	3.04	5	7	1.20E-01	1.85E-01	REG_IV	3.30E-01	0.56
Chrysene	3.04	5	7	1.20E-01	1.85E-01	ER_L	3.80E-01	0.49
Chrysene	3.04	5	7	1.20E-01	1.85E-01	ER_M	2.80E+00	0.07
Chrysene	4.01	6	10	4.70E-02	8.65E-02	REG_IV	3.30E-01	0.26
Chrysene	4.01	6	10	4.70E-02	8.65E-02	ER_L	3.80E-01	0.23
Chrysene	4.01	6	10	4.70E-02	8.65E-02	ER_M	2.80E+00	0.03
Chrysene	4.02	4	5	9.00E-02	1.50E-01	REG_IV	3.30E-01	0.45
Chrysene	4.02	4	5	9.00E-02	1.50E-01	ER_L	3.80E-01	0.39
Chrysene	4.02	4	5	9.00E-02	1.50E-01	ER_M	2.80E+00	0.05
Chrysene	4.03	7	7	6.70E-02	1.20E-01	REG_IV	3.30E-01	0.36
Chrysene	4.03	7	7	6.70E-02	1.20E-01	ER_L	3.80E-01	0.32
Chrysene	4.03	7	7	6.70E-02	1.20E-01	ER_M	2.80E+00	0.04
Chrysene	4.04	8	12	1.10E-01	2.10E-01	REG_IV	3.30E-01	0.64
Chrysene	4.04	8	12	1.10E-01	2.10E-01	ER_L	3.80E-01	0.55
Chrysene	4.04	8	12	1.10E-01	2.10E-01	ER_M	2.80E+00	0.08
Chrysene	7.01	1	1	3.30E-02	3.30E-02	REG_IV	3.30E-01	0.10
Chrysene	7.01	1	1	3.30E-02	3.30E-02	ER_L	3.80E-01	0.09
Chrysene	7.01	1	1	3.30E-02	3.30E-02	ER_M	2.80E+00	0.01
Chrysene	7.02	1	1	4.80E-02	4.80E-02	REG_IV	3.30E-01	0.15
Chrysene	7.02	1	1	4.80E-02	4.80E-02	ER_L	3.80E-01	0.13
Chrysene	7.02	1	1	4.80E-02	4.80E-02	ER_M	2.80E+00	0.02

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Chrysene	8	1	1	4.10E-02	4.10E-02	REG_IV	3.30E-01	0.12
Chrysene	8	1	1	4.10E-02	4.10E-02	ER_L	3.80E-01	0.11
Chrysene	8	1	1	4.10E-02	4.10E-02	ER_M	2.80E+00	0.01
Chrysene	**13**	**4**	**5**	**9.80E-02**	**5.50E-01**	**REG_IV**	**3.30E-01**	**1.67**
Chrysene	**13**	**4**	**5**	**9.80E-02**	**5.50E-01**	**ER_L**	**3.80E-01**	**1.45**
Chrysene	13	4	5	9.80E-02	5.50E-01	ER_M	2.80E+00	0.20
Chrysene	18	3	3	2.00E-01	2.30E-01	REG_IV	3.30E-01	0.70
Chrysene	18	3	3	2.00E-01	2.30E-01	ER_L	3.80E-01	0.61
Chrysene	18	3	3	2.00E-01	2.30E-01	ER_M	2.80E+00	0.08
Dibenz(a,h)anthracene	3.02	3	9	3.40E-02	5.50E-02	ER_L	6.30E-02	0.87
Dibenz(a,h)anthracene	3.02	3	9	3.40E-02	5.50E-02	ER_M	2.60E-01	0.21
Dibenz(a,h)anthracene	3.02	3	9	3.40E-02	5.50E-02	REG_IV	3.30E-01	0.17
Dibenz(a,h)anthracene	**3.03**	**7**	**9**	**2.40E-02**	**1.20E-01**	**ER_L**	**6.30E-02**	**1.90**
Dibenz(a,h)anthracene	3.03	7	9	2.40E-02	1.20E-01	ER_M	2.60E-01	0.46
Dibenz(a,h)anthracene	3.03	7	9	2.40E-02	1.20E-01	REG_IV	3.30E-01	0.36
Dibenz(a,h)anthracene	**3.04**	**3**	**7**	**2.90E-02**	**1.28E-01**	**ER_L**	**6.30E-02**	**2.02**
Dibenz(a,h)anthracene	3.04	3	7	2.90E-02	1.28E-01	ER_M	2.60E-01	0.49
Dibenz(a,h)anthracene	3.04	3	7	2.90E-02	1.28E-01	REG_IV	3.30E-01	0.39
Dibenz(a,h)anthracene	**4.01**	**1**	**10**	**1.15E-01**	**1.15E-01**	**ER_L**	**6.30E-02**	**1.82**
Dibenz(a,h)anthracene	4.01	1	10	1.15E-01	1.15E-01	ER_M	2.60E-01	0.44
Dibenz(a,h)anthracene	4.01	1	10	1.15E-01	1.15E-01	REG_IV	3.30E-01	0.35
Dibenz(a,h)anthracene	4.02	2	5	1.90E-02	2.00E-02	ER_L	6.30E-02	0.32
Dibenz(a,h)anthracene	4.02	2	5	1.90E-02	2.00E-02	ER_M	2.60E-01	0.08
Dibenz(a,h)anthracene	4.02	2	5	1.90E-02	2.00E-02	REG_IV	3.30E-01	0.06
Dibenz(a,h)anthracene	4.03	2	7	1.90E-02	2.40E-02	ER_L	6.30E-02	0.38
Dibenz(a,h)anthracene	4.03	2	7	1.90E-02	2.40E-02	ER_M	2.60E-01	0.09
Dibenz(a,h)anthracene	4.03	2	7	1.90E-02	2.40E-02	REG_IV	3.30E-01	0.07

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Dibenz(a,h)anthracene	13	1	5	2.30E-02	2.30E-02	ER_L	6.30E-02	0.37
Dibenz(a,h)anthracene	13	1	5	2.30E-02	2.30E-02	ER_M	2.60E-01	0.09
Dibenz(a,h)anthracene	13	1	5	2.30E-02	2.30E-02	REG_IV	3.30E-01	0.07
Fluoranthene	0	3	5	8.60E-02	1.10E-01	REG_IV	3.80E-01	0.29
Fluoranthene	0	3	5	8.60E-02	1.10E-01	ER_L	6.00E-01	0.18
Fluoranthene	0	3	5	8.60E-02	1.10E-01	ER_M	5.10E+00	0.02
Fluoranthene	0	3	5	8.60E-02	1.10E-01	EPASQC	8.85E+00	0.01
Fluoranthene	**2.04**	**7**	**8**	**9.50E-02**	**4.96E-01**	**REG_IV**	**3.80E-01**	**1.30**
Fluoranthene	2.04	7	8	9.50E-02	4.96E-01	ER_L	6.00E-01	0.83
Fluoranthene	2.04	7	8	9.50E-02	4.96E-01	ER_M	5.10E+00	0.10
Fluoranthene	2.04	7	8	9.50E-02	4.96E-01	EPASQC	9.42E+00	0.05
Fluoranthene	3.01	2	2	8.25E-02	1.40E-01	REG_IV	3.80E-01	0.37
Fluoranthene	3.01	2	2	8.25E-02	1.40E-01	ER_L	6.00E-01	0.23
Fluoranthene	3.01	2	2	8.25E-02	1.40E-01	ER_M	5.10E+00	0.03
Fluoranthene	3.01	2	2	8.25E-02	1.40E-01	EPASQC	5.53E+00	0.03
Fluoranthene	**3.02**	**8**	**9**	**4.40E-01**	**7.10E-01**	**REG_IV**	**3.80E-01**	**1.87**
Fluoranthene	**3.02**	**8**	**9**	**4.40E-01**	**7.10E-01**	**ER_L**	**6.00E-01**	**1.18**
Fluoranthene	3.02	8	9	4.40E-01	7.10E-01	ER_M	5.10E+00	0.14
Fluoranthene	3.02	8	9	4.40E-01	7.10E-01	EPASQC	3.88E+01	0.02
Fluoranthene	**3.03**	**9**	**9**	**3.30E-01**	**1.40E+00**	**REG_IV**	**3.80E-01**	**3.68**
Fluoranthene	**3.03**	**9**	**9**	**3.30E-01**	**1.40E+00**	**ER_L**	**6.00E-01**	**2.33**
Fluoranthene	3.03	9	9	3.30E-01	1.40E+00	ER_M	5.10E+00	0.27
Fluoranthene	3.03	9	9	3.30E-01	1.40E+00	EPASQC	1.14E+01	0.12
Fluoranthene	3.04	7	7	1.68E-01	2.70E-01	REG_IV	3.80E-01	0.71
Fluoranthene	3.04	7	7	1.68E-01	2.70E-01	ER_L	6.00E-01	0.45
Fluoranthene	3.04	7	7	1.68E-01	2.70E-01	ER_M	5.10E+00	0.05
Fluoranthene	3.04	7	7	1.68E-01	2.70E-01	EPASQC	5.64E+00	0.05

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Fluoranthene	4.01	7	10	7.80E-02	1.75E-01	REG_IV	3.80E-01	0.46
Fluoranthene	4.01	7	10	7.80E-02	1.75E-01	ER_L	6.00E-01	0.29
Fluoranthene	4.01	7	10	7.80E-02	1.75E-01	ER_M	5.10E+00	0.03
Fluoranthene	4.01	7	10	7.80E-02	1.75E-01	EPASQC	5.18E+00	0.03
Fluoranthene	4.02	4	5	7.60E-02	2.60E-01	REG_IV	3.80E-01	0.68
Fluoranthene	4.02	4	5	7.60E-02	2.60E-01	ER_L	6.00E-01	0.43
Fluoranthene	4.02	4	5	7.60E-02	2.60E-01	ER_M	5.10E+00	0.05
Fluoranthene	4.02	4	5	7.60E-02	2.60E-01	EPASQC	6.99E+00	0.04
Fluoranthene	4.03	7	7	9.55E-02	1.40E-01	REG_IV	3.80E-01	0.37
Fluoranthene	4.03	7	7	9.55E-02	1.40E-01	ER_L	6.00E-01	0.23
Fluoranthene	4.03	7	7	9.55E-02	1.40E-01	ER_M	5.10E+00	0.03
Fluoranthene	4.03	7	7	9.55E-02	1.40E-01	EPASQC	9.88E+00	0.01
Fluoranthene	4.04	11	12	1.60E-01	2.20E-01	REG_IV	3.80E-01	0.58
Fluoranthene	4.04	11	12	1.60E-01	2.20E-01	ER_L	6.00E-01	0.37
Fluoranthene	4.04	11	12	1.60E-01	2.20E-01	ER_M	5.10E+00	0.04
Fluoranthene	4.04	11	12	1.60E-01	2.20E-01	EPASQC	1.52E+01	0.01
Fluoranthene	8	1	1	4.90E-02	4.90E-02	REG_IV	3.80E-01	0.13
Fluoranthene	8	1	1	4.90E-02	4.90E-02	ER_L	6.00E-01	0.08
Fluoranthene	8	1	1	4.90E-02	4.90E-02	ER_M	5.10E+00	0.01
Fluoranthene	8	1	1	4.90E-02	4.90E-02	EPASQC	1.08E+01	0.00
Fluoranthene	13	4	5	1.20E-01	2.70E-01	REG_IV	3.80E-01	0.71
Fluoranthene	13	4	5	1.20E-01	2.70E-01	ER_L	6.00E-01	0.45
Fluoranthene	13	4	5	1.20E-01	2.70E-01	ER_M	5.10E+00	0.05
Fluoranthene	13	4	5	1.20E-01	2.70E-01	EPASQC	1.97E+01	0.01
Fluoranthene	**18**	**3**	**3**	**3.70E-01**	**4.10E-01**	**REG_IV**	**3.80E-01**	**1.08**
Fluoranthene	18	3	3	3.70E-01	4.10E-01	ER_L	6.00E-01	0.68
Fluoranthene	18	3	3	3.70E-01	4.10E-01	ER_M	5.10E+00	0.08

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Fluoranthene	18	3	3	3.70E-01	4.10E-01	EPASQC	1.02E+01	0.04
Fluorene	**0**	**2**	**5**	**4.10E-02**	**4.10E-02**	**ER_L**	**1.90E-02**	**2.16**
Fluorene	0	2	5	4.10E-02	4.10E-02	REG_IV	3.30E-01	0.12
Fluorene	0	2	5	4.10E-02	4.10E-02	ER_M	5.40E-01	0.08
Fluorene	**3.02**	**4**	**9**	**6.00E-02**	**9.40E-02**	**ER_L**	**1.90E-02**	**4.95**
Fluorene	3.02	4	9	6.00E-02	9.40E-02	REG_IV	3.30E-01	0.28
Fluorene	3.02	4	9	6.00E-02	9.40E-02	ER_M	5.40E-01	0.17
Fluorene	**3.03**	**6**	**9**	**4.40E-02**	**1.39E-01**	**ER_L**	**1.90E-02**	**7.29**
Fluorene	3.03	6	9	4.40E-02	1.39E-01	REG_IV	3.30E-01	0.42
Fluorene	3.03	6	9	4.40E-02	1.39E-01	ER_M	5.40E-01	0.26
Fluorene	**3.04**	**4**	**7**	**7.68E-02**	**1.37E-01**	**ER_L**	**1.90E-02**	**7.18**
Fluorene	3.04	4	7	7.68E-02	1.37E-01	REG_IV	3.30E-01	0.41
Fluorene	3.04	4	7	7.68E-02	1.37E-01	ER_M	5.40E-01	0.25
Fluorene	4.02	1	5	1.80E-02	1.80E-02	ER_L	1.90E-02	0.95
Fluorene	4.02	1	5	1.80E-02	1.80E-02	REG_IV	3.30E-01	0.05
Fluorene	4.02	1	5	1.80E-02	1.80E-02	ER_M	5.40E-01	0.03
Fluorene	**4.03**	**1**	**7**	**2.70E-02**	**2.70E-02**	**ER_L**	**1.90E-02**	**1.42**
Fluorene	4.03	1	7	2.70E-02	2.70E-02	REG_IV	3.30E-01	0.08
Fluorene	4.03	1	7	2.70E-02	2.70E-02	ER_M	5.40E-01	0.05
Fluorene	**13**	**2**	**5**	**1.90E-02**	**2.60E-01**	**ER_L**	**1.90E-02**	**13.68**
Fluorene	13	2	5	1.90E-02	2.60E-01	REG_IV	3.30E-01	0.79
Fluorene	13	2	5	1.90E-02	2.60E-01	ER_M	5.40E-01	0.48
Naphthalene	0	5	5	3.50E-02	3.80E-01	EQ_PART	5.81E-01	0.65
Naphthalene	**0**	**5**	**5**	**3.50E-02**	**3.80E-01**	**ER_L**	**1.60E-01**	**2.38**
Naphthalene	**0**	**5**	**5**	**3.50E-02**	**3.80E-01**	**REG_IV**	**3.30E-01**	**1.15**
Naphthalene	0	5	5	3.50E-02	3.80E-01	ER_M	2.10E+00	0.18
Naphthalene	2.04	5	8	2.60E-02	3.60E-01	EQ_PART	6.18E-01	0.58

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Naphthalene	**2.04**	**5**	**8**	**2.60E-02**	**3.60E-01**	**ER_L**	**1.60E-01**	**2.25**
Naphthalene	**2.04**	**5**	**8**	**2.60E-02**	**3.60E-01**	**REG_IV**	**3.30E-01**	**1.09**
Naphthalene	2.04	5	8	2.60E-02	3.60E-01	ER_M	2.10E+00	0.17
Naphthalene	3.02	7	9	9.80E-02	2.40E-01	EQ_PART	2.55E-02	0.09
Naphthalene	**3.02**	**7**	**9**	**9.80E-02**	**2.40E-01**	**ER_L**	**1.60E-01**	**1.50**
Naphthalene	3.02	7	9	9.80E-02	2.40E-01	REG_IV	3.30E-01	0.73
Naphthalene	3.02	7	9	9.80E-02	2.40E-01	ER_M	2.10E+00	0.11
Naphthalene	3.03	9	9	8.00E-02	3.90E-01	EQ_PART	7.47E-01	0.52
Naphthalene	**3.03**	**9**	**9**	**8.00E-02**	**3.90E-01**	**ER_L**	**1.60E-01**	**2.44**
Naphthalene	**3.03**	**9**	**9**	**8.00E-02**	**3.90E-01**	**REG_IV**	**3.30E-01**	**1.18**
Naphthalene	3.03	9	9	8.00E-02	3.90E-01	ER_M	2.10E+00	0.19
Naphthalene	3.04	7	7	7.30E-02	3.31E-01	EQ_PART	3.70E-01	0.89
Naphthalene	**3.04**	**7**	**7**	**7.30E-02**	**3.31E-01**	**ER_L**	**1.60E-01**	**2.07**
Naphthalene	**3.04**	**7**	**7**	**7.30E-02**	**3.31E-01**	**REG_IV**	**3.30E-01**	**1.00**
Naphthalene	3.04	7	7	7.30E-02	3.31E-01	ER_M	2.10E+00	0.16
Naphthalene	4.01	7	10	3.60E-02	4.65E-02	EQ_PART	3.40E-01	0.14
Naphthalene	4.01	7	10	3.60E-02	4.65E-02	ER_L	1.60E-01	0.29
Naphthalene	4.01	7	10	3.60E-02	4.65E-02	REG_IV	3.30E-01	0.14
Naphthalene	4.01	7	10	3.60E-02	4.65E-02	ER_M	2.10E+00	0.02
Naphthalene	4.02	4	5	3.30E-02	1.50E-01	EQ_PART	4.59E-01	0.33
Naphthalene	4.02	4	5	3.30E-02	1.50E-01	ER_L	1.60E-01	0.94
Naphthalene	4.02	4	5	3.30E-02	1.50E-01	REG_IV	3.30E-01	0.45
Naphthalene	4.02	4	5	3.30E-02	1.50E-01	ER_M	2.10E+00	0.07
Naphthalene	4.03	7	7	6.00E-02	1.20E-01	EQ_PART	6.49E-01	0.19
Naphthalene	4.03	7	7	6.00E-02	1.20E-01	ER_L	1.60E-01	0.75
Naphthalene	4.03	7	7	6.00E-02	1.20E-01	REG_IV	3.30E-01	0.36
Naphthalene	4.03	7	7	6.00E-02	1.20E-01	ER_M	2.10E+00	0.06

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Naphthalene	4.04	7	12	9.60E-02	1.20E-01	EQ_PART	1.00E-00	0.12
Naphthalene	4.04	7	12	9.60E-02	1.20E-01	ER_L	1.60E-01	0.75
Naphthalene	4.04	7	12	9.60E-02	1.20E-01	REG_IV	3.30E-01	0.36
Naphthalene	4.04	7	12	9.60E-02	1.20E-01	ER_M	2.10E+00	0.06
Naphthalene	7.02	1	1	5.80E-02	5.80E-02	EQ_PART	7.11E-01	0.08
Naphthalene	7.02	1	1	5.80E-02	5.80E-02	ER_L	1.60E-01	0.36
Naphthalene	7.02	1	1	5.80E-02	5.80E-02	REG_IV	3.30E-01	0.18
Naphthalene	7.02	1	1	5.80E-02	5.80E-02	ER_M	2.10E+00	0.03
Naphthalene	8	1	1	2.50E-02	2.50E-02	EQ_PART	7.11E-01	0.04
Naphthalene	8	1	1	2.50E-02	2.50E-02	ER_L	1.60E-01	0.16
Naphthalene	8	1	1	2.50E-02	2.50E-02	REG_IV	3.30E-01	0.08
Naphthalene	8	1	1	2.50E-02	2.50E-02	ER_M	2.10E+00	0.01
Naphthalene	**13**	**5**	**5**	**1.60E-01**	**8.30E+00**	**EQ_PART**	**1.29E-00**	**6.42**
Naphthalene	**13**	**5**	**5**	**1.60E-01**	**8.30E+00**	**ER_L**	**1.60E-01**	**51.88**
Naphthalene	**13**	**5**	**5**	**1.60E-01**	**8.30E+00**	**REG_IV**	**3.30E-01**	**25.15**
Naphthalene	**13**	**5**	**5**	**1.60E-01**	**8.30E+00**	**ER_M**	**2.10E+00**	**3.95**
PAH, total	**0**	**5**	**5**	**2.94E+00**	**4.09E+00**	**REG_IV**	**2.90E+00**	**1.41**
PAH, total	**0**	**5**	**5**	**2.94E+00**	**4.09E+00**	**ER_L**	**4.03E+00**	**1.02**
PAH, total	0	5	5	2.94E+00	4.09E+00	ER_M	4.48E+01	0.09
PAH, total	**2.04**	**7**	**8**	**3.15E+00**	**8.92E+00**	**REG_IV**	**2.90E+00**	**3.08**
PAH, total	**2.04**	**7**	**8**	**3.15E+00**	**8.92E+00**	**ER_L**	**4.03E+00**	**2.22**
PAH, total	2.04	7	8	3.15E+00	8.92E+00	ER_M	4.48E+01	0.20
PAH, total	**3.01**	**2**	**2**	**2.88E+00**	**3.05E+00**	**REG_IV**	**2.90E+00**	**1.05**
PAH, total	3.01	2	2	2.88E+00	3.05E+00	ER_L	4.03E+00	0.76
PAH, total	3.01	2	2	2.88E+00	3.05E+00	ER_M	4.48E+01	0.07
PAH, total	**3.02**	**9**	**9**	**3.68E+00**	**8.85E+00**	**REG_IV**	**2.90E+00**	**3.05**
PAH, total	**3.02**	**9**	**9**	**3.68E+00**	**8.85E+00**	**ER_L**	**4.03E+00**	**2.20**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
PAH, total	3.02	9	9	3.68E+00	8.85E+00	ER_M	4.48E+01	0.20
PAH, total	**3.03**	**9**	**9**	**2.56E+00**	**1.05E+01**	**REG_IV**	**2.90E+00**	**3.63**
PAH, total	**3.03**	**9**	**9**	**2.56E+00**	**1.05E+01**	**ER_L**	**4.03E+00**	**2.61**
PAH, total	3.03	9	9	2.56E+00	1.05E+01	ER_M	4.48E+01	0.24
PAH, total	**3.04**	**7**	**7**	**2.92E+00**	**7.81E+00**	**REG_IV**	**2.90E+00**	**2.69**
PAH, total	**3.04**	**7**	**7**	**2.92E+00**	**7.81E+00**	**ER_L**	**4.03E+00**	**1.94**
PAH, total	3.04	7	7	2.92E+00	7.81E+00	ER_M	4.48E+01	0.17
PAH, total	**4.01**	**8**	**10**	**2.52E+00**	**4.62E+00**	**REG_IV**	**2.90E+00**	**1.59**
PAH, total	**4.01**	**8**	**10**	**2.52E+00**	**4.62E+00**	**ER_L**	**4.03E+00**	**1.15**
PAH, total	4.01	8	10	2.52E+00	4.62E+00	ER_M	4.48E+01	0.10
PAH, total	**4.02**	**5**	**5**	**2.67E+00**	**3.37E+00**	**REG_IV**	**2.90E+00**	**1.16**
PAH, total	4.02	5	5	2.67E+00	3.37E+00	ER_L	4.03E+00	0.84
PAH, total	4.02	5	5	2.67E+00	3.37E+00	ER_M	4.48E+01	0.08
PAH, total	**4.03**	**7**	**7**	**2.37E+00**	**3.77E+00**	**REG_IV**	**2.90E+00**	**1.30**
PAH, total	4.03	7	7	2.37E+00	3.77E+00	ER_L	4.03E+00	0.94
PAH, total	4.03	7	7	2.37E+00	3.77E+00	ER_M	4.48E+01	0.08
PAH, total	**4.04**	**11**	**12**	**1.15E+01**	**1.87E+01**	**REG_IV**	**2.90E+00**	**6.45**
PAH, total	**4.04**	**11**	**12**	**1.15E+01**	**1.87E+01**	**ER_L**	**4.03E+00**	**4.64**
PAH, total	4.04	11	12	1.15E+01	1.87E+01	ER_M	4.48E+01	0.42
PAH, total	**7.01**	**1**	**1**	**5.18E+00**	**5.18E+00**	**REG_IV**	**2.90E+00**	**1.79**
PAH, total	**7.01**	**1**	**1**	**5.18E+00**	**5.18E+00**	**ER_L**	**4.03E+00**	**1.29**
PAH, total	7.01	1	1	5.18E+00	5.18E+00	ER_M	4.48E+01	0.12
PAH, total	**7.02**	**1**	**1**	**4.84E+00**	**4.84E+00**	**REG_IV**	**2.90E+00**	**1.67**
PAH, total	**7.02**	**1**	**1**	**4.84E+00**	**4.84E+00**	**ER_L**	**4.03E+00**	**1.20**
PAH, total	7.02	1	1	4.84E+00	4.84E+00	ER_M	4.48E+01	0.11
PAH, total	**8**	**1**	**1**	**4.29E+00**	**4.29E+00**	**REG_IV**	**2.90E+00**	**1.48**
PAH, total	**8**	**1**	**1**	**4.29E+00**	**4.29E+00**	**ER_L**	**4.03E+00**	**1.07**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
PAH, total	8	1	1	4.29E+00	4.29E+00	ER_M	4.48E+01	0.10
PAH, total	**13**	**5**	**5**	**3.32E+00**	**3.39E+01**	**REG_IV**	**2.90E+00**	**11.69**
PAH, total	**13**	**5**	**5**	**3.32E+00**	**3.39E+01**	**ER_L**	**4.03E+00**	**8.42**
PAH, total	13	5	5	3.32E+00	3.39E+01	ER_M	4.48E+01	0.76
PAH, total	**18**	**3**	**3**	**1.17E+01**	**1.26E+01**	**REG_IV**	**2.90E+00**	**4.33**
PAH, total	**18**	**3**	**3**	**1.17E+01**	**1.26E+01**	**ER_L**	**4.03E+00**	**3.12**
PAH, total	18	3	3	1.17E+01	1.26E+01	ER_M	4.48E+01	0.28
PCB-1248	3.02	2	9	5.20E-02	2.90E-01	EQ_PART	6.58E-00	0.04
PCB-1248	**3.02**	**2**	**9**	**5.20E-02**	**2.90E-01**	**ER_L**	**2.30E-02**	**12.61**
PCB-1248	**3.02**	**2**	**9**	**5.20E-02**	**2.90E-01**	**ER_M**	**1.80E-01**	**1.61**
PCB-1248	3.04	2	7	4.60E-02	1.48E-01	EQ_PART	9.56E-01	0.15
PCB-1248	**3.04**	**2**	**7**	**4.60E-02**	**1.48E-01**	**ER_L**	**2.30E-02**	**6.43**
PCB-1248	3.04	2	7	4.60E-02	1.48E-01	ER_M	1.80E-01	0.82
PCB-1254	**2.02**	**1**	**1**	**1.17E+00**	**1.17E+00**	**EQ_PART**	**2.97E-01**	**3.93**
PCB-1254	**2.02**	**1**	**1**	**1.17E+00**	**1.17E+00**	**ER_L**	**2.30E-02**	**50.74**
PCB-1254	**2.02**	**1**	**1**	**1.17E+00**	**1.17E+00**	**ER_M**	**1.80E-01**	**6.48**
PCB-1254	**3.02**	**7**	**9**	**1.30E-01**	**1.50E+00**	**EQ_PART**	**1.07E-00**	**1.41**
PCB-1254	**3.02**	**7**	**9**	**1.30E-01**	**1.50E+00**	**ER_L**	**2.30E-02**	**65.17**
PCB-1254	**3.02**	**7**	**9**	**1.30E-01**	**1.50E+00**	**ER_M**	**1.80E-01**	**8.33**
PCB-1254	**3.03**	**9**	**9**	**1.00E-01**	**5.30E-01**	**EQ_PART**	**3.12E-01**	**1.70**
PCB-1254	**3.03**	**9**	**9**	**1.00E-01**	**5.30E-01**	**ER_L**	**2.30E-02**	**23.04**
PCB-1254	**3.03**	**9**	**9**	**1.00E-01**	**5.30E-01**	**ER_M**	**1.80E-01**	**2.94**
PCB-1254	**3.04**	**6**	**7**	**7.88E-02**	**2.25E-01**	**EQ_PART**	**1.55E-01**	**1.45**
PCB-1254	**3.04**	**6**	**7**	**7.88E-02**	**2.25E-01**	**ER_L**	**2.30E-02**	**9.78**
PCB-1254	**3.04**	**6**	**7**	**7.88E-02**	**2.25E-01**	**ER_M**	**1.80E-01**	**1.25**
PCB-1254	**4.01**	**8**	**10**	**2.50E-02**	**8.58E-01**	**EQ_PART**	**1.42E-01**	**6.04**
PCB-1254	**4.01**	**8**	**10**	**2.50E-02**	**8.58E-01**	**ER_L**	**2.30E-02**	**37.30**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
PCB-1254	**4.01**	**8**	**10**	**2.50E-02**	**8.58E-01**	**ER_M**	**1.80E-01**	**4.77**
PCB-1254	4.02	2	5	1.10E-02	4.50E-02	EQ_PART	1.92E-01	0.23
PCB-1254	**4.02**	**2**	**5**	**1.10E-02**	**4.50E-02**	**ER_L**	**2.30E-02**	**1.96**
PCB-1254	4.02	2	5	1.10E-02	4.50E-02	ER_M	1.80E-01	0.25
PCB-1254	4.03	2	7	5.60E-02	8.20E-02	EQ_PART	2.71E-01	0.30
PCB-1254	**4.03**	**2**	**7**	**5.60E-02**	**8.20E-02**	**ER_L**	**2.30E-02**	**3.57**
PCB-1254	4.03	2	7	5.60E-02	8.20E-02	ER_M	1.80E-01	0.46
PCB-1254	**4.04**	**1**	**12**	**2.79E+00**	**2.79E+00**	**EQ_PART**	**4.18E-01**	**6.68**
PCB-1254	**4.04**	**1**	**12**	**2.79E+00**	**2.79E+00**	**ER_L**	**2.30E-02**	**121.40**
PCB-1254	**4.04**	**1**	**12**	**2.79E+00**	**2.79E+00**	**ER_M**	**1.80E-01**	**15.51**
PCB-1254	13	1	5	1.70E-02	1.70E-02	EQ_PART	5.40E-01	0.03
PCB-1254	13	1	5	1.70E-02	1.70E-02	ER_L	2.30E-02	0.74
PCB-1254	13	1	5	1.70E-02	1.70E-02	ER_M	1.80E-01	0.09
PCB-1254	**22**	**1**	**1**	**1.59E+00**	**1.59E+00**	**EQ_PART**	**2.97E-01**	**5.37**
PCB-1254	**22**	**1**	**1**	**1.59E+00**	**1.59E+00**	**ER_L**	**2.30E-02**	**69.30**
PCB-1254	**22**	**1**	**1**	**1.59E+00**	**1.59E+00**	**ER_M**	**1.80E-01**	**8.86**
PCB-1260	2.02	1	1	1.17E+00	1.17E+00	EQ_PART	1.92E+03	0.00
PCB-1260	**2.02**	**1**	**1**	**1.17E+00**	**1.17E+00**	**ER_L**	**2.30E-02**	**50.74**
PCB-1260	**2.02**	**1**	**1**	**1.17E+00**	**1.17E+00**	**ER_M**	**1.80E-01**	**6.48**
PCB-1260	3.01	1	2	1.90E-02	1.90E-02	EQ_PART	9.81E+02	0.00
PCB-1260	3.01	1	2	1.90E-02	1.90E-02	ER_L	2.30E-02	0.83
PCB-1260	3.01	1	2	1.90E-02	1.90E-02	ER_M	1.80E-01	0.11
PCB-1260	3.02	6	9	6.45E-02	5.60E-01	EQ_PART	6.89E+03	0.00
PCB-1260	**3.02**	**6**	**9**	**6.45E-02**	**5.60E-01**	**ER_L**	**2.30E-02**	**24.35**
PCB-1260	**3.02**	**6**	**9**	**6.45E-02**	**5.60E-01**	**ER_M**	**1.80E-01**	**3.11**
PCB-1260	3.03	8	9	4.40E-02	2.80E-01	EQ_PART	2.02E+03	0.00
PCB-1260	**3.03**	**8**	**9**	**4.40E-02**	**2.80E-01**	**ER_L**	**2.30E-02**	**12.17**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
PCB-1260	**3.03**	**8**	**9**	**4.40E-02**	**2.80E-01**	**ER_M**	**1.80E-01**	**1.56**
PCB-1260	3.04	5	7	6.43E-02	1.75E-01	EQ_PART	1.00E+03	0.00
PCB-1260	**3.04**	**5**	**7**	**6.43E-02**	**1.75E-01**	**ER_L**	**2.30E-02**	**7.61**
PCB-1260	3.04	5	7	6.43E-02	1.75E-01	ER_M	1.80E-01	0.97
PCB-1260	4.01	5	10	1.03E-02	3.40E-02	EQ_PART	9.18E+02	0.00
PCB-1260	**4.01**	**5**	**10**	**1.03E-02**	**3.40E-02**	**ER_L**	**2.30E-02**	**1.48**
PCB-1260	4.01	5	10	1.03E-02	3.40E-02	ER_M	1.80E-01	0.19
PCB-1260	4.02	1	5	2.80E-02	2.80E-02	EQ_PART	1.24E+03	0.00
PCB-1260	**4.02**	**1**	**5**	**2.80E-02**	**2.80E-02**	**ER_L**	**2.30E-02**	**1.22**
PCB-1260	4.02	1	5	2.80E-02	2.80E-02	ER_M	1.80E-01	0.16
PCB-1260	4.03	2	7	2.70E-02	4.30E-02	EQ_PART	1.75E+03	0.00
PCB-1260	**4.03**	**2**	**7**	**2.70E-02**	**4.30E-02**	**ER_L**	**2.30E-02**	**1.87**
PCB-1260	4.03	2	7	2.70E-02	4.30E-02	ER_M	1.80E-01	0.24
Phenanthrene	**0**	**5**	**5**	**3.70E-02**	**3.70E-01**	**ER_L**	**2.40E-01**	**1.54**
Phenanthrene	**0**	**5**	**5**	**3.70E-02**	**3.70E-01**	**REG_IV**	**3.30E-01**	**1.12**
Phenanthrene	0	5	5	3.70E-02	3.70E-01	ER_M	1.50E+00	0.25
Phenanthrene	0	5	5	3.70E-02	3.70E-01	EPASQC	2.57E+00	0.14
Phenanthrene	**2.04**	**6**	**8**	**6.70E-02**	**4.96E-01**	**ER_L**	**2.40E-01**	**2.07**
Phenanthrene	**2.04**	**6**	**8**	**6.70E-02**	**4.96E-01**	**REG_IV**	**3.30E-01**	**1.50**
Phenanthrene	2.04	6	8	6.70E-02	4.96E-01	ER_M	1.50E+00	0.33
Phenanthrene	2.04	6	8	6.70E-02	4.96E-01	EPASQC	2.73E+00	0.18
Phenanthrene	3.01	2	2	4.80E-02	7.40E-02	ER_L	2.40E-01	0.31
Phenanthrene	3.01	2	2	4.80E-02	7.40E-02	REG_IV	3.30E-01	0.22
Phenanthrene	3.01	2	2	4.80E-02	7.40E-02	ER_M	1.50E+00	0.05
Phenanthrene	3.01	2	2	4.80E-02	7.40E-02	EPASQC	1.61E+00	0.05
Phenanthrene	**3.02**	**8**	**9**	**2.60E-01**	**7.80E-01**	**ER_L**	**2.40E-01**	**3.25**
Phenanthrene	**3.02**	**8**	**9**	**2.60E-01**	**7.80E-01**	**REG_IV**	**3.30E-01**	**2.36**

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[a]	HQ max[a]
Phenanthrene	3.02	8	9	2.60E-01	7.80E-01	ER_M	1.50E+00	0.52
Phenanthrene	3.02	8	9	2.60E-01	7.80E-01	EPASQC	1.13E+01	0.07
Phenanthrene	**3.03**	**9**	**9**	**2.80E-01**	**1.20E+00**	**ER_L**	**2.40E-01**	**5.00**
Phenanthrene	**3.03**	**9**	**9**	**2.80E-01**	**1.20E+00**	**REG_IV**	**3.30E-01**	**3.64**
Phenanthrene	3.03	9	9	2.80E-01	1.20E+00	ER_M	1.50E+00	0.80
Phenanthrene	3.03	9	9	2.80E-01	1.20E+00	EPASQC	3.30E+00	0.36
Phenanthrene	**3.04**	**7**	**7**	**1.40E-01**	**3.10E-01**	**ER_L**	**2.40E-01**	**1.29**
Phenanthrene	3.04	7	7	1.40E-01	3.10E-01	REG_IV	3.30E-01	0.94
Phenanthrene	3.04	7	7	1.40E-01	3.10E-01	ER_M	1.50E+00	0.21
Phenanthrene	3.04	7	7	1.40E-01	3.10E-01	EPASQC	1.64E+00	0.19
Phenanthrene	4.01	7	10	6.00E-02	1.23E-01	ER_L	2.40E-01	0.51
Phenanthrene	4.01	7	10	6.00E-02	1.23E-01	REG_IV	3.30E-01	0.37
Phenanthrene	4.01	7	10	6.00E-02	1.23E-01	ER_M	1.50E+00	0.08
Phenanthrene	4.01	7	10	6.00E-02	1.23E-01	EPASQC	1.50E+00	0.08
Phenanthrene	4.02	5	5	6.10E-02	2.20E-01	ER_L	2.40E-01	0.92
Phenanthrene	4.02	5	5	6.10E-02	2.20E-01	REG_IV	3.30E-01	0.67
Phenanthrene	4.02	5	5	6.10E-02	2.20E-01	ER_M	1.50E+00	0.15
Phenanthrene	4.02	5	5	6.10E-02	2.20E-01	EPASQC	2.03E+00	0.11
Phenanthrene	4.03	7	7	8.70E-02	1.90E-01	ER_L	2.40E-01	0.79
Phenanthrene	4.03	7	7	8.70E-02	1.90E-01	REG_IV	3.30E-01	0.58
Phenanthrene	4.03	7	7	8.70E-02	1.90E-01	ER_M	1.50E+00	0.13
Phenanthrene	4.03	7	7	8.70E-02	1.90E-01	EPASQC	2.87E+00	0.07
Phenanthrene	4.04	11	12	1.60E-01	2.20E-01	ER_L	2.40E-01	0.92
Phenanthrene	4.04	11	12	1.60E-01	2.20E-01	REG_IV	3.30E-01	0.67
Phenanthrene	4.04	11	12	1.60E-01	2.20E-01	ER_M	1.50E+00	0.15
Phenanthrene	4.04	11	12	1.60E-01	2.20E-01	EPASQC	4.43E+00	0.05
Phenanthrene	7.01	1	1	3.00E-02	3.00E-02	ER_L	2.40E-01	0.13

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Phenanthrene	7.01	1	1	3.00E-02	3.00E-02	REG_IV	3.30E-01	0.09
Phenanthrene	7.01	1	1	3.00E-02	3.00E-02	ER_M	1.50E+00	0.02
Phenanthrene	7.01	1	1	3.00E-02	3.00E-02	EPASQC	3.14E+00	0.01
Phenanthrene	7.02	1	1	7.50E-02	7.50E-02	ER_L	2.40E-01	0.31
Phenanthrene	7.02	1	1	7.50E-02	7.50E-02	REG_IV	3.30E-01	0.23
Phenanthrene	7.02	1	1	7.50E-02	7.50E-02	ER_M	1.50E+00	0.05
Phenanthrene	7.02	1	1	7.50E-02	7.50E-02	EPASQC	3.14E+00	0.02
Phenanthrene	8	1	1	4.40E-02	4.40E-02	ER_L	2.40E-01	0.18
Phenanthrene	8	1	1	4.40E-02	4.40E-02	REG_IV	3.30E-01	0.13
Phenanthrene	8	1	1	4.40E-02	4.40E-02	ER_M	1.50E+00	0.03
Phenanthrene	8	1	1	4.40E-02	4.40E-02	EPASQC	3.14E+00	0.01
Phenanthrene	**13**	**5**	**5**	**1.80E-01**	**3.70E+00**	**ER_L**	**2.40E-01**	**15.42**
Phenanthrene	**13**	**5**	**5**	**1.80E-01**	**3.70E+00**	**REG_IV**	**3.30E-01**	**11.21**
Phenanthrene	**13**	**5**	**5**	**1.80E-01**	**3.70E+00**	**ER_M**	**1.50E+00**	**2.47**
Phenanthrene	13	5	5	1.80E-01	3.70E+00	EPASQC	5.72E+00	0.65
Phenanthrene	18	3	3	1.40E-01	1.90E-01	ER_L	2.40E-01	0.79
Phenanthrene	18	3	3	1.40E-01	1.90E-01	REG_IV	3.30E-01	0.58
Phenanthrene	18	3	3	1.40E-01	1.90E-01	ER_M	1.50E+00	0.13
Phenanthrene	18	3	3	1.40E-01	1.90E-01	EPASQC	2.96E+00	0.06
Pyrene	0	5	5	3.70E-02	1.50E-01	ER_L	6.60E-01	0.23
Pyrene	0	5	5	3.70E-02	1.50E-01	ER_M	2.60E+00	0.06
Pyrene	2.04	4	8	2.70E-02	4.96E-01	ER_L	6.60E-01	0.75
Pyrene	2.04	4	8	2.70E-02	4.96E-01	ER_M	2.60E+00	0.19
Pyrene	3.01	2	2	7.33E-02	1.30E-01	ER_L	6.60E-01	0.20
Pyrene	3.01	2	2	7.33E-02	1.30E-01	ER_M	2.60E+00	0.05
Pyrene	**3.02**	**8**	**9**	**2.80E-01**	**6.60E-01**	**ER_L**	**6.60E-01**	**1.00**
Pyrene	3.02	8	9	2.80E-01	6.60E-01	ER_M	2.60E+00	0.25

Table F3.1 (continued)

Analyte	Reach	Detects	Total samples	Median	Maximum	BMK name	BMK value[b]	HQ max[b]
Pyrene	**3.03**	**9**	**9**	**3.00E-01**	**1.25E+00**	**ER_L**	**6.60E-01**	**1.90**
Pyrene	3.03	9	9	3.00E-01	1.25E+00	ER_M	2.60E+00	0.48
Pyrene	3.04	7	7	1.90E-01	2.70E-01	ER_L	6.60E-01	0.41
Pyrene	3.04	7	7	1.90E-01	2.70E-01	ER_M	2.60E+00	0.10
Pyrene	4.01	7	10	6.40E-02	1.43E-01	ER_L	6.60E-01	0.22
Pyrene	4.01	7	10	6.40E-02	1.43E-01	ER_M	2.60E+00	0.06
Pyrene	4.02	5	5	7.41E-02	2.40E-01	ER_L	6.60E-01	0.36
Pyrene	4.02	5	5	7.41E-02	2.40E-01	ER_M	2.60E+00	0.09
Pyrene	4.03	7	7	9.30E-02	1.50E-01	ER_L	6.60E-01	0.23
Pyrene	4.03	7	7	9.30E-02	1.50E-01	ER_M	2.60E+00	0.06
Pyrene	4.04	11	12	1.50E-01	3.20E-01	ER_L	6.60E-01	0.49
Pyrene	4.04	11	12	1.50E-01	3.20E-01	ER_M	2.60E+00	0.12
Pyrene	7.01	1	1	5.20E-02	5.20E-02	ER_L	6.60E-01	0.08
Pyrene	7.01	1	1	5.20E-02	5.20E-02	ER_M	2.60E+00	0.02
Pyrene	7.02	1	1	1.10E-01	1.10E-01	ER_L	6.60E-01	0.17
Pyrene	7.02	1	1	1.10E-01	1.10E-01	ER_M	2.60E+00	0.04
Pyrene	8	1	1	7.50E-02	7.50E-02	ER_L	6.60E-01	0.11
Pyrene	8	1	1	7.50E-02	7.50E-02	ER_M	2.60E+00	0.03
Pyrene	13	4	5	1.60E-01	6.10E-01	ER_L	6.60E-01	0.92
Pyrene	13	4	5	1.60E-01	6.10E-01	ER_M	2.60E+00	0.23
Pyrene	18	3	3	3.70E-01	3.74E-01	ER_L	6.60E-01	0.57
Pyrene	18	3	3	3.70E-01	3.74E-01	ER_M	2.60E+00	0.14

[a] Units are mg/kg.
[b] Maximum and HQ(Max) for EPASQCand EQ_PART are corrected for site-specific percent total organic carbon.

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Table F3.2. Median and maximum concentrations[a] of contaminants of potential ecological concern[b] in pore water, aqueous ecotoxicological benchmarks (BMK name) and their values (BMK value) for each chemical, and the quotients (HQ max) of maximum/BMK value

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Aluminum	**0**	**5**	**5**	**5.00E-02**	**4.38E-01**	**NAWQ_CHR**	**8.70E-02**	**5.04**
Aluminum	0	5	5	5.00E-02	4.38E-01	LCV_AQPL	4.60E-01	0.95
Aluminum	0	5	5	5.00E-02	4.38E-01	LTV_DAPH	5.40E-01	0.81
Aluminum	0	5	5	5.00E-02	4.38E-01	NAWQ_ACU	7.50E-01	0.58
Aluminum	0	5	5	5.00E-02	4.38E-01	LCV_DAPH	1.90E+00	0.23
Aluminum	0	5	5	5.00E-02	4.38E-01	LCV_FISH	3.29E+00	0.13
Aluminum	0	5	5	5.00E-02	4.38E-01	LTV_FISH	4.70E+00	0.09
Aluminum	2.01	1	1	1.81E-02	1.81E-02	NAWQ_CHR	8.70E-02	0.21
Aluminum	2.01	1	1	1.81E-02	1.81E-02	LCV_AQPL	4.60E-01	0.04
Aluminum	2.01	1	1	1.81E-02	1.81E-02	LTV_DAPH	5.40E-01	0.03
Aluminum	2.01	1	1	1.81E-02	1.81E-02	NAWQ_ACU	7.50E-01	0.02
Aluminum	2.01	1	1	1.81E-02	1.81E-02	LCV_DAPH	1.90E+00	0.01
Aluminum	2.01	1	1	1.81E-02	1.81E-02	LCV_FISH	3.29E+00	0.01
Aluminum	2.01	1	1	1.81E-02	1.81E-02	LTV_FISH	4.70E+00	0.00
Aluminum	2.03	1	1	1.66E-02	1.66E-02	NAWQ_CHR	8.70E-02	0.19
Aluminum	2.03	1	1	1.66E-02	1.66E-02	LCV_AQPL	4.60E-01	0.04
Aluminum	2.03	1	1	1.66E-02	1.66E-02	LTV_DAPH	5.40E-01	0.03
Aluminum	2.03	1	1	1.66E-02	1.66E-02	NAWQ_ACU	7.50E-01	0.02
Aluminum	2.03	1	1	1.66E-02	1.66E-02	LCV_DAPH	1.90E+00	0.01
Aluminum	2.03	1	1	1.66E-02	1.66E-02	LCV_FISH	3.29E+00	0.01
Aluminum	2.03	1	1	1.66E-02	1.66E-02	LTV_FISH	4.70E+00	0.00
Aluminum	2.04	6	6	2.05E-02	4.34E-02	NAWQ_CHR	8.70E-02	0.50
Aluminum	2.04	6	6	2.05E-02	4.34E-02	LCV_AQPL	4.60E-01	0.09
Aluminum	2.04	6	6	2.05E-02	4.34E-02	LTV_DAPH	5.40E-01	0.08
Aluminum	2.04	6	6	2.05E-02	4.34E-02	NAWQ_ACU	7.50E-01	0.06

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Aluminum	2.04	6	6	2.05E-02	4.34E-02	LCV_DAPH	1.90E+00	0.02
Aluminum	2.04	6	6	2.05E-02	4.34E-02	LCV_FISH	3.29E+00	0.01
Aluminum	2.04	6	6	2.05E-02	4.34E-02	LTV_FISH	4.70E+00	0.01
Aluminum	3.01	1	2	4.26E-02	4.26E-02	NAWQ_CHR	8.70E-02	0.49
Aluminum	3.01	1	2	4.26E-02	4.26E-02	LCV_AQPL	4.60E-01	0.09
Aluminum	3.01	1	2	4.26E-02	4.26E-02	LTV_DAPH	5.40E-01	0.08
Aluminum	3.01	1	2	4.26E-02	4.26E-02	NAWQ_ACU	7.50E-01	0.06
Aluminum	3.01	1	2	4.26E-02	4.26E-02	LCV_DAPH	1.90E+00	0.02
Aluminum	3.01	1	2	4.26E-02	4.26E-02	LCV_FISH	3.29E+00	0.01
Aluminum	3.01	1	2	4.26E-02	4.26E-02	LTV_FISH	4.70E+00	0.01
Aluminum	3.02	6	8	1.91E-02	7.52E-02	NAWQ_CHR	8.70E-02	0.86
Aluminum	3.02	6	8	1.91E-02	7.52E-02	LCV_AQPL	4.60E-01	0.16
Aluminum	3.02	6	8	1.91E-02	7.52E-02	LTV_DAPH	5.40E-01	0.14
Aluminum	3.02	6	8	1.91E-02	7.52E-02	NAWQ_ACU	7.50E-01	0.10
Aluminum	3.02	6	8	1.91E-02	7.52E-02	LCV_DAPH	1.90E+00	0.04
Aluminum	3.02	6	8	1.91E-02	7.52E-02	LCV_FISH	3.29E+00	0.02
Aluminum	3.02	6	8	1.91E-02	7.52E-02	LTV_FISH	4.70E+00	0.02
Aluminum	3.03	7	9	1.06E-02	3.53E-02	NAWQ_CHR	8.70E-02	0.41
Aluminum	3.03	7	9	1.06E-02	3.53E-02	LCV_AQPL	4.60E-01	0.08
Aluminum	3.03	7	9	1.06E-02	3.53E-02	LTV_DAPH	5.40E-01	0.07
Aluminum	3.03	7	9	1.06E-02	3.53E-02	NAWQ_ACU	7.50E-01	0.05
Aluminum	3.03	7	9	1.06E-02	3.53E-02	LCV_DAPH	1.90E+00	0.02
Aluminum	3.03	7	9	1.06E-02	3.53E-02	LCV_FISH	3.29E+00	0.01
Aluminum	3.03	7	9	1.06E-02	3.53E-02	LTV_FISH	4.70E+00	0.01
Aluminum	**3.04**	**4**	**6**	**2.06E-02**	**8.99E-02**	**NAWQ_CHR**	**8.70E-02**	**1.03**
Aluminum	3.04	4	6	2.06E-02	8.99E-02	LCV_AQPL	4.60E-01	0.20
Aluminum	3.04	4	6	2.06E-02	8.99E-02	LTV_DAPH	5.40E-01	0.17

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Aluminum	3.04	4	6	2.06E-02	8.99E-02	NAWQ_ACU	7.50E-01	0.12
Aluminum	3.04	4	6	2.06E-02	8.99E-02	LCV_DAPH	1.90E+00	0.05
Aluminum	3.04	4	6	2.06E-02	8.99E-02	LCV_FISH	3.29E+00	0.03
Aluminum	3.04	4	6	2.06E-02	8.99E-02	LTV_FISH	4.70E+00	0.02
Aluminum	**4.01**	**9**	**9**	**1.98E-02**	**6.20E-01**	**NAWQ_CHR**	**8.70E-02**	**7.13**
Aluminum	**4.01**	**9**	**9**	**1.98E-02**	**6.20E-01**	**LCV_AQPL**	**4.60E-01**	**1.35**
Aluminum	**4.01**	**9**	**9**	**1.98E-02**	**6.20E-01**	**LTV_DAPH**	**5.40E-01**	**1.15**
Aluminum	4.01	9	9	1.98E-02	6.20E-01	NAWQ_ACU	7.50E-01	0.83
Aluminum	4.01	9	9	1.98E-02	6.20E-01	LCV_DAPH	1.90E+00	0.33
Aluminum	4.01	9	9	1.98E-02	6.20E-01	LCV_FISH	3.29E+00	0.19
Aluminum	4.01	9	9	1.98E-02	6.20E-01	LTV_FISH	4.70E+00	0.13
Aluminum	**4.02**	**6**	**6**	**2.01E-02**	**8.96E-02**	**NAWQ_CHR**	**8.70E-02**	**1.03**
Aluminum	4.02	6	6	2.01E-02	8.96E-02	LCV_AQPL	4.60E-01	0.19
Aluminum	4.02	6	6	2.01E-02	8.96E-02	LTV_DAPH	5.40E-01	0.17
Aluminum	4.02	6	6	2.01E-02	8.96E-02	NAWQ_ACU	7.50E-01	0.12
Aluminum	4.02	6	6	2.01E-02	8.96E-02	LCV_DAPH	1.90E+00	0.05
Aluminum	4.02	6	6	2.01E-02	8.96E-02	LCV_FISH	3.29E+00	0.03
Aluminum	4.02	6	6	2.01E-02	8.96E-02	LTV_FISH	4.70E+00	0.02
Aluminum	4.03	6	7	1.61E-02	3.35E-02	NAWQ_CHR	8.70E-02	0.39
Aluminum	4.03	6	7	1.61E-02	3.35E-02	LCV_AQPL	4.60E-01	0.07
Aluminum	4.03	6	7	1.61E-02	3.35E-02	LTV_DAPH	5.40E-01	0.06
Aluminum	4.03	6	7	1.61E-02	3.35E-02	NAWQ_ACU	7.50E-01	0.04
Aluminum	4.03	6	7	1.61E-02	3.35E-02	LCV_DAPH	1.90E+00	0.02
Aluminum	4.03	6	7	1.61E-02	3.35E-02	LCV_FISH	3.29E+00	0.01
Aluminum	4.03	6	7	1.61E-02	3.35E-02	LTV_FISH	4.70E+00	0.01
Aluminum	**4.04**	**11**	**11**	**2.84E-02**	**1.20E-01**	**NAWQ_CHR**	**8.70E-02**	**1.38**
Aluminum	4.04	11	11	2.84E-02	1.20E-01	LCV_AQPL	4.60E-01	0.26

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Aluminum	4.04	11	11	2.84E-02	1.20E-01	LTV_DAPH	5.40E-01	0.22
Aluminum	4.04	11	11	2.84E-02	1.20E-01	NAWQ_ACU	7.50E-01	0.16
Aluminum	4.04	11	11	2.84E-02	1.20E-01	LCV_DAPH	1.90E+00	0.06
Aluminum	4.04	11	11	2.84E-02	1.20E-01	LCV_FISH	3.29E+00	0.04
Aluminum	4.04	11	11	2.84E-02	1.20E-01	LTV_FISH	4.70E+00	0.03
Aluminum	7.01	1	1	3.07E-02	3.07E-02	NAWQ_CHR	8.70E-02	0.35
Aluminum	7.01	1	1	3.07E-02	3.07E-02	LCV_AQPL	4.60E-01	0.07
Aluminum	7.01	1	1	3.07E-02	3.07E-02	LTV_DAPH	5.40E-01	0.06
Aluminum	7.01	1	1	3.07E-02	3.07E-02	NAWQ_ACU	7.50E-01	0.04
Aluminum	7.01	1	1	3.07E-02	3.07E-02	LCV_DAPH	1.90E+00	0.02
Aluminum	7.01	1	1	3.07E-02	3.07E-02	LCV_FISH	3.29E+00	0.01
Aluminum	7.01	1	1	3.07E-02	3.07E-02	LTV_FISH	4.70E+00	0.01
Aluminum	**7.02**	**1**	**1**	**2.72E-01**	**2.72E-01**	**NAWQ_CHR**	**8.70E-02**	**3.13**
Aluminum	7.02	1	1	2.72E-01	2.72E-01	LCV_AQPL	4.60E-01	0.59
Aluminum	7.02	1	1	2.72E-01	2.72E-01	LTV_DAPH	5.40E-01	0.50
Aluminum	7.02	1	1	2.72E-01	2.72E-01	NAWQ_ACU	7.50E-01	0.36
Aluminum	7.02	1	1	2.72E-01	2.72E-01	LCV_DAPH	1.90E+00	0.14
Aluminum	7.02	1	1	2.72E-01	2.72E-01	LCV_FISH	3.29E+00	0.08
Aluminum	7.02	1	1	2.72E-01	2.72E-01	LTV_FISH	4.70E+00	0.06
Aluminum	8	1	1	2.66E-02	2.66E-02	NAWQ_CHR	8.70E-02	0.31
Aluminum	8	1	1	2.66E-02	2.66E-02	LCV_AQPL	4.60E-01	0.06
Aluminum	8	1	1	2.66E-02	2.66E-02	LTV_DAPH	5.40E-01	0.05
Aluminum	8	1	1	2.66E-02	2.66E-02	NAWQ_ACU	7.50E-01	0.04
Aluminum	8	1	1	2.66E-02	2.66E-02	LCV_DAPH	1.90E+00	0.01
Aluminum	8	1	1	2.66E-02	2.66E-02	LCV_FISH	3.29E+00	0.01
Aluminum	8	1	1	2.66E-02	2.66E-02	LTV_FISH	4.70E+00	0.01
Aluminum	**18**	**3**	**3**	**4.17E-02**	**3.13E-01**	**NAWQ_CHR**	**8.70E-02**	**3.60**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Aluminum	18	3	3	4.17E-02	3.13E-01	LCV_AQPL	4.60E-01	0.68
Aluminum	18	3	3	4.17E-02	3.13E-01	LTV_DAPH	5.40E-01	0.58
Aluminum	18	3	3	4.17E-02	3.13E-01	NAWQ_ACU	7.50E-01	0.42
Aluminum	18	3	3	4.17E-02	3.13E-01	LCV_DAPH	1.90E+00	0.16
Aluminum	18	3	3	4.17E-02	3.13E-01	LCV_FISH	3.29E+00	0.10
Aluminum	18	3	3	4.17E-02	3.13E-01	LTV_FISH	4.70E+00	0.07
Arsenic	2.04	2	6	2.10E-03	3.30E-03	NAWQ_CHR	1.90E-01	0.02
Arsenic	2.04	2	6	2.10E-03	3.30E-03	NAWQ_ACU	3.60E-01	0.01
Arsenic	2.04	2	6	2.10E-03	3.30E-03	LTV_DAPH	6.33E-01	0.01
Arsenic	2.04	2	6	2.10E-03	3.30E-03	LCV_DAPH	9.14E-01	0.00
Arsenic	2.04	2	6	2.10E-03	3.30E-03	LTV_FISH	2.13E+00	0.00
Arsenic	2.04	2	6	2.10E-03	3.30E-03	LCV_FISH	2.96E+00	0.00
Arsenic	3.02	5	8	1.40E-03	6.40E-03	NAWQ_CHR	1.90E-01	0.03
Arsenic	3.02	5	8	1.40E-03	6.40E-03	NAWQ_ACU	3.60E-01	0.02
Arsenic	3.02	5	8	1.40E-03	6.40E-03	LTV_DAPH	6.33E-01	0.01
Arsenic	3.02	5	8	1.40E-03	6.40E-03	LCV_DAPH	9.14E-01	0.01
Arsenic	3.02	5	8	1.40E-03	6.40E-03	LTV_FISH	2.13E+00	0.00
Arsenic	3.02	5	8	1.40E-03	6.40E-03	LCV_FISH	2.96E+00	0.00
Arsenic	3.03	3	9	2.09E-03	1.00E-02	NAWQ_CHR	1.90E-01	0.05
Arsenic	3.03	3	9	2.09E-03	1.00E-02	NAWQ_ACU	3.60E-01	0.03
Arsenic	3.03	3	9	2.09E-03	1.00E-02	LTV_DAPH	6.33E-01	0.02
Arsenic	3.03	3	9	2.09E-03	1.00E-02	LCV_DAPH	9.14E-01	0.01
Arsenic	3.03	3	9	2.09E-03	1.00E-02	LTV_FISH	2.13E+00	0.00
Arsenic	3.03	3	9	2.09E-03	1.00E-02	LCV_FISH	2.96E+00	0.00
Arsenic	3.04	6	6	5.85E-03	1.24E-01	NAWQ_CHR	1.90E-01	0.65
Arsenic	3.04	6	6	5.85E-03	1.24E-01	NAWQ_ACU	3.60E-01	0.34
Arsenic	3.04	6	6	5.85E-03	1.24E-01	LTV_DAPH	6.33E-01	0.20

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Arsenic	3.04	6	6	5.85E-03	1.24E-01	LCV_DAPH	9.14E-01	0.14
Arsenic	3.04	6	6	5.85E-03	1.24E-01	LTV_FISH	2.13E+00	0.06
Arsenic	3.04	6	6	5.85E-03	1.24E-01	LCV_FISH	2.96E+00	0.04
Arsenic	4.02	2	6	1.10E-03	2.80E-03	NAWQ_CHR	1.90E-01	0.01
Arsenic	4.02	2	6	1.10E-03	2.80E-03	NAWQ_ACU	3.60E-01	0.01
Arsenic	4.02	2	6	1.10E-03	2.80E-03	LTV_DAPH	6.33E-01	0.00
Arsenic	4.02	2	6	1.10E-03	2.80E-03	LCV_DAPH	9.14E-01	0.00
Arsenic	4.02	2	6	1.10E-03	2.80E-03	LTV_FISH	2.13E+00	0.00
Arsenic	4.02	2	6	1.10E-03	2.80E-03	LCV_FISH	2.96E+00	0.00
Arsenic	4.03	2	7	1.62E-03	1.70E-03	NAWQ_CHR	1.90E-01	0.01
Arsenic	4.03	2	7	1.62E-03	1.70E-03	NAWQ_ACU	3.60E-01	0.00
Arsenic	4.03	2	7	1.62E-03	1.70E-03	LTV_DAPH	6.33E-01	0.00
Arsenic	4.03	2	7	1.62E-03	1.70E-03	LCV_DAPH	9.14E-01	0.00
Arsenic	4.03	2	7	1.62E-03	1.70E-03	LTV_FISH	2.13E+00	0.00
Arsenic	4.03	2	7	1.62E-03	1.70E-03	LCV_FISH	2.96E+00	0.00
Arsenic	4.04	5	11	1.60E-03	3.90E-03	NAWQ_CHR	1.90E-01	0.02
Arsenic	4.04	5	11	1.60E-03	3.90E-03	NAWQ_ACU	3.60E-01	0.01
Arsenic	4.04	5	11	1.60E-03	3.90E-03	LTV_DAPH	6.33E-01	0.01
Arsenic	4.04	5	11	1.60E-03	3.90E-03	LCV_DAPH	9.14E-01	0.00
Arsenic	4.04	5	11	1.60E-03	3.90E-03	LTV_FISH	2.13E+00	0.00
Arsenic	4.04	5	11	1.60E-03	3.90E-03	LCV_FISH	2.96E+00	0.00
Arsenic	7.01	1	1	1.26E-01	1.26E-01	NAWQ_CHR	1.90E-01	0.66
Arsenic	7.01	1	1	1.26E-01	1.26E-01	NAWQ_ACU	3.60E-01	0.35
Arsenic	7.01	1	1	1.26E-01	1.26E-01	LTV_DAPH	6.33E-01	0.20
Arsenic	7.01	1	1	1.26E-01	1.26E-01	LCV_DAPH	9.14E-01	0.14
Arsenic	7.01	1	1	1.26E-01	1.26E-01	LTV_FISH	2.13E+00	0.06
Arsenic	7.01	1	1	1.26E-01	1.26E-01	LCV_FISH	2.96E+00	0.04

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Arsenic	7.02	1	1	1.45E-02	1.45E-02	NAWQ_CHR	1.90E-01	0.08
Arsenic	7.02	1	1	1.45E-02	1.45E-02	NAWQ_ACU	3.60E-01	0.04
Arsenic	7.02	1	1	1.45E-02	1.45E-02	LTV_DAPH	6.33E-01	0.02
Arsenic	7.02	1	1	1.45E-02	1.45E-02	LCV_DAPH	9.14E-01	0.02
Arsenic	7.02	1	1	1.45E-02	1.45E-02	LTV_FISH	2.13E+00	0.01
Arsenic	7.02	1	1	1.45E-02	1.45E-02	LCV_FISH	2.96E+00	0.00
Arsenic	18	2	3	1.20E-03	1.30E-03	NAWQ_CHR	1.90E-01	0.01
Arsenic	18	2	3	1.20E-03	1.30E-03	NAWQ_ACU	3.60E-01	0.00
Arsenic	18	2	3	1.20E-03	1.30E-03	LTV_DAPH	6.33E-01	0.00
Arsenic	18	2	3	1.20E-03	1.30E-03	LCV_DAPH	9.14E-01	0.00
Arsenic	18	2	3	1.20E-03	1.30E-03	LTV_FISH	2.13E+00	0.00
Arsenic	18	2	3	1.20E-03	1.30E-03	LCV_FISH	2.96E+00	0.00
Barium	**0**	**5**	**5**	**9.57E-02**	**9.97E-02**	**S_CHR_V**	**3.80E-03**	**26.24**
Barium	**0**	**5**	**5**	**9.57E-02**	**9.97E-02**	**S_ACU_V**	**6.91E-02**	**1.44**
Barium	0	5	5	9.57E-02	9.97E-02	LCV_DAPH	5.80E+00	0.02
Barium	**2.01**	**1**	**1**	**9.74E-02**	**9.74E-02**	**S_CHR_V**	**3.80E-03**	**25.63**
Barium	**2.01**	**1**	**1**	**9.74E-02**	**9.74E-02**	**S_ACU_V**	**6.91E-02**	**1.41**
Barium	2.01	1	1	9.74E-02	9.74E-02	LCV_DAPH	5.80E+00	0.02
Barium	**2.03**	**1**	**1**	**2.83E-02**	**2.83E-02**	**S_CHR_V**	**3.80E-03**	**7.45**
Barium	2.03	1	1	2.83E-02	2.83E-02	S_ACU_V	6.91E-02	0.41
Barium	2.03	1	1	2.83E-02	2.83E-02	LCV_DAPH	5.80E+00	0.00
Barium	**2.04**	**6**	**6**	**4.28E-02**	**8.69E-02**	**S_CHR_V**	**3.80E-03**	**22.88**
Barium	**2.04**	**6**	**6**	**4.28E-02**	**8.69E-02**	**S_ACU_V**	**6.91E-02**	**1.26**
Barium	2.04	6	6	4.28E-02	8.69E-02	LCV_DAPH	5.80E+00	0.01
Barium	**3.01**	**2**	**2**	**3.73E-02**	**4.72E-02**	**S_CHR_V**	**3.80E-03**	**12.42**
Barium	3.01	2	2	3.73E-02	4.72E-02	S_ACU_V	6.91E-02	0.68
Barium	3.01	2	2	3.73E-02	4.72E-02	LCV_DAPH	5.80E+00	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Barium	**3.02**	**8**	**8**	**6.32E-02**	**1.18E-01**	**S_CHR_V**	**3.80E-03**	**31.05**
Barium	**3.02**	**8**	**8**	**6.32E-02**	**1.18E-01**	**S_ACU_V**	**6.91E-02**	**1.71**
Barium	3.02	8	8	6.32E-02	1.18E-01	LCV_DAPH	5.80E+00	0.02
Barium	**3.03**	**9**	**9**	**4.57E-02**	**8.65E-02**	**S_CHR_V**	**3.80E-03**	**22.77**
Barium	**3.03**	**9**	**9**	**4.57E-02**	**8.65E-02**	**S_ACU_V**	**6.91E-02**	**1.25**
Barium	3.03	9	9	4.57E-02	8.65E-02	LCV_DAPH	5.80E+00	0.01
Barium	**3.04**	**6**	**6**	**6.49E-02**	**1.09E-01**	**S_CHR_V**	**3.80E-03**	**28.68**
Barium	**3.04**	**6**	**6**	**6.49E-02**	**1.09E-01**	**S_ACU_V**	**6.91E-02**	**1.58**
Barium	3.04	6	6	6.49E-02	1.09E-01	LCV_DAPH	5.80E+00	0.02
Barium	**4.01**	**9**	**9**	**4.14E-02**	**5.56E-02**	**S_CHR_V**	**3.80E-03**	**14.63**
Barium	4.01	9	9	4.14E-02	5.56E-02	S_ACU_V	6.91E-02	0.80
Barium	4.01	9	9	4.14E-02	5.56E-02	LCV_DAPH	5.80E+00	0.01
Barium	**4.02**	**6**	**6**	**6.10E-02**	**8.75E-02**	**S_CHR_V**	**3.80E-03**	**23.03**
Barium	**4.02**	**6**	**6**	**6.10E-02**	**8.75E-02**	**S_ACU_V**	**6.91E-02**	**1.27**
Barium	4.02	6	6	6.10E-02	8.75E-02	LCV_DAPH	5.80E+00	0.02
Barium	**4.03**	**7**	**7**	**4.96E-02**	**2.21E-01**	**S_CHR_V**	**3.80E-03**	**58.07**
Barium	**4.03**	**7**	**7**	**4.96E-02**	**2.21E-01**	**S_ACU_V**	**6.91E-02**	**3.19**
Barium	4.03	7	7	4.96E-02	2.21E-01	LCV_DAPH	5.80E+00	0.04
Barium	**4.04**	**11**	**11**	**4.14E-02**	**2.03E-01**	**S_CHR_V**	**3.80E-03**	**53.42**
Barium	**4.04**	**11**	**11**	**4.14E-02**	**2.03E-01**	**S_ACU_V**	**6.91E-02**	**2.94**
Barium	4.04	11	11	4.14E-02	2.03E-01	LCV_DAPH	5.80E+00	0.04
Barium	**7.01**	**1**	**1**	**6.04E-02**	**6.04E-02**	**S_CHR_V**	**3.80E-03**	**15.89**
Barium	7.01	1	1	6.04E-02	6.04E-02	S_ACU_V	6.91E-02	0.87
Barium	7.01	1	1	6.04E-02	6.04E-02	LCV_DAPH	5.80E+00	0.01
Barium	**7.02**	**1**	**1**	**6.23E-02**	**6.23E-02**	**S_CHR_V**	**3.80E-03**	**16.39**
Barium	7.02	1	1	6.23E-02	6.23E-02	S_ACU_V	6.91E-02	0.90
Barium	7.02	1	1	6.23E-02	6.23E-02	LCV_DAPH	5.80E+00	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Barium	**8**	**1**	**1**	**5.36E-02**	**5.36E-02**	**S_CHR_V**	**3.80E-03**	**14.11**
Barium	8	1	1	5.36E-02	5.36E-02	S_ACU_V	6.91E-02	0.78
Barium	8	1	1	5.36E-02	5.36E-02	LCV_DAPH	5.80E+00	0.01
Barium	**13**	**5**	**5**	**6.98E-02**	**1.24E-01**	**S_CHR_V**	**3.80E-03**	**32.63**
Barium	**13**	**5**	**5**	**6.98E-02**	**1.24E-01**	**S_ACU_V**	**6.91E-02**	**1.79**
Barium	13	5	5	6.98E-02	1.24E-01	LCV_DAPH	5.80E+00	0.02
Barium	**18**	**3**	**3**	**5.69E-02**	**6.49E-02**	**S_CHR_V**	**3.80E-03**	**17.08**
Barium	18	3	3	5.69E-02	6.49E-02	S_ACU_V	6.91E-02	0.94
Barium	18	3	3	5.69E-02	6.49E-02	LCV_DAPH	5.80E+00	0.01
Boron	**0**	**4**	**5**	**3.96E-02**	**1.71E-01**	**LTV_DAPH**	**7.00E-03**	**24.43**
Boron	0	4	5	3.96E-02	1.71E-01	S_CHR_V	5.47E-01	0.31
Boron	0	4	5	3.96E-02	1.71E-01	LCV_DAPH	8.83E+00	0.02
Boron	0	4	5	3.96E-02	1.71E-01	S_ACU_V	1.10E+01	0.02
Boron	**2.04**	**4**	**6**	**3.55E-02**	**6.69E-02**	**LTV_DAPH**	**7.00E-03**	**9.56**
Boron	2.04	4	6	3.55E-02	6.69E-02	S_CHR_V	5.47E-01	0.12
Boron	2.04	4	6	3.55E-02	6.69E-02	LCV_DAPH	8.83E+00	0.01
Boron	2.04	4	6	3.55E-02	6.69E-02	S_ACU_V	1.10E+01	0.01
Boron	**3.01**	**1**	**2**	**5.49E-02**	**5.49E-02**	**LTV_DAPH**	**7.00E-03**	**7.84**
Boron	3.01	1	2	5.49E-02	5.49E-02	S_CHR_V	5.47E-01	0.10
Boron	3.01	1	2	5.49E-02	5.49E-02	LCV_DAPH	8.83E+00	0.01
Boron	3.01	1	2	5.49E-02	5.49E-02	S_ACU_V	1.10E+01	0.00
Boron	**3.02**	**6**	**8**	**6.78E-02**	**9.65E-02**	**LTV_DAPH**	**7.00E-03**	**13.79**
Boron	3.02	6	8	6.78E-02	9.65E-02	S_CHR_V	5.47E-01	0.18
Boron	3.02	6	8	6.78E-02	9.65E-02	LCV_DAPH	8.83E+00	0.01
Boron	3.02	6	8	6.78E-02	9.65E-02	S_ACU_V	1.10E+01	0.01
Boron	**3.03**	**8**	**9**	**4.52E-02**	**8.88E-02**	**LTV_DAPH**	**7.00E-03**	**12.69**
Boron	3.03	8	9	4.52E-02	8.88E-02	S_CHR_V	5.47E-01	0.16

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Boron	3.03	8	9	4.52E-02	8.88E-02	LCV_DAPH	8.83E+00	0.01
Boron	3.03	8	9	4.52E-02	8.88E-02	S_ACU_V	1.10E+01	0.01
Boron	**3.04**	**5**	**6**	**9.97E-02**	**1.17E+00**	**LTV_DAPH**	**7.00E-03**	**167.14**
Boron	**3.04**	**5**	**6**	**9.97E-02**	**1.17E+00**	**S_CHR_V**	**5.47E-01**	**2.14**
Boron	3.04	5	6	9.97E-02	1.17E+00	LCV_DAPH	8.83E+00	0.13
Boron	3.04	5	6	9.97E-02	1.17E+00	S_ACU_V	1.10E+01	0.11
Boron	**4.01**	**9**	**9**	**2.82E-02**	**6.29E-02**	**LTV_DAPH**	**7.00E-03**	**8.99**
Boron	4.01	9	9	2.82E-02	6.29E-02	S_CHR_V	5.47E-01	0.11
Boron	4.01	9	9	2.82E-02	6.29E-02	LCV_DAPH	8.83E+00	0.01
Boron	4.01	9	9	2.82E-02	6.29E-02	S_ACU_V	1.10E+01	0.01
Boron	**4.02**	**5**	**6**	**4.29E-02**	**4.75E-02**	**LTV_DAPH**	**7.00E-03**	**6.79**
Boron	4.02	5	6	4.29E-02	4.75E-02	S_CHR_V	5.47E-01	0.09
Boron	4.02	5	6	4.29E-02	4.75E-02	LCV_DAPH	8.83E+00	0.01
Boron	4.02	5	6	4.29E-02	4.75E-02	S_ACU_V	1.10E+01	0.00
Boron	**4.03**	**6**	**7**	**3.56E-02**	**4.97E-02**	**LTV_DAPH**	**7.00E-03**	**7.10**
Boron	4.03	6	7	3.56E-02	4.97E-02	S_CHR_V	5.47E-01	0.09
Boron	4.03	6	7	3.56E-02	4.97E-02	LCV_DAPH	8.83E+00	0.01
Boron	4.03	6	7	3.56E-02	4.97E-02	S_ACU_V	1.10E+01	0.00
Boron	**4.04**	**11**	**11**	**2.98E-02**	**4.01E-02**	**LTV_DAPH**	**7.00E-03**	**5.73**
Boron	4.04	11	11	2.98E-02	4.01E-02	S_CHR_V	5.47E-01	0.07
Boron	4.04	11	11	2.98E-02	4.01E-02	LCV_DAPH	8.83E+00	0.00
Boron	4.04	11	11	2.98E-02	4.01E-02	S_ACU_V	1.10E+01	0.00
Boron	**7.01**	**1**	**1**	**4.35E-02**	**4.35E-02**	**LTV_DAPH**	**7.00E-03**	**6.21**
Boron	7.01	1	1	4.35E-02	4.35E-02	S_CHR_V	5.47E-01	0.08
Boron	7.01	1	1	4.35E-02	4.35E-02	LCV_DAPH	8.83E+00	0.00
Boron	7.01	1	1	4.35E-02	4.35E-02	S_ACU_V	1.10E+01	0.00
Boron	**7.02**	**1**	**1**	**3.45E-02**	**3.45E-02**	**LTV_DAPH**	**7.00E-03**	**4.93**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Boron	7.02	1	1	3.45E-02	3.45E-02	S_CHR_V	5.47E-01	0.06
Boron	7.02	1	1	3.45E-02	3.45E-02	LCV_DAPH	8.83E+00	0.00
Boron	7.02	1	1	3.45E-02	3.45E-02	S_ACU_V	1.10E+01	0.00
Boron	**13**	**2**	**5**	**2.59E-02**	**4.76E-02**	**LTV_DAPH**	**7.00E-03**	**6.80**
Boron	13	2	5	2.59E-02	4.76E-02	S_CHR_V	5.47E-01	0.09
Boron	13	2	5	2.59E-02	4.76E-02	LCV_DAPH	8.83E+00	0.01
Boron	13	2	5	2.59E-02	4.76E-02	S_ACU_V	1.10E+01	0.00
Boron	**18**	**3**	**3**	**3.37E-02**	**3.85E-02**	**LTV_DAPH**	**7.00E-03**	**5.50**
Boron	18	3	3	3.37E-02	3.85E-02	S_CHR_V	5.47E-01	0.07
Boron	18	3	3	3.37E-02	3.85E-02	LCV_DAPH	8.83E+00	0.00
Boron	18	3	3	3.37E-02	3.85E-02	S_ACU_V	1.10E+01	0.00
Cadmium	**4.04**	**1**	**11**	**1.00E-03**	**1.00E-03**	**LCV_DAPH**	**1.50E-04**	**6.67**
Cadmium	**4.04**	**1**	**11**	**1.00E-03**	**1.00E-03**	**LTV_DAPH**	**7.50E-04**	**1.33**
Cadmium	4.04	1	11	1.00E-03	1.00E-03	NAWQ_CHR	1.10E-03	0.91
Cadmium	4.04	1	11	1.00E-03	1.00E-03	LCV_FISH	1.70E-03	0.59
Cadmium	4.04	1	11	1.00E-03	1.00E-03	LTV_FISH	1.80E-03	0.56
Cadmium	4.04	1	11	1.00E-03	1.00E-03	LCV_AQPL	2.00E-03	0.50
Cadmium	4.04	1	11	1.00E-03	1.00E-03	NAWQ_ACU	3.90E-03	0.26
Chromium	0	4	5	1.62E-03	1.90E-03	LCV_DAPH	4.40E-02	0.04
Chromium	0	4	5	1.62E-03	1.90E-03	LCV_FISH	6.88E-02	0.03
Chromium	0	4	5	1.62E-03	1.90E-03	LTV_FISH	8.90E-02	0.02
Chromium	0	4	5	1.62E-03	1.90E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	0	4	5	1.62E-03	1.90E-03	LCV_AQPL	3.97E-01	0.00
Chromium	0	4	5	1.62E-03	1.90E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	2.04	4	6	1.05E-03	2.30E-03	LCV_DAPH	4.40E-02	0.05
Chromium	2.04	4	6	1.05E-03	2.30E-03	LCV_FISH	6.88E-02	0.03
Chromium	2.04	4	6	1.05E-03	2.30E-03	LTV_FISH	8.90E-02	0.03

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Chromium	2.04	4	6	1.05E-03	2.30E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	2.04	4	6	1.05E-03	2.30E-03	LCV_AQPL	3.97E-01	0.01
Chromium	2.04	4	6	1.05E-03	2.30E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	3.01	2	2	2.05E-03	2.80E-03	LCV_DAPH	4.40E-02	0.06
Chromium	3.01	2	2	2.05E-03	2.80E-03	LCV_FISH	6.88E-02	0.04
Chromium	3.01	2	2	2.05E-03	2.80E-03	LTV_FISH	8.90E-02	0.03
Chromium	3.01	2	2	2.05E-03	2.80E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	3.01	2	2	2.05E-03	2.80E-03	LCV_AQPL	3.97E-01	0.01
Chromium	3.01	2	2	2.05E-03	2.80E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	3.02	7	8	2.00E-03	2.70E-03	LCV_DAPH	4.40E-02	0.06
Chromium	3.02	7	8	2.00E-03	2.70E-03	LCV_FISH	6.88E-02	0.04
Chromium	3.02	7	8	2.00E-03	2.70E-03	LTV_FISH	8.90E-02	0.03
Chromium	3.02	7	8	2.00E-03	2.70E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	3.02	7	8	2.00E-03	2.70E-03	LCV_AQPL	3.97E-01	0.01
Chromium	3.02	7	8	2.00E-03	2.70E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	3.03	7	9	2.10E-03	3.70E-03	LCV_DAPH	4.40E-02	0.08
Chromium	3.03	7	9	2.10E-03	3.70E-03	LCV_FISH	6.88E-02	0.05
Chromium	3.03	7	9	2.10E-03	3.70E-03	LTV_FISH	8.90E-02	0.04
Chromium	3.03	7	9	2.10E-03	3.70E-03	NAWQ_CHR	2.10E-01	0.02
Chromium	3.03	7	9	2.10E-03	3.70E-03	LCV_AQPL	3.97E-01	0.01
Chromium	3.03	7	9	2.10E-03	3.70E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	3.04	4	6	1.13E-03	2.85E-03	LCV_DAPH	4.40E-02	0.06
Chromium	3.04	4	6	1.13E-03	2.85E-03	LCV_FISH	6.88E-02	0.04
Chromium	3.04	4	6	1.13E-03	2.85E-03	LTV_FISH	8.90E-02	0.03
Chromium	3.04	4	6	1.13E-03	2.85E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	3.04	4	6	1.13E-03	2.85E-03	LCV_AQPL	3.97E-01	0.01
Chromium	3.04	4	6	1.13E-03	2.85E-03	NAWQ_ACU	1.70E+00	0.00

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Chromium	4.01	8	9	1.80E-03	2.70E-03	LCV_DAPH	4.40E-02	0.06
Chromium	4.01	8	9	1.80E-03	2.70E-03	LCV_FISH	6.88E-02	0.04
Chromium	4.01	8	9	1.80E-03	2.70E-03	LTV_FISH	8.90E-02	0.03
Chromium	4.01	8	9	1.80E-03	2.70E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	4.01	8	9	1.80E-03	2.70E-03	LCV_AQPL	3.97E-01	0.01
Chromium	4.01	8	9	1.80E-03	2.70E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	4.02	3	6	1.00E-03	2.20E-03	LCV_DAPH	4.40E-02	0.05
Chromium	4.02	3	6	1.00E-03	2.20E-03	LCV_FISH	6.88E-02	0.03
Chromium	4.02	3	6	1.00E-03	2.20E-03	LTV_FISH	8.90E-02	0.02
Chromium	4.02	3	6	1.00E-03	2.20E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	4.02	3	6	1.00E-03	2.20E-03	LCV_AQPL	3.97E-01	0.01
Chromium	4.02	3	6	1.00E-03	2.20E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	4.03	5	7	1.10E-03	2.03E-03	LCV_DAPH	4.40E-02	0.05
Chromium	4.03	5	7	1.10E-03	2.03E-03	LCV_FISH	6.88E-02	0.03
Chromium	4.03	5	7	1.10E-03	2.03E-03	LTV_FISH	8.90E-02	0.02
Chromium	4.03	5	7	1.10E-03	2.03E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	4.03	5	7	1.10E-03	2.03E-03	LCV_AQPL	3.97E-01	0.01
Chromium	4.03	5	7	1.10E-03	2.03E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	4.04	9	11	1.20E-03	3.10E-03	LCV_DAPH	4.40E-02	0.07
Chromium	4.04	9	11	1.20E-03	3.10E-03	LCV_FISH	6.88E-02	0.05
Chromium	4.04	9	11	1.20E-03	3.10E-03	LTV_FISH	8.90E-02	0.03
Chromium	4.04	9	11	1.20E-03	3.10E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	4.04	9	11	1.20E-03	3.10E-03	LCV_AQPL	3.97E-01	0.01
Chromium	4.04	9	11	1.20E-03	3.10E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	7.01	1	1	1.10E-03	1.10E-03	LCV_DAPH	4.40E-02	0.03
Chromium	7.01	1	1	1.10E-03	1.10E-03	LCV_FISH	6.88E-02	0.02
Chromium	7.01	1	1	1.10E-03	1.10E-03	LTV_FISH	8.90E-02	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Chromium	7.01	1	1	1.10E-03	1.10E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	7.01	1	1	1.10E-03	1.10E-03	LCV_AQPL	3.97E-01	0.00
Chromium	7.01	1	1	1.10E-03	1.10E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	8	1	1	1.10E-03	1.10E-03	LCV_DAPH	4.40E-02	0.03
Chromium	8	1	1	1.10E-03	1.10E-03	LCV_FISH	6.88E-02	0.02
Chromium	8	1	1	1.10E-03	1.10E-03	LTV_FISH	8.90E-02	0.01
Chromium	8	1	1	1.10E-03	1.10E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	8	1	1	1.10E-03	1.10E-03	LCV_AQPL	3.97E-01	0.00
Chromium	8	1	1	1.10E-03	1.10E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	13	1	5	1.50E-03	1.50E-03	LCV_DAPH	4.40E-02	0.03
Chromium	13	1	5	1.50E-03	1.50E-03	LCV_FISH	6.88E-02	0.02
Chromium	13	1	5	1.50E-03	1.50E-03	LTV_FISH	8.90E-02	0.02
Chromium	13	1	5	1.50E-03	1.50E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	13	1	5	1.50E-03	1.50E-03	LCV_AQPL	3.97E-01	0.00
Chromium	13	1	5	1.50E-03	1.50E-03	NAWQ_ACU	1.70E+00	0.00
Chromium	18	3	3	1.10E-03	1.20E-03	LCV_DAPH	4.40E-02	0.03
Chromium	18	3	3	1.10E-03	1.20E-03	LCV_FISH	6.88E-02	0.02
Chromium	18	3	3	1.10E-03	1.20E-03	LTV_FISH	8.90E-02	0.01
Chromium	18	3	3	1.10E-03	1.20E-03	NAWQ_CHR	2.10E-01	0.01
Chromium	18	3	3	1.10E-03	1.20E-03	LCV_AQPL	3.97E-01	0.00
Chromium	18	3	3	1.10E-03	1.20E-03	NAWQ_ACU	1.70E+00	0.00
Cobalt	**0**	**3**	**5**	**1.15E-03**	**3.30E-03**	**S_CHR_V**	**3.06E-03**	**1.08**
Cobalt	0	3	5	1.15E-03	3.30E-03	LTV_DAPH	4.40E-03	0.75
Cobalt	0	3	5	1.15E-03	3.30E-03	LCV_DAPH	5.10E-03	0.65
Cobalt	0	3	5	1.15E-03	3.30E-03	S_ACU_V	1.95E-01	0.02
Cobalt	0	3	5	1.15E-03	3.30E-03	LCV_FISH	2.90E-01	0.01
Cobalt	0	3	5	1.15E-03	3.30E-03	LTV_FISH	8.10E-01	0.00

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Cobalt	2.01	1	1	1.90E-03	1.90E-03	S_CHR_V	3.06E-03	0.62
Cobalt	2.01	1	1	1.90E-03	1.90E-03	LTV_DAPH	4.40E-03	0.43
Cobalt	2.01	1	1	1.90E-03	1.90E-03	LCV_DAPH	5.10E-03	0.37
Cobalt	2.01	1	1	1.90E-03	1.90E-03	S_ACU_V	1.95E-01	0.01
Cobalt	2.01	1	1	1.90E-03	1.90E-03	LCV_FISH	2.90E-01	0.01
Cobalt	2.01	1	1	1.90E-03	1.90E-03	LTV_FISH	8.10E-01	0.00
Cobalt	2.04	1	6	1.50E-03	1.50E-03	S_CHR_V	3.06E-03	0.49
Cobalt	2.04	1	6	1.50E-03	1.50E-03	LTV_DAPH	4.40E-03	0.34
Cobalt	2.04	1	6	1.50E-03	1.50E-03	LCV_DAPH	5.10E-03	0.29
Cobalt	2.04	1	6	1.50E-03	1.50E-03	S_ACU_V	1.95E-01	0.01
Cobalt	2.04	1	6	1.50E-03	1.50E-03	LCV_FISH	2.90E-01	0.01
Cobalt	2.04	1	6	1.50E-03	1.50E-03	LTV_FISH	8.10E-01	0.00
Cobalt	**3.01**	**2**	**2**	**1.03E-02**	**1.39E-02**	**S_CHR_V**	**3.06E-03**	**4.54**
Cobalt	**3.01**	**2**	**2**	**1.03E-02**	**1.39E-02**	**LTV_DAPH**	**4.40E-03**	**3.16**
Cobalt	**3.01**	**2**	**2**	**1.03E-02**	**1.39E-02**	**LCV_DAPH**	**5.10E-03**	**2.73**
Cobalt	3.01	2	2	1.03E-02	1.39E-02	S_ACU_V	1.95E-01	0.07
Cobalt	3.01	2	2	1.03E-02	1.39E-02	LCV_FISH	2.90E-01	0.05
Cobalt	3.01	2	2	1.03E-02	1.39E-02	LTV_FISH	8.10E-01	0.02
Cobalt	**3.02**	**7**	**8**	**2.15E-03**	**4.00E-03**	**S_CHR_V**	**3.06E-03**	**1.31**
Cobalt	3.02	7	8	2.15E-03	4.00E-03	LTV_DAPH	4.40E-03	0.91
Cobalt	3.02	7	8	2.15E-03	4.00E-03	LCV_DAPH	5.10E-03	0.78
Cobalt	3.02	7	8	2.15E-03	4.00E-03	S_ACU_V	1.95E-01	0.02
Cobalt	3.02	7	8	2.15E-03	4.00E-03	LCV_FISH	2.90E-01	0.01
Cobalt	3.02	7	8	2.15E-03	4.00E-03	LTV_FISH	8.10E-01	0.00
Cobalt	**3.03**	**8**	**9**	**2.40E-03**	**6.52E-03**	**S_CHR_V**	**3.06E-03**	**2.13**
Cobalt	**3.03**	**8**	**9**	**2.40E-03**	**6.52E-03**	**LTV_DAPH**	**4.40E-03**	**1.48**
Cobalt	**3.03**	**8**	**9**	**2.40E-03**	**6.52E-03**	**LCV_DAPH**	**5.10E-03**	**1.28**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Cobalt	3.03	8	9	2.40E-03	6.52E-03	S_ACU_V	1.95E-01	0.03
Cobalt	3.03	8	9	2.40E-03	6.52E-03	LCV_FISH	2.90E-01	0.02
Cobalt	3.03	8	9	2.40E-03	6.52E-03	LTV_FISH	8.10E-01	0.01
Cobalt	3.04	5	6	1.43E-03	2.00E-03	S_CHR_V	3.06E-03	0.65
Cobalt	3.04	5	6	1.43E-03	2.00E-03	LTV_DAPH	4.40E-03	0.45
Cobalt	3.04	5	6	1.43E-03	2.00E-03	LCV_DAPH	5.10E-03	0.39
Cobalt	3.04	5	6	1.43E-03	2.00E-03	S_ACU_V	1.95E-01	0.01
Cobalt	3.04	5	6	1.43E-03	2.00E-03	LCV_FISH	2.90E-01	0.01
Cobalt	3.04	5	6	1.43E-03	2.00E-03	LTV_FISH	8.10E-01	0.00
Cobalt	4.01	1	9	1.30E-03	1.30E-03	S_CHR_V	3.06E-03	0.42
Cobalt	4.01	1	9	1.30E-03	1.30E-03	LTV_DAPH	4.40E-03	0.30
Cobalt	4.01	1	9	1.30E-03	1.30E-03	LCV_DAPH	5.10E-03	0.25
Cobalt	4.01	1	9	1.30E-03	1.30E-03	S_ACU_V	1.95E-01	0.01
Cobalt	4.01	1	9	1.30E-03	1.30E-03	LCV_FISH	2.90E-01	0.00
Cobalt	4.01	1	9	1.30E-03	1.30E-03	LTV_FISH	8.10E-01	0.00
Cobalt	4.02	5	6	1.25E-03	3.00E-03	S_CHR_V	3.06E-03	0.98
Cobalt	4.02	5	6	1.25E-03	3.00E-03	LTV_DAPH	4.40E-03	0.68
Cobalt	4.02	5	6	1.25E-03	3.00E-03	LCV_DAPH	5.10E-03	0.59
Cobalt	4.02	5	6	1.25E-03	3.00E-03	S_ACU_V	1.95E-01	0.02
Cobalt	4.02	5	6	1.25E-03	3.00E-03	LCV_FISH	2.90E-01	0.01
Cobalt	4.02	5	6	1.25E-03	3.00E-03	LTV_FISH	8.10E-01	0.00
Cobalt	**4.03**	**5**	**7**	**1.66E-03**	**1.23E-02**	**S_CHR_V**	**3.06E-03**	**4.01**
Cobalt	**4.03**	**5**	**7**	**1.66E-03**	**1.23E-02**	**LTV_DAPH**	**4.40E-03**	**2.79**
Cobalt	**4.03**	**5**	**7**	**1.66E-03**	**1.23E-02**	**LCV_DAPH**	**5.10E-03**	**2.41**
Cobalt	4.03	5	7	1.66E-03	1.23E-02	S_ACU_V	1.95E-01	0.06
Cobalt	4.03	5	7	1.66E-03	1.23E-02	LCV_FISH	2.90E-01	0.04
Cobalt	4.03	5	7	1.66E-03	1.23E-02	LTV_FISH	8.10E-01	0.02

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Cobalt	**4.04**	**10**	**11**	**1.50E-03**	**9.20E-03**	**S_CHR_V**	**3.06E-03**	**3.01**
Cobalt	**4.04**	**10**	**11**	**1.50E-03**	**9.20E-03**	**LTV_DAPH**	**4.40E-03**	**2.09**
Cobalt	**4.04**	**10**	**11**	**1.50E-03**	**9.20E-03**	**LCV_DAPH**	**5.10E-03**	**1.80**
Cobalt	4.04	10	11	1.50E-03	9.20E-03	S_ACU_V	1.95E-01	0.05
Cobalt	4.04	10	11	1.50E-03	9.20E-03	LCV_FISH	2.90E-01	0.03
Cobalt	4.04	10	11	1.50E-03	9.20E-03	LTV_FISH	8.10E-01	0.01
Cobalt	**13**	**4**	**5**	**1.50E-03**	**8.70E-03**	**S_CHR_V**	**3.06E-03**	**2.84**
Cobalt	**13**	**4**	**5**	**1.50E-03**	**8.70E-03**	**LTV_DAPH**	**4.40E-03**	**1.98**
Cobalt	**13**	**4**	**5**	**1.50E-03**	**8.70E-03**	**LCV_DAPH**	**5.10E-03**	**1.71**
Cobalt	13	4	5	1.50E-03	8.70E-03	S_ACU_V	1.95E-01	0.04
Cobalt	13	4	5	1.50E-03	8.70E-03	LCV_FISH	2.90E-01	0.03
Cobalt	13	4	5	1.50E-03	8.70E-03	LTV_FISH	8.10E-01	0.01
Cobalt	18	2	3	1.10E-03	1.40E-03	S_CHR_V	3.06E-03	0.46
Cobalt	18	2	3	1.10E-03	1.40E-03	LTV_DAPH	4.40E-03	0.32
Cobalt	18	2	3	1.10E-03	1.40E-03	LCV_DAPH	5.10E-03	0.27
Cobalt	18	2	3	1.10E-03	1.40E-03	S_ACU_V	1.95E-01	0.01
Cobalt	18	2	3	1.10E-03	1.40E-03	LCV_FISH	2.90E-01	0.00
Cobalt	18	2	3	1.10E-03	1.40E-03	LTV_FISH	8.10E-01	0.00
Copper	**0**	**5**	**5**	**2.00E-03**	**2.20E-03**	**LTV_DAPH**	**2.05E-04**	**10.73**
Copper	**0**	**5**	**5**	**2.00E-03**	**2.20E-03**	**LCV_DAPH**	**2.30E-04**	**9.57**
Copper	**0**	**5**	**5**	**2.00E-03**	**2.20E-03**	**LCV_AQPL**	**1.00E-03**	**2.20**
Copper	0	5	5	2.00E-03	2.20E-03	LCV_FISH	3.80E-03	0.58
Copper	0	5	5	2.00E-03	2.20E-03	LTV_FISH	5.00E-03	0.44
Copper	0	5	5	2.00E-03	2.20E-03	LCV_NDI	6.07E-03	0.36
Copper	0	5	5	2.00E-03	2.20E-03	NAWQ_CHR	1.20E-02	0.18
Copper	0	5	5	2.00E-03	2.20E-03	NAWQ_ACU	1.80E-02	0.12
Copper	**2.01**	**1**	**1**	**3.70E-03**	**3.70E-03**	**LTV_DAPH**	**2.05E-04**	**18.05**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Copper	**2.01**	**1**	**1**	**3.70E-03**	**3.70E-03**	**LCV_DAPH**	**2.30E-04**	**16.09**
Copper	**2.01**	**1**	**1**	**3.70E-03**	**3.70E-03**	**LCV_AQPL**	**1.00E-03**	**3.70**
Copper	2.01	1	1	3.70E-03	3.70E-03	LCV_FISH	3.80E-03	0.97
Copper	2.01	1	1	3.70E-03	3.70E-03	LTV_FISH	5.00E-03	0.74
Copper	2.01	1	1	3.70E-03	3.70E-03	LCV_NDI	6.07E-03	0.61
Copper	2.01	1	1	3.70E-03	3.70E-03	NAWQ_CHR	1.20E-02	0.31
Copper	2.01	1	1	3.70E-03	3.70E-03	NAWQ_ACU	1.80E-02	0.21
Copper	**2.03**	**1**	**1**	**1.10E-03**	**1.10E-03**	**LTV_DAPH**	**2.05E-04**	**5.37**
Copper	**2.03**	**1**	**1**	**1.10E-03**	**1.10E-03**	**LCV_DAPH**	**2.30E-04**	**4.78**
Copper	**2.03**	**1**	**1**	**1.10E-03**	**1.10E-03**	**LCV_AQPL**	**1.00E-03**	**1.10**
Copper	2.03	1	1	1.10E-03	1.10E-03	LCV_FISH	3.80E-03	0.29
Copper	2.03	1	1	1.10E-03	1.10E-03	LTV_FISH	5.00E-03	0.22
Copper	2.03	1	1	1.10E-03	1.10E-03	LCV_NDI	6.07E-03	0.18
Copper	2.03	1	1	1.10E-03	1.10E-03	NAWQ_CHR	1.20E-02	0.09
Copper	2.03	1	1	1.10E-03	1.10E-03	NAWQ_ACU	1.80E-02	0.06
Copper	**2.04**	**6**	**6**	**2.00E-03**	**2.90E-03**	**LTV_DAPH**	**2.05E-04**	**14.15**
Copper	**2.04**	**6**	**6**	**2.00E-03**	**2.90E-03**	**LCV_DAPH**	**2.30E-04**	**12.61**
Copper	**2.04**	**6**	**6**	**2.00E-03**	**2.90E-03**	**LCV_AQPL**	**1.00E-03**	**2.90**
Copper	2.04	6	6	2.00E-03	2.90E-03	LCV_FISH	3.80E-03	0.76
Copper	2.04	6	6	2.00E-03	2.90E-03	LTV_FISH	5.00E-03	0.58
Copper	2.04	6	6	2.00E-03	2.90E-03	LCV_NDI	6.07E-03	0.48
Copper	2.04	6	6	2.00E-03	2.90E-03	NAWQ_CHR	1.20E-02	0.24
Copper	2.04	6	6	2.00E-03	2.90E-03	NAWQ_ACU	1.80E-02	0.16
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LTV_DAPH**	**2.05E-04**	**57.07**
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LCV_DAPH**	**2.30E-04**	**50.87**
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LCV_AQPL**	**1.00E-03**	**11.70**
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LCV_FISH**	**3.80E-03**	**3.08**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LTV_FISH**	**5.00E-03**	**2.34**
Copper	**3.01**	**1**	**2**	**1.17E-02**	**1.17E-02**	**LCV_NDI**	**6.07E-03**	**1.93**
Copper	3.01	1	2	1.17E-02	1.17E-02	NAWQ_CHR	1.20E-02	0.98
Copper	3.01	1	2	1.17E-02	1.17E-02	NAWQ_ACU	1.80E-02	0.65
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LTV_DAPH**	**2.05E-04**	**41.95**
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LCV_DAPH**	**2.30E-04**	**37.39**
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LCV_AQPL**	**1.00E-03**	**8.60**
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LCV_FISH**	**3.80E-03**	**2.26**
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LTV_FISH**	**5.00E-03**	**1.72**
Copper	**3.02**	**8**	**8**	**3.50E-03**	**8.60E-03**	**LCV_NDI**	**6.07E-03**	**1.42**
Copper	3.02	8	8	3.50E-03	8.60E-03	NAWQ_CHR	1.20E-02	0.72
Copper	3.02	8	8	3.50E-03	8.60E-03	NAWQ_ACU	1.80E-02	0.48
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LTV_DAPH**	**2.05E-04**	**40.49**
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LCV_DAPH**	**2.30E-04**	**36.09**
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LCV_AQPL**	**1.00E-03**	**8.30**
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LCV_FISH**	**3.80E-03**	**2.18**
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LTV_FISH**	**5.00E-03**	**1.66**
Copper	**3.03**	**9**	**9**	**2.40E-03**	**8.30E-03**	**LCV_NDI**	**6.07E-03**	**1.37**
Copper	3.03	9	9	2.40E-03	8.30E-03	NAWQ_CHR	1.20E-02	0.69
Copper	3.03	9	9	2.40E-03	8.30E-03	NAWQ_ACU	1.80E-02	0.46
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LTV_DAPH**	**2.05E-04**	**66.10**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LCV_DAPH**	**2.30E-04**	**58.91**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LCV_AQPL**	**1.00E-03**	**13.55**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LCV_FISH**	**3.80E-03**	**3.57**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LTV_FISH**	**5.00E-03**	**2.71**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**LCV_NDI**	**6.07E-03**	**2.23**
Copper	**3.04**	**6**	**6**	**2.95E-03**	**1.36E-02**	**NAWQ_CHR**	**1.20E-02**	**1.13**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Copper	3.04	6	6	2.95E-03	1.36E-02	NAWQ_ACU	1.80E-02	0.75
Copper	**4.01**	**9**	**9**	**2.70E-03**	**4.00E-03**	**LTV_DAPH**	**2.05E-04**	**19.51**
Copper	**4.01**	**9**	**9**	**2.70E-03**	**4.00E-03**	**LCV_DAPH**	**2.30E-04**	**17.39**
Copper	**4.01**	**9**	**9**	**2.70E-03**	**4.00E-03**	**LCV_AQPL**	**1.00E-03**	**4.00**
Copper	**4.01**	**9**	**9**	**2.70E-03**	**4.00E-03**	**LCV_FISH**	**3.80E-03**	**1.05**
Copper	4.01	9	9	2.70E-03	4.00E-03	LTV_FISH	5.00E-03	0.80
Copper	4.01	9	9	2.70E-03	4.00E-03	LCV_NDI	6.07E-03	0.66
Copper	4.01	9	9	2.70E-03	4.00E-03	NAWQ_CHR	1.20E-02	0.33
Copper	4.01	9	9	2.70E-03	4.00E-03	NAWQ_ACU	1.80E-02	0.22
Copper	**4.02**	**6**	**6**	**2.25E-03**	**3.60E-03**	**LTV_DAPH**	**2.05E-04**	**17.56**
Copper	**4.02**	**6**	**6**	**2.25E-03**	**3.60E-03**	**LCV_DAPH**	**2.30E-04**	**15.65**
Copper	**4.02**	**6**	**6**	**2.25E-03**	**3.60E-03**	**LCV_AQPL**	**1.00E-03**	**3.60**
Copper	4.02	6	6	2.25E-03	3.60E-03	LCV_FISH	3.80E-03	0.95
Copper	4.02	6	6	2.25E-03	3.60E-03	LTV_FISH	5.00E-03	0.72
Copper	4.02	6	6	2.25E-03	3.60E-03	LCV_NDI	6.07E-03	0.59
Copper	4.02	6	6	2.25E-03	3.60E-03	NAWQ_CHR	1.20E-02	0.30
Copper	4.02	6	6	2.25E-03	3.60E-03	NAWQ_ACU	1.80E-02	0.20
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LTV_DAPH**	**2.05E-04**	**41.46**
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LCV_DAPH**	**2.30E-04**	**36.96**
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LCV_AQPL**	**1.00E-03**	**8.50**
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LCV_FISH**	**3.80E-03**	**2.24**
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LTV_FISH**	**5.00E-03**	**1.70**
Copper	**4.03**	**7**	**7**	**2.30E-03**	**8.50E-03**	**LCV_NDI**	**6.07E-03**	**1.40**
Copper	4.03	7	7	2.30E-03	8.50E-03	NAWQ_CHR	1.20E-02	0.71
Copper	4.03	7	7	2.30E-03	8.50E-03	NAWQ_ACU	1.80E-02	0.47
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LTV_DAPH**	**2.05E-04**	**40.49**
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LCV_DAPH**	**2.30E-04**	**36.09**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LCV_AQPL**	**1.00E-03**	**8.30**
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LCV_FISH**	**3.80E-03**	**2.18**
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LTV_FISH**	**5.00E-03**	**1.66**
Copper	**4.04**	**11**	**11**	**4.30E-03**	**8.30E-03**	**LCV_NDI**	**6.07E-03**	**1.37**
Copper	4.04	11	11	4.30E-03	8.30E-03	NAWQ_CHR	1.20E-02	0.69
Copper	4.04	11	11	4.30E-03	8.30E-03	NAWQ_ACU	1.80E-02	0.46
Copper	**7.01**	**1**	**1**	**4.20E-03**	**4.20E-03**	**LTV_DAPH**	**2.05E-04**	**20.49**
Copper	**7.01**	**1**	**1**	**4.20E-03**	**4.20E-03**	**LCV_DAPH**	**2.30E-04**	**18.26**
Copper	**7.01**	**1**	**1**	**4.20E-03**	**4.20E-03**	**LCV_AQPL**	**1.00E-03**	**4.20**
Copper	**7.01**	**1**	**1**	**4.20E-03**	**4.20E-03**	**LCV_FISH**	**3.80E-03**	**1.11**
Copper	7.01	1	1	4.20E-03	4.20E-03	LTV_FISH	5.00E-03	0.84
Copper	7.01	1	1	4.20E-03	4.20E-03	LCV_NDI	6.07E-03	0.69
Copper	7.01	1	1	4.20E-03	4.20E-03	NAWQ_CHR	1.20E-02	0.35
Copper	7.01	1	1	4.20E-03	4.20E-03	NAWQ_ACU	1.80E-02	0.23
Copper	**7.02**	**1**	**1**	**2.30E-03**	**2.30E-03**	**LTV_DAPH**	**2.05E-04**	**11.22**
Copper	**7.02**	**1**	**1**	**2.30E-03**	**2.30E-03**	**LCV_DAPH**	**2.30E-04**	**10.00**
Copper	**7.02**	**1**	**1**	**2.30E-03**	**2.30E-03**	**LCV_AQPL**	**1.00E-03**	**2.30**
Copper	7.02	1	1	2.30E-03	2.30E-03	LCV_FISH	3.80E-03	0.61
Copper	7.02	1	1	2.30E-03	2.30E-03	LTV_FISH	5.00E-03	0.46
Copper	7.02	1	1	2.30E-03	2.30E-03	LCV_NDI	6.07E-03	0.38
Copper	7.02	1	1	2.30E-03	2.30E-03	NAWQ_CHR	1.20E-02	0.19
Copper	7.02	1	1	2.30E-03	2.30E-03	NAWQ_ACU	1.80E-02	0.13
Copper	**8**	**1**	**1**	**2.60E-03**	**2.60E-03**	**LTV_DAPH**	**2.05E-04**	**12.68**
Copper	**8**	**1**	**1**	**2.60E-03**	**2.60E-03**	**LCV_DAPH**	**2.30E-04**	**11.30**
Copper	**8**	**1**	**1**	**2.60E-03**	**2.60E-03**	**LCV_AQPL**	**1.00E-03**	**2.60**
Copper	8	1	1	2.60E-03	2.60E-03	LCV_FISH	3.80E-03	0.68
Copper	8	1	1	2.60E-03	2.60E-03	LTV_FISH	5.00E-03	0.52

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Copper	8	1	1	2.60E-03	2.60E-03	LCV_NDI	6.07E-03	0.43
Copper	8	1	1	2.60E-03	2.60E-03	NAWQ_CHR	1.20E-02	0.22
Copper	8	1	1	2.60E-03	2.60E-03	NAWQ_ACU	1.80E-02	0.14
Copper	**13**	**4**	**5**	**1.30E-03**	**3.50E-03**	**LTV_DAPH**	**2.05E-04**	**17.07**
Copper	**13**	**4**	**5**	**1.30E-03**	**3.50E-03**	**LCV_DAPH**	**2.30E-04**	**15.22**
Copper	**13**	**4**	**5**	**1.30E-03**	**3.50E-03**	**LCV_AQPL**	**1.00E-03**	**3.50**
Copper	13	4	5	1.30E-03	3.50E-03	LCV_FISH	3.80E-03	0.92
Copper	13	4	5	1.30E-03	3.50E-03	LTV_FISH	5.00E-03	0.70
Copper	13	4	5	1.30E-03	3.50E-03	LCV_NDI	6.07E-03	0.58
Copper	13	4	5	1.30E-03	3.50E-03	NAWQ_CHR	1.20E-02	0.29
Copper	13	4	5	1.30E-03	3.50E-03	NAWQ_ACU	1.80E-02	0.19
Copper	**18**	**3**	**3**	**4.90E-03**	**5.40E-03**	**LTV_DAPH**	**2.05E-04**	**26.34**
Copper	**18**	**3**	**3**	**4.90E-03**	**5.40E-03**	**LCV_DAPH**	**2.30E-04**	**23.48**
Copper	**18**	**3**	**3**	**4.90E-03**	**5.40E-03**	**LCV_AQPL**	**1.00E-03**	**5.40**
Copper	**18**	**3**	**3**	**4.90E-03**	**5.40E-03**	**LCV_FISH**	**3.80E-03**	**1.42**
Copper	**18**	**3**	**3**	**4.90E-03**	**5.40E-03**	**LTV_FISH**	**5.00E-03**	**1.08**
Copper	18	3	3	4.90E-03	5.40E-03	LCV_NDI	6.07E-03	0.89
Copper	18	3	3	4.90E-03	5.40E-03	NAWQ_CHR	1.20E-02	0.45
Copper	18	3	3	4.90E-03	5.40E-03	NAWQ_ACU	1.80E-02	0.30
Iron	**0**	**5**	**5**	**3.29E-02**	**2.18E-01**	**LTV_DAPH**	**1.60E-02**	**13.63**
Iron	**0**	**5**	**5**	**3.29E-02**	**2.18E-01**	**LCV_DAPH**	**1.58E-01**	**1.38**
Iron	0	5	5	3.29E-02	2.18E-01	NAWQ_CHR	1.00E+00	0.22
Iron	0	5	5	3.29E-02	2.18E-01	LCV_FISH	1.30E+00	0.17
Iron	**2.01**	**1**	**1**	**3.40E-01**	**3.40E-01**	**LTV_DAPH**	**1.60E-02**	**21.25**
Iron	**2.01**	**1**	**1**	**3.40E-01**	**3.40E-01**	**LCV_DAPH**	**1.58E-01**	**2.15**
Iron	2.01	1	1	3.40E-01	3.40E-01	NAWQ_CHR	1.00E+00	0.34
Iron	2.01	1	1	3.40E-01	3.40E-01	LCV_FISH	1.30E+00	0.26

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Iron	**2.03**	**1**	**1**	**2.41E-01**	**2.41E-01**	**LTV_DAPH**	**1.60E-02**	**15.06**
Iron	**2.03**	**1**	**1**	**2.41E-01**	**2.41E-01**	**LCV_DAPH**	**1.58E-01**	**1.53**
Iron	2.03	1	1	2.41E-01	2.41E-01	NAWQ_CHR	1.00E+00	0.24
Iron	2.03	1	1	2.41E-01	2.41E-01	LCV_FISH	1.30E+00	0.19
Iron	**2.04**	**6**	**6**	**5.41E-02**	**1.72E-01**	**LTV_DAPH**	**1.60E-02**	**10.75**
Iron	**2.04**	**6**	**6**	**5.41E-02**	**1.72E-01**	**LCV_DAPH**	**1.58E-01**	**1.09**
Iron	2.04	6	6	5.41E-02	1.72E-01	NAWQ_CHR	1.00E+00	0.17
Iron	2.04	6	6	5.41E-02	1.72E-01	LCV_FISH	1.30E+00	0.13
Iron	**3.01**	**1**	**2**	**3.09E-02**	**3.09E-02**	**LTV_DAPH**	**1.60E-02**	**1.93**
Iron	3.01	1	2	3.09E-02	3.09E-02	LCV_DAPH	1.58E-01	0.20
Iron	3.01	1	2	3.09E-02	3.09E-02	NAWQ_CHR	1.00E+00	0.03
Iron	3.01	1	2	3.09E-02	3.09E-02	LCV_FISH	1.30E+00	0.02
Iron	**3.02**	**8**	**8**	**8.61E-02**	**2.12E+00**	**LTV_DAPH**	**1.60E-02**	**132.50**
Iron	**3.02**	**8**	**8**	**8.61E-02**	**2.12E+00**	**LCV_DAPH**	**1.58E-01**	**13.42**
Iron	**3.02**	**8**	**8**	**8.61E-02**	**2.12E+00**	**NAWQ_CHR**	**1.00E+00**	**2.12**
Iron	**3.02**	**8**	**8**	**8.61E-02**	**2.12E+00**	**LCV_FISH**	**1.30E+00**	**1.63**
Iron	**3.03**	**8**	**9**	**4.18E-02**	**2.35E-01**	**LTV_DAPH**	**1.60E-02**	**14.71**
Iron	**3.03**	**8**	**9**	**4.18E-02**	**2.35E-01**	**LCV_DAPH**	**1.58E-01**	**1.49**
Iron	3.03	8	9	4.18E-02	2.35E-01	NAWQ_CHR	1.00E+00	0.24
Iron	3.03	8	9	4.18E-02	2.35E-01	LCV_FISH	1.30E+00	0.18
Iron	**3.04**	**6**	**6**	**9.75E-02**	**3.68E-01**	**LTV_DAPH**	**1.60E-02**	**22.97**
Iron	**3.04**	**6**	**6**	**9.75E-02**	**3.68E-01**	**LCV_DAPH**	**1.58E-01**	**2.33**
Iron	3.04	6	6	9.75E-02	3.68E-01	NAWQ_CHR	1.00E+00	0.37
Iron	3.04	6	6	9.75E-02	3.68E-01	LCV_FISH	1.30E+00	0.28
Iron	**4.01**	**9**	**9**	**3.22E-01**	**3.62E-01**	**LTV_DAPH**	**1.60E-02**	**22.63**
Iron	**4.01**	**9**	**9**	**3.22E-01**	**3.62E-01**	**LCV_DAPH**	**1.58E-01**	**2.29**
Iron	4.01	9	9	3.22E-01	3.62E-01	NAWQ_CHR	1.00E+00	0.36

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Iron	4.01	9	9	3.22E-01	3.62E-01	LCV_FISH	1.30E+00	0.28
Iron	**4.02**	**6**	**6**	**4.14E-02**	**8.64E-02**	**LTV_DAPH**	**1.60E-02**	**5.40**
Iron	4.02	6	6	4.14E-02	8.64E-02	LCV_DAPH	1.58E-01	0.55
Iron	4.02	6	6	4.14E-02	8.64E-02	NAWQ_CHR	1.00E+00	0.09
Iron	4.02	6	6	4.14E-02	8.64E-02	LCV_FISH	1.30E+00	0.07
Iron	**4.03**	**7**	**7**	**3.14E-02**	**1.00E-01**	**LTV_DAPH**	**1.60E-02**	**6.26**
Iron	4.03	7	7	3.14E-02	1.00E-01	LCV_DAPH	1.58E-01	0.63
Iron	4.03	7	7	3.14E-02	1.00E-01	NAWQ_CHR	1.00E+00	0.10
Iron	4.03	7	7	3.14E-02	1.00E-01	LCV_FISH	1.30E+00	0.08
Iron	**4.04**	**11**	**11**	**2.42E-01**	**6.03E+00**	**LTV_DAPH**	**1.60E-02**	**376.88**
Iron	**4.04**	**11**	**11**	**2.42E-01**	**6.03E+00**	**LCV_DAPH**	**1.58E-01**	**38.16**
Iron	**4.04**	**11**	**11**	**2.42E-01**	**6.03E+00**	**NAWQ_CHR**	**1.00E+00**	**6.03**
Iron	**4.04**	**11**	**11**	**2.42E-01**	**6.03E+00**	**LCV_FISH**	**1.30E+00**	**4.64**
Iron	**7.01**	**1**	**1**	**3.32E-02**	**3.32E-02**	**LTV_DAPH**	**1.60E-02**	**2.08**
Iron	7.01	1	1	3.32E-02	3.32E-02	LCV_DAPH	1.58E-01	0.21
Iron	7.01	1	1	3.32E-02	3.32E-02	NAWQ_CHR	1.00E+00	0.03
Iron	7.01	1	1	3.32E-02	3.32E-02	LCV_FISH	1.30E+00	0.03
Iron	**7.02**	**1**	**1**	**2.20E-02**	**2.20E-02**	**LTV_DAPH**	**1.60E-02**	**1.38**
Iron	7.02	1	1	2.20E-02	2.20E-02	LCV_DAPH	1.58E-01	0.14
Iron	7.02	1	1	2.20E-02	2.20E-02	NAWQ_CHR	1.00E+00	0.02
Iron	7.02	1	1	2.20E-02	2.20E-02	LCV_FISH	1.30E+00	0.02
Iron	**8**	**1**	**1**	**2.86E-02**	**2.86E-02**	**LTV_DAPH**	**1.60E-02**	**1.79**
Iron	8	1	1	2.86E-02	2.86E-02	LCV_DAPH	1.58E-01	0.18
Iron	8	1	1	2.86E-02	2.86E-02	NAWQ_CHR	1.00E+00	0.03
Iron	8	1	1	2.86E-02	2.86E-02	LCV_FISH	1.30E+00	0.02
Iron	**13**	**1**	**5**	**4.42E-02**	**4.42E-02**	**LTV_DAPH**	**1.60E-02**	**2.76**
Iron	13	1	5	4.42E-02	4.42E-02	LCV_DAPH	1.58E-01	0.28

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Iron	13	1	5	4.42E-02	4.42E-02	NAWQ_CHR	1.00E+00	0.04
Iron	13	1	5	4.42E-02	4.42E-02	LCV_FISH	1.30E+00	0.03
Iron	**18**	**3**	**3**	**1.27E-01**	**1.86E-01**	**LTV_DAPH**	**1.60E-02**	**11.63**
Iron	**18**	**3**	**3**	**1.27E-01**	**1.86E-01**	**LCV_DAPH**	**1.58E-01**	**1.18**
Iron	18	3	3	1.27E-01	1.86E-01	NAWQ_CHR	1.00E+00	0.19
Iron	18	3	3	1.27E-01	1.86E-01	LCV_FISH	1.30E+00	0.14
Lead	4.03	3	7	1.20E-03	2.80E-03	NAWQ_CHR	3.20E-03	0.88
Lead	4.03	3	7	1.20E-03	2.80E-03	LCV_DAPH	1.23E-02	0.23
Lead	4.03	3	7	1.20E-03	2.80E-03	LCV_FISH	1.89E-02	0.15
Lead	4.03	3	7	1.20E-03	2.80E-03	LTV_FISH	2.20E-02	0.13
Lead	4.03	3	7	1.20E-03	2.80E-03	LCV_NDI	2.55E-02	0.11
Lead	4.03	3	7	1.20E-03	2.80E-03	NAWQ_ACU	8.20E-02	0.03
Lead	4.03	3	7	1.20E-03	2.80E-03	LCV_AQPL	5.00E-01	0.01
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**S_CHR_V**	**8.03E-02**	**141.97**
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**LCV_DAPH**	**1.10E+00**	**10.36**
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**LTV_DAPH**	**1.10E+00**	**10.36**
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**LTV_FISH**	**1.27E+00**	**8.98**
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**S_ACU_V**	**1.47E+00**	**7.76**
Manganese	**0**	**4**	**5**	**5.14E+00**	**1.14E+01**	**LCV_FISH**	**1.77E+00**	**6.44**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**S_CHR_V**	**8.03E-02**	**80.45**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**LCV_DAPH**	**1.10E+00**	**5.87**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**LTV_DAPH**	**1.10E+00**	**5.87**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**LTV_FISH**	**1.27E+00**	**5.09**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**S_ACU_V**	**1.47E+00**	**4.39**
Manganese	**2.01**	**1**	**1**	**6.46E+00**	**6.46E+00**	**LCV_FISH**	**1.77E+00**	**3.65**
Manganese	2.03	1	1	3.00E-03	3.00E-03	S_CHR_V	8.03E-02	0.04
Manganese	2.03	1	1	3.00E-03	3.00E-03	LCV_DAPH	1.10E+00	0.00

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Manganese	2.03	1	1	3.00E-03	3.00E-03	LTV_DAPH	1.10E+00	0.00
Manganese	2.03	1	1	3.00E-03	3.00E-03	LTV_FISH	1.27E+00	0.00
Manganese	2.03	1	1	3.00E-03	3.00E-03	S_ACU_V	1.47E+00	0.00
Manganese	2.03	1	1	3.00E-03	3.00E-03	LCV_FISH	1.77E+00	0.00
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**S_CHR_V**	**8.03E-02**	**39.36**
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**LCV_DAPH**	**1.10E+00**	**2.87**
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**LTV_DAPH**	**1.10E+00**	**2.87**
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**LTV_FISH**	**1.27E+00**	**2.49**
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**S_ACU_V**	**1.47E+00**	**2.15**
Manganese	**2.04**	**6**	**6**	**1.17E+00**	**3.16E+00**	**LCV_FISH**	**1.77E+00**	**1.79**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**S_CHR_V**	**8.03E-02**	**32.50**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**LCV_DAPH**	**1.10E+00**	**2.37**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**LTV_DAPH**	**1.10E+00**	**2.37**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**LTV_FISH**	**1.27E+00**	**2.06**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**S_ACU_V**	**1.47E+00**	**1.78**
Manganese	**3.01**	**2**	**2**	**2.41E+00**	**2.61E+00**	**LCV_FISH**	**1.77E+00**	**1.47**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**S_CHR_V**	**8.03E-02**	**120.42**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**LCV_DAPH**	**1.10E+00**	**8.79**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**LTV_DAPH**	**1.10E+00**	**8.79**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**LTV_FISH**	**1.27E+00**	**7.61**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**S_ACU_V**	**1.47E+00**	**6.58**
Manganese	**3.02**	**8**	**8**	**4.14E+00**	**9.67E+00**	**LCV_FISH**	**1.77E+00**	**5.46**
Manganese	**3.03**	**9**	**9**	**3.31E+00**	**5.78E+00**	**S_CHR_V**	**8.03E-02**	**72.02**
Manganese	**3.03**	**9**	**9**	**3.31E+00**	**5.78E+00**	**LCV_DAPH**	**1.10E+00**	**5.26**
Manganese	**3.03**	**9**	**9**	**3.31E+00**	**5.78E+00**	**LTV_DAPH**	**1.10E+00**	**5.26**
Manganese	**3.03**	**9**	**9**	**3.31E+00**	**5.78E+00**	**LTV_FISH**	**1.27E+00**	**4.55**
Manganese	**3.03**	**9**	**9**	**3.31E+00**	**5.78E+00**	**S_ACU_V**	**1.47E+00**	**3.93**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Manganese	3.03	9	9	3.31E+00	5.78E+00	LCV_FISH	1.77E+00	3.27
Manganese	3.04	6	6	3.03E+00	6.30E+00	S_CHR_V	8.03E-02	78.46
Manganese	3.04	6	6	3.03E+00	6.30E+00	LCV_DAPH	1.10E+00	5.73
Manganese	3.04	6	6	3.03E+00	6.30E+00	LTV_DAPH	1.10E+00	5.73
Manganese	3.04	6	6	3.03E+00	6.30E+00	LTV_FISH	1.27E+00	4.96
Manganese	3.04	6	6	3.03E+00	6.30E+00	S_ACU_V	1.47E+00	4.29
Manganese	3.04	6	6	3.03E+00	6.30E+00	LCV_FISH	1.77E+00	3.56
Manganese	4.01	9	9	1.79E-01	2.39E+00	S_CHR_V	8.03E-02	29.76
Manganese	4.01	9	9	1.79E-01	2.39E+00	LCV_DAPH	1.10E+00	2.17
Manganese	4.01	9	9	1.79E-01	2.39E+00	LTV_DAPH	1.10E+00	2.17
Manganese	4.01	9	9	1.79E-01	2.39E+00	LTV_FISH	1.27E+00	1.88
Manganese	4.01	9	9	1.79E-01	2.39E+00	S_ACU_V	1.47E+00	1.63
Manganese	4.01	9	9	1.79E-01	2.39E+00	LCV_FISH	1.77E+00	1.35
Manganese	4.02	6	6	3.90E+00	7.85E+00	S_CHR_V	8.03E-02	97.76
Manganese	4.02	6	6	3.90E+00	7.85E+00	LCV_DAPH	1.10E+00	7.14
Manganese	4.02	6	6	3.90E+00	7.85E+00	LTV_DAPH	1.10E+00	7.14
Manganese	4.02	6	6	3.90E+00	7.85E+00	LTV_FISH	1.27E+00	6.18
Manganese	4.02	6	6	3.90E+00	7.85E+00	S_ACU_V	1.47E+00	5.34
Manganese	4.02	6	6	3.90E+00	7.85E+00	LCV_FISH	1.77E+00	4.44
Manganese	4.03	7	7	2.77E+00	1.95E+01	S_CHR_V	8.03E-02	243.30
Manganese	4.03	7	7	2.77E+00	1.95E+01	LCV_DAPH	1.10E+00	17.76
Manganese	4.03	7	7	2.77E+00	1.95E+01	LTV_DAPH	1.10E+00	17.76
Manganese	4.03	7	7	2.77E+00	1.95E+01	LTV_FISH	1.27E+00	15.38
Manganese	4.03	7	7	2.77E+00	1.95E+01	S_ACU_V	1.47E+00	13.29
Manganese	4.03	7	7	2.77E+00	1.95E+01	LCV_FISH	1.77E+00	11.04
Manganese	4.04	8	11	2.87E+00	4.34E+00	S_CHR_V	8.03E-02	54.05
Manganese	4.04	8	11	2.87E+00	4.34E+00	LCV_DAPH	1.10E+00	3.95

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Manganese	4.04	8	11	2.87E+00	4.34E+00	LTV_DAPH	1.10E+00	3.95
Manganese	4.04	8	11	2.87E+00	4.34E+00	LTV_FISH	1.27E+00	3.42
Manganese	4.04	8	11	2.87E+00	4.34E+00	S_ACU_V	1.47E+00	2.95
Manganese	4.04	8	11	2.87E+00	4.34E+00	LCV_FISH	1.77E+00	2.45
Manganese	7.01	1	1	5.23E+00	5.23E+00	S_CHR_V	8.03E-02	65.13
Manganese	7.01	1	1	5.23E+00	5.23E+00	LCV_DAPH	1.10E+00	4.75
Manganese	7.01	1	1	5.23E+00	5.23E+00	LTV_DAPH	1.10E+00	4.75
Manganese	7.01	1	1	5.23E+00	5.23E+00	LTV_FISH	1.27E+00	4.12
Manganese	7.01	1	1	5.23E+00	5.23E+00	S_ACU_V	1.47E+00	3.56
Manganese	7.01	1	1	5.23E+00	5.23E+00	LCV_FISH	1.77E+00	2.95
Manganese	7.02	1	1	4.17E+00	4.17E+00	S_CHR_V	8.03E-02	51.93
Manganese	7.02	1	1	4.17E+00	4.17E+00	LCV_DAPH	1.10E+00	3.79
Manganese	7.02	1	1	4.17E+00	4.17E+00	LTV_DAPH	1.10E+00	3.79
Manganese	7.02	1	1	4.17E+00	4.17E+00	LTV_FISH	1.27E+00	3.28
Manganese	7.02	1	1	4.17E+00	4.17E+00	S_ACU_V	1.47E+00	2.84
Manganese	7.02	1	1	4.17E+00	4.17E+00	LCV_FISH	1.77E+00	2.36
Manganese	8	1	1	3.35E+00	3.35E+00	S_CHR_V	8.03E-02	41.72
Manganese	8	1	1	3.35E+00	3.35E+00	LCV_DAPH	1.10E+00	3.05
Manganese	8	1	1	3.35E+00	3.35E+00	LTV_DAPH	1.10E+00	3.05
Manganese	8	1	1	3.35E+00	3.35E+00	LTV_FISH	1.27E+00	2.64
Manganese	8	1	1	3.35E+00	3.35E+00	S_ACU_V	1.47E+00	2.28
Manganese	8	1	1	3.35E+00	3.35E+00	LCV_FISH	1.77E+00	1.89
Manganese	13	5	5	5.33E+00	9.09E+00	S_CHR_V	8.03E-02	113.20
Manganese	13	5	5	5.33E+00	9.09E+00	LCV_DAPH	1.10E+00	8.26
Manganese	13	5	5	5.33E+00	9.09E+00	LTV_DAPH	1.10E+00	8.26
Manganese	13	5	5	5.33E+00	9.09E+00	LTV_FISH	1.27E+00	7.16
Manganese	13	5	5	5.33E+00	9.09E+00	S_ACU_V	1.47E+00	6.18

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Manganese	**13**	**5**	**5**	**5.33E+00**	**9.09E+00**	**LCV_FISH**	**1.77E+00**	**5.14**
Mercury	**3.01**	**2**	**4**	**5.60E-04**	**6.02E-04**	**LCV_FISH**	**2.30E-04**	**2.62**
Mercury	3.01	2	4	5.60E-04	6.02E-04	LTV_DAPH	8.70E-04	0.69
Mercury	3.01	2	4	5.60E-04	6.02E-04	LTV_FISH	8.70E-04	0.69
Mercury	3.01	2	4	5.60E-04	6.02E-04	LCV_DAPH	9.60E-04	0.63
Mercury	3.01	2	4	5.60E-04	6.02E-04	S_CHR_V	1.30E-03	0.46
Mercury	3.01	2	4	5.60E-04	6.02E-04	NAWQ_ACU	2.40E-03	0.25
Mercury	3.01	2	4	5.60E-04	6.02E-04	LCV_AQPL	5.00E-03	0.12
Mercury	**3.02**	**5**	**12**	**9.60E-06**	**2.30E-04**	**LCV_FISH**	**2.30E-04**	**1.00**
Mercury	3.02	5	12	9.60E-06	2.30E-04	LTV_DAPH	8.70E-04	0.26
Mercury	3.02	5	12	9.60E-06	2.30E-04	LTV_FISH	8.70E-04	0.26
Mercury	3.02	5	12	9.60E-06	2.30E-04	LCV_DAPH	9.60E-04	0.24
Mercury	3.02	5	12	9.60E-06	2.30E-04	S_CHR_V	1.30E-03	0.18
Mercury	3.02	5	12	9.60E-06	2.30E-04	NAWQ_ACU	2.40E-03	0.10
Mercury	3.02	5	12	9.60E-06	2.30E-04	LCV_AQPL	5.00E-03	0.05
Mercury	3.03	9	17	1.37E-05	2.00E-04	LCV_FISH	2.30E-04	0.87
Mercury	3.03	9	17	1.37E-05	2.00E-04	LTV_DAPH	8.70E-04	0.23
Mercury	3.03	9	17	1.37E-05	2.00E-04	LTV_FISH	8.70E-04	0.23
Mercury	3.03	9	17	1.37E-05	2.00E-04	LCV_DAPH	9.60E-04	0.21
Mercury	3.03	9	17	1.37E-05	2.00E-04	S_CHR_V	1.30E-03	0.15
Mercury	3.03	9	17	1.37E-05	2.00E-04	NAWQ_ACU	2.40E-03	0.08
Mercury	3.03	9	17	1.37E-05	2.00E-04	LCV_AQPL	5.00E-03	0.04
Mercury	3.04	4	12	9.47E-06	3.60E-05	LCV_FISH	2.30E-04	0.16
Mercury	3.04	4	12	9.47E-06	3.60E-05	LTV_DAPH	8.70E-04	0.04
Mercury	3.04	4	12	9.47E-06	3.60E-05	LTV_FISH	8.70E-04	0.04
Mercury	3.04	4	12	9.47E-06	3.60E-05	LCV_DAPH	9.60E-04	0.04
Mercury	3.04	4	12	9.47E-06	3.60E-05	S_CHR_V	1.30E-03	0.03

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Mercury	3.04	4	12	9.47E-06	3.60E-05	NAWQ_ACU	2.40E-03	0.02
Mercury	3.04	4	12	9.47E-06	3.60E-05	LCV_AQPL	5.00E-03	0.01
Mercury	4.01	1	14	5.54E-06	5.54E-06	LCV_FISH	2.30E-04	0.02
Mercury	4.01	1	14	5.54E-06	5.54E-06	LTV_DAPH	8.70E-04	0.01
Mercury	4.01	1	14	5.54E-06	5.54E-06	LTV_FISH	8.70E-04	0.01
Mercury	4.01	1	14	5.54E-06	5.54E-06	LCV_DAPH	9.60E-04	0.01
Mercury	4.01	1	14	5.54E-06	5.54E-06	S_CHR_V	1.30E-03	0.00
Mercury	4.01	1	14	5.54E-06	5.54E-06	NAWQ_ACU	2.40E-03	0.00
Mercury	4.01	1	14	5.54E-06	5.54E-06	LCV_AQPL	5.00E-03	0.00
Mercury	4.03	1	8	9.15E-06	9.15E-06	LCV_FISH	2.30E-04	0.04
Mercury	4.03	1	8	9.15E-06	9.15E-06	LTV_DAPH	8.70E-04	0.01
Mercury	4.03	1	8	9.15E-06	9.15E-06	LTV_FISH	8.70E-04	0.01
Mercury	4.03	1	8	9.15E-06	9.15E-06	LCV_DAPH	9.60E-04	0.01
Mercury	4.03	1	8	9.15E-06	9.15E-06	S_CHR_V	1.30E-03	0.01
Mercury	4.03	1	8	9.15E-06	9.15E-06	NAWQ_ACU	2.40E-03	0.00
Mercury	4.03	1	8	9.15E-06	9.15E-06	LCV_AQPL	5.00E-03	0.00
Mercury	**4.04**	**1**	**14**	**8.10E-04**	**8.10E-04**	**LCV_FISH**	**2.30E-04**	**3.52**
Mercury	4.04	1	14	8.10E-04	8.10E-04	LTV_DAPH	8.70E-04	0.93
Mercury	4.04	1	14	8.10E-04	8.10E-04	LTV_FISH	8.70E-04	0.93
Mercury	4.04	1	14	8.10E-04	8.10E-04	LCV_DAPH	9.60E-04	0.84
Mercury	4.04	1	14	8.10E-04	8.10E-04	S_CHR_V	1.30E-03	0.62
Mercury	4.04	1	14	8.10E-04	8.10E-04	NAWQ_ACU	2.40E-03	0.34
Mercury	4.04	1	14	8.10E-04	8.10E-04	LCV_AQPL	5.00E-03	0.16
Mercury	13	3	10	4.92E-06	1.30E-05	LCV_FISH	2.30E-04	0.06
Mercury	13	3	10	4.92E-06	1.30E-05	LTV_DAPH	8.70E-04	0.01
Mercury	13	3	10	4.92E-06	1.30E-05	LTV_FISH	8.70E-04	0.01
Mercury	13	3	10	4.92E-06	1.30E-05	LCV_DAPH	9.60E-04	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Mercury	13	3	10	4.92E-06	1.30E-05	S_CHR_V	1.30E-03	0.01
Mercury	13	3	10	4.92E-06	1.30E-05	NAWQ_ACU	2.40E-03	0.01
Mercury	13	3	10	4.92E-06	1.30E-05	LCV_AQPL	5.00E-03	0.00
Nickel	**0**	**4**	**5**	**1.45E-02**	**2.35E-02**	**LCV_AQPL**	**5.00E-03**	**4.70**
Nickel	**0**	**4**	**5**	**1.45E-02**	**2.35E-02**	**LCV_DAPH**	**5.00E-03**	**4.70**
Nickel	0	4	5	1.45E-02	2.35E-02	LCV_FISH	3.50E-02	0.67
Nickel	0	4	5	1.45E-02	2.35E-02	LTV_DAPH	4.50E-02	0.52
Nickel	0	4	5	1.45E-02	2.35E-02	LTV_FISH	6.20E-02	0.38
Nickel	0	4	5	1.45E-02	2.35E-02	LCV_NDI	1.28E-01	0.18
Nickel	0	4	5	1.45E-02	2.35E-02	NAWQ_CHR	1.60E-01	0.15
Nickel	0	4	5	1.45E-02	2.35E-02	NAWQ_ACU	1.40E+00	0.02
Nickel	2.01	1	1	2.60E-03	2.60E-03	LCV_AQPL	5.00E-03	0.52
Nickel	2.01	1	1	2.60E-03	2.60E-03	LCV_DAPH	5.00E-03	0.52
Nickel	2.01	1	1	2.60E-03	2.60E-03	LCV_FISH	3.50E-02	0.07
Nickel	2.01	1	1	2.60E-03	2.60E-03	LTV_DAPH	4.50E-02	0.06
Nickel	2.01	1	1	2.60E-03	2.60E-03	LTV_FISH	6.20E-02	0.04
Nickel	2.01	1	1	2.60E-03	2.60E-03	LCV_NDI	1.28E-01	0.02
Nickel	2.01	1	1	2.60E-03	2.60E-03	NAWQ_CHR	1.60E-01	0.02
Nickel	2.01	1	1	2.60E-03	2.60E-03	NAWQ_ACU	1.40E+00	0.00
Nickel	**2.04**	**6**	**6**	**5.58E-03**	**1.69E-02**	**LCV_AQPL**	**5.00E-03**	**3.37**
Nickel	**2.04**	**6**	**6**	**5.58E-03**	**1.69E-02**	**LCV_DAPH**	**5.00E-03**	**3.37**
Nickel	2.04	6	6	5.58E-03	1.69E-02	LCV_FISH	3.50E-02	0.48
Nickel	2.04	6	6	5.58E-03	1.69E-02	LTV_DAPH	4.50E-02	0.37
Nickel	2.04	6	6	5.58E-03	1.69E-02	LTV_FISH	6.20E-02	0.27
Nickel	2.04	6	6	5.58E-03	1.69E-02	LCV_NDI	1.28E-01	0.13
Nickel	2.04	6	6	5.58E-03	1.69E-02	NAWQ_CHR	1.60E-01	0.11
Nickel	2.04	6	6	5.58E-03	1.69E-02	NAWQ_ACU	1.40E+00	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Nickel	**3.01**	**2**	**2**	**5.41E-02**	**1.01E-01**	**LCV_AQPL**	**5.00E-03**	**20.20**
Nickel	**3.01**	**2**	**2**	**5.41E-02**	**1.01E-01**	**LCV_DAPH**	**5.00E-03**	**20.20**
Nickel	**3.01**	**2**	**2**	**5.41E-02**	**1.01E-01**	**LCV_FISH**	**3.50E-02**	**2.89**
Nickel	**3.01**	**2**	**2**	**5.41E-02**	**1.01E-01**	**LTV_DAPH**	**4.50E-02**	**2.24**
Nickel	**3.01**	**2**	**2**	**5.41E-02**	**1.01E-01**	**LTV_FISH**	**6.20E-02**	**1.63**
Nickel	3.01	2	2	5.41E-02	1.01E-01	LCV_NDI	1.28E-01	0.79
Nickel	3.01	2	2	5.41E-02	1.01E-01	NAWQ_CHR	1.60E-01	0.63
Nickel	3.01	2	2	5.41E-02	1.01E-01	NAWQ_ACU	1.40E+00	0.07
Nickel	**3.02**	**7**	**8**	**9.85E-03**	**4.15E-02**	**LCV_AQPL**	**5.00E-03**	**8.30**
Nickel	**3.02**	**7**	**8**	**9.85E-03**	**4.15E-02**	**LCV_DAPH**	**5.00E-03**	**8.30**
Nickel	**3.02**	**7**	**8**	**9.85E-03**	**4.15E-02**	**LCV_FISH**	**3.50E-02**	**1.19**
Nickel	3.02	7	8	9.85E-03	4.15E-02	LTV_DAPH	4.50E-02	0.92
Nickel	3.02	7	8	9.85E-03	4.15E-02	LTV_FISH	6.20E-02	0.67
Nickel	3.02	7	8	9.85E-03	4.15E-02	LCV_NDI	1.28E-01	0.32
Nickel	3.02	7	8	9.85E-03	4.15E-02	NAWQ_CHR	1.60E-01	0.26
Nickel	3.02	7	8	9.85E-03	4.15E-02	NAWQ_ACU	1.40E+00	0.03
Nickel	**3.03**	**9**	**9**	**1.09E-02**	**2.52E-02**	**LCV_AQPL**	**5.00E-03**	**5.04**
Nickel	**3.03**	**9**	**9**	**1.09E-02**	**2.52E-02**	**LCV_DAPH**	**5.00E-03**	**5.04**
Nickel	3.03	9	9	1.09E-02	2.52E-02	LCV_FISH	3.50E-02	0.72
Nickel	3.03	9	9	1.09E-02	2.52E-02	LTV_DAPH	4.50E-02	0.56
Nickel	3.03	9	9	1.09E-02	2.52E-02	LTV_FISH	6.20E-02	0.41
Nickel	3.03	9	9	1.09E-02	2.52E-02	LCV_NDI	1.28E-01	0.20
Nickel	3.03	9	9	1.09E-02	2.52E-02	NAWQ_CHR	1.60E-01	0.16
Nickel	3.03	9	9	1.09E-02	2.52E-02	NAWQ_ACU	1.40E+00	0.02
Nickel	**3.04**	**6**	**6**	**5.88E-03**	**7.00E-03**	**LCV_AQPL**	**5.00E-03**	**1.40**
Nickel	**3.04**	**6**	**6**	**5.88E-03**	**7.00E-03**	**LCV_DAPH**	**5.00E-03**	**1.40**
Nickel	3.04	6	6	5.88E-03	7.00E-03	LCV_FISH	3.50E-02	0.20

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Nickel	3.04	6	6	5.88E-03	7.00E-03	LTV_DAPH	4.50E-02	0.16
Nickel	3.04	6	6	5.88E-03	7.00E-03	LTV_FISH	6.20E-02	0.11
Nickel	3.04	6	6	5.88E-03	7.00E-03	LCV_NDI	1.28E-01	0.05
Nickel	3.04	6	6	5.88E-03	7.00E-03	NAWQ_CHR	1.60E-01	0.04
Nickel	3.04	6	6	5.88E-03	7.00E-03	NAWQ_ACU	1.40E+00	0.01
Nickel	**4.01**	**9**	**9**	**3.50E-03**	**5.20E-03**	**LCV_AQPL**	**5.00E-03**	**1.04**
Nickel	**4.01**	**9**	**9**	**3.50E-03**	**5.20E-03**	**LCV_DAPH**	**5.00E-03**	**1.04**
Nickel	4.01	9	9	3.50E-03	5.20E-03	LCV_FISH	3.50E-02	0.15
Nickel	4.01	9	9	3.50E-03	5.20E-03	LTV_DAPH	4.50E-02	0.12
Nickel	4.01	9	9	3.50E-03	5.20E-03	LTV_FISH	6.20E-02	0.08
Nickel	4.01	9	9	3.50E-03	5.20E-03	LCV_NDI	1.28E-01	0.04
Nickel	4.01	9	9	3.50E-03	5.20E-03	NAWQ_CHR	1.60E-01	0.03
Nickel	4.01	9	9	3.50E-03	5.20E-03	NAWQ_ACU	1.40E+00	0.00
Nickel	**4.02**	**6**	**6**	**9.15E-03**	**2.87E-02**	**LCV_AQPL**	**5.00E-03**	**5.74**
Nickel	**4.02**	**6**	**6**	**9.15E-03**	**2.87E-02**	**LCV_DAPH**	**5.00E-03**	**5.74**
Nickel	4.02	6	6	9.15E-03	2.87E-02	LCV_FISH	3.50E-02	0.82
Nickel	4.02	6	6	9.15E-03	2.87E-02	LTV_DAPH	4.50E-02	0.64
Nickel	4.02	6	6	9.15E-03	2.87E-02	LTV_FISH	6.20E-02	0.46
Nickel	4.02	6	6	9.15E-03	2.87E-02	LCV_NDI	1.28E-01	0.22
Nickel	4.02	6	6	9.15E-03	2.87E-02	NAWQ_CHR	1.60E-01	0.18
Nickel	4.02	6	6	9.15E-03	2.87E-02	NAWQ_ACU	1.40E+00	0.02
Nickel	**4.03**	**7**	**7**	**1.10E-02**	**1.84E-02**	**LCV_AQPL**	**5.00E-03**	**3.68**
Nickel	**4.03**	**7**	**7**	**1.10E-02**	**1.84E-02**	**LCV_DAPH**	**5.00E-03**	**3.68**
Nickel	4.03	7	7	1.10E-02	1.84E-02	LCV_FISH	3.50E-02	0.53
Nickel	4.03	7	7	1.10E-02	1.84E-02	LTV_DAPH	4.50E-02	0.41
Nickel	4.03	7	7	1.10E-02	1.84E-02	LTV_FISH	6.20E-02	0.30
Nickel	4.03	7	7	1.10E-02	1.84E-02	LCV_NDI	1.28E-01	0.14

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Nickel	4.03	7	7	1.10E-02	1.84E-02	NAWQ_CHR	1.60E-01	0.12
Nickel	4.03	7	7	1.10E-02	1.84E-02	NAWQ_ACU	1.40E+00	0.01
Nickel	**4.04**	**11**	**11**	**4.60E-03**	**6.70E-03**	**LCV_AQPL**	**5.00E-03**	**1.34**
Nickel	**4.04**	**11**	**11**	**4.60E-03**	**6.70E-03**	**LCV_DAPH**	**5.00E-03**	**1.34**
Nickel	4.04	11	11	4.60E-03	6.70E-03	LCV_FISH	3.50E-02	0.19
Nickel	4.04	11	11	4.60E-03	6.70E-03	LTV_DAPH	4.50E-02	0.15
Nickel	4.04	11	11	4.60E-03	6.70E-03	LTV_FISH	6.20E-02	0.11
Nickel	4.04	11	11	4.60E-03	6.70E-03	LCV_NDI	1.28E-01	0.05
Nickel	4.04	11	11	4.60E-03	6.70E-03	NAWQ_CHR	1.60E-01	0.04
Nickel	4.04	11	11	4.60E-03	6.70E-03	NAWQ_ACU	1.40E+00	0.00
Nickel	**7.01**	**1**	**1**	**1.16E-02**	**1.16E-02**	**LCV_AQPL**	**5.00E-03**	**2.32**
Nickel	**7.01**	**1**	**1**	**1.16E-02**	**1.16E-02**	**LCV_DAPH**	**5.00E-03**	**2.32**
Nickel	7.01	1	1	1.16E-02	1.16E-02	LCV_FISH	3.50E-02	0.33
Nickel	7.01	1	1	1.16E-02	1.16E-02	LTV_DAPH	4.50E-02	0.26
Nickel	7.01	1	1	1.16E-02	1.16E-02	LTV_FISH	6.20E-02	0.19
Nickel	7.01	1	1	1.16E-02	1.16E-02	LCV_NDI	1.28E-01	0.09
Nickel	7.01	1	1	1.16E-02	1.16E-02	NAWQ_CHR	1.60E-01	0.07
Nickel	7.01	1	1	1.16E-02	1.16E-02	NAWQ_ACU	1.40E+00	0.01
Nickel	**7.02**	**1**	**1**	**1.05E-02**	**1.05E-02**	**LCV_AQPL**	**5.00E-03**	**2.10**
Nickel	**7.02**	**1**	**1**	**1.05E-02**	**1.05E-02**	**LCV_DAPH**	**5.00E-03**	**2.10**
Nickel	7.02	1	1	1.05E-02	1.05E-02	LCV_FISH	3.50E-02	0.30
Nickel	7.02	1	1	1.05E-02	1.05E-02	LTV_DAPH	4.50E-02	0.23
Nickel	7.02	1	1	1.05E-02	1.05E-02	LTV_FISH	6.20E-02	0.17
Nickel	7.02	1	1	1.05E-02	1.05E-02	LCV_NDI	1.28E-01	0.08
Nickel	7.02	1	1	1.05E-02	1.05E-02	NAWQ_CHR	1.60E-01	0.07
Nickel	7.02	1	1	1.05E-02	1.05E-02	NAWQ_ACU	1.40E+00	0.01
Nickel	**8**	**1**	**1**	**1.24E-02**	**1.24E-02**	**LCV_AQPL**	**5.00E-03**	**2.48**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Nickel	**8**	**1**	**1**	**1.24E-02**	**1.24E-02**	**LCV_DAPH**	**5.00E-03**	**2.48**
Nickel	8	1	1	1.24E-02	1.24E-02	LCV_FISH	3.50E-02	0.35
Nickel	8	1	1	1.24E-02	1.24E-02	LTV_DAPH	4.50E-02	0.28
Nickel	8	1	1	1.24E-02	1.24E-02	LTV_FISH	6.20E-02	0.20
Nickel	8	1	1	1.24E-02	1.24E-02	LCV_NDI	1.28E-01	0.10
Nickel	8	1	1	1.24E-02	1.24E-02	NAWQ_CHR	1.60E-01	0.08
Nickel	8	1	1	1.24E-02	1.24E-02	NAWQ_ACU	1.40E+00	0.01
Nickel	**13**	**3**	**5**	**4.40E-03**	**1.15E-02**	**LCV_AQPL**	**5.00E-03**	**2.30**
Nickel	**13**	**3**	**5**	**4.40E-03**	**1.15E-02**	**LCV_DAPH**	**5.00E-03**	**2.30**
Nickel	13	3	5	4.40E-03	1.15E-02	LCV_FISH	3.50E-02	0.33
Nickel	13	3	5	4.40E-03	1.15E-02	LTV_DAPH	4.50E-02	0.26
Nickel	13	3	5	4.40E-03	1.15E-02	LTV_FISH	6.20E-02	0.19
Nickel	13	3	5	4.40E-03	1.15E-02	LCV_NDI	1.28E-01	0.09
Nickel	13	3	5	4.40E-03	1.15E-02	NAWQ_CHR	1.60E-01	0.07
Nickel	13	3	5	4.40E-03	1.15E-02	NAWQ_ACU	1.40E+00	0.01
Nickel	18	3	3	2.50E-03	4.30E-03	LCV_AQPL	5.00E-03	0.86
Nickel	18	3	3	2.50E-03	4.30E-03	LCV_DAPH	5.00E-03	0.86
Nickel	18	3	3	2.50E-03	4.30E-03	LCV_FISH	3.50E-02	0.12
Nickel	18	3	3	2.50E-03	4.30E-03	LTV_DAPH	4.50E-02	0.10
Nickel	18	3	3	2.50E-03	4.30E-03	LTV_FISH	6.20E-02	0.07
Nickel	18	3	3	2.50E-03	4.30E-03	LCV_NDI	1.28E-01	0.03
Nickel	18	3	3	2.50E-03	4.30E-03	NAWQ_CHR	1.60E-01	0.03
Nickel	18	3	3	2.50E-03	4.30E-03	NAWQ_ACU	1.40E+00	0.00
Uranium	**3.02**	**8**	**8**	**9.10E-03**	**9.89E-02**	**S_CHR_V**	**1.87E-03**	**52.89**
Uranium	**3.02**	**8**	**8**	**9.10E-03**	**9.89E-02**	**S_ACU_V**	**3.35E-02**	**2.95**
Uranium	3.02	8	8	9.10E-03	9.89E-02	LCV_FISH	1.42E-01	0.70
Uranium	3.02	8	8	9.10E-03	9.89E-02	LTV_FISH	4.55E-01	0.22

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Uranium	**3.03**	**9**	**9**	**6.90E-03**	**2.07E-02**	**S_CHR_V**	**1.87E-03**	**11.10**
Uranium	3.03	9	9	6.90E-03	2.07E-02	S_ACU_V	3.35E-02	0.62
Uranium	3.03	9	9	6.90E-03	2.07E-02	LCV_FISH	1.42E-01	0.15
Uranium	3.03	9	9	6.90E-03	2.07E-02	LTV_FISH	4.55E-01	0.05
Uranium	**3.04**	**6**	**6**	**5.05E-03**	**1.02E-02**	**S_CHR_V**	**1.87E-03**	**5.45**
Uranium	3.04	6	6	5.05E-03	1.02E-02	S_ACU_V	3.35E-02	0.30
Uranium	3.04	6	6	5.05E-03	1.02E-02	LCV_FISH	1.42E-01	0.07
Uranium	3.04	6	6	5.05E-03	1.02E-02	LTV_FISH	4.55E-01	0.02
Uranium	4.01	3	9	1.20E-03	1.60E-03	S_CHR_V	1.87E-03	0.86
Uranium	4.01	3	9	1.20E-03	1.60E-03	S_ACU_V	3.35E-02	0.05
Uranium	4.01	3	9	1.20E-03	1.60E-03	LCV_FISH	1.42E-01	0.01
Uranium	4.01	3	9	1.20E-03	1.60E-03	LTV_FISH	4.55E-01	0.00
Uranium	4.02	2	6	1.10E-03	1.80E-03	S_CHR_V	1.87E-03	0.96
Uranium	4.02	2	6	1.10E-03	1.80E-03	S_ACU_V	3.35E-02	0.05
Uranium	4.02	2	6	1.10E-03	1.80E-03	LCV_FISH	1.42E-01	0.01
Uranium	4.02	2	6	1.10E-03	1.80E-03	LTV_FISH	4.55E-01	0.00
Uranium	**4.03**	**1**	**7**	**2.07E-03**	**2.07E-03**	**S_CHR_V**	**1.87E-03**	**1.11**
Uranium	4.03	1	7	2.07E-03	2.07E-03	S_ACU_V	3.35E-02	0.06
Uranium	4.03	1	7	2.07E-03	2.07E-03	LCV_FISH	1.42E-01	0.01
Uranium	4.03	1	7	2.07E-03	2.07E-03	LTV_FISH	4.55E-01	0.00
Uranium	13	2	5	1.00E-03	1.50E-03	S_CHR_V	1.87E-03	0.80
Uranium	13	2	5	1.00E-03	1.50E-03	S_ACU_V	3.35E-02	0.04
Uranium	13	2	5	1.00E-03	1.50E-03	LCV_FISH	1.42E-01	0.01
Uranium	13	2	5	1.00E-03	1.50E-03	LTV_FISH	4.55E-01	0.00
Zinc	0	5	5	7.90E-03	8.53E-03	LCV_AQPL	3.00E-02	0.28
Zinc	0	5	5	7.90E-03	8.53E-03	LCV_FISH	3.64E-02	0.23
Zinc	0	5	5	7.90E-03	8.53E-03	LCV_DAPH	4.67E-02	0.18

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Zinc	0	5	5	7.90E-03	8.53E-03	LTV_FISH	4.70E-02	0.18
Zinc	0	5	5	7.90E-03	8.53E-03	NAWQ_CHR	1.10E-01	0.08
Zinc	0	5	5	7.90E-03	8.53E-03	NAWQ_ACU	1.20E-01	0.07
Zinc	0	5	5	7.90E-03	8.53E-03	LCV_NDI	5.24E+00	0.00
Zinc	2.01	1	1	3.10E-03	3.10E-03	LCV_AQPL	3.00E-02	0.10
Zinc	2.01	1	1	3.10E-03	3.10E-03	LCV_FISH	3.64E-02	0.09
Zinc	2.01	1	1	3.10E-03	3.10E-03	LCV_DAPH	4.67E-02	0.07
Zinc	2.01	1	1	3.10E-03	3.10E-03	LTV_FISH	4.70E-02	0.07
Zinc	2.01	1	1	3.10E-03	3.10E-03	NAWQ_CHR	1.10E-01	0.03
Zinc	2.01	1	1	3.10E-03	3.10E-03	NAWQ_ACU	1.20E-01	0.03
Zinc	2.01	1	1	3.10E-03	3.10E-03	LCV_NDI	5.24E+00	0.00
Zinc	2.03	1	1	1.09E-02	1.09E-02	LCV_AQPL	3.00E-02	0.36
Zinc	2.03	1	1	1.09E-02	1.09E-02	LCV_FISH	3.64E-02	0.30
Zinc	2.03	1	1	1.09E-02	1.09E-02	LCV_DAPH	4.67E-02	0.23
Zinc	2.03	1	1	1.09E-02	1.09E-02	LTV_FISH	4.70E-02	0.23
Zinc	2.03	1	1	1.09E-02	1.09E-02	NAWQ_CHR	1.10E-01	0.10
Zinc	2.03	1	1	1.09E-02	1.09E-02	NAWQ_ACU	1.20E-01	0.09
Zinc	2.03	1	1	1.09E-02	1.09E-02	LCV_NDI	5.24E+00	0.00
Zinc	2.04	6	6	6.20E-03	1.72E-02	LCV_AQPL	3.00E-02	0.57
Zinc	2.04	6	6	6.20E-03	1.72E-02	LCV_FISH	3.64E-02	0.47
Zinc	2.04	6	6	6.20E-03	1.72E-02	LCV_DAPH	4.67E-02	0.37
Zinc	2.04	6	6	6.20E-03	1.72E-02	LTV_FISH	4.70E-02	0.37
Zinc	2.04	6	6	6.20E-03	1.72E-02	NAWQ_CHR	1.10E-01	0.16
Zinc	2.04	6	6	6.20E-03	1.72E-02	NAWQ_ACU	1.20E-01	0.14
Zinc	2.04	6	6	6.20E-03	1.72E-02	LCV_NDI	5.24E+00	0.00
Zinc	3.01	1	2	2.32E-02	2.32E-02	LCV_AQPL	3.00E-02	0.77
Zinc	3.01	1	2	2.32E-02	2.32E-02	LCV_FISH	3.64E-02	0.64

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Zinc	3.01	1	2	2.32E-02	2.32E-02	LCV_DAPH	4.67E-02	0.50
Zinc	3.01	1	2	2.32E-02	2.32E-02	LTV_FISH	4.70E-02	0.49
Zinc	3.01	1	2	2.32E-02	2.32E-02	NAWQ_CHR	1.10E-01	0.21
Zinc	3.01	1	2	2.32E-02	2.32E-02	NAWQ_ACU	1.20E-01	0.19
Zinc	3.01	1	2	2.32E-02	2.32E-02	LCV_NDI	5.24E+00	0.00
Zinc	3.02	7	8	7.40E-03	1.23E-02	LCV_AQPL	3.00E-02	0.41
Zinc	3.02	7	8	7.40E-03	1.23E-02	LCV_FISH	3.64E-02	0.34
Zinc	3.02	7	8	7.40E-03	1.23E-02	LCV_DAPH	4.67E-02	0.26
Zinc	3.02	7	8	7.40E-03	1.23E-02	LTV_FISH	4.70E-02	0.26
Zinc	3.02	7	8	7.40E-03	1.23E-02	NAWQ_CHR	1.10E-01	0.11
Zinc	3.02	7	8	7.40E-03	1.23E-02	NAWQ_ACU	1.20E-01	0.10
Zinc	3.02	7	8	7.40E-03	1.23E-02	LCV_NDI	5.24E+00	0.00
Zinc	**3.03**	**8**	**9**	**1.00E-02**	**3.19E-02**	**LCV_AQPL**	**3.00E-02**	**1.06**
Zinc	3.03	8	9	1.00E-02	3.19E-02	LCV_FISH	3.64E-02	0.88
Zinc	3.03	8	9	1.00E-02	3.19E-02	LCV_DAPH	4.67E-02	0.68
Zinc	3.03	8	9	1.00E-02	3.19E-02	LTV_FISH	4.70E-02	0.68
Zinc	3.03	8	9	1.00E-02	3.19E-02	NAWQ_CHR	1.10E-01	0.29
Zinc	3.03	8	9	1.00E-02	3.19E-02	NAWQ_ACU	1.20E-01	0.27
Zinc	3.03	8	9	1.00E-02	3.19E-02	LCV_NDI	5.24E+00	0.01
Zinc	3.04	6	6	4.93E-03	1.19E-02	LCV_AQPL	3.00E-02	0.40
Zinc	3.04	6	6	4.93E-03	1.19E-02	LCV_FISH	3.64E-02	0.33
Zinc	3.04	6	6	4.93E-03	1.19E-02	LCV_DAPH	4.67E-02	0.25
Zinc	3.04	6	6	4.93E-03	1.19E-02	LTV_FISH	4.70E-02	0.25
Zinc	3.04	6	6	4.93E-03	1.19E-02	NAWQ_CHR	1.10E-01	0.11
Zinc	3.04	6	6	4.93E-03	1.19E-02	NAWQ_ACU	1.20E-01	0.10
Zinc	3.04	6	6	4.93E-03	1.19E-02	LCV_NDI	5.24E+00	0.00
Zinc	4.01	9	9	6.40E-03	1.84E-02	LCV_AQPL	3.00E-02	0.61

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Zinc	4.01	9	9	6.40E-03	1.84E-02	LCV_FISH	3.64E-02	0.51
Zinc	4.01	9	9	6.40E-03	1.84E-02	LCV_DAPH	4.67E-02	0.39
Zinc	4.01	9	9	6.40E-03	1.84E-02	LTV_FISH	4.70E-02	0.39
Zinc	4.01	9	9	6.40E-03	1.84E-02	NAWQ_CHR	1.10E-01	0.17
Zinc	4.01	9	9	6.40E-03	1.84E-02	NAWQ_ACU	1.20E-01	0.15
Zinc	4.01	9	9	6.40E-03	1.84E-02	LCV_NDI	5.24E+00	0.00
Zinc	4.02	6	6	1.20E-02	2.85E-02	LCV_AQPL	3.00E-02	0.95
Zinc	4.02	6	6	1.20E-02	2.85E-02	LCV_FISH	3.64E-02	0.78
Zinc	4.02	6	6	1.20E-02	2.85E-02	LCV_DAPH	4.67E-02	0.61
Zinc	4.02	6	6	1.20E-02	2.85E-02	LTV_FISH	4.70E-02	0.61
Zinc	4.02	6	6	1.20E-02	2.85E-02	NAWQ_CHR	1.10E-01	0.26
Zinc	4.02	6	6	1.20E-02	2.85E-02	NAWQ_ACU	1.20E-01	0.24
Zinc	4.02	6	6	1.20E-02	2.85E-02	LCV_NDI	5.24E+00	0.01
Zinc	**4.03**	**7**	**7**	**2.15E-02**	**7.35E-02**	**LCV_AQPL**	**3.00E-02**	**2.45**
Zinc	**4.03**	**7**	**7**	**2.15E-02**	**7.35E-02**	**LCV_FISH**	**3.64E-02**	**2.02**
Zinc	**4.03**	**7**	**7**	**2.15E-02**	**7.35E-02**	**LCV_DAPH**	**4.67E-02**	**1.57**
Zinc	**4.03**	**7**	**7**	**2.15E-02**	**7.35E-02**	**LTV_FISH**	**4.70E-02**	**1.56**
Zinc	4.03	7	7	2.15E-02	7.35E-02	NAWQ_CHR	1.10E-01	0.67
Zinc	4.03	7	7	2.15E-02	7.35E-02	NAWQ_ACU	1.20E-01	0.61
Zinc	4.03	7	7	2.15E-02	7.35E-02	LCV_NDI	5.24E+00	0.01
Zinc	4.04	11	11	4.80E-03	2.63E-02	LCV_AQPL	3.00E-02	0.88
Zinc	4.04	11	11	4.80E-03	2.63E-02	LCV_FISH	3.64E-02	0.72
Zinc	4.04	11	11	4.80E-03	2.63E-02	LCV_DAPH	4.67E-02	0.56
Zinc	4.04	11	11	4.80E-03	2.63E-02	LTV_FISH	4.70E-02	0.56
Zinc	4.04	11	11	4.80E-03	2.63E-02	NAWQ_CHR	1.10E-01	0.24
Zinc	4.04	11	11	4.80E-03	2.63E-02	NAWQ_ACU	1.20E-01	0.22
Zinc	4.04	11	11	4.80E-03	2.63E-02	LCV_NDI	5.24E+00	0.01

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Zinc	7.01	1	1	4.50E-03	4.50E-03	LCV_AQPL	3.00E-02	0.15
Zinc	7.01	1	1	4.50E-03	4.50E-03	LCV_FISH	3.64E-02	0.12
Zinc	7.01	1	1	4.50E-03	4.50E-03	LCV_DAPH	4.67E-02	0.10
Zinc	7.01	1	1	4.50E-03	4.50E-03	LTV_FISH	4.70E-02	0.10
Zinc	7.01	1	1	4.50E-03	4.50E-03	NAWQ_CHR	1.10E-01	0.04
Zinc	7.01	1	1	4.50E-03	4.50E-03	NAWQ_ACU	1.20E-01	0.04
Zinc	7.01	1	1	4.50E-03	4.50E-03	LCV_NDI	5.24E+00	0.00
Zinc	7.02	1	1	6.60E-03	6.60E-03	LCV_AQPL	3.00E-02	0.22
Zinc	7.02	1	1	6.60E-03	6.60E-03	LCV_FISH	3.64E-02	0.18
Zinc	7.02	1	1	6.60E-03	6.60E-03	LCV_DAPH	4.67E-02	0.14
Zinc	7.02	1	1	6.60E-03	6.60E-03	LTV_FISH	4.70E-02	0.14
Zinc	7.02	1	1	6.60E-03	6.60E-03	NAWQ_CHR	1.10E-01	0.06
Zinc	7.02	1	1	6.60E-03	6.60E-03	NAWQ_ACU	1.20E-01	0.06
Zinc	7.02	1	1	6.60E-03	6.60E-03	LCV_NDI	5.24E+00	0.00
Zinc	8	1	1	4.80E-03	4.80E-03	LCV_AQPL	3.00E-02	0.16
Zinc	8	1	1	4.80E-03	4.80E-03	LCV_FISH	3.64E-02	0.13
Zinc	8	1	1	4.80E-03	4.80E-03	LCV_DAPH	4.67E-02	0.10
Zinc	8	1	1	4.80E-03	4.80E-03	LTV_FISH	4.70E-02	0.10
Zinc	8	1	1	4.80E-03	4.80E-03	NAWQ_CHR	1.10E-01	0.04
Zinc	8	1	1	4.80E-03	4.80E-03	NAWQ_ACU	1.20E-01	0.04
Zinc	8	1	1	4.80E-03	4.80E-03	LCV_NDI	5.24E+00	0.00
Zinc	13	4	5	4.70E-03	5.50E-03	LCV_AQPL	3.00E-02	0.18
Zinc	13	4	5	4.70E-03	5.50E-03	LCV_FISH	3.64E-02	0.15
Zinc	13	4	5	4.70E-03	5.50E-03	LCV_DAPH	4.67E-02	0.12
Zinc	13	4	5	4.70E-03	5.50E-03	LTV_FISH	4.70E-02	0.12
Zinc	13	4	5	4.70E-03	5.50E-03	NAWQ_CHR	1.10E-01	0.05
Zinc	13	4	5	4.70E-03	5.50E-03	NAWQ_ACU	1.20E-01	0.05

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Zinc	13	4	5	4.70E-03	5.50E-03	LCV_NDI	5.24E+00	0.00
Zinc	18	3	3	1.02E-02	1.27E-02	LCV_AQPL	3.00E-02	0.42
Zinc	18	3	3	1.02E-02	1.27E-02	LCV_FISH	3.64E-02	0.35
Zinc	18	3	3	1.02E-02	1.27E-02	LCV_DAPH	4.67E-02	0.27
Zinc	18	3	3	1.02E-02	1.27E-02	LTV_FISH	4.70E-02	0.27
Zinc	18	3	3	1.02E-02	1.27E-02	NAWQ_CHR	1.10E-01	0.12
Zinc	18	3	3	1.02E-02	1.27E-02	NAWQ_ACU	1.20E-01	0.11
Zinc	18	3	3	1.02E-02	1.27E-02	LCV_NDI	5.24E+00	0.00
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	LCV_DAPH	3.00E-03	0.33
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	LTV_DAPH	3.00E-03	0.33
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	LCV_FISH	8.40E-03	0.12
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	S_CHR_V	3.22E-02	0.03
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	LTV_FISH	5.40E-02	0.02
Bis(2-ethylhexyl)phthalate	2.04	1	3	1.00E-03	1.00E-03	S_ACU_V	2.86E-01	0.00
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	LCV_DAPH	3.00E-03	0.67
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	LTV_DAPH	3.00E-03	0.67
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	LCV_FISH	8.40E-03	0.24
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	S_CHR_V	3.22E-02	0.06
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	LTV_FISH	5.40E-02	0.04
Bis(2-ethylhexyl)phthalate	3.02	1	5	2.00E-03	2.00E-03	S_ACU_V	2.86E-01	0.01
Bis(2-ethylhexyl)phthalate	**3.03**	**1**	**5**	**3.50E-03**	**3.50E-03**	**LCV_DAPH**	**3.00E-03**	**1.17**
Bis(2-ethylhexyl)phthalate	**3.03**	**1**	**5**	**3.50E-03**	**3.50E-03**	**LTV_DAPH**	**3.00E-03**	**1.17**
Bis(2-ethylhexyl)phthalate	3.03	1	5	3.50E-03	3.50E-03	LCV_FISH	8.40E-03	0.42
Bis(2-ethylhexyl)phthalate	3.03	1	5	3.50E-03	3.50E-03	S_CHR_V	3.22E-02	0.11
Bis(2-ethylhexyl)phthalate	3.03	1	5	3.50E-03	3.50E-03	LTV_FISH	5.40E-02	0.06
Bis(2-ethylhexyl)phthalate	3.03	1	5	3.50E-03	3.50E-03	S_ACU_V	2.86E-01	0.01
Bis(2-ethylhexyl)phthalate	**4.01**	**2**	**5**	**2.25E-03**	**3.50E-03**	**LCV_DAPH**	**3.00E-03**	**1.17**

Table F3.2 (continued)

Analyte	Subreach	Detects	Total samples	Median	Maximum	BMK name	BMK value	HQ max
Bis(2-ethylhexyl)phthalate	**4.01**	**2**	**5**	**2.25E-03**	**3.50E-03**	**LTV_DAPH**	**3.00E-03**	**1.17**
Bis(2-ethylhexyl)phthalate	4.01	2	5	2.25E-03	3.50E-03	LCV_FISH	8.40E-03	0.42
Bis(2-ethylhexyl)phthalate	4.01	2	5	2.25E-03	3.50E-03	S_CHR_V	3.22E-02	0.11
Bis(2-ethylhexyl)phthalate	4.01	2	5	2.25E-03	3.50E-03	LTV_FISH	5.40E-02	0.06
Bis(2-ethylhexyl)phthalate	4.01	2	5	2.25E-03	3.50E-03	S_ACU_V	2.86E-01	0.01
PCB-1254	**18**	**1**	**4**	**7.15E-04**	**7.15E-04**	**S_CHR_V**	**2.00E-05**	**35.75**
PCB-1254	**18**	**1**	**4**	**7.15E-04**	**7.15E-04**	**LCV_AQPL**	**1.00E-04**	**7.15**
PCB-1254	**18**	**1**	**4**	**7.15E-04**	**7.15E-04**	**S_ACU_V**	**2.10E-04**	**3.40**
PCB-1254	**18**	**1**	**4**	**7.15E-04**	**7.15E-04**	**LTV_FISH**	**5.20E-04**	**1.38**
PCB-1254	18	1	4	7.15E-04	7.15E-04	LCV_NDI	8.00E-04	0.89
PCB-1254	18	1	4	7.15E-04	7.15E-04	LCV_FISH	1.00E-03	0.72
PCB-1254	18	1	4	7.15E-04	7.15E-04	LTV_DAPH	1.20E-03	0.60
PCB-1254	18	1	4	7.15E-04	7.15E-04	LCV_DAPH	2.10E-03	0.34

[a] All units are mg/L.
[b] Includes Contaminants of Potential Ecological Concern in whole sediment and pore water which were detected at least once in the pore water samples

Table F3.3. Measured concentrations of reach 3 contaminants of ecological concern at sites with *H. azteca* toxicity tests and the determination of potential toxicity

COEC	Reach	Site[a]	Chemical Sampling Date	Concentration (mg/kg)[b]	Potentially Toxic[c]
Arsenic	3.04	PCM 1.0	28-Feb-94	64.300	Yes
Arsenic	3.04	PCM 1.0	7-Mar-90	53.551	Yes
Arsenic	3.04	PCM 0.5	21-Feb-94	**25.332**	
Arsenic	3.02	PCM 4.5	18-Jul-94	17.800	
Arsenic	3.02	PCM 4.3	7-Mar-94	6.600	Yes
Arsenic	3.02	PCM 4.0	18-Jul-94	2.800	
Arsenic	3.03	PCM 2.9	7-Mar-94	1.916	Yes
Arsenic	3.01	PCM 5.1	14-Mar-94	1.600	Yes
Chromium	3.02	PCM 4.5	18-Jul-94	**67.400**	
Chromium	3.04	PCM 0.5	21-Feb-94	45.552	
Chromium	3.04	PCM 1.0	28-Feb-94	30.300	Yes
Chromium	3.02	PCM 4.3	7-Mar-94	25.700	Yes
Chromium	3.04	PCM 1.0	7-Mar-90	25.609	Yes
Chromium	3.02	PCM 4.0	18-Jul-94	18.000	
Chromium	3.03	PCM 2.9	7-Mar-94	15.417	Yes
Chromium	3.01	PCM 5.1	14-Mar-94	12.000	Yes
Mercury	3.04	PCM 0.5	21-Feb-94	**139.409**	
Mercury	3.04	PCM 1.0	28-Feb-94	20.600	Yes
Mercury	3.02	PCM 4.5	18-Jul-94	9.293	
Mercury	3.02	PCM 4.3	7-Mar-94	5.868	Yes
Mercury	3.04	PCM 1.0	7-Mar-94	5.593	Yes
Mercury	3.04	PCM 1.0	7-Mar-90	2.778	Yes
Mercury	3.03	PCM 2.9	7-Mar-94	1.980	Yes
Mercury	3.02	PCM 4.0	18-Jul-94	0.628	
Mercury	3.01	PCM 5.1	14-Mar-94	0.031	Yes
Nickel	3.02	PCM 4.5	18-Jul-94	**228.000**	
Nickel	3.04	PCM 0.5	21-Feb-94	69.562	
Nickel	3.04	PCM 1.0	28-Feb-94	58.100	Yes
Nickel	3.02	PCM 4.3	7-Mar-94	52.900	Yes
Nickel	7.02	MBM 0.2	11-Jun-91	41.023	

Table F3.3 (continued)

COEC	Reach	Site[a]	Chemical Sampling Date	Concentration (mg/kg)[b]	Potentially Toxic[c]
Nickel	3.04	PCM 1.0	7-Mar-90	36.692	Yes
Nickel	7.02	MBM 0.2	3-Jun-94	29.300	
Nickel	7.02	MBM 0.2	11-Jun-91	28.014	
Nickel	7.02	MBM 0.2	11-Jun-91	27.765	
Nickel	7.01	MBM 0.4	3-Jun-94	26.663	
Nickel	7.02	MBM 0.2	11-Jun-91	25.400	
Nickel	3.02	PCM 4.0	18-Jul-94	24.600	
Nickel	7.02	MBM 0.2	11-Jun-91	24.178	
Nickel	7.02	MBM 0.2	11-Jun-91	24.113	
Nickel	7.02	MBM 0.2	11-Jun-91	20.825	
Nickel	7.02	MBM 0.2	11-Jun-91	17.709	
Nickel	3.03	PCM 2.9	7-Mar-94	16.895	Yes
Nickel	3.01	PCM 5.1	14-Mar-94	11.900	Yes
Nickel	4.01	CRM 9.0	28-Feb-94	8.079	Yes
Silver	3.02	PCM 4.3	7-Mar-94	1.400	Yes
Silver	3.04	PCM 0.5	21-Feb-94	**1.289**	
Silver	3.04	PCM 1.0	28-Feb-94	1.100	Yes
Silver	3.02	PCM 4.5	18-Jul-94	0.820	
Silver	7.02	MBM 0.2	11-Jun-91	0.261	
Silver	3.03	PCM 2.9	7-Mar-94	0.138	Yes
Silver	7.02	MBM 0.2	11-Jun-91	0.132	
Silver	7.02	MBM 0.2	3-Jun-94	0.120	
Silver	3.02	PCM 4.0	18-Jul-94	0.090	
Silver	7.02	MBM 0.2	11-Jun-91	0.079	
Silver	7.02	MBM 0.2	11-Jun-91	0.077	
Silver	4.01	CRM 9.0	28-Feb-94	0.068	Yes
Silver	7.02	MBM 0.2	11-Jun-91	0.050	
Silver	3.01	PCM 5.1	14-Mar-94	0.040	Yes
PCB, Total	3.04	PCM 0.5	21-Feb-94	**0.548**	
PCB, Total	3.02	PCM 4.5	18-Jul-94	0.280	
PCB, Total	3.04	PCM 1.0	28-Feb-94	0.270	Yes
PCB, Total	3.02	PCM 4.3	7-Mar-94	0.162	Yes

Table F3.3 (continued)

COEC	Reach	Site[a]	Chemical Sampling Date	Concentration (mg/kg)[b]	Potentially Toxic[c]
PCB, Total	3.03	PCM 2.9	7-Mar-94	0.154	Yes
PAH, Total[d]	3.03	PCM 2.9	7-Mar-94	10.068	Yes
PAH, Total	3.02	PCM 4.3	7-Mar-94	5.625	Yes
PAH, Total	3.02	PCM 4.5	18-Jul-94	3.933	
PAH, Total	3.04	PCM 0.5	21-Feb-94	1.785	
PAH, Total	3.04	PCM 1.0	7-Mar-90	1.423	Yes
PAH, Total	3.04	PCM 1.0	28-Feb-94	0.877	Yes
PAH, Total	3.02	PCM 4.0	18-Jul-94	0.230	
PAH, Total	3.01	PCM 5.1	14-Mar-94	0.105	Yes

[a] Only data for Poplar Creek were used for chemicals that may vary between reaches in chemical speciation (i.e., As, Cr, and Hg) or mixture composition (i.e., Total PCBs).
[b] The Site-Specific No Apparent Effects Level (SSNAEL) is in bold.
[c] COEC concentrations are considered to be potentially toxic if one or more *H. azteca* toxicity tests were significant.
[d] PAH, Total is the sum of the measured concentrations of all detected PAHs in a single sediment sample. PAHs are likely contributors to toxicity in Reach 3, but RGOs were not developed for PAHs because they present a greater risk above the OU (Reach 13) than in Reach 3. They are presented here in completeness.

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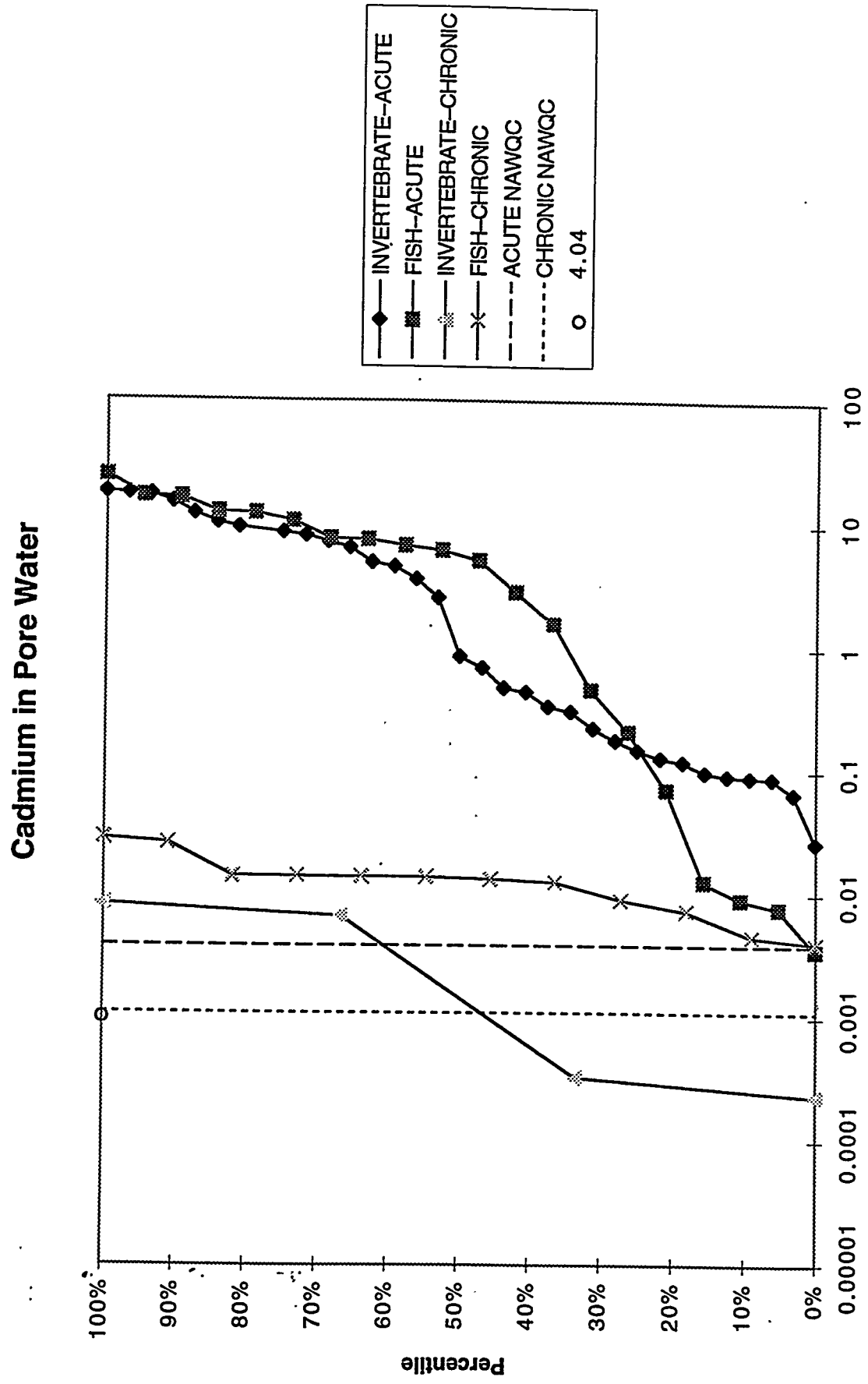


Fig. F3.1. Empirical distribution functions for acute toxicity and chronic toxicity of cadmium to aquatic organisms and individual measurements of cadmium in reaches for which potentially significant concentrations were reported.

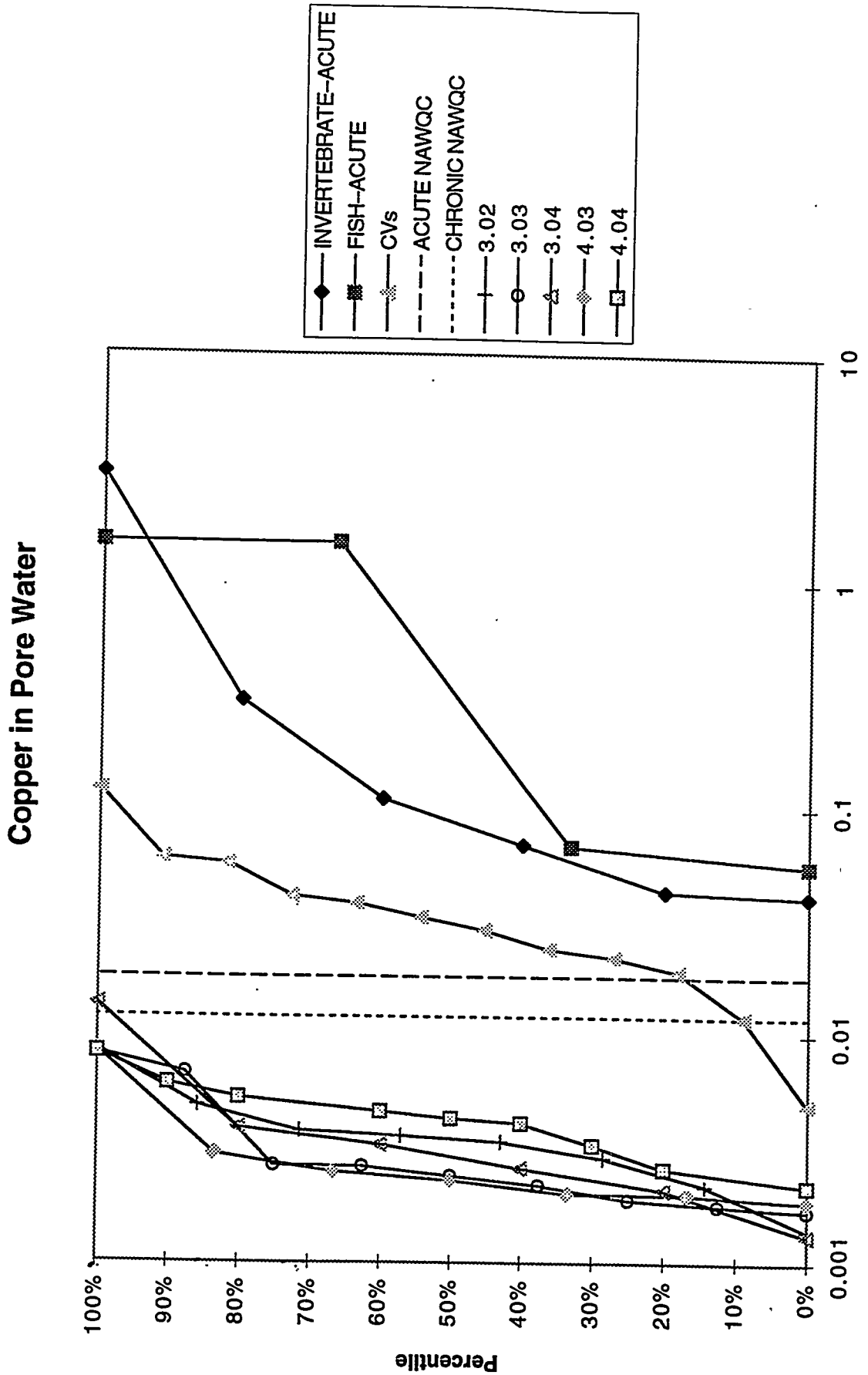


Fig. F3.2. Empirical distribution functions for acute toxicity and chronic toxicity of copper to aquatic organisms and individual measurements of copper in reaches for which potentially significant concentrations were reported.

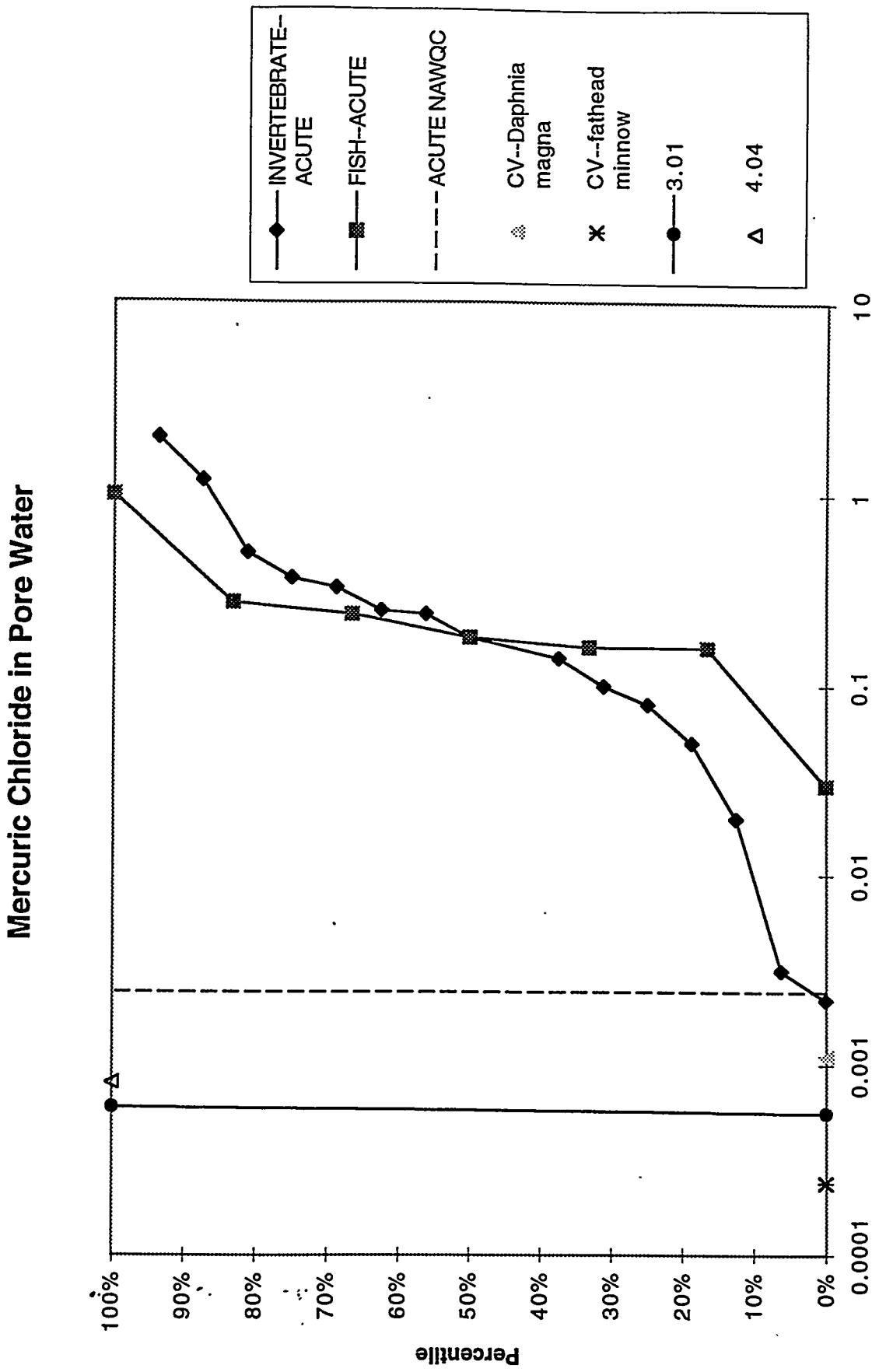


Fig. F3.3. Empirical distribution functions for acute toxicity and chronic toxicity of mercury to aquatic organisms and individual measurements of mercury in reaches for which potentially significant concentrations were reported.

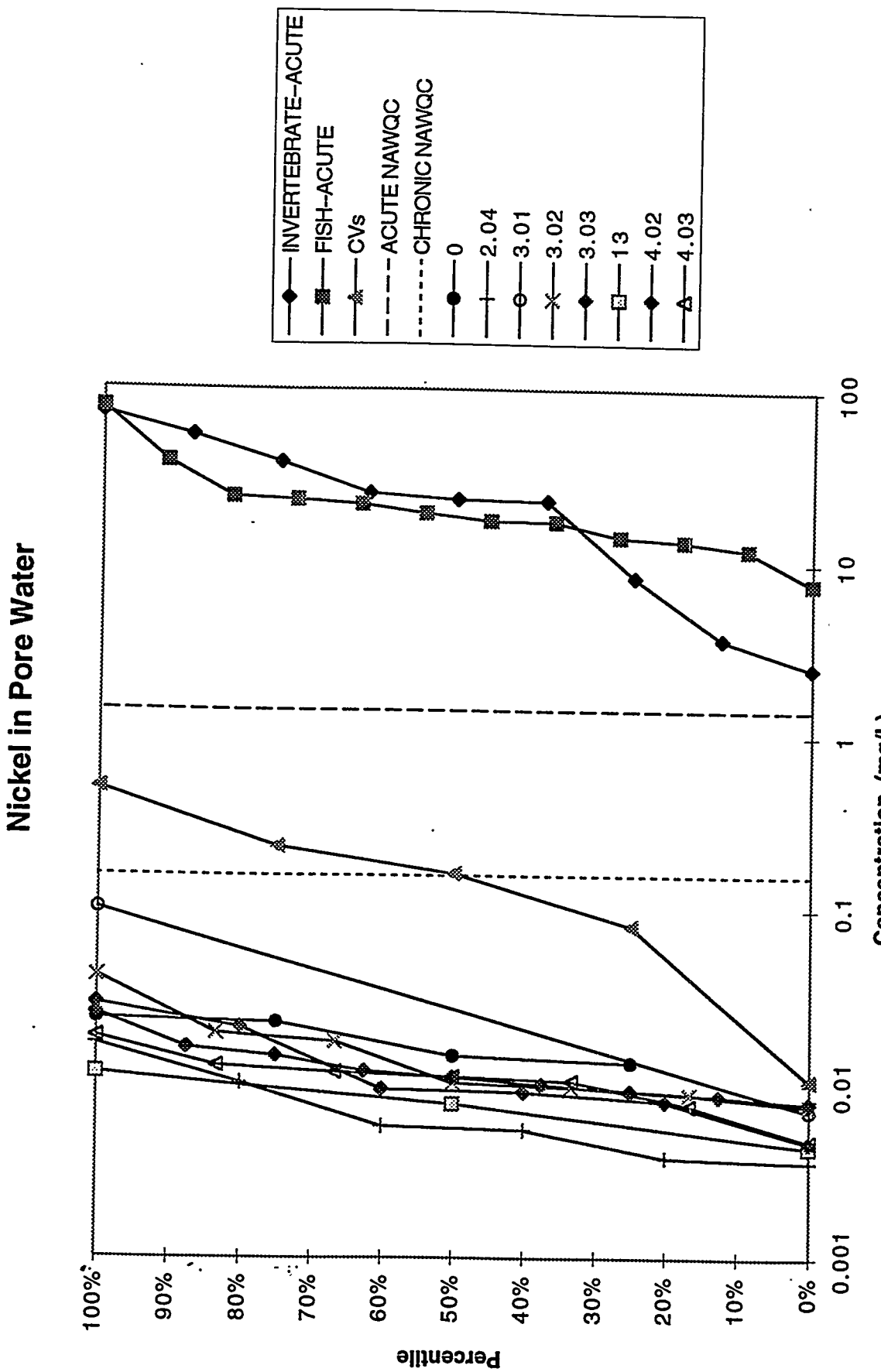


Fig. F3.4. Empirical distribution functions for acute toxicity and chronic toxicity of nickel to aquatic organisms and individual measurements of nickel in reaches for which potentially significant concentrations were reported.

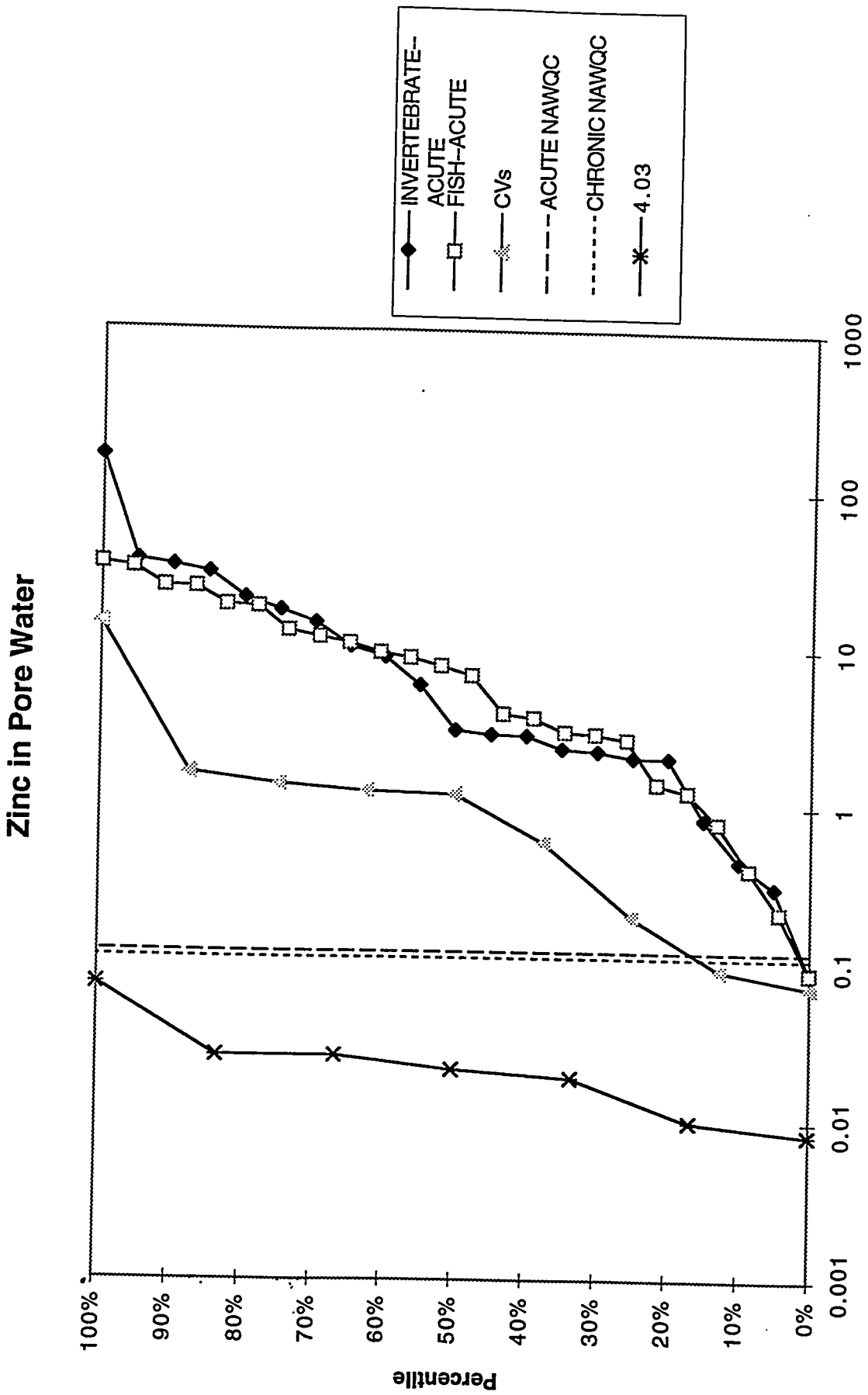


Fig. F3.5. Empirical distribution functions for acute toxicity and chronic toxicity of zinc to aquatic organisms and individual measurements of zinc in reaches for which potentially significant concentrations were reported.

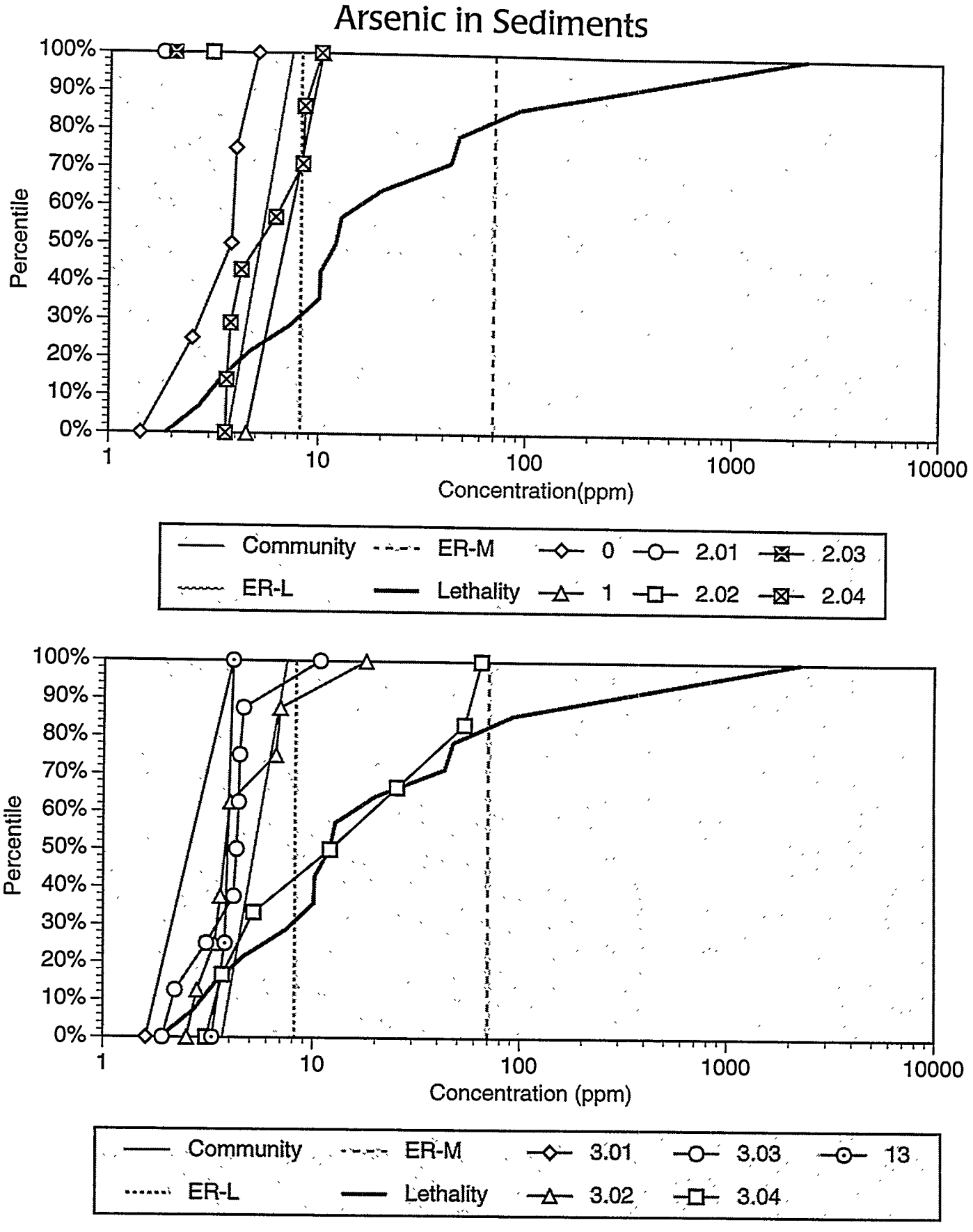


Fig. F3.6(a-b). Empirical distribution functions for sediment toxicity of arsenic to sediment-associated organisms and individual measurements of arsenic in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

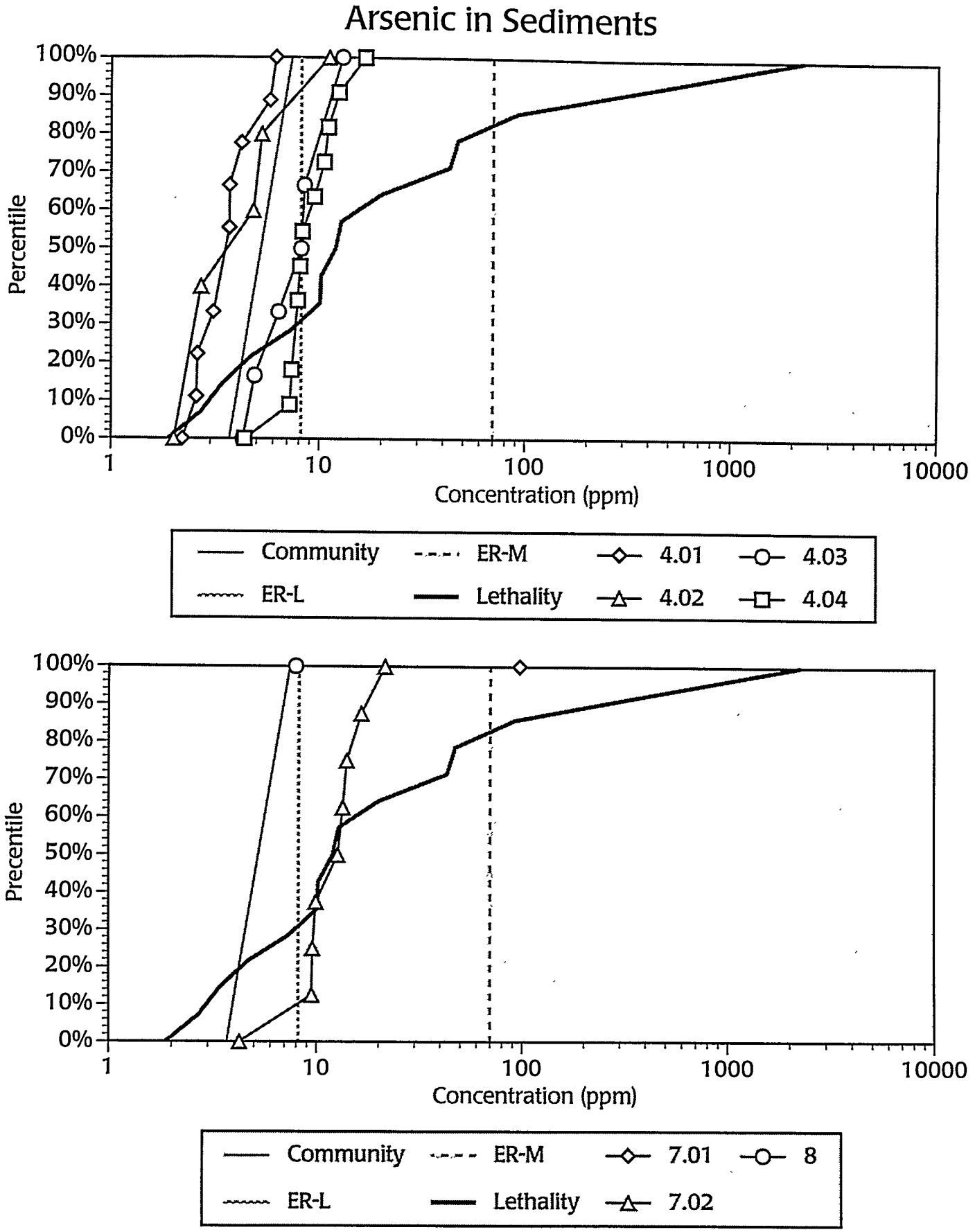


Fig. F3.6(c-d). Empirical distribution functions for sediment toxicity of arsenic to sediment-associated organisms and individual measurements of arsenic in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

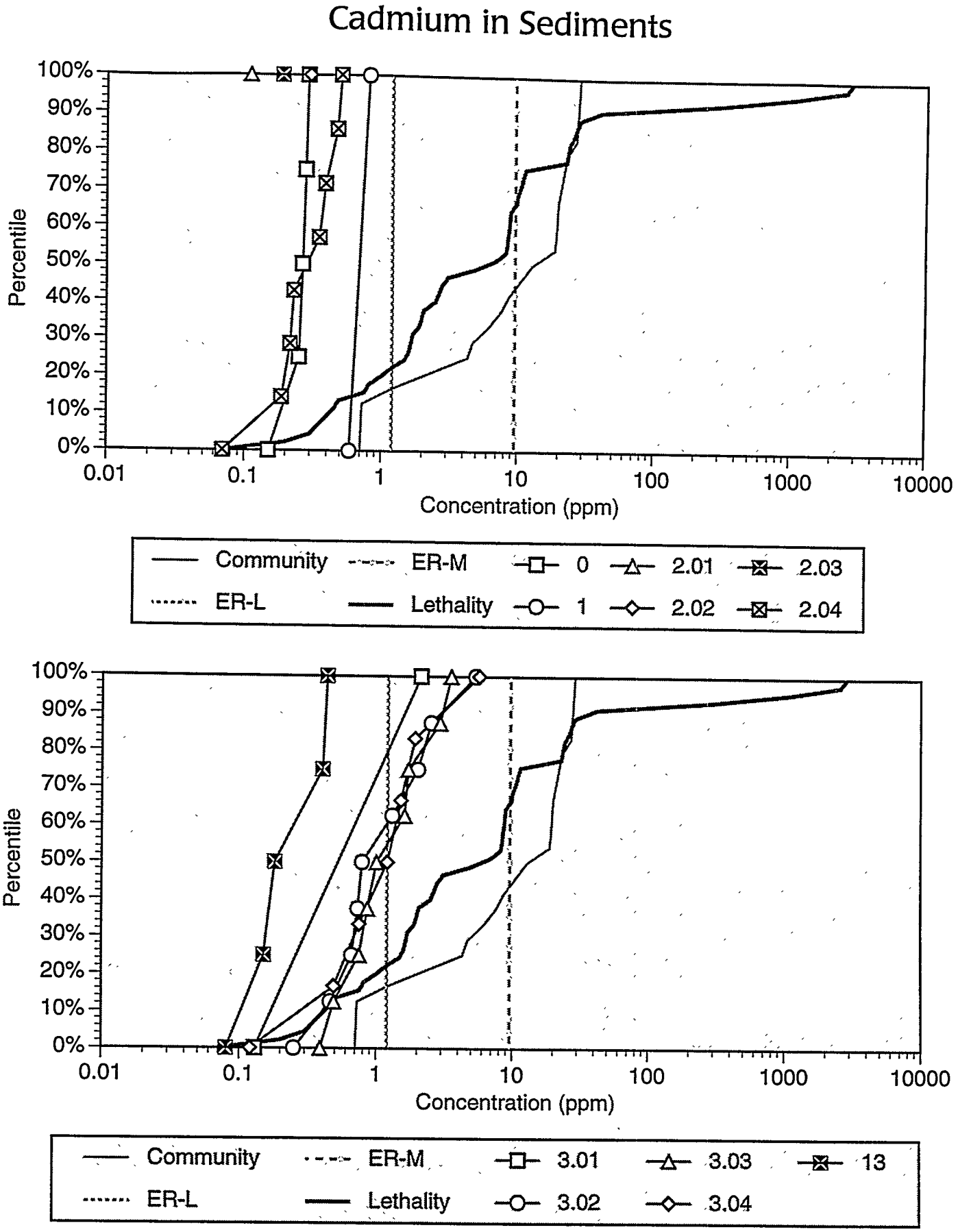


Fig. F3.7(a-b). Empirical distribution functions for sediment toxicity of cadmium to sediment-associated organisms and individual measurements of cadmium in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

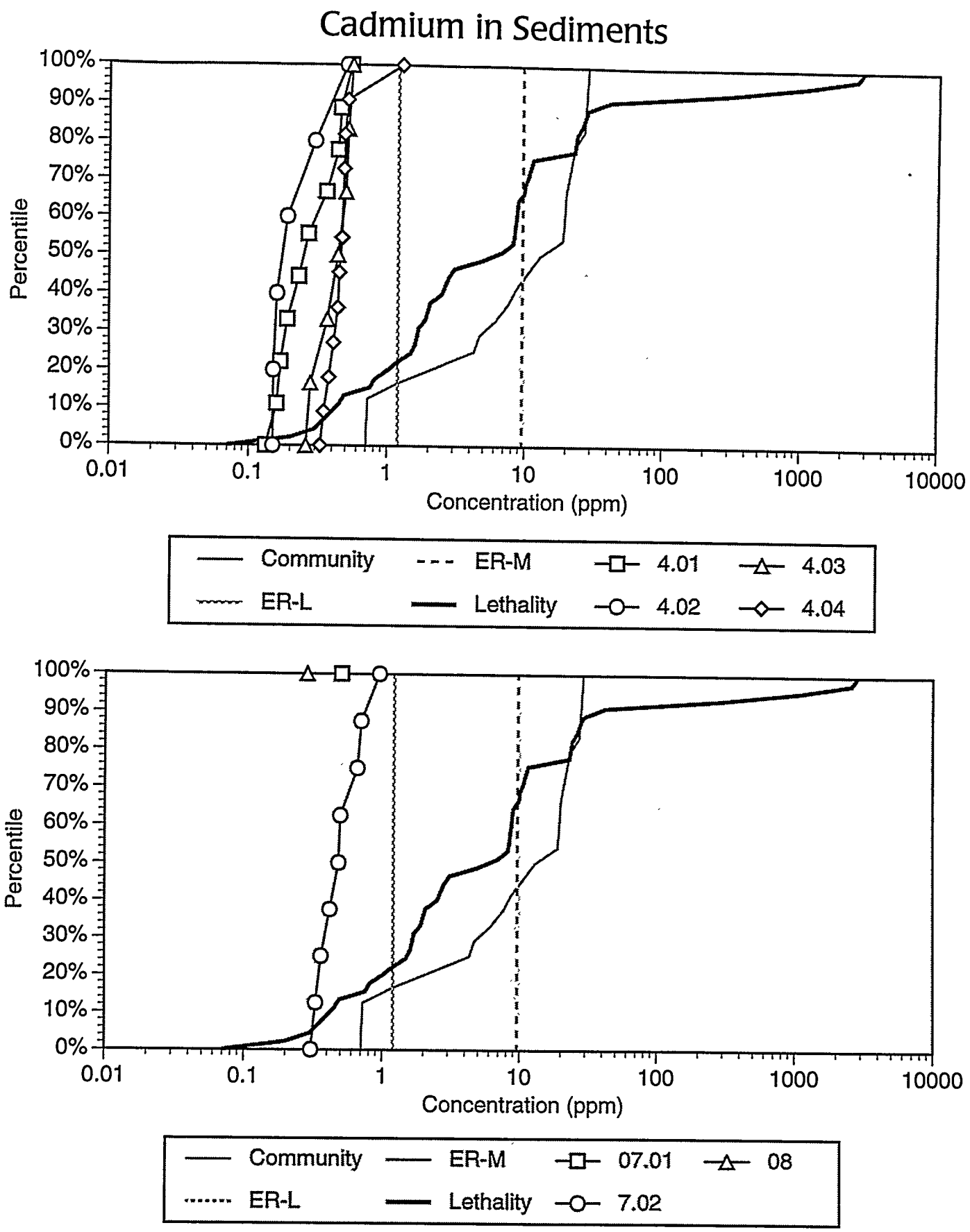


Fig. F3.7(c-d). Empirical distribution functions for sediment toxicity of cadmium to sediment-associated organisms and individual measurements of cadmium in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

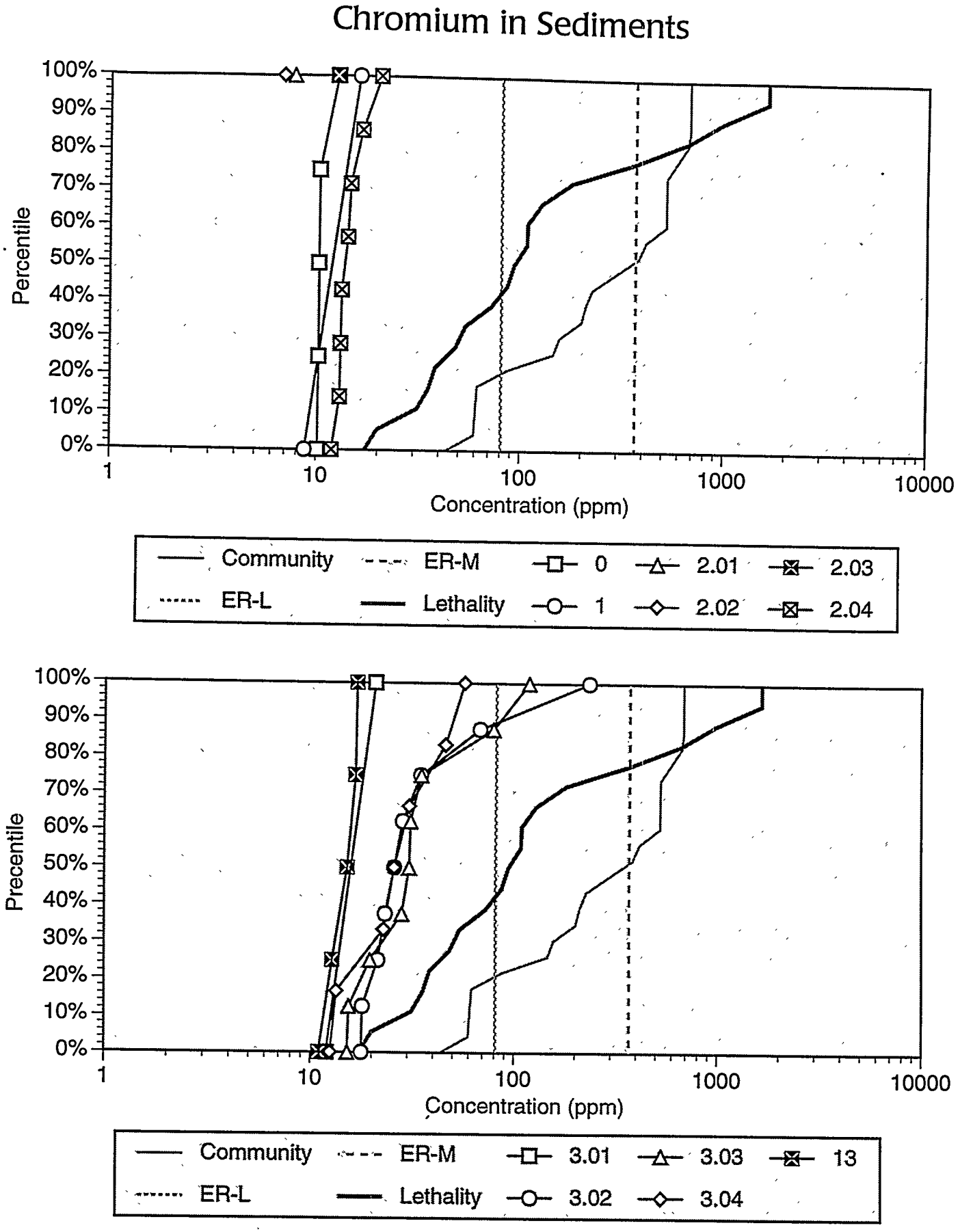


Fig. F3.8(a-b). Empirical distribution functions for sediment toxicity of chromium to sediment-associated organisms and individual measurements of chromium in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

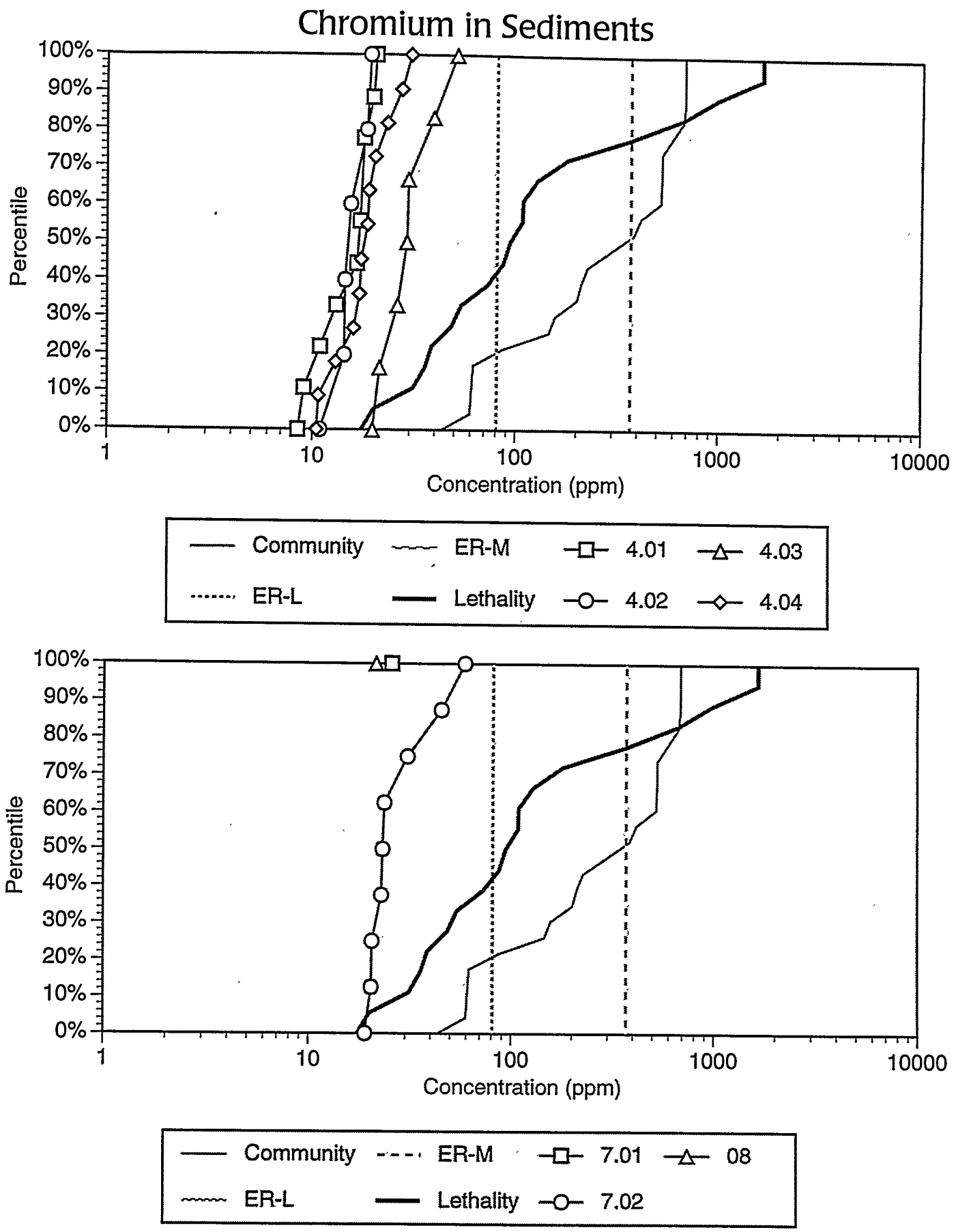


Fig. F3.8(c-d). Empirical distribution functions for sediment toxicity of chromium to sediment-associated organisms and individual measurements of chromium in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

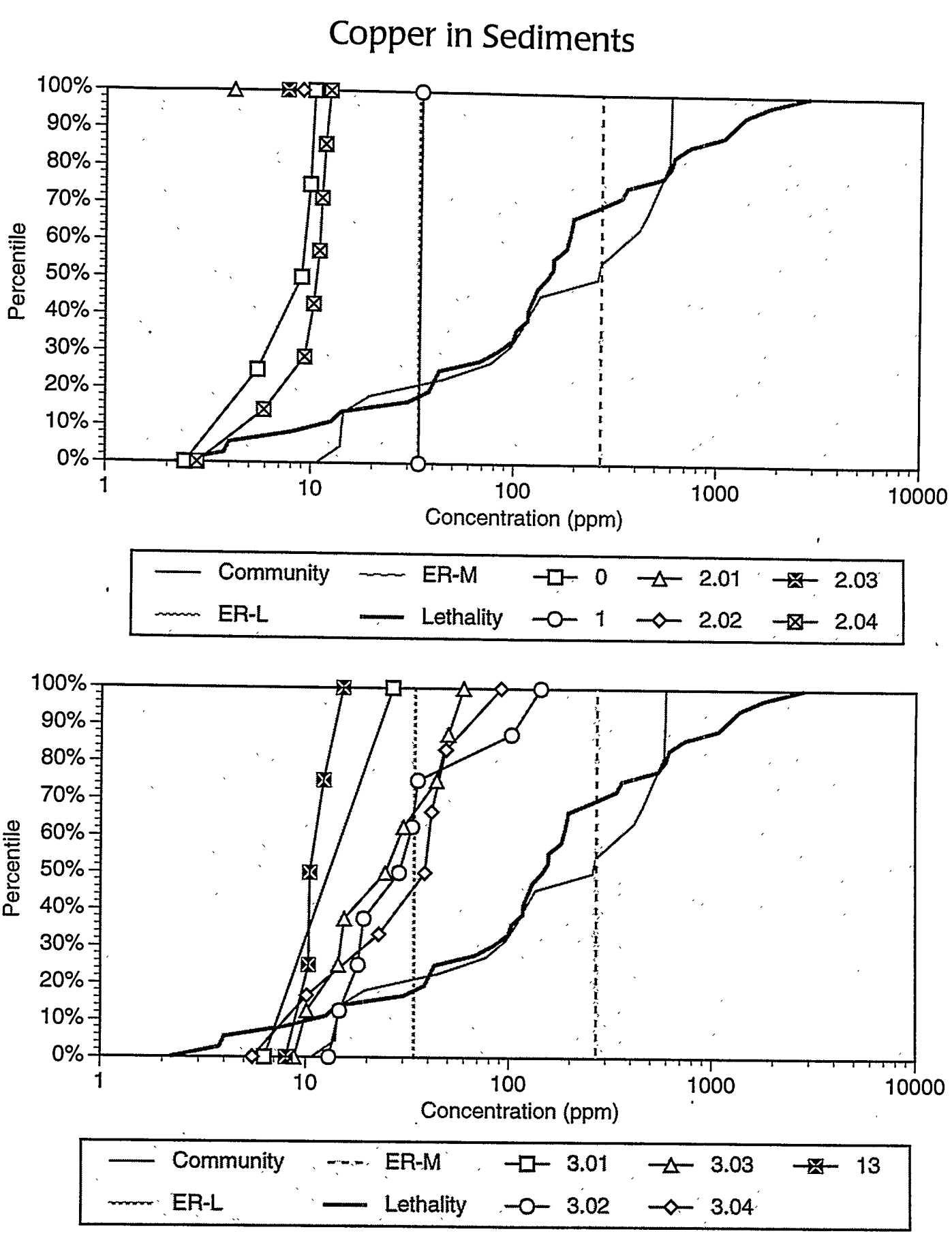


Fig. F3.9(a-b). Empirical distribution functions for sediment toxicity of copper to sediment-associated organisms and individual measurements of copper in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

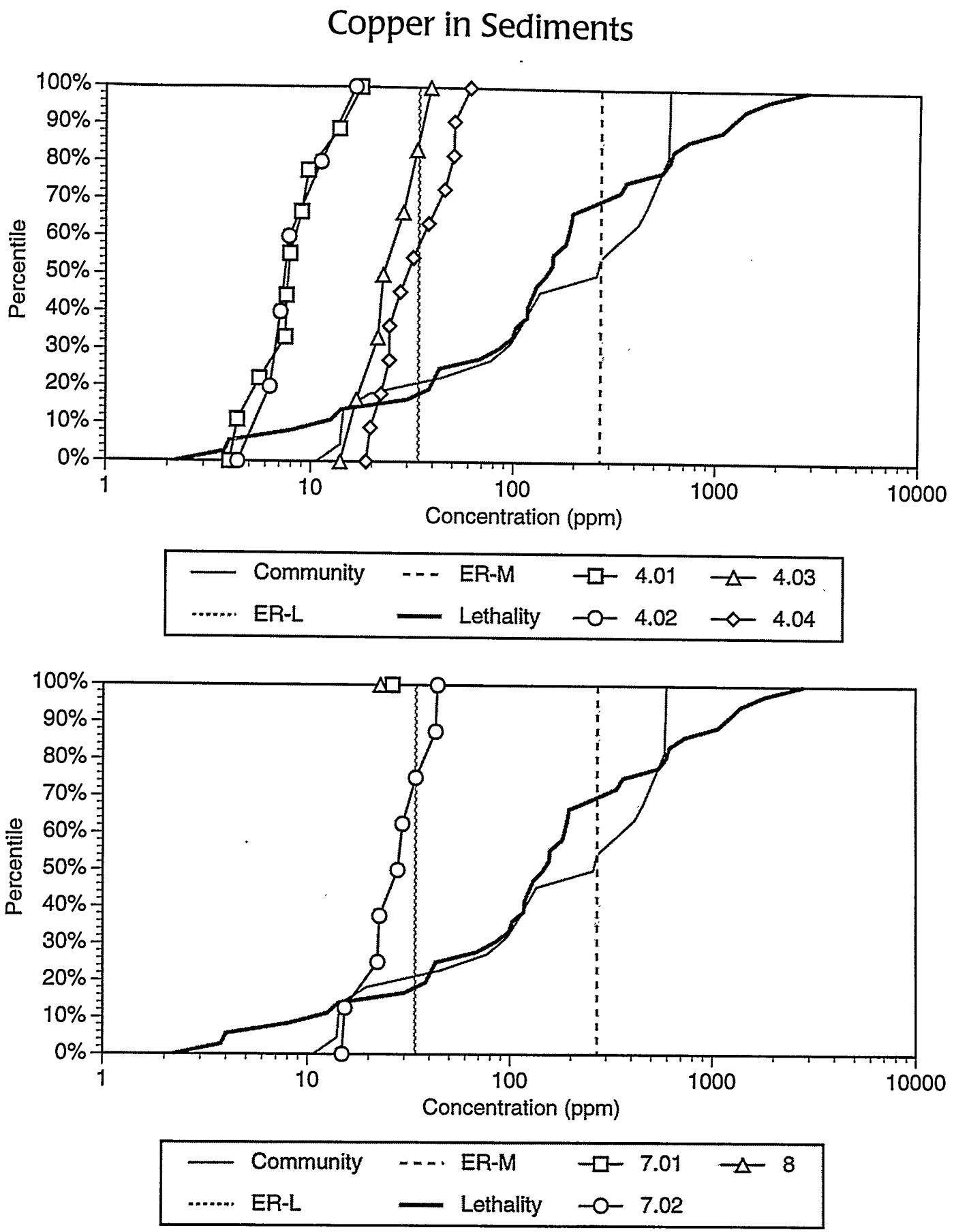


Fig. F3.9(c-d). Empirical distribution functions for sediment toxicity of copper to sediment-associated organisms and individual measurements of copper in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

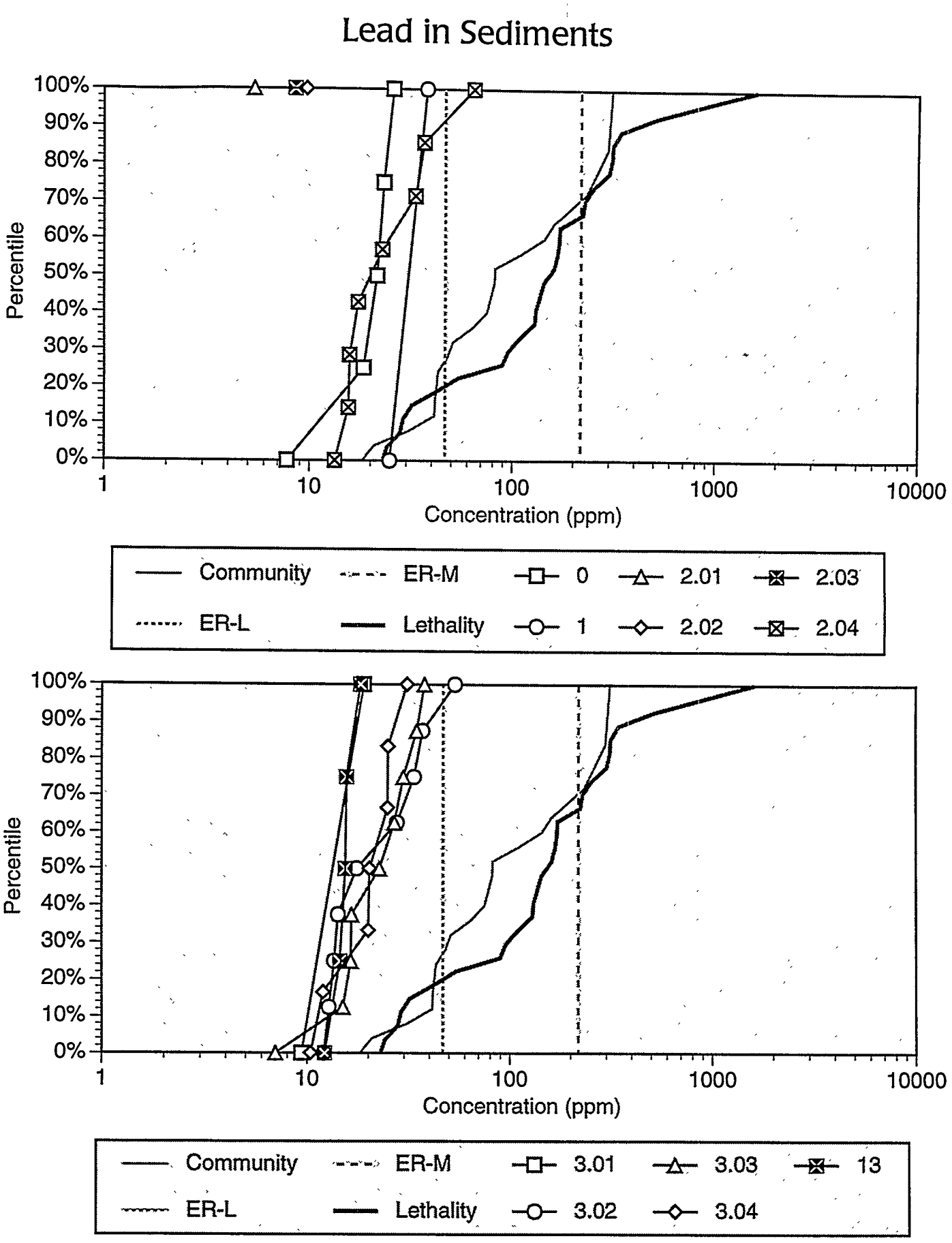
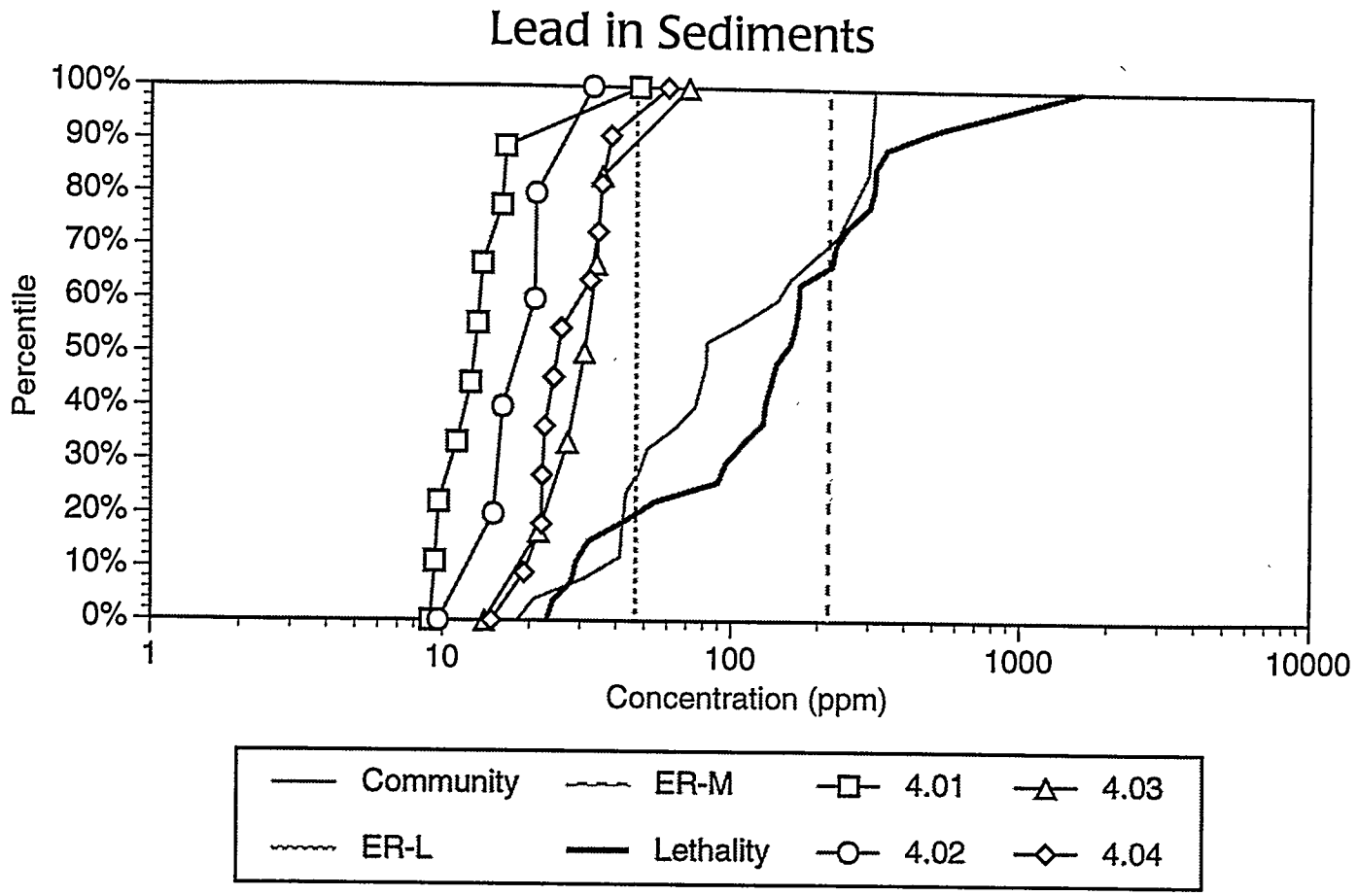


Fig. F3.10(a-b). Empirical distribution functions for sediment toxicity of lead to sediment-associated organisms and individual measurements of lead in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.



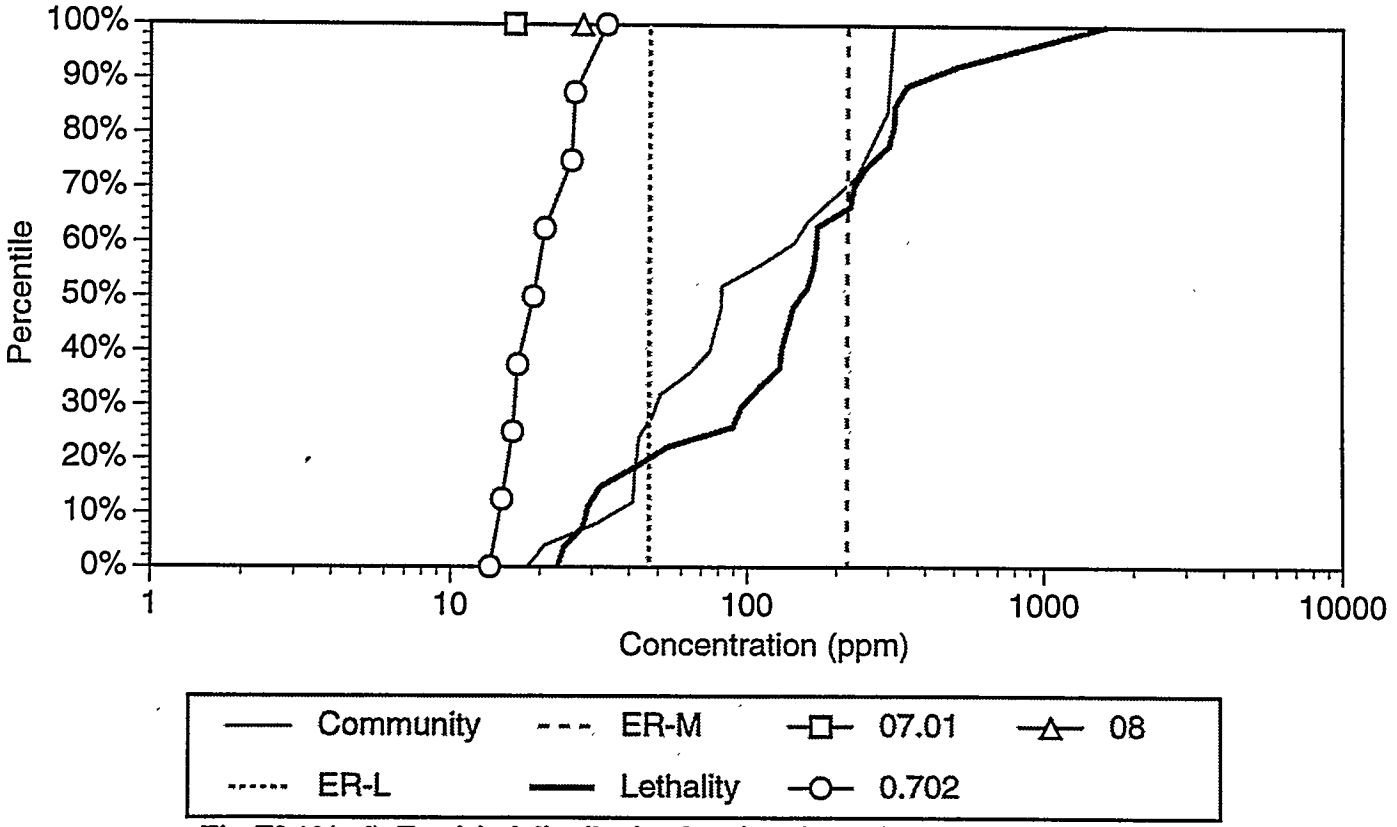


Fig. F3.10(c-d). Empirical distribution functions for sediment toxicity of lead to sediment-associated organisms and individual measurements of lead in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

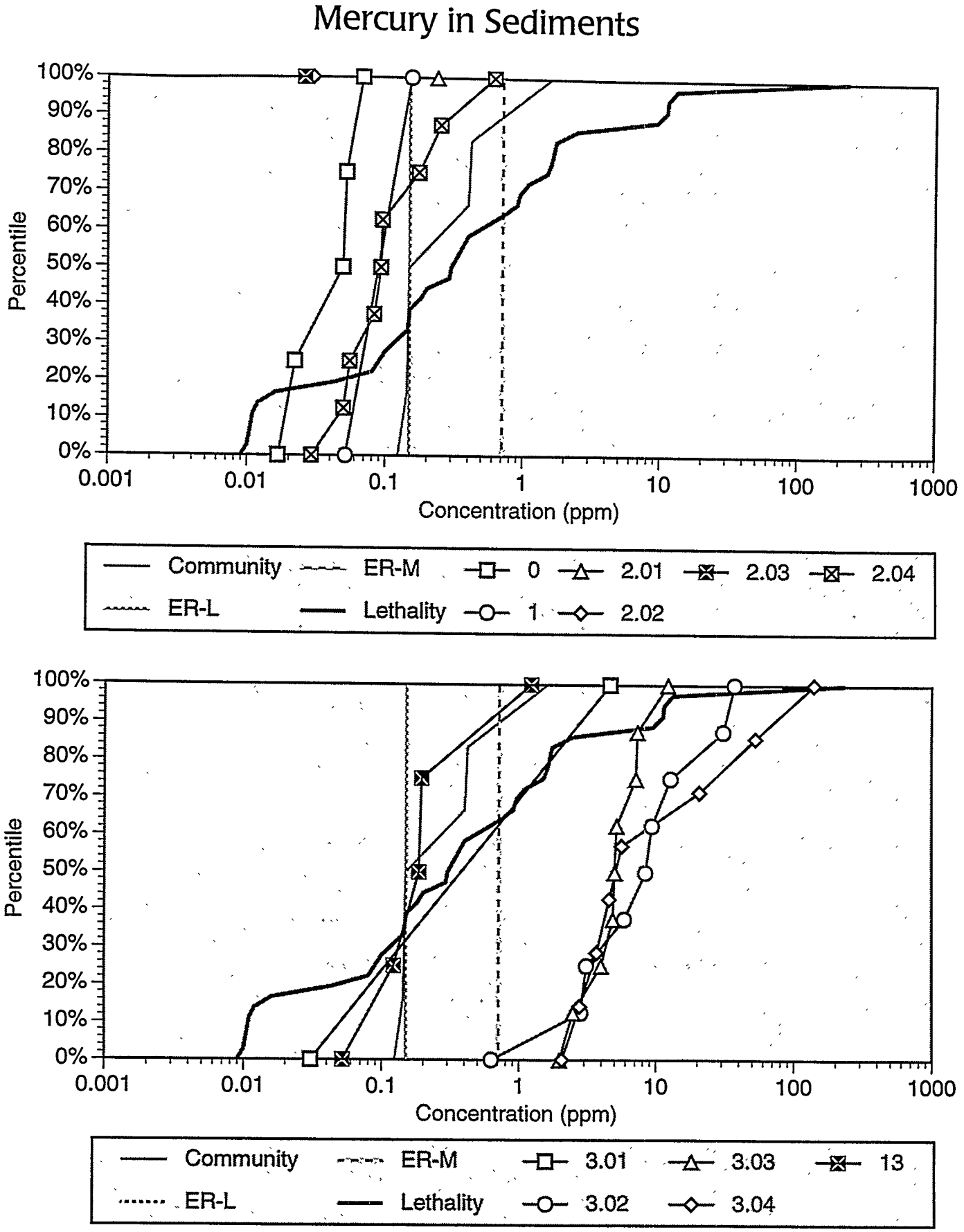


Fig. F3.11(a-b). Empirical distribution functions for sediment toxicity of mercury to sediment-associated organisms and individual measurements of mercury in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

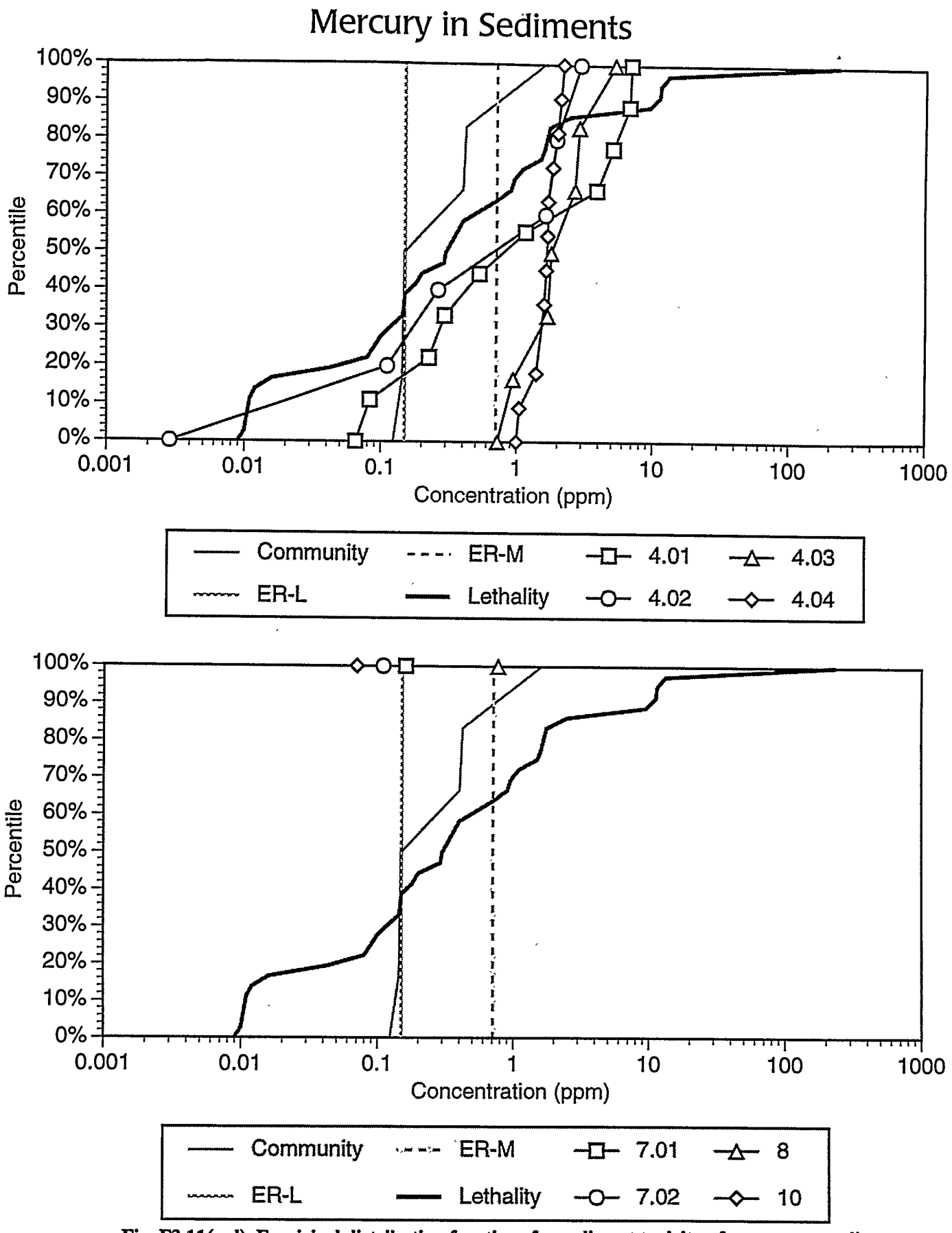


Fig. F3.11(c-d). Empirical distribution functions for sediment toxicity of mercury to sediment-associated organisms and individual measurements of mercury in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

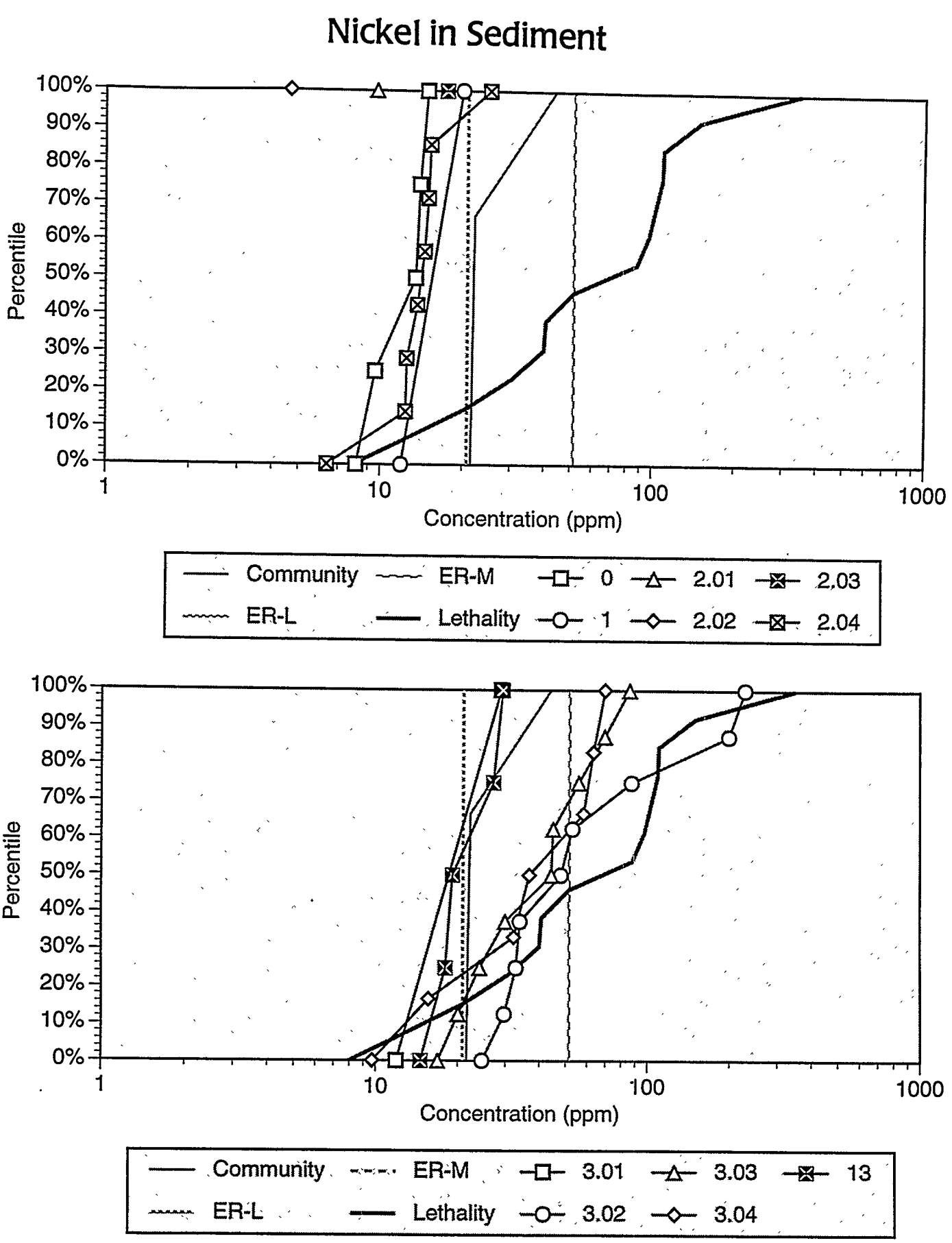


Fig. F3.12(a-b). Empirical distribution functions for sediment toxicity of nickel to sediment-associated organism and individual measurements of nickel in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

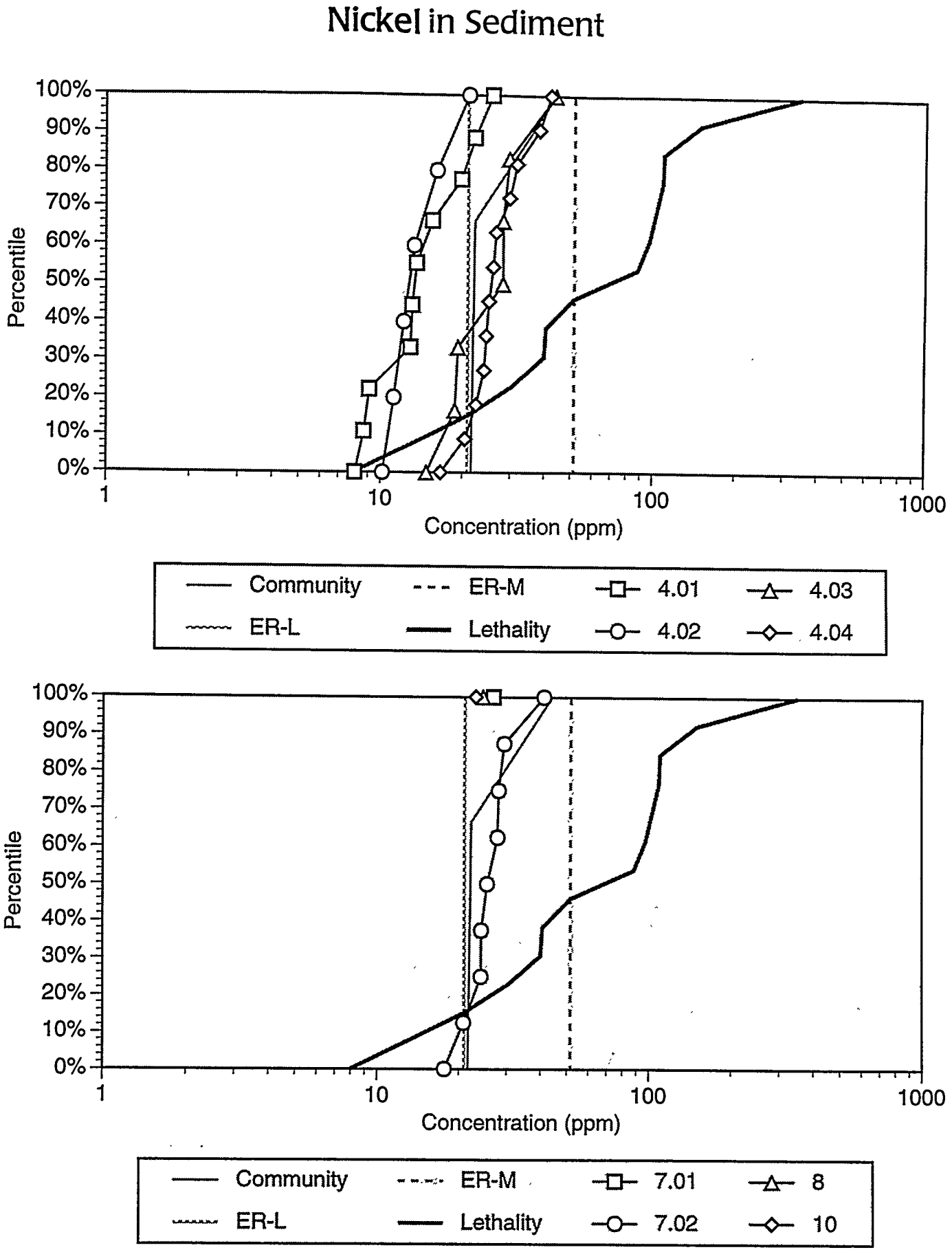


Fig. F3.12(c-d). Empirical distribution functions for sediment toxicity of nickel to sediment-associated organisms and individual measurements of nickel in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

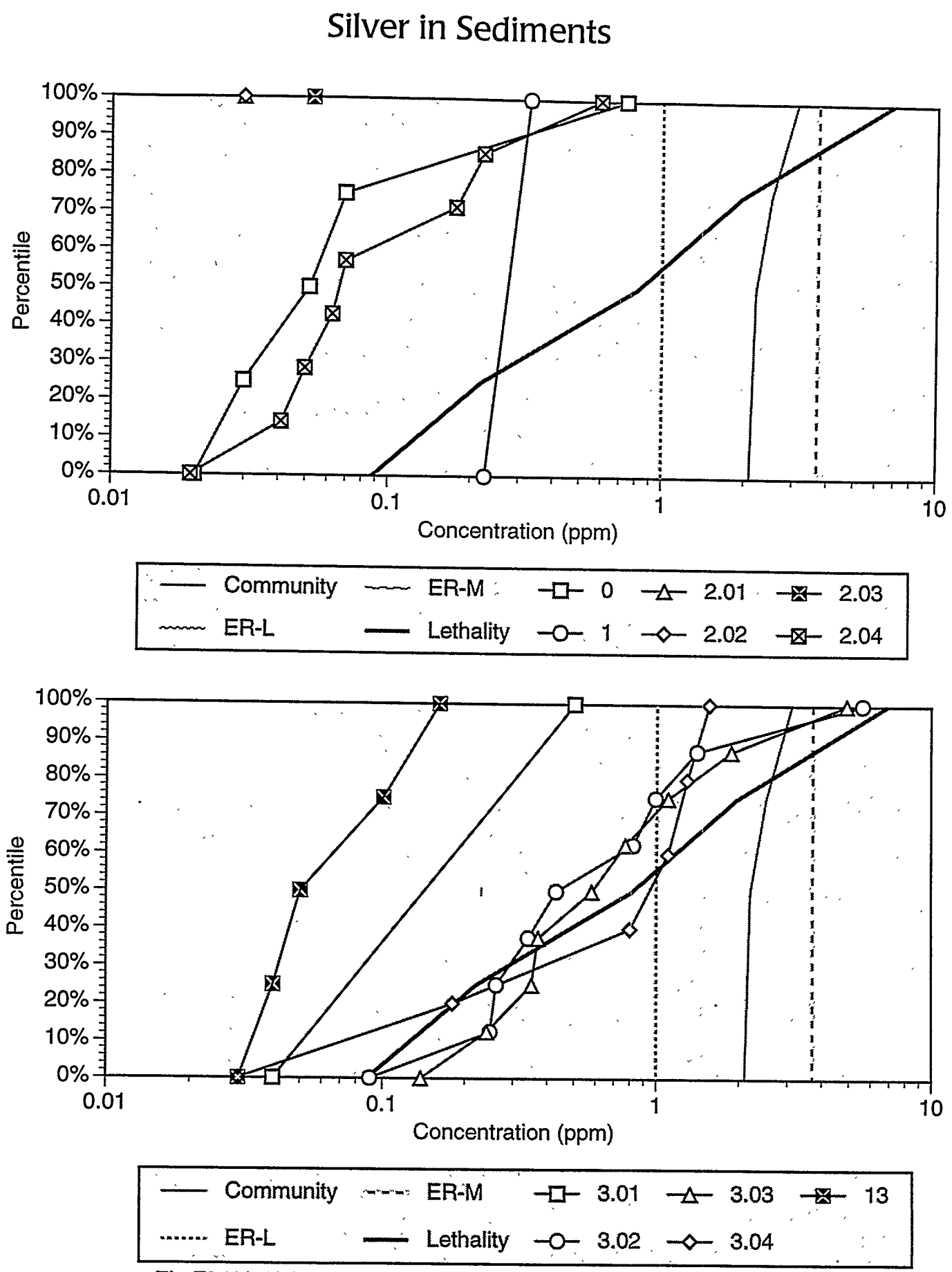


Fig. F3.13(a-b). Empirical distribution functions for sediment toxicity of silver to sediment-associated organisms and individual measurements of silver in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

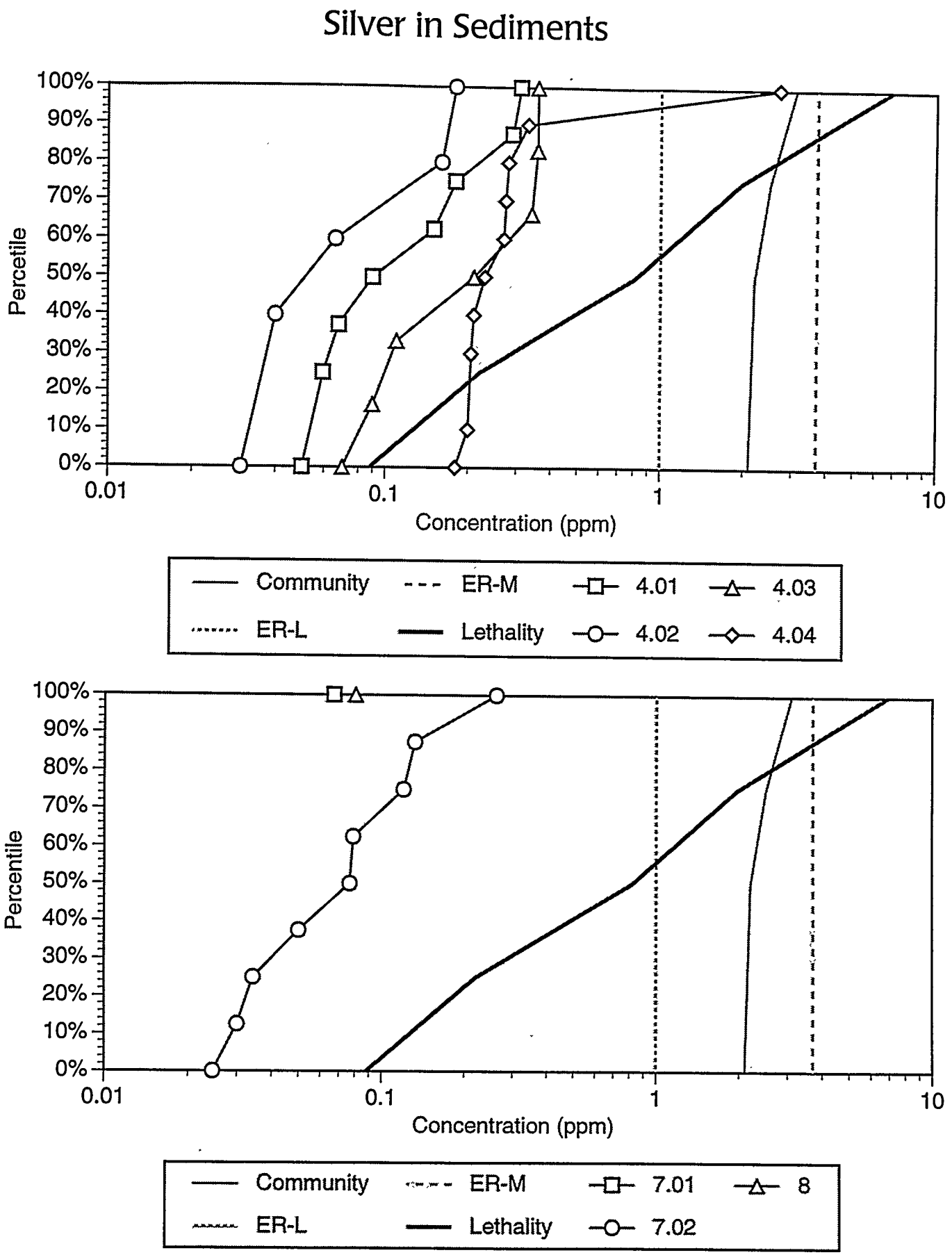


Fig. F3.13(c-d). Empirical distribution functions for sediment toxicity of silver to sediment-associated organisms and individual measurements of silver in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

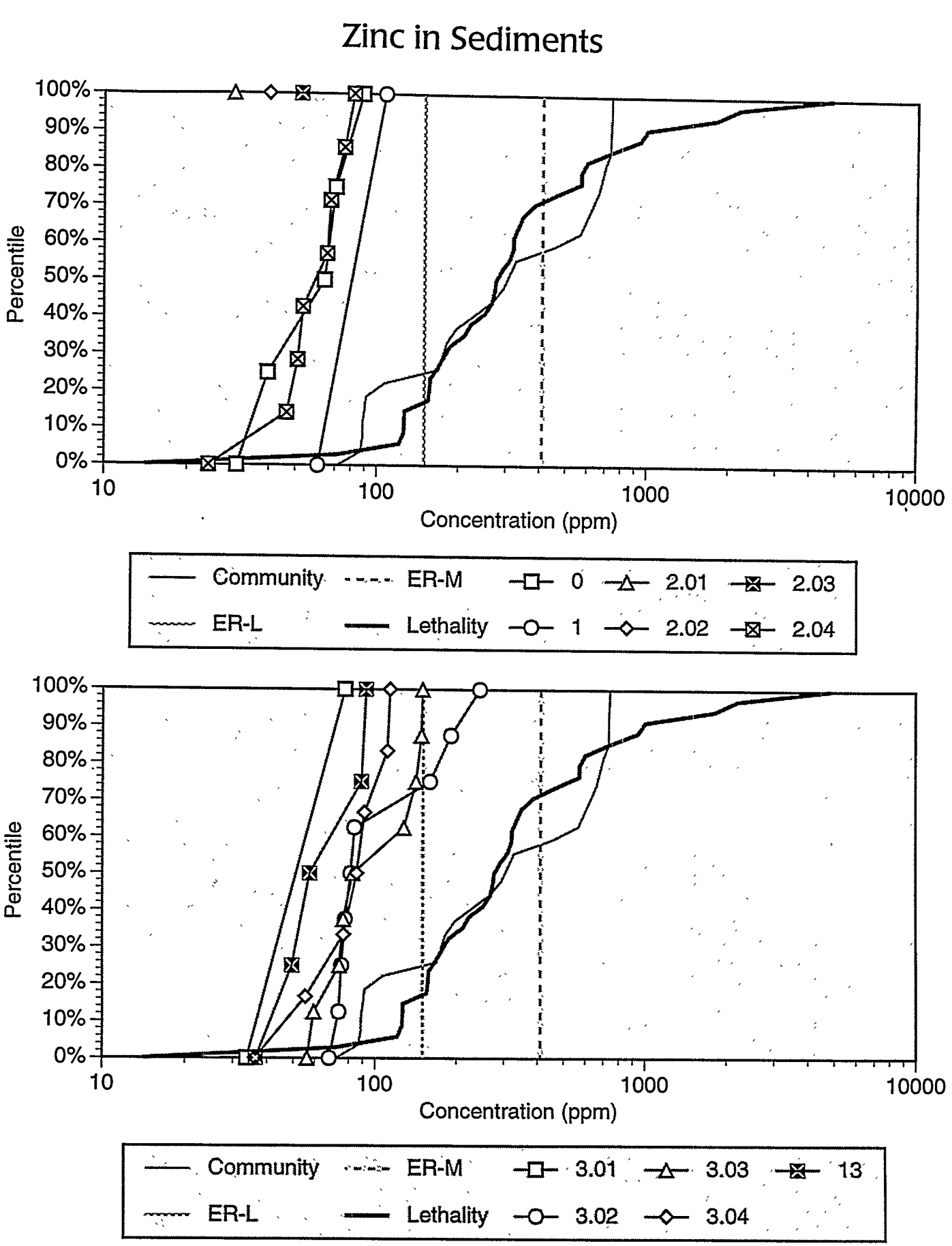


Fig. F3.14(a-b). Empirical distribution functions for sediment toxicity of zinc to sediment-associated organisms and individual measurements of zinc in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

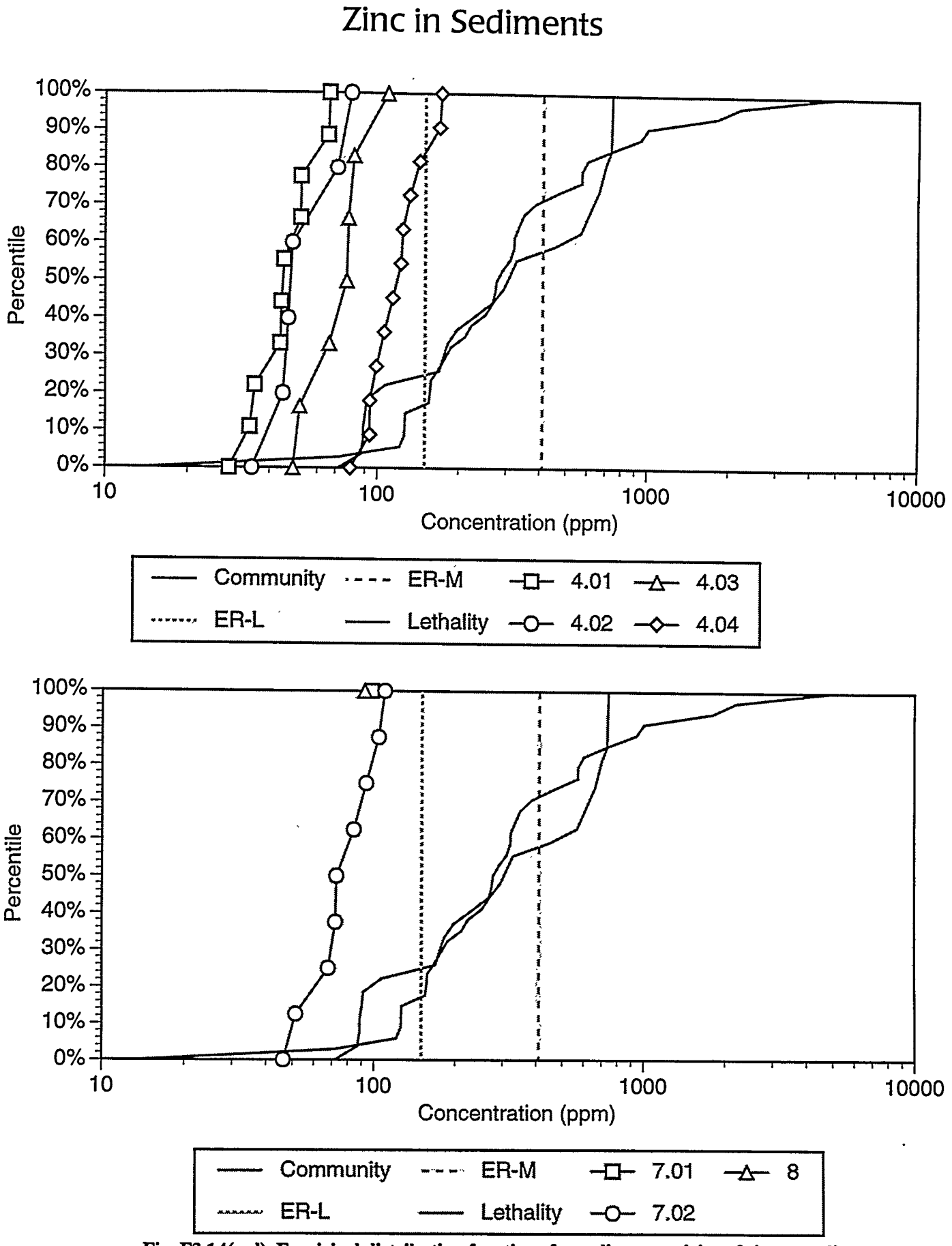


Fig. F3.14(c-d). Empirical distribution functions for sediment toxicity of zinc to sediment-associated organisms and individual measurements of zinc in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

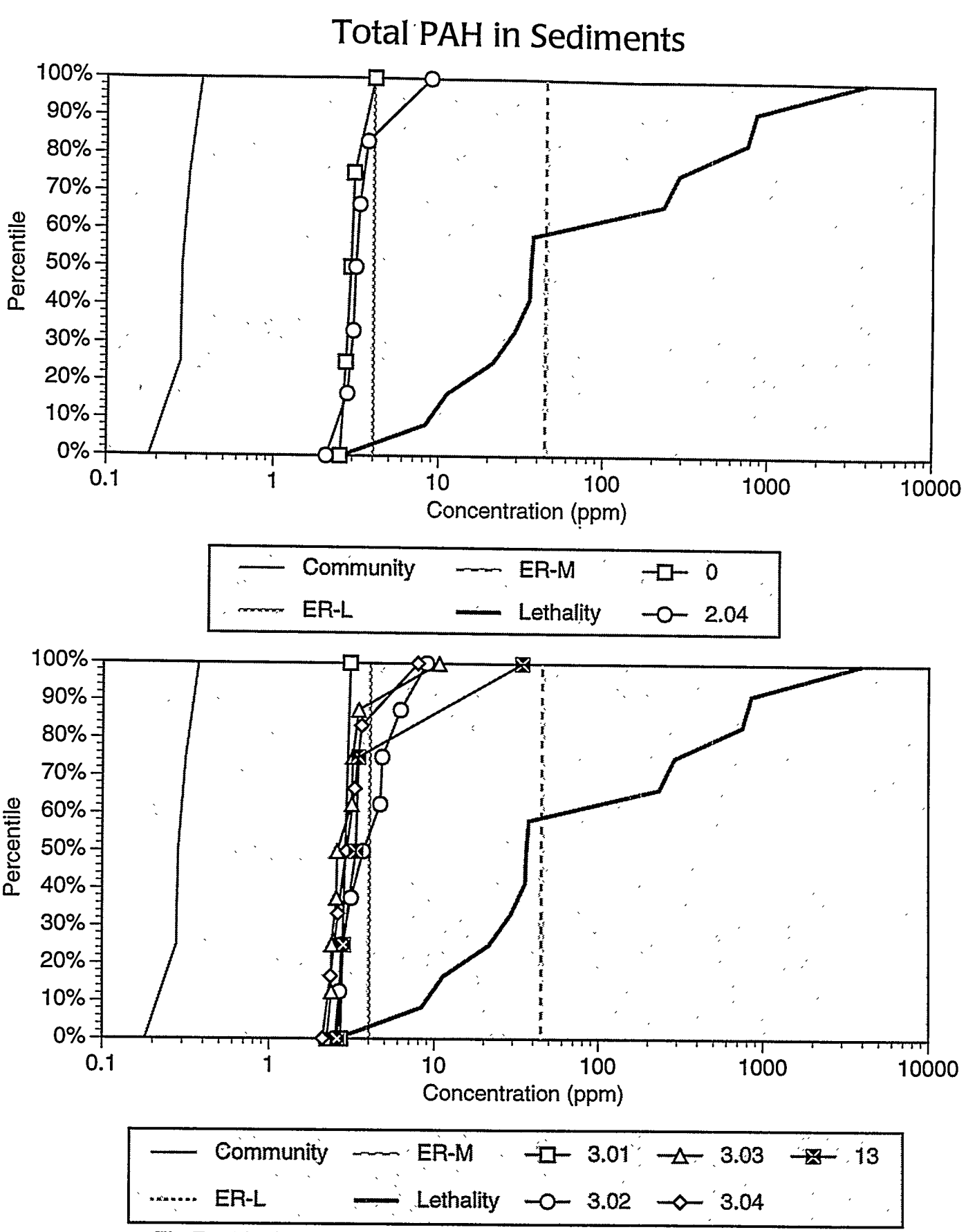


Fig. F3.15(a-b). Empirical distribution functions for sediment toxicity of Total PAH to sediment-associated organisms and individual measurements of 2-methylnaphthalene in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River, bottom graph (b) is Poplar Creek.

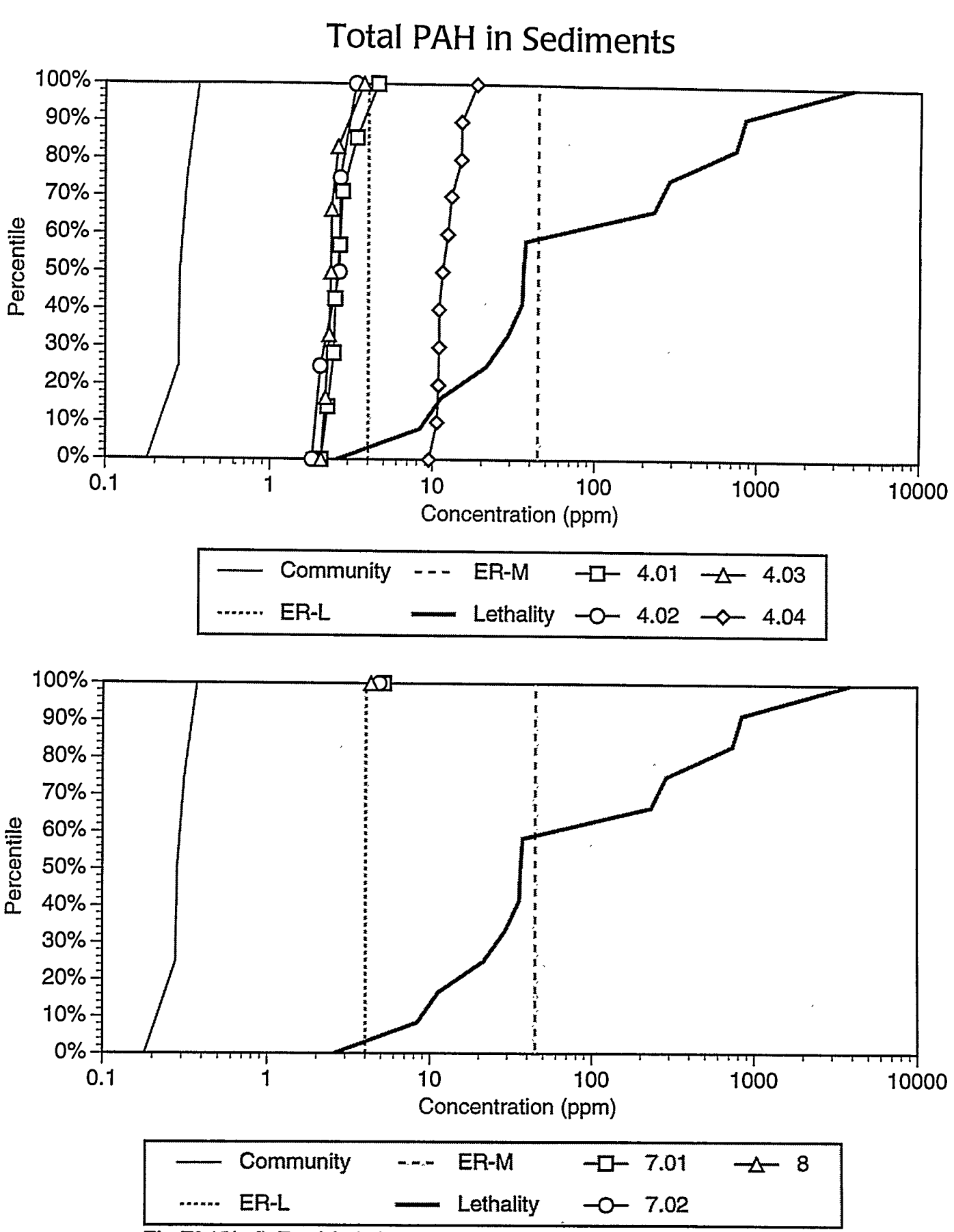


Fig. F3.15(c-d). Empirical distribution functions for sediment toxicity of Total PAH to sediment-associated organisms and individual measurements of 2-methylnaphthalene in sediments from the Clinch River and Poplar Creek System. Top graph (c) is Lower Clinch River bottom graph (d) is McCoy Branch Embayment and Walker Branch Embayment.

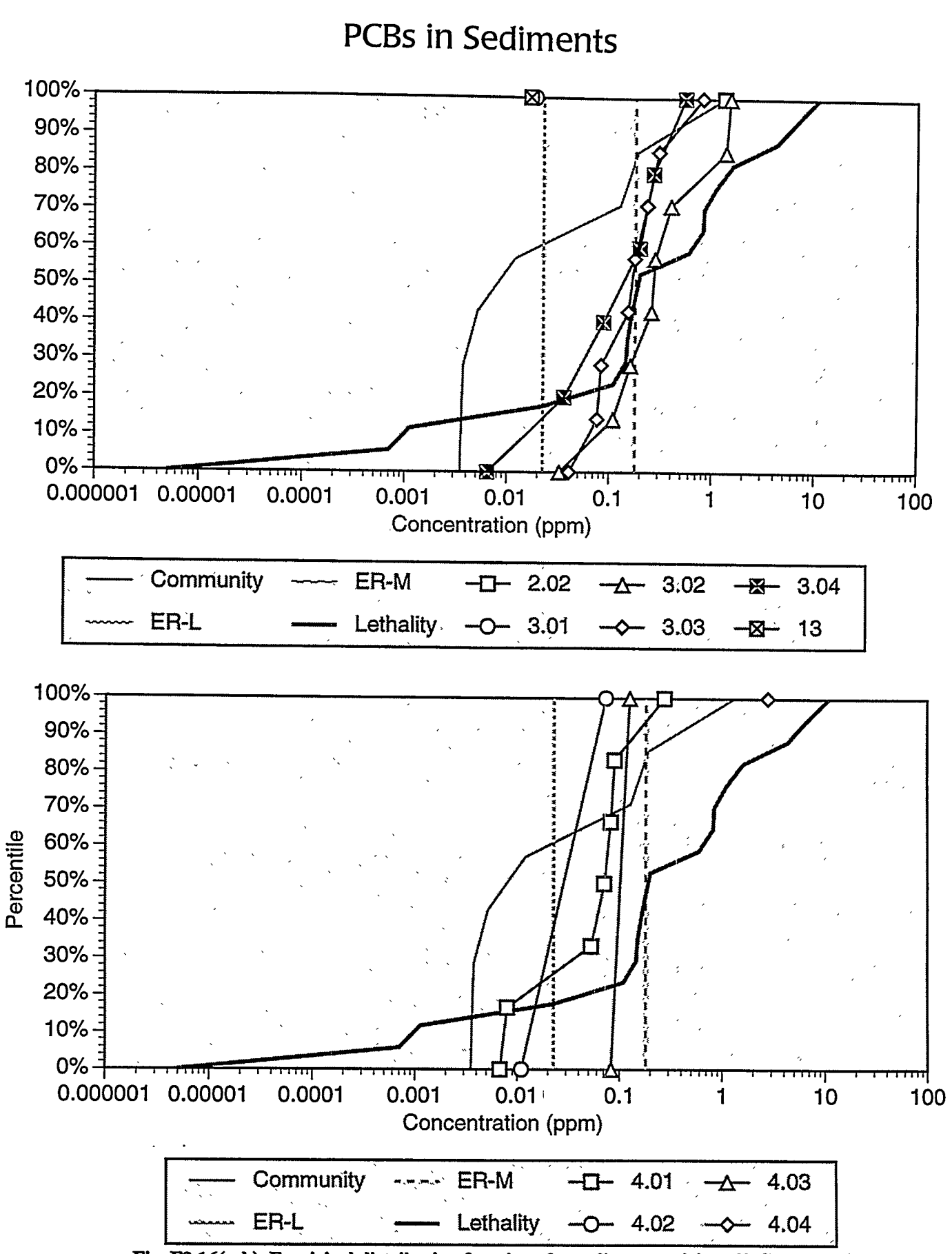


Fig. F3.16(a-b). Empirical distribution functions for sediment toxicity of PCBs to sediment-associated organisms and individual measurements of PCBs in sediments from the Clinch River and Poplar Creek System. Top graph (a) is Upper Clinch River and Poplar Creek, bottom graph (b) is Lower Clinch River.

Appendix F4

PISCIVOROUS WILDLIFE

Table F4.1. Life history parameters for osprey

Parameter	Value	Comments	Reference
Body Weight	1.5 kg (♂+♀)		EPA 1993 (GLWQC)
Food Consumption Rate	0.3 kg/d	fresh weight	EPA 1993 (GLWQC)
Water Consumption Rate	0.077 L/d		EPA 1993 (GLWQC)
Diet Composition	almost 100% fish fish sizes: 0–10 cm=3.3% 11–20 cm=42.1% 21–30 cm=46.7% 31–40 cm=6.6% >41 cm=1.3%	all parts of fish consumed except large bones	EPA 1993 (GLWQC) VanDaele and VanDaele 1982
Home Range (foraging distance from nest site)	10–15 km		VanDaele and VanDaele 1982
Habitat Requirements	Coastal areas plus large rivers and lakes Nesting habitat requires open, shallow water nearby plus abundant fish. Nests atop isolated (often dead) trees and man-made structures		EPA 1993a
Population Density	0.005–0.1 nests/ha		EPA 1993a
Behavior	year-round resident in southern part of range (i.e. Florida) Migratory in Tennessee		EPA 1993a

Table F4.2. Life history parameters for great blue heron

Parameter	Value	Comments	Reference
Body Weight	2.576 kg (♂) 2.204 kg (♀) **2.39** kg (mean♂+♀)		Dunning 1984
Food Consumption Rate	**0.42** kg/d	estimated using allometric equation[a] specific for herons and egrets assuming 2.39 kg bw	Kushlan 1978
Water Consumption Rate	**0.1058** L/d	estimated using allometric equation[b] assuming 2.39 kg bw	After Calder and Braun 1983
Diet Composition	diet predominantly fish but may include crustaceans, insects, snails, amphibians, reptiles, birds, and mammals		Kushlan 1978 Collazo 1985 Hoffman 1978
	fish sizes: 0–10 cm=39.2% 11–20 cm=47.1% 21–30 cm=13.7%		Alexander 1977
Home Range (foraging distance from colony)	3.1 km	up to 24.2 km - S. Dakota - river	EPA 1993a
	7–8 km	N. Carolina - coastal	Short and Cooper 1985
Habitat Requirements	use both coastal and inland water-associated habitats		Short and Cooper 1985
	Foraging: shallow shores of ponds, lakes, streams, wet meadows, wooded swamps, bays, and marshes		DeGraaf et al. 1981
	breeding: trees for rookery sites. In absence of trees will use rock ledges, cliffs, and artificial structures		Short and Cooper 1985

Table F4.2 (continued)

Parameter	Value	Comments	Reference
Population Density	nest colonially, therefore population density depends on availability of nest habitat and suitable foraging habitat		EPA 1993a
Behavior	may or may not defend a feeding territory depending on local population size and food availability		Kushlan 1978
	Migrates in northern U.S. and southern Canada; year round resident from WV, PA south.		National Geographic Society 1987

[a] Allometric equation for estimation of food consumption by herons and egrets is:

$$\log FIR = 0.966 \log bw - 0.640$$

where: FIR = food ingestion rate (g/d)
bw = body weight (g)

[b] Allometric equation for estimation of water consumption by birds is:

$$W=0.059(bw)^{0.67}$$

where: W = water consumption (L/d)
bw = body weight (kg)

Table F4.3. Life history parameters for mink

Parameter	Value	Comments	Reference
Body Weight	**1.0** kg (mean ♂+♀)		EPA 1993b
Food Consumption Rate	**0.137** kg/d (mean ♂+♀)		Bleavins and Aulerich 1981
Water Consumption Rate	0.099 L/d	estimated using allometric equation[a] assuming 1.0 kg bw	After Calder and Braun 1983
Diet Composition	Diverse diet includes: mammals, fish, aquatic invertebrates, amphibians, and birds		Hamilton 1940, Sealander 1943, Korschgen 1958, Burgess and Bider 1980, Alexander 1977
	Proportion of aquatic prey (fish, amphibians, inverts, etc.) = 0.546±0.21	Proportion represents means of values from five studies	
	fish sizes: 0–10 cm=72% 11–20 cm=28%		
Home Range	2.63 km (♂) 1.85 km (♀)	stream - Sweden	Gerell 1970
	770 ha (♂)	prairie potholes, Manitoba	Arnold and Fritzell 1987
		range size and shape depends on habitat - linear along streams, circular in marshes	EPA 1993a
Habitat Requirements	aquatic habitats - streams, lakes, marshes;		Burt and Grossenheider 1976
Population Density	0.03–0.085 /ha	river - Montana	Mitchell 1961
Behavior	nocturnal active year-round, does not hibernate		EPA 1993a

[a] Allometric equation for estimation of water consumption by mammals is:

$$W=0.099(bw)^{0.90}$$

where: W = water consumption (L/d)
bw = body weight (kg)

Table F4.4. Life history parameters for river otter

Parameter	Value	Comments	Reference
Body Weight	**8.0** kg (mean ♂+♀)		EPA 1993b
Food Consumption Rate	**0.9** kg/d (mean ♂+♀)		EPA 1993b
Water Consumption Rate	**0.64** L/d		EPA 1993b
Diet Composition	Almost exclusively fish 2–50 cm in size; most ≥30 cm.		Melquist and Hornocker 1983
	50% large and 50% small fish		EPA 1993b
Home Range	10–78 km	river-Idaho	Melquist and Hornocker 1983
		range size and shape depends on habitat - linear along streams, circular in marshes	EPA 1993b
Habitat Requirements	aquatic habitats - streams, lakes, marshes;		EPA 1993b
Population Density	0.17–0.37 /km	river-Idaho	Melquist and Hornocker 1983
	0.0094–0.014/ha		EPA 1993b
Behavior	Generally most active morning and evening, but may be active at any time in day.		Melquist and Hornocker 1983
	active year-round, does not hibernate		EPA 1993b

Table F4.5. Fillet-to-whole fish ratios for contaminants detected in fish from the Clinch River

	N	Mean	Standard error	Maximum	Minimum
DDD [a]		3.8	0.32	6.7	1.22
DDE [a]		3.8	0.32	6.7	1.22
DDT [a]		3.8	0.32	6.7	1.22
Aldrin [a]		3.8	0.32	6.7	1.22
Arsenic [c]	12	1.4	0.068	1.8	1.13
Beryllium [b]		1			
Bis(ethylhexyl)phthalate [a]		3.8	0.32	6.7	1.22
Chlordane, total	6	3.9	0.49	5.05	2.2
Copper [c]	12	6.8	3.4	43.5	0.86
Mercury [c]	12	0.68	0.019	0.74	0.54
Aroclor-1016 [a]		3.8	0.32	6.7	1.22
Aroclor-1254	22	3.8	0.32	6.7	1.22
Aroclor-1260	23	5.46	0.87	21.8	3.03
Selenium [c]	12	1.07	0.03	1.3	0.87
Zinc [c]	12	2.46	0.14	3.1	1.68

[a] Specific ratios were not available for these contaminants. Because K_{ow}s for these chemicals are comparable to that for Aroclor 1254, ratios were also assumed to be comparable.
[b] Specific ratio was not available because most inorganics had ratios ~1, assumed 1.
[c] Specific ratio from Clinch River was not available. Data from spotted bass from Southworth (1994).

Table F4.6. Product limit estimate 95% upper confidence bounds for contaminants in fish and water from Clinch River/Poplar Creek system, by subreach

Subreach	Analyte	Contaminant concentration in surface water	Contaminant concentrations in whole fish (by size class)[a]				
			0–10 cm	10–20 cm	20–30 cm	30–40 cm	>40 cm
0	As	0.05	*0.093*	0.093	0.196	0.270	0.424
0	Be	0.0012	*0.004*	0.004	0.000	0.004	0.000
0	Chlordane	0	*0.000*	0.000	0.000	0.107	0.797
0	DDD	0	*0.000*	0.000	0.000	0.000	0.017
0	DDE	0	*0.000*	0.000	0.000	0.011	0.070
0	Hg	0.00003	*0.056*	0.056	0.052	0.244	0.254
0	PCB-1254	0	*0.000*	0.000	0.000	0.114	0.807
0	PCB-1260	0	*0.000*	0.000	0.000	0.764	9.793
0	Se	0	*0.879*	0.879	0.578	1.083	0.791
0	Zn	0.015244	*22.179*	22.179	12.054	14.753	11.970
1	As	0.0012	*0.101*	0.101	0.000	0.550	0.112
1	Be	0.0014	*0.006*	0.006	0.000	0.000	0.000
1	Bis(2ethylhexyl)phthalate	0.002723	*0.000*	0.000	0.000	0.000	0.000
1	Chlordane	0	*0.000*	0.000	0.097	0.000	0.000
1	Hg	0.00001	*0.030*	0.030	0.000	0.081	0.050
1	PCB-1254	0	*0.000*	0.000	0.087	0.000	0.000
1	PCB-1260	0	*0.000*	0.000	0.258	0.000	0.000
1	Se	0	*0.986*	0.986	0.000	1.177	0.952
1	Zn	0.017743	*19.788*	19.788	0.000	22.849	12.546
2.01	As	0	*0.000*	0.000	*0.305*	0.609	0.472
2.01	Be	0	*0.004*	0.004	*0.002*	0.000	0.000
2.01	Chlordane	0	*0.000*	0.000	*0.144*	0.288	0.318
2.01	Cu	0.00741	*132.438*	132.438	*66.219*	0.000	0.000
2.01	Hg	0.00001	*0.000*	0.000	*0.044*	0.088	0.284
2.01	PCB-1254	0	*0.000*	0.000	*0.147*	0.293	0.902
2.01	PCB-1260	0	*0.000*	0.000	*0.177*	0.355	1.659
2.01	Se	0	*0.610*	0.610	*0.566*	0.522	0.424
2.01	Zn	0.019837	*0.000*	0.000	*0.000*	0.000	0.000
2.02	As	0.0011	*0.082*	0.082	0.025	0.415	0.448
2.02	Be	0	*0.002*	0.002	0.000	0.002	0.002
2.02	Bis(2ethylhexyl)phthalate	0.006315	*0.000*	0.000	0.000	0.000	0.000
2.02	Chlordane	0	*0.000*	0.000	0.068	0.331	0.623
2.02	Cu	0.0065	*1.878*	1.878	0.000	6.130	0.000
2.02	Hg	0.00007	*0.068*	0.068	0.068	0.156	0.366
2.02	PCB-1016	0	*0.000*	0.000	0.009	0.000	0.000

Table F4.6 (continued)

Subreach	Analyte	Contaminant concentration in surface water	Contaminant concentrations in whole fish (by size class)[a]				
			0–10 cm	10–20 cm	20–30 cm	30–40 cm	>40 cm
2.02	PCB-1254	0	*0.000*	0.000	0.145	1.198	2.487
2.02	PCB-1260	0	*0.000*	0.000	0.216	1.856	4.649
2.02	Se	0	*0.564*	0.564	0.997	0.494	0.556
2.02	Zn	0.015594	*18.213*	18.213	0.000	18.815	21.212
2.04	Aldrin	0	*0.000*	*0.000*	*0.000*	0.000	0.001
2.04	As	0.0011	*0.000*	*0.000*	*0.000*	0.000	0.000
2.04	Bis(2ethylhexyl)phthalate	0.0375	*0.000*	*0.000*	*0.000*	0.000	0.000
2.04	Chlordane	0	*0.000*	*0.000*	*0.000*	0.000	0.177
2.04	Cu	0.00873	*0.000*	*0.000*	*0.000*	0.000	0.000
2.04	DDE	0	*0.000*	*0.000*	*0.000*	0.000	0.015
2.04	DDT	0	*0.000*	*0.000*	*0.000*	0.000	0.003
2.04	Hg	0.00002	*0.000*	*0.000*	*0.000*	0.000	0.000
2.04	PCB-1254	0	*0.000*	*0.000*	*0.000*	0.000	1.736
2.04	PCB-1260	0	*19.190*	*19.190*	*19.190*	19.190	7.080
2.04	Zn	0.017309	*0.000*	*0.000*	*0.000*	0.000	0.000
3.01	Aldrin	0.00001	*0.000*	0.000	*0.000*	0.000	0.000
3.01	As	0	*0.165*	0.165	*0.082*	0.000	0.168
3.01	Be	0	*0.006*	0.006	*0.006*	0.006	0.008
3.01	Bis(2ethylhexyl)phthalate	0.005	*0.000*	0.000	*0.000*	0.000	0.000
3.01	Chlordane	0	*0.000*	0.000	*0.189*	0.377	0.529
3.01	Cu	0.00429	*6.227*	6.227	*3.114*	0.000	0.000
3.01	DDE	0	*0.000*	0.000	*0.104*	0.208	0.030
3.01	Hg	0.00013	*0.392*	0.392	*0.431*	0.469	1.272
3.01	PCB-1016	0	*0.000*	0.000	*0.000*	0.000	0.381
3.01	PCB-1254	0.00029	*0.000*	0.000	*0.323*	0.645	1.480
3.01	PCB-1260	0	*0.000*	0.000	*1.403*	2.806	3.160
3.01	Se	0	*0.538*	0.538	*0.269*	0.000	0.214
3.01	Zn	0.017248	*14.896*	14.896	*7.448*	0.000	0.000
3.02	As	0.0014	*0.091*	0.091	0.315	0.407	0.083
3.02	Be	0	*0.009*	0.009	0.008	0.006	0.000
3.02	Bis(2ethylhexyl)phthalate	0.004841	*0.000*	0.000	0.000	0.000	0.000
3.02	Chlordane	0	*0.000*	0.000	0.287	0.336	0.558
3.02	Cu	0.00336	*8.184*	8.184	0.000	0.000	0.000
3.02	Hg	0.00012	*0.367*	0.367	0.477	0.533	1.614
3.02	PCB-1254	0	*0.000*	0.000	3.549	1.785	7.853
3.02	PCB-1260	0	*0.000*	0.000	4.539	2.013	8.533

Table F4.6 (continued)

Subreach	Analyte	Contaminant concentration in surface water	Contaminant concentrations in whole fish (by size class)[a]				
			0–10 cm	10–20 cm	20–30 cm	30–40 cm	>40 cm
3.02	Se	0	*0.413*	0.413	0.653	0.214	0.321
3.02	Zn	0.012169	*15.268*	15.268	21.522	10.824	0.000
3.03	As	0.00145	*0.111*	0.111	0.154	0.000	0.205
3.03	Be	0	*0.014*	0.014	0.000	0.000	0.004
3.03	Bis(2ethylhexyl)phthalate	0.002138	*0.000*	0.000	0.000	0.000	0.000
3.03	Chlordane	0	*0.000*	0.000	0.000	0.284	0.231
3.03	Cu	0.00494	*0.000*	0.000	0.000	0.000	0.000
3.03	DDE	0	*0.000*	0.000	0.000	0.003	0.002
3.03	Hg	0.00013	*0.241*	0.241	0.270	0.000	0.554
3.03	PCB-1254	0	*0.000*	0.000	0.000	0.786	1.035
3.03	PCB-1260	0	*0.000*	0.000	0.000	4.158	5.244
3.03	Zn	0.014037	*19.004*	19.004	13.776	0.000	24.480
3.04	As	0.0012	*0.133*	0.133	0.000	0.403	0.329
3.04	Be	0	*0.002*	0.002	0.000	0.003	0.004
3.04	Bis(2ethylhexyl)phthalate	0.005	*0.000*	0.000	0.000	0.000	0.179
3.04	Chlordane	0	*0.000*	0.000	0.079	0.272	0.345
3.04	Cu	0.00496	*0.000*	0.000	0.000	0.000	0.000
3.04	DDE	0	*0.000*	0.000	0.000	0.003	0.003
3.04	Hg	0.00026	*0.251*	0.251	0.000	0.492	0.596
3.04	PCB-1254	0.00014	*0.000*	0.000	0.264	1.213	2.097
3.04	PCB-1260	0	*0.000*	0.000	0.437	2.320	5.175
3.04	Se	0	*0.322*	0.322	0.000	0.329	0.417
3.04	Zn	0.018682	*0.000*	0.000	0.000	0.000	0.000
4.01	As	0.00107	*0.092*	0.092	0.000	0.244	0.404
4.01	Be	0	*0.000*	0.000	0.000	0.004	0.000
4.01	Bis(2ethylhexyl)phthalate	0.005	*0.000*	0.000	0.000	0.000	0.000
4.01	Chlordane	0.00002	*0.000*	0.000	0.063	0.316	0.434
4.01	Cu	0.01781	*3.526*	3.526	0.000	9.009	1.500
4.01	Hg	0.00005	*0.257*	0.257	0.057	0.210	0.447
4.01	PCB-1254	0	*0.000*	0.000	0.272	1.238	2.017
4.01	PCB-1260	0	*0.000*	0.000	0.235	2.380	3.653
4.01	Se	0	*0.757*	0.757	0.000	0.259	0.972
4.01	Zn	0.042085	*16.726*	16.726	0.000	19.328	10.578
4.04	As	0.00169	0.000	0.078	0.000	0.378	0.257
4.04	Be	0	0.000	0.003	0.000	0.000	0.002

Table F4.6 (continued)

Subreach	Analyte	Contaminant concentration in surface water	Contaminant concentrations in whole fish (by size class)[a]				
			0–10 cm	10–20 cm	20–30 cm	30–40 cm	>40 cm
4.04	Bis(2ethylhexyl)phthalate	0.010114	0.000	0.000	0.000	0.000	0.000
4.04	Chlordane	0	0.073	0.000	0.069	0.480	0.468
4.04	Cu	0.00602	0.000	19.096	0.000	60.186	5.433
4.04	DDD	0	0.000	0.000	0.000	0.000	0.060
4.04	DDE	0	0.000	0.000	0.000	0.041	0.220
4.04	Hg	0.00003	0.000	0.075	0.000	0.170	0.230
4.04	PCB-1254	0	0.100	0.000	0.118	0.673	2.049
4.04	PCB-1260	0	0.090	0.000	0.176	1.809	4.336
4.04	Se	0	0.000	0.470	0.000	0.479	0.344
4.04	Zn	0.017114	0.000	18.889	0.000	10.086	10.302
5	Aldrin	0	0.000	0.000	0.000	0.000	0.013
5	As	0	0.000	0.104	0.000	0.257	0.271
5	Be	0	0.000	0.000	0.000	0.003	0.007
5	Chlordane	0	0.069	0.000	0.065	0.242	0.446
5	Cu	0	0.000	86.293	0.000	0.000	3.784
5	DDD	0	0.000	0.000	0.000	0.005	0.031
5	DDE	0	0.000	0.000	0.000	0.035	0.064
5	DDT	0	0.000	0.000	0.000	0.002	0.006
5	Hg	0	0.000	0.043	0.000	0.137	0.200
5	PCB-1254	0	0.060	0.000	0.177	0.459	1.791
5	PCB-1260	0	0.070	0.000	0.144	1.099	4.329
5	Se	0	0.000	0.362	0.000	0.409	0.315
5	Zn	0	0.000	39.510	0.000	9.594	11.542
6	Chlordane	0	*0.060*	*0.060*	0.060	*0.060*	*0.060*
6	PCB-1254	0	*0.167*	*0.167*	0.167	*0.167*	*0.167*
6	PCB-1260	0	*0.173*	*0.173*	0.173	*0.173*	*0.173*
10	As	0	0.000	0.083	0.157	0.420	0.262
10	Be	0	0.000	0.003	0.026	0.003	0.002
10	Bis(2ethylhexyl)phthalate	0.005	0.000	0.000	0.000	0.000	0.000
10	Chlordane	0	0.077	0.000	0.073	0.263	0.280
10	Cu	0	0.000	0.000	1.978	0.000	0.000
10	DDD	0	0.000	0.000	0.000	0.000	0.004
10	DDE	0	0.000	0.000	0.000	0.000	0.011
10	Hg	0	0.000	0.047	0.099	0.184	0.341
10	PCB-1254	0	0.000	0.000	0.052	0.262	0.253
10	PCB-1260	0	0.000	0.000	0.000	0.647	0.905

Table F4.6 (continued)

Subreach	Analyte	Contaminant concentration in surface water	Contaminant concentrations in whole fish (by size class)[a]				
			0–10 cm	10–20 cm	20–30 cm	30–40 cm	>40 cm
10	Se	0	0.000	0.449	0.568	0.507	0.555
10	Zn	0	0.000	14.355	17.475	12.208	18.092
13	Aldrin	0	*0.000*	0.000	*0.002*	0.003	0.004
13	As	0.0037	*0.083*	0.083	*0.041*	0.000	0.000
13	Bis(2ethylhexyl)phthalate	0.007443	*0.000*	0.000	*0.000*	0.000	0.000
13	Chlordane	0.00002	*0.000*	0.000	*0.183*	0.366	0.396
13	Cu	0.00471	*0.000*	0.000	*0.000*	0.000	0.000
13	DDE	0	*0.000*	0.000	*0.013*	0.026	0.008
13	Hg	0.00002	*0.205*	0.205	*0.102*	0.000	0.000
13	PCB-1254	0.00046	*0.000*	0.000	*0.362*	0.724	0.152
13	PCB-1260	0.00102	*0.000*	0.000	*1.717*	3.433	3.435
13	Se	0.0012	*0.000*	0.000	*0.000*	0.000	0.000
13	Zn	0.01308	*16.820*	16.820	*8.410*	0.000	0.000
15	As	0	*0.184*	0.184	*0.165*	0.145	0.200
15	Be	0	*0.000*	0.000	*0.008*	0.016	0.019
15	Chlordane	0	*0.000*	0.000	*0.598*	1.195	2.946
15	DDD	0	*0.000*	0.000	*0.000*	0.000	0.018
15	Hg	0	*0.078*	0.078	*0.114*	0.150	0.511
15	PCB-1254	0	*0.000*	0.000	*0.152*	0.305	0.882
15	PCB-1260	0	*0.000*	0.000	*0.273*	0.546	4.522
15	Se	0	*0.807*	0.807	*0.741*	0.674	0.000
15	Zn	0	*20.360*	20.360	*16.905*	13.450	15.238
18	As	0	0.000	0.038	0.000	0.386	0.379
18	Be	0	0.000	0.003	0.000	0.004	0.004
18	Chlordane	0	0.066	0.000	0.063	0.591	0.533
18	Hg	0.00007	0.000	0.034	0.000	0.172	0.234
18	PCB-1254	0	0.090	0.000	0.143	1.009	1.832
18	PCB-1260	0	0.070	0.000	0.237	2.361	4.309
18	Se	0	0.000	0.307	0.000	0.275	0.266
18	Zn	0.010578	0.000	0.000	0.000	0.000	0.000

[a]Italicized values represent estimated concentrations. No data were available for fish in these size classes. Concentrations were assumed to be equivolent to that in the next higher size class for which contaminants were detected. If contaminants were detected in fish in size classes above and below that in which data are missing, concentrations were estimated to be the mean of the concentrations in the higher and lower size classes.

Table F4.7. Exposure estimates for osprey in the Clinch River/Poplar Creek system

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
As	0	0.003	0.001	0.008	0.018	0.004	0.001	0.034	0.0
Be	0	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Chlordane	0	0.000	0.000	0.000	0.000	0.001	0.002	0.003	0.0
DDD	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.1
Hg	0	0.000	0.000	0.005	0.005	0.003	0.001	0.014	2.3
PCB-1254	0	0.000	0.000	0.000	0.000	0.002	0.002	0.004	0.0
PCB-1260	0	0.000	0.000	0.000	0.000	0.010	0.025	0.036	0.2
Se	0	0.000	0.006	0.074	0.054	0.014	0.002	0.150	0.3
Zn	0	0.001	0.146	1.867	1.126	0.195	0.031	3.366	0.2
As	1	0.000	0.001	0.008	0.000	0.007	0.000	0.017	0.0
Be	1	0.000	0.000	0.001	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	1	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.0
Hg	1	0.000	0.000	0.003	0.000	0.001	0.000	0.004	0.7
PCB-1254	1	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.1
PCB-1260	1	0.000	0.000	0.000	0.024	0.000	0.000	0.024	0.2
Se	1	0.000	0.007	0.083	0.000	0.016	0.002	0.108	0.2
Zn	1	0.001	0.131	1.666	0.000	0.302	0.033	2.132	0.1
As	2.01	0.000	0.000	0.000	0.028	0.008	0.001	0.038	0.0
Be	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Chlordane	2.01	0.000	0.000	0.000	0.013	0.004	0.001	0.018	0.0
Cu	2.01	0.000	0.874	11.151	6.185	0.000	0.000	18.211	0.8
Hg	2.01	0.000	0.000	0.000	0.004	0.001	0.001	0.006	1.0
PCB-1254	2.01	0.000	0.000	0.000	0.014	0.004	0.002	0.020	0.1
PCB-1260	2.01	0.000	0.000	0.000	0.017	0.005	0.004	0.026	0.2
Se	2.01	0.000	0.004	0.051	0.053	0.007	0.001	0.116	0.3
Zn	2.01	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
As	2.02	0.000	0.001	0.007	0.002	0.005	0.001	0.016	0.0
Be	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	2.02	0.000	0.000	0.000	0.006	0.004	0.002	0.012	0.0
Cu	2.02	0.000	0.012	0.158	0.000	0.081	0.000	0.252	0.0
Hg	2.02	0.000	0.000	0.006	0.006	0.002	0.001	0.016	2.6
PCB-1016	2.02	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.0
PCB-1254	2.02	0.000	0.000	0.000	0.014	0.016	0.006	0.036	0.2
PCB-1260	2.02	0.000	0.000	0.000	0.020	0.024	0.012	0.057	0.4
Se	2.02	0.000	0.004	0.047	0.093	0.007	0.001	0.152	0.3
Zn	2.02	0.001	0.120	1.534	0.000	0.248	0.055	1.958	0.1

Table F4.7 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Aldrin	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Bis(2ethylhexyl) phthalate	2.04	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
Chlordane	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.04	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.0
PCB-1260	2.04	0.000	0.127	1.616	1.792	0.253	0.018	3.806	24.2
Zn	2.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Aldrin	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	3.01	0.000	0.001	0.014	0.008	0.000	0.000	0.023	0.0
Be	3.01	0.000	0.000	0.001	0.001	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.01	0.000	0.000	0.000	0.018	0.005	0.001	0.024	0.0
Cu	3.01	0.000	0.041	0.524	0.291	0.000	0.000	0.856	0.0
DDE	3.01	0.000	0.000	0.000	0.010	0.003	0.000	0.013	3.1
Hg	3.01	0.000	0.003	0.033	0.040	0.006	0.003	0.085	14.2
PCB-1016	3.01	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.0
PCB-1254	3.01	0.000	0.000	0.000	0.030	0.009	0.004	0.043	0.3
PCB-1260	3.01	0.000	0.000	0.000	0.131	0.037	0.008	0.176	1.1
Se	3.01	0.000	0.004	0.045	0.025	0.000	0.001	0.075	0.2
Zn	3.01	0.001	0.098	1.254	0.696	0.000	0.000	2.049	0.1
As	3.02	0.000	0.001	0.008	0.029	0.005	0.000	0.043	0.0
Be	3.02	0.000	0.000	0.001	0.001	0.000	0.000	0.002	
Bis(2ethylhexyl) phthalate	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.02	0.000	0.000	0.000	0.027	0.004	0.001	0.033	0.0
Cu	3.02	0.000	0.054	0.689	0.000	0.000	0.000	0.743	0.0
Hg	3.02	0.000	0.002	0.031	0.045	0.007	0.004	0.089	14.9
PCB-1254	3.02	0.000	0.000	0.000	0.331	0.024	0.020	0.375	2.4
PCB-1260	3.02	0.000	0.000	0.000	0.424	0.027	0.022	0.473	3.0
Se	3.02	0.000	0.003	0.035	0.061	0.003	0.001	0.102	0.2
Zn	3.02	0.001	0.101	1.286	2.010	0.143	0.000	3.540	0.2
As	3.03	0.000	0.001	0.009	0.014	0.000	0.001	0.025	0.0
Be	3.03	0.000	0.000	0.001	0.000	0.000	0.000	0.001	

Table F4.7 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Bis(2ethylhexyl) phthalate	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.03	0.000	0.000	0.000	0.000	0.004	0.001	0.004	0.0
Cu	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.03	0.000	0.002	0.020	0.025	0.000	0.001	0.049	8.1
PCB-1254	3.03	0.000	0.000	0.000	0.000	0.010	0.003	0.013	0.1
PCB-1260	3.03	0.000	0.000	0.000	0.000	0.055	0.014	0.069	0.4
Zn	3.03	0.001	0.125	1.600	1.287	0.000	0.064	3.077	0.2
As	3.04	0.000	0.001	0.011	0.000	0.005	0.001	0.018	0.0
Be	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	3.04	0.000	0.000	0.000	0.007	0.004	0.001	0.012	0.0
Cu	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.04	0.000	0.002	0.021	0.000	0.006	0.002	0.031	5.1
PCB-1254	3.04	0.000	0.000	0.000	0.025	0.016	0.005	0.046	0.3
PCB-1260	3.04	0.000	0.000	0.000	0.041	0.031	0.013	0.085	0.5
Se	3.04	0.000	0.002	0.027	0.000	0.004	0.001	0.035	0.1
Zn	3.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
As	4.01	0.000	0.001	0.008	0.000	0.003	0.001	0.013	0.0
Be	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	4.01	0.000	0.000	0.000	0.006	0.004	0.001	0.011	0.0
Cu	4.01	0.001	0.023	0.297	0.000	0.119	0.004	0.444	0.0
Hg	4.01	0.000	0.002	0.022	0.005	0.003	0.001	0.033	5.4
PCB-1254	4.01	0.000	0.000	0.000	0.025	0.016	0.005	0.047	0.3
PCB-1260	4.01	0.000	0.000	0.000	0.022	0.031	0.010	0.063	0.4
Se	4.01	0.000	0.005	0.064	0.000	0.003	0.003	0.075	0.2
Zn	4.01	0.002	0.110	1.408	0.000	0.255	0.028	1.803	0.1
As	4.04	0.000	0.000	0.007	0.000	0.005	0.001	0.012	0.0
Be	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	4.04	0.000	0.000	0.000	0.006	0.006	0.001	0.014	0.0
Cu	4.04	0.000	0.000	1.608	0.000	0.794	0.014	2.417	0.1
DDD	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	4.04	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.3
Hg	4.04	0.000	0.000	0.006	0.000	0.002	0.001	0.009	1.5

Table F4.7 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
PCB-1254	4.04	0.000	0.001	0.000	0.011	0.009	0.005	0.026	0.2
PCB-1260	4.04	0.000	0.001	0.000	0.016	0.024	0.011	0.052	0.3
Se	4.04	0.000	0.000	0.040	0.000	0.006	0.001	0.047	0.1
Zn	4.04	0.001	0.000	1.590	0.000	0.133	0.027	1.751	0.1
Aldrin	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	5	0.000	0.000	0.009	0.000	0.003	0.001	0.013	0.0
Be	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	5	0.000	0.000	0.000	0.006	0.003	0.001	0.011	0.0
Cu	5	0.000	0.000	7.266	0.000	0.000	0.010	7.276	0.3
DDD	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	5	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.2
DDT	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	5	0.000	0.000	0.004	0.000	0.002	0.001	0.006	1.0
PCB-1254	5	0.000	0.000	0.000	0.017	0.006	0.005	0.028	0.2
PCB-1260	5	0.000	0.000	0.000	0.013	0.015	0.011	0.040	0.3
Se	5	0.000	0.000	0.031	0.000	0.005	0.001	0.037	0.1
Zn	5	0.000	0.000	3.327	0.000	0.127	0.030	3.483	0.2
Chlordane	6	0.000	0.000	0.005	0.006	0.001	0.000	0.012	0.0
PCB-1254	6	0.000	0.001	0.014	0.016	0.002	0.000	0.033	0.2
PCB-1260	6	0.000	0.001	0.015	0.016	0.002	0.000	0.035	0.2
As	10	0.000	0.000	0.007	0.015	0.006	0.001	0.028	0.0
Be	10	0.000	0.000	0.000	0.002	0.000	0.000	0.003	
Bis(2ethylhexyl) phthalate	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	10	0.000	0.001	0.000	0.007	0.003	0.001	0.012	0.0
Cu	10	0.000	0.000	0.000	0.185	0.000	0.000	0.185	0.0
DDD	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	10	0.000	0.000	0.004	0.009	0.002	0.001	0.016	2.7
PCB-1254	10	0.000	0.000	0.000	0.005	0.003	0.001	0.009	0.1
PCB-1260	10	0.000	0.000	0.000	0.000	0.009	0.002	0.011	0.1
Se	10	0.000	0.000	0.038	0.053	0.007	0.001	0.099	0.2
Zn	10	0.000	0.000	1.209	1.632	0.161	0.047	3.049	0.2
Aldrin	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	13	0.000	0.001	0.007	0.004	0.000	0.000	0.012	0.0
Bis(2ethylhexyl) phthalate	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	13	0.000	0.000	0.000	0.017	0.005	0.001	0.023	0.0
Cu	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	13	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.4

Table F4.7 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Hg	13	0.000	0.001	0.017	0.010	0.000	0.000	0.028	4.7
PCB-1254	13	0.000	0.000	0.000	0.034	0.010	0.000	0.044	0.3
PCB-1260	13	0.000	0.000	0.000	0.160	0.045	0.009	0.215	1.4
Se	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	13	0.001	0.111	1.416	0.785	0.000	0.000	2.313	0.1
As	15	0.000	0.001	0.016	0.015	0.002	0.001	0.035	0.0
Be	15	0.000	0.000	0.000	0.001	0.000	0.000	0.001	
Chlordane	15	0.000	0.000	0.000	0.056	0.016	0.008	0.079	0.1
DDD	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	15	0.000	0.001	0.007	0.011	0.002	0.001	0.021	3.5
PCB-1254	15	0.000	0.000	0.000	0.014	0.004	0.002	0.021	0.1
PCB-1260	15	0.000	0.000	0.000	0.025	0.007	0.012	0.044	0.3
Se	15	0.000	0.005	0.068	0.069	0.009	0.000	0.151	0.3
Zn	15	0.000	0.134	1.714	1.579	0.178	0.040	3.645	0.2
As	18	0.000	0.000	0.003	0.000	0.005	0.001	0.009	0.0
Be	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	18	0.000	0.000	0.000	0.006	0.008	0.001	0.016	0.0
Hg	18	0.000	0.000	0.003	0.000	0.002	0.001	0.006	1.0
PCB-1254	18	0.000	0.001	0.000	0.013	0.013	0.005	0.032	0.2
PCB-1260	18	0.000	0.000	0.000	0.022	0.031	0.011	0.065	0.4
Se	18	0.000	0.000	0.026	0.000	0.004	0.001	0.030	0.1
Zn	18	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0

[a] NOAEL HQ = No observed adverse effect level hazard quotient.

Table F4.8. Exposure estimates for great blue heron in the Clinch River/Poplar Creek system

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
As	0	0.002	0.006	0.008	0.005	0.000	0.000	0.021	0.0
Be	0	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Chlordane	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDD	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	0	0.000	0.004	0.005	0.001	0.000	0.000	0.010	2.0
PCB-1254	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	0	0.000	0.061	0.073	0.014	0.000	0.000	0.147	0.4
Zn	0	0.001	1.528	1.836	0.290	0.000	0.000	3.655	0.3
As	1	0.000	0.007	0.008	0.000	0.000	0.000	0.015	0.0
Be	1	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	1	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
Hg	1	0.000	0.002	0.002	0.000	0.000	0.000	0.005	0.9
PCB-1254	1	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
PCB-1260	1	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.0
Se	1	0.000	0.068	0.082	0.000	0.000	0.000	0.150	0.4
Zn	1	0.001	1.363	1.638	0.000	0.000	0.000	3.002	0.2
As	2.01	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.0
Be	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Chlordane	2.01	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.0
Cu	2.01	0.000	9.123	10.962	1.594	0.000	0.000	21.680	1.1
Hg	2.01	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.2
PCB-1254	2.01	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.0
PCB-1260	2.01	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.0
Se	2.01	0.000	0.042	0.050	0.014	0.000	0.000	0.106	0.3
Zn	2.01	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
As	2.02	0.000	0.006	0.007	0.001	0.000	0.000	0.013	0.0
Be	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	2.02	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
Cu	2.02	0.000	0.129	0.155	0.000	0.000	0.000	0.285	0.0
Hg	2.02	0.000	0.005	0.006	0.002	0.000	0.000	0.012	2.4
PCB-1016	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.02	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.0
PCB-1260	2.02	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.0
Se	2.02	0.000	0.039	0.047	0.024	0.000	0.000	0.110	0.3
Zn	2.02	0.001	1.255	1.507	0.000	0.000	0.000	2.763	0.2

Table F4.8 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Aldrin	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Bis(2ethylhexyl) phthalate	2.04	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
Chlordane	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	2.04	0.000	1.322	1.588	0.462	0.000	0.000	3.372	25.0
Zn	2.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Aldrin	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	3.01	0.000	0.011	0.014	0.002	0.000	0.000	0.027	0.0
Be	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.01	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.0
Cu	3.01	0.000	0.429	0.515	0.075	0.000	0.000	1.020	0.1
DDE	3.01	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.8
Hg	3.01	0.000	0.027	0.032	0.010	0.000	0.000	0.070	14.0
PCB-1016	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	3.01	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.1
PCB-1260	3.01	0.000	0.000	0.000	0.034	0.000	0.000	0.034	0.3
Se	3.01	0.000	0.037	0.045	0.006	0.000	0.000	0.088	0.2
Zn	3.01	0.001	1.026	1.233	0.179	0.000	0.000	2.439	0.2
As	3.02	0.000	0.006	0.008	0.008	0.000	0.000	0.022	0.0
Be	3.02	0.000	0.001	0.001	0.000	0.000	0.000	0.002	
Bis(2ethylhexyl) phthalate	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.02	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.0
Cu	3.02	0.000	0.564	0.677	0.000	0.000	0.000	1.241	0.1
Hg	3.02	0.000	0.025	0.030	0.012	0.000	0.000	0.067	13.4
PCB-1254	3.02	0.000	0.000	0.000	0.085	0.000	0.000	0.085	0.6
PCB-1260	3.02	0.000	0.000	0.000	0.109	0.000	0.000	0.109	0.8
Se	3.02	0.000	0.028	0.034	0.016	0.000	0.000	0.078	0.2
Zn	3.02	0.001	1.052	1.264	0.518	0.000	0.000	2.834	0.2
As	3.03	0.000	0.008	0.009	0.004	0.000	0.000	0.021	0.0
Be	3.03	0.000	0.001	0.001	0.000	0.000	0.000	0.002	

Table F4.8 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Bis(2ethylhexyl) phthalate	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.03	0.000	0.017	0.020	0.007	0.000	0.000	0.043	8.6
PCB-1254	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	3.03	0.001	1.309	1.573	0.332	0.000	0.000	3.214	0.2
As	3.04	0.000	0.009	0.011	0.000	0.000	0.000	0.020	0.0
Be	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.04	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
Cu	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.04	0.000	0.017	0.021	0.000	0.000	0.000	0.038	7.6
PCB-1254	3.04	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.0
PCB-1260	3.04	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.1
Se	3.04	0.000	0.022	0.027	0.000	0.000	0.000	0.049	0.1
Zn	3.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
As	4.01	0.000	0.006	0.008	0.000	0.000	0.000	0.014	0.0
Be	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	4.01	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
Cu	4.01	0.001	0.243	0.292	0.000	0.000	0.000	0.536	0.0
Hg	4.01	0.000	0.018	0.021	0.001	0.000	0.000	0.040	8.1
PCB-1254	4.01	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.0
PCB-1260	4.01	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.0
Se	4.01	0.000	0.052	0.063	0.000	0.000	0.000	0.115	0.3
Zn	4.01	0.002	1.152	1.384	0.000	0.000	0.000	2.538	0.2
As	4.04	0.000	0.000	0.006	0.000	0.000	0.000	0.007	0.0
Be	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	4.04	0.000	0.005	0.000	0.002	0.000	0.000	0.007	0.0
Cu	4.04	0.000	0.000	1.581	0.000	0.000	0.000	1.581	0.1
DDD	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

Table F4.8 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Hg	4.04	0.000	0.000	0.006	0.000	0.000	0.000	0.006	1.2
PCB-1254	4.04	0.000	0.007	0.000	0.003	0.000	0.000	0.010	0.1
PCB-1260	4.04	0.000	0.006	0.000	0.004	0.000	0.000	0.010	0.1
Se	4.04	0.000	0.000	0.039	0.000	0.000	0.000	0.039	0.1
Zn	4.04	0.001	0.000	1.563	0.000	0.000	0.000	1.564	0.1
Aldrin	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	5	0.000	0.000	0.009	0.000	0.000	0.000	0.009	0.0
Be	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	5	0.000	0.005	0.000	0.002	0.000	0.000	0.006	0.0
Cu	5	0.000	0.000	7.142	0.000	0.000	0.000	7.142	0.4
DDD	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	5	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.7
PCB-1254	5	0.000	0.004	0.000	0.004	0.000	0.000	0.008	0.1
PCB-1260	5	0.000	0.005	0.000	0.003	0.000	0.000	0.008	0.1
Se	5	0.000	0.000	0.030	0.000	0.000	0.000	0.030	0.1
Zn	5	0.000	0.000	3.270	0.000	0.000	0.000	3.270	0.2
Chlordane	6	0.000	0.004	0.005	0.001	0.000	0.000	0.011	0.0
PCB-1254	6	0.000	0.011	0.014	0.004	0.000	0.000	0.029	0.2
PCB-1260	6	0.000	0.012	0.014	0.004	0.000	0.000	0.030	0.2
As	10	0.000	0.000	0.007	0.004	0.000	0.000	0.011	0.0
Be	10	0.000	0.000	0.000	0.001	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	10	0.000	0.005	0.000	0.002	0.000	0.000	0.007	0.0
Cu	10	0.000	0.000	0.000	0.048	0.000	0.000	0.048	0.0
DDD	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	10	0.000	0.000	0.004	0.002	0.000	0.000	0.006	1.3
PCB-1254	10	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.0
PCB-1260	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	10	0.000	0.000	0.037	0.014	0.000	0.000	0.051	0.1
Zn	10	0.000	0.000	1.188	0.421	0.000	0.000	1.609	0.1
Aldrin	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	13	0.000	0.006	0.007	0.001	0.000	0.000	0.014	0.0
Bis(2ethylhexyl) phthalate	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	13	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.0

Table F4.8 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Cu	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.1
Hg	13	0.000	0.014	0.017	0.002	0.000	0.000	0.033	6.7
PCB-1254	13	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.1
PCB-1260	13	0.000	0.000	0.000	0.041	0.000	0.000	0.041	0.3
Se	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	13	0.001	1.159	1.392	0.202	0.000	0.000	2.754	0.2
As	15	0.000	0.013	0.015	0.004	0.000	0.000	0.032	0.0
Be	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	15	0.000	0.000	0.000	0.014	0.000	0.000	0.014	0.0
DDD	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	15	0.000	0.005	0.006	0.003	0.000	0.000	0.015	2.9
PCB-1254	15	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.0
PCB-1260	15	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.0
Se	15	0.000	0.056	0.067	0.018	0.000	0.000	0.140	0.4
Zn	15	0.000	1.403	1.685	0.407	0.000	0.000	3.495	0.3
As	18	0.000	0.000	0.003	0.000	0.000	0.000	0.003	0.0
Be	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	18	0.000	0.005	0.000	0.002	0.000	0.000	0.006	0.0
Hg	18	0.000	0.000	0.003	0.000	0.000	0.000	0.003	0.6
PCB-1254	18	0.000	0.006	0.000	0.003	0.000	0.000	0.010	0.1
PCB-1260	18	0.000	0.005	0.000	0.006	0.000	0.000	0.011	0.1
Se	18	0.000	0.000	0.025	0.000	0.000	0.000	0.025	0.1
Zn	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

[a] NOAEL HQ = No observed adverse effect level hazard quotient.

Table F4.9. Exposure estimates for mink in the Clinch River/Poplar Creek system

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
As	0	0.005	0.005	0.002	0.000	0.000	0.000	0.012	0.3
Be	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDD	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	0	0.000	0.003	0.001	0.000	0.000	0.000	0.004	0.3
PCB-1254	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	0	0.000	0.047	0.018	0.000	0.000	0.000	0.066	2.7
Zn	0	0.002	1.195	0.465	0.000	0.000	0.000	1.661	0.0
As	1	0.000	0.005	0.002	0.000	0.000	0.000	0.008	0.2
Be	1	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	1	0.000	0.002	0.001	0.000	0.000	0.000	0.002	0.2
PCB-1254	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	1	0.000	0.053	0.021	0.000	0.000	0.000	0.074	3.1
Zn	1	0.002	1.066	0.414	0.000	0.000	0.000	1.482	0.0
As	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Be	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	2.01	0.001	7.133	2.774	0.000	0.000	0.000	9.907	0.8
Hg	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	2.01	0.000	0.033	0.013	0.000	0.000	0.000	0.046	1.9
Zn	2.01	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
As	2.02	0.000	0.004	0.002	0.000	0.000	0.000	0.006	0.2
Be	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	2.02	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	2.02	0.001	0.101	0.039	0.000	0.000	0.000	0.141	0.0
Hg	2.02	0.000	0.004	0.001	0.000	0.000	0.000	0.005	0.3
PCB-1016	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	2.02	0.000	0.030	0.012	0.000	0.000	0.000	0.042	1.8
Zn	2.02	0.002	0.981	0.381	0.000	0.000	0.000	1.364	0.0

Table F4.9 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Aldrin	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Bis(2ethylhexyl) phthalate	2.04	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.0
Chlordane	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	2.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
DDE	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	2.04	0.000	1.034	0.402	0.000	0.000	0.000	1.435	10.5
Zn	2.04	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
Aldrin	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	3.01	0.000	0.009	0.003	0.000	0.000	0.000	0.012	0.3
Be	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	3.01	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	3.01	0.000	0.335	0.130	0.000	0.000	0.000	0.466	0.0
DDE	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.01	0.000	0.021	0.008	0.000	0.000	0.000	0.029	2.0
PCB-1016	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	3.01	0.000	0.029	0.011	0.000	0.000	0.000	0.040	1.7
Zn	3.01	0.002	0.802	0.312	0.000	0.000	0.000	1.116	0.0
As	3.02	0.000	0.005	0.002	0.000	0.000	0.000	0.007	0.2
Be	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	3.02	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	3.02	0.000	0.441	0.171	0.000	0.000	0.000	0.613	0.1
Hg	3.02	0.000	0.020	0.008	0.000	0.000	0.000	0.027	1.8
PCB-1254	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	3.02	0.000	0.022	0.009	0.000	0.000	0.000	0.031	1.3
Zn	3.02	0.001	0.822	0.320	0.000	0.000	0.000	1.143	0.0
As	3.03	0.000	0.006	0.002	0.000	0.000	0.000	0.008	0.2
Be	3.03	0.000	0.001	0.000	0.000	0.000	0.000	0.001	

Table F4.9 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Bis(2ethylhexyl) phthalate	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	3.03	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
DDE	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.03	0.000	0.013	0.005	0.000	0.000	0.000	0.018	1.2
PCB-1254	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	3.03	0.001	1.024	0.398	0.000	0.000	0.000	1.423	0.0
As	3.04	0.000	0.007	0.003	0.000	0.000	0.000	0.010	0.3
Be	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	3.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	3.04	0.001	0.000	0.000	0.000	0.000	0.000.	0.001	0.0
DDE	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.04	0.000	0.014	0.005	0.000	0.000	0.000	0.019	1.3
PCB-1254	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	3.04	0.000	0.017	0.007	0.000	0.000	0.000	0.024	1.0
Zn	3.04	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
As	4.01	0.000	0.005	0.002	0.000	0.000	0.000	0.007	0.2
Be	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.01	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	4.01	0.002	0.190	0.074	0.000	0.000	0.000	0.266	0.0
Hg	4.01	0.000	0.014	0.005	0.000	0.000	0.000	0.019	1.3
PCB-1254	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	4.01	0.000	0.041	0.016	0.000	0.000	0.000	0.057	2.4
Zn	4.01	0.004	0.901	0.350	0.000	0.000	0.000	1.256	0.0
As	4.04	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.0
Be	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	4.04	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Cu	4.04	0.001	0.000	0.400	0.000	0.000	0.000	0.401	0.0
DDD	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	4.04	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.1

Table F4.9 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
PCB-1254	4.04	0.000	0.005	0.000	0.000	0.000	0.000	0.005	0.0
PCB-1260	4.04	0.000	0.005	0.000	0.000	0.000	0.000	0.005	0.0
Se	4.04	0.000	0.000	0.010	0.000	0.000	0.000	0.010	0.4
Zn	4.04	0.002	0.000	0.396	0.000	0.000	0.000	0.397	0.0
Aldrin	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	5	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.1
Be	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	5	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Cu	5	0.000	0.000	1.807	0.000	0.000	0.000	1.807	0.2
DDD	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	5	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.1
PCB-1254	5	0.000	0.003	0.000	0.000	0.000	0.000	0.003	0.0
PCB-1260	5	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Se	5	0.000	0.000	0.008	0.000	0.000	0.000	0.008	0.3
Zn	5	0.000	0.000	0.828	0.000	0.000	0.000	0.828	0.0
Chlordane	6	0.000	0.003	0.001	0.000	0.000	0.000	0.005	0.0
PCB-1254	6	0.000	0.009	0.003	0.000	0.000	0.000	0.012	0.1
PCB-1260	6	0.000	0.009	0.004	0.000	0.000	0.000	0.013	0.1
As	10	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.0
Be	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	10	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	10	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Cu	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDD	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	10	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.1
PCB-1254	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	10	0.000	0.000	0.009	0.000	0.000	0.000	0.009	0.4
Zn	10	0.000	0.000	0.301	0.000	0.000	0.000	0.301	0.0
Aldrin	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	13	0.000	0.004	0.002	0.000	0.000	0.000	0.007	0.2
Bis(2ethylhexyl) phthalate	13	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Cu	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

Table F4.9 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
DDE	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	13	0.000	0.011	0.004	0.000	0.000	0.000	0.015	1.0
PCB-1254	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	13	0.001	0.906	0.352	0.000	0.000	0.000	1.260	0.0
As	15	0.000	0.010	0.004	0.000	0.000	0.000	0.014	0.3
Be	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDD	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	15	0.000	0.004	0.002	0.000	0.000	0.000	0.006	0.4
PCB-1254	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1260	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Se	15	0.000	0.043	0.017	0.000	0.000	0.000	0.060	2.5
Zn	15	0.000	1.097	0.426	0.000	0.000	0.000	1.523	0.0
As	18	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.0
Be	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	18	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Hg	18	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.0
PCB-1254	18	0.000	0.005	0.000	0.000	0.000	0.000	0.005	0.0
PCB-1260	18	0.000	0.004	0.000	0.000	0.000	0.000	0.004	0.0
Se	18	0.000	0.000	0.006	0.000	0.000	0.000	0.006	0.3
Zn	18	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0

[a] NOAEL HQ = No observed adverse effect level hazard quotient.

Table F4.10. Exposure estimates for river otter in the Clinch River/Poplar Creek system

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
As	0	0.004	0.002	0.002	0.004	0.008	0.012	0.031	1.5
Be	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	0	0.000	0.000	0.000	0.000	0.003	0.022	0.025	0.0
DDD	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	0	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.0
Hg	0	0.000	0.001	0.001	0.001	0.007	0.007	0.017	2.1
PCB-1254	0	0.000	0.000	0.000	0.000	0.003	0.023	0.026	0.4
PCB-1260	0	0.000	0.000	0.000	0.000	0.022	0.275	0.297	4.2
Se	0	0.000	0.017	0.017	0.011	0.030	0.022	0.097	8.0
Zn	0	0.001	0.417	0.417	0.226	0.415	0.337	1.813	0.0
As	1	0.000	0.002	0.002	0.000	0.015	0.003	0.022	1.1
Be	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	1	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
Hg	1	0.000	0.001	0.001	0.000	0.002	0.001	0.005	0.6
PCB-1254	1	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.0
PCB-1260	1	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.1
Se	1	0.000	0.019	0.019	0.000	0.033	0.027	0.097	8.1
Zn	1	0.001	0.372	0.372	0.000	0.643	0.353	1.740	0.0
As	2.01	0.000	0.000	0.000	0.006	0.017	0.013	0.036	1.8
Be	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	2.01	0.000	0.000	0.000	0.003	0.008	0.009	0.020	0.0
Cu	2.01	0.001	2.488	2.488	1.244	0.000	0.000	6.221	1.1
Hg	2.01	0.000	0.000	0.000	0.001	0.002	0.008	0.011	1.4
PCB-1254	2.01	0.000	0.000	0.000	0.003	0.008	0.025	0.036	0.5
PCB-1260	2.01	0.000	0.000	0.000	0.003	0.010	0.047	0.060	0.9
Se	2.01	0.000	0.011	0.011	0.011	0.015	0.012	0.060	5.0
Zn	2.01	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.0
As	2.02	0.000	0.002	0.002	0.000	0.012	0.013	0.028	1.4
Be	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	2.02	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	2.02	0.000	0.000	0.000	0.001	0.009	0.018	0.028	0.0
Cu	2.02	0.001	0.035	0.035	0.000	0.172	0.000	0.244	0.0
Hg	2.02	0.000	0.001	0.001	0.001	0.004	0.010	0.019	2.3
PCB-1016	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.02	0.000	0.000	0.000	0.003	0.034	0.070	0.106	1.5
PCB-1260	2.02	0.000	0.000	0.000	0.004	0.052	0.131	0.187	2.7
Se	2.02	0.000	0.011	0.011	0.019	0.014	0.016	0.069	5.8
Zn	2.02	0.001	0.342	0.342	0.000	0.529	0.597	1.811	0.0

Table F4.10 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Aldrin	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Bis(2ethylhexyl) phthalate	2.04	0.003	0.000	0.000	0.000	0.000	0.000	0.003	0.0
Chlordane	2.04	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.0
Cu	2.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
DDE	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDT	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
PCB-1254	2.04	0.000	0.000	0.000	0.000	0.000	0.049	0.049	0.7
PCB-1260	2.04	0.000	0.361	0.361	0.361	0.540	0.199	1.820	26.0
Zn	2.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Aldrin	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	3.01	0.000	0.003	0.003	0.002	0.000	0.005	0.012	0.6
Be	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.01	0.000	0.000	0.000	0.004	0.011	0.015	0.029	0.0
Cu	3.01	0.000	0.117	0.117	0.058	0.000	0.000	0.293	0.0
DDE	3.01	0.000	0.000	0.000	0.002	0.006	0.001	0.009	0.0
Hg	3.01	0.000	0.007	0.007	0.008	0.013	0.036	0.072	9.0
PCB-1016	3.01	0.000	0.000	0.000	0.000	0.000	0.011	0.011	0.2
PCB-1254	3.01	0.000	0.000	0.000	0.006	0.018	0.042	0.066	0.9
PCB-1260	3.01	0.000	0.000	0.000	0.026	0.079	0.089	0.194	2.8
Se	3.01	0.000	0.010	0.010	0.005	0.000	0.006	0.031	2.6
Zn	3.01	0.001	0.280	0.280	0.140	0.000	0.000	0.701	0.0
As	3.02	0.000	0.002	0.002	0.006	0.011	0.002	0.023	1.2
Be	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	3.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.02	0.000	0.000	0.000	0.005	0.009	0.016	0.031	0.0
Cu	3.02	0.000	0.154	0.154	0.000	0.000	0.000	0.308	0.1
Hg	3.02	0.000	0.007	0.007	0.009	0.015	0.045	0.083	10.4
PCB-1254	3.02	0.000	0.000	0.000	0.067	0.050	0.221	0.338	4.8
PCB-1260	3.02	0.000	0.000	0.000	0.085	0.057	0.240	0.382	5.5
Se	3.02	0.000	0.008	0.008	0.012	0.006	0.009	0.043	3.6
Zn	3.02	0.001	0.287	0.287	0.404	0.304	0.000	1.283	0.0
As	3.03	0.000	0.002	0.002	0.003	0.000	0.006	0.013	0.6
Be	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.001	

Table F4.10 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
Bis(2ethylhexyl) phthalate	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	3.03	0.000	0.000	0.000	0.000	0.008	0.007	0.015	0.0
Cu	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.03	0.000	0.005	0.005	0.005	0.000	0.016	0.030	3.7
PCB-1254	3.03	0.000	0.000	0.000	0.000	0.022	0.029	0.051	0.7
PCB-1260	3.03	0.000	0.000	0.000	0.000	0.117	0.147	0.264	3.8
Zn	3.03	0.001	0.357	0.357	0.259	0.000	0.688	1.663	0.0
As	3.04	0.000	0.003	0.003	0.000	0.011	0.009	0.026	1.3
Be	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	3.04	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.0
Chlordane	3.04	0.000	0.000	0.000	0.001	0.008	0.010	0.019	0.0
Cu	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	3.04	0.000	0.005	0.005	0.000	0.014	0.017	0.040	5.0
PCB-1254	3.04	0.000	0.000	0.000	0.005	0.034	0.059	0.098	1.4
PCB-1260	3.04	0.000	0.000	0.000	0.008	0.065	0.146	0.219	3.1
Se	3.04	0.000	0.006	0.006	0.000	0.009	0.012	0.033	2.8
Zn	3.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
As	4.01	0.000	0.002	0.002	0.000	0.007	0.011	0.022	1.1
Be	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	4.01	0.000	0.000	0.000	0.001	0.009	0.012	0.022	0.0
Cu	4.01	0.001	0.066	0.066	0.000	0.253	0.042	0.429	0.1
Hg	4.01	0.000	0.005	0.005	0.001	0.006	0.013	0.029	3.7
PCB-1254	4.01	0.000	0.000	0.000	0.005	0.035	0.057	0.097	1.4
PCB-1260	4.01	0.000	0.000	0.000	0.004	0.067	0.103	0.174	2.5
Se	4.01	0.000	0.014	0.014	0.000	0.007	0.027	0.063	5.3
Zn	4.01	0.003	0.314	0.314	0.000	0.544	0.298	1.473	0.0
As	4.04	0.000	0.000	0.001	0.000	0.011	0.007	0.019	1.0
Be	4.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bis(2ethylhexyl) phthalate	4.04	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	4.04	0.000	0.001	0.000	0.001	0.014	0.013	0.029	0.0
Cu	4.04	0.000	0.000	0.359	0.000	1.693	0.153	2.205	0.4
DDD	4.04	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.0
DDE	4.04	0.000	0.000	0.000	0.000	0.001	0.006	0.007	0.0
Hg	4.04	0.000	0.000	0.001	0.000	0.005	0.006	0.013	1.6

Table F4.10 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
PCB-1254	4.04	0.000	0.002	0.000	0.002	0.019	0.058	0.081	1.2
PCB-1260	4.04	0.000	0.002	0.000	0.003	0.051	0.122	0.178	2.5
Se	4.04	0.000	0.000	0.009	0.000	0.013	0.010	0.032	2.7
Zn	4.04	0.001	0.000	0.355	0.000	0.284	0.290	0.930	0.0
Aldrin	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	5	0.000	0.000	0.002	0.000	0.007	0.008	0.017	0.8
Be	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	5	0.000	0.001	0.000	0.001	0.007	0.013	0.022	0.0
Cu	5	0.000	0.000	1.621	0.000	0.000	0.106	1.728	0.3
DDD	5	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.0
DDE	5	0.000	0.000	0.000	0.000	0.001	0.002	0.003	0.0
DDT	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	5	0.000	0.000	0.001	0.000	0.004	0.006	0.010	1.3
PCB-1254	5	0.000	0.001	0.000	0.003	0.013	0.050	0.068	1.0
PCB-1260	5	0.000	0.001	0.000	0.003	0.031	0.122	0.157	2.2
Se	5	0.000	0.000	0.007	0.000	0.012	0.009	0.027	2.3
Zn	5	0.000	0.000	0.742	0.000	0.270	0.325	1.337	0.0
Chlordane	6	0.000	0.001	0.001	0.001	0.002	0.002	0.007	0.0
PCB-1254	6	0.000	0.003	0.003	0.003	0.005	0.005	0.019	0.3
PCB-1260	6	0.000	0.003	0.003	0.003	0.005	0.005	0.019	0.3
As	10	0.000	0.000	0.002	0.003	0.012	0.007	0.024	1.2
Be	10	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Bis(2ethylhexyl) phthalate	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Chlordane	10	0.000	0.001	0.000	0.001	0.007	0.008	0.018	0.0
Cu	10	0.000	0.000	0.000	0.037	0.000	0.000	0.037	0.0
DDD	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
DDE	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Hg	10	0.000	0.000	0.001	0.002	0.005	0.010	0.018	2.2
PCB-1254	10	0.000	0.000	0.000	0.001	0.007	0.007	0.015	0.2
PCB-1260	10	0.000	0.000	0.000	0.000	0.018	0.025	0.044	0.6
Se	10	0.000	0.000	0.008	0.011	0.014	0.016	0.049	4.1
Zn	10	0.000	0.000	0.270	0.328	0.343	0.509	1.450	0.0
Aldrin	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
As	13	0.000	0.002	0.002	0.001	0.000	0.000	0.004	0.2
Bis(2ethylhexyl)p hthalate	13	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0
Chlordane	13	0.000	0.000	0.000	0.003	0.010	0.011	0.025	0.0
Cu	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

Table F4.10 (continued)

Analyte	Subreach	Exposure estimate (mg/kg/d)							NOAEL HQ[a]
		Water	0–10 cm fish	10–20 cm fish	20–30 cm fish	30–40 cm fish	>40 cm fish	Total	
DDE	13	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.0
Hg	13	0.000	0.004	0.004	0.002	0.000	0.000	0.010	1.2
PCB-1254	13	0.000	0.000	0.000	0.007	0.020	0.004	0.031	0.4
PCB-1260	13	0.000	0.000	0.000	0.032	0.097	0.097	0.226	3.2
Se	13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
Zn	13	0.001	0.316	0.316	0.158	0.000	0.000	0.791	0.0
As	15	0.000	0.003	0.003	0.003	0.004	0.006	0.020	1.0
Be	15	0.000	0.000	0.000	0.000	0.000	0.001	0.001	
Chlordane	15	0.000	0.000	0.000	0.011	0.034	0.083	0.128	0.2
DDD	15	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.0
Hg	15	0.000	0.001	0.001	0.002	0.004	0.014	0.024	3.0
PCB-1254	15	0.000	0.000	0.000	0.003	0.009	0.025	0.036	0.5
PCB-1260	15	0.000	0.000	0.000	0.005	0.015	0.127	0.148	2.1
Se	15	0.000	0.015	0.015	0.014	0.019	0.000	0.063	5.3
Zn	15	0.000	0.383	0.383	0.318	0.378	0.429	1.889	0.0
As	18	0.000	0.000	0.001	0.000	0.011	0.011	0.022	1.1
Be	18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Chlordane	18	0.000	0.001	0.000	0.001	0.017	0.015	0.034	0.0
Hg	18	0.000	0.000	0.001	0.000	0.005	0.007	0.012	1.5
PCB-1254	18	0.000	0.002	0.000	0.003	0.028	0.052	0.084	1.2
PCB-1260	18	0.000	0.001	0.000	0.004	0.066	0.121	0.193	2.8
Se	18	0.000	0.000	0.006	0.000	0.008	0.007	0.021	1.7
Zn	18	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.0

[a] NOAEL HQ = No observed adverse effect level hazard quotient.

Table F4.11. Clinch River subreaches, endpoints, and contaminants where hazard quotients (HQs) >1 were observed and Monte Carlo simulations were performed

Subreach	Subreach Name	Endpoint			
		Osprey	Great Blue Heron	Mink	River Otter
10	Norris Reservoir	Hg	Hg		As, Hg, Se
0	Upper Melton Hill Reservoir	Hg	Hg	Se	As, Hg, PCBs, Se
1	Lower Melton Hill Reservoir			Se	As, Se
2.01	Clinch River: Melton Hill Dam	Hg	Cu	Se	As, Cu, Hg, PCBs, Se
2.02	Clinch River: White Oak Creek	Hg	Hg	Se	As, Hg, PCBs, Se
2.04	Clinch River: Grassy Creek	PCBs	PCBs	PCBs	PCBs
13	Upper Poplar Creek	Hg, PCBs	Hg	Hg	Hg, PCBs
3.01	Poplar Creek: East Fork Poplar Creek	DDE, Hg, PCBs	Hg	Hg, Se	Hg, PCBs, Se
3.02	Poplar Creek: Mitchell Branch	Hg, PCBs	Hg, PCBs	Hg, Se	As, Hg, PCBs, Se
3.03	Poplar Creek: CNF	Hg	Hg	Hg	Hg, PCBs
3.04	Poplar Creek: Mouth	Hg	Hg	Hg, Se	As, Hg, PCBs, Se
4.01	Clinch River: Poplar Creek	Hg	Hg	Hg, Se	As, Hg, PCBs, Se
4.04	Clinch River: Mouth	Hg	Hg		As, Hg, PCBs, Se
18	Tennessee River Arm	Hg			As, Hg, PCBs, Se
5	Lower Watts Bar	Hg			Hg, PCBs, Se
15	Chickamauga Reservoir	Hg	Hg	Se	As, Hg, PCBs, Se

Table F4.12. Mean and standard errors for concentrations of contaminants of concern for piscivorous wildlife in water and fish from the Clinch River/Poplar Creek system

Analyte	Subreach	Water (mg/L)		0–10 cm (mg/kg)		10–20 cm (mg/kg)		20–30 cm (mg/kg)		30–40 cm (mg/kg)		>40 cm (mg/kg)	
		Mean	Standard error	Mean	Standard Error	Mean	Standard error	Mean	Standard error	Mean	Standard error	Mean	Standard error
As	0	0.046	0.004	0.081	0.006	0.081	0.006	0.196	0.000	0.182	0.014	0.203	0.035
Hg	0	0.000	0.000	0.045	0.006	0.045	0.006	0.052	0.000	0.066	0.028	0.116	0.022
PCB-1254	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.114	0.000	0.324	0.228
PCB-1260	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.764	0.000	5.205	2.277
Se	0	0.000	0.000	0.816	0.044	0.816	0.044	0.578	0.000	0.610	0.075	0.589	0.032
As	1	0.028	0.003	0.087	0.007	0.087	0.007	0.000	0.000	0.196	0.056	0.112	0.000
Se	1	0.000	0.000	0.915	0.039	0.915	0.039	0.000	0.000	1.033	0.144	0.952	0.000
As	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.252	0.022	0.504	0.045	0.336	0.058
Cu	2.01	0.004	0.001	39.376	37.304	39.376	37.304	19.688	18.652	0.000	0.000	0.000	0.000
Hg	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.006	0.063	0.012	0.199	0.036
PCB-1254	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.180	0.011	0.359	0.022	0.733	0.166
PCB-1260	2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.249	0.024	0.498	0.048	0.969	0.273
Se	2.01	0.000	0.000	0.502	0.056	0.502	0.056	0.452	0.053	0.401	0.051	0.321	0.044
As	2.02	0.021	0.005	0.056	0.006	0.056	0.006	0.025	0.000	0.357	0.032	0.338	0.058
Hg	2.02	0.000	0.000	0.062	0.005	0.062	0.005	0.044	0.009	0.125	0.017	0.270	0.050
PCB-1016	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.094	0.006	0.000	0.000	0.000	0.000
PCB-1254	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.118	0.017	0.958	0.201	2.218	0.172
PCB-1260	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.037	1.209	0.432	3.836	0.488
Se	2.02	0.000	0.000	0.501	0.042	0.501	0.042	0.321	0.107	0.443	0.037	0.479	0.041

Table F4.12 (continued)

Analyte	Subreach	Water (mg/L)		0–10 cm (mg/kg)		10–20 cm (mg/kg)		20–30 cm (mg/kg)		30–40 cm (mg/kg)		>40 cm (mg/kg)	
		Mean	Standard error	Mean	Standard Error	Mean	Standard error	Mean	Standard error	Mean	Standard error	Mean	Standard error
PCB-1254	2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.533	0.191
PCB-1260	2.04	0.000	0.000	3.849	2.430	3.849	2.430	3.849	2.430	3.849	2.430	3.604	1.477
DDE	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.021	0.086	0.042	0.023	0.003
Hg	3.01	0.000	0.000	0.334	0.034	0.334	0.034	0.401	0.017	0.469	0.000	1.272	0.000
PCB-1016	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.381	0.000
PCB-1254	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.237	0.045	0.474	0.089	1.073	0.227
PCB-1260	3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.863	0.286	1.727	0.572	2.548	0.341
Se	3.01	0.000	0.000	0.545	0.028	0.545	0.028	0.273	0.014	0.000	0.000	0.214	0.000
As	3.02	0.002	0.000	0.084	0.008	0.084	0.008	0.207	0.051	0.203	0.082	0.074	0.001
Hg	3.02	0.000	0.000	0.321	0.027	0.321	0.027	0.286	0.090	0.364	0.072	0.884	0.116
PCB-1254	3.02	0.000	0.000	0.000	0.000	0.000	0.000	1.143	0.381	1.143	0.220	1.238	1.048
PCB-1260	3.02	0.000	0.000	0.000	0.000	0.000	0.000	1.092	0.546	1.092	0.315	1.638	1.092
Se	3.02	0.000	0.000	0.487	0.056	0.487	0.056	0.398	0.114	0.216	0.071	0.321	0.000
Hg	3.03	0.000	0.000	0.191	0.027	0.191	0.027	0.270	0.000	0.000	0.000	0.346	0.033
PCB-1254	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.305	0.076	0.579	0.214
PCB-1260	3.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.621	0.527	3.245	1.029
As	3.04	0.001	0.000	0.074	0.016	0.074	0.016	0.000	0.000	0.334	0.039	0.263	0.035
Hg	3.04	0.000	0.000	0.206	0.026	0.206	0.026	0.000	0.000	0.345	0.082	0.451	0.077
PCB-1254	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.206	0.033	0.930	0.162	1.666	0.254

Table F4.12 (continued)

Analyte	Subreach	Water (mg/L)		0–10 cm (mg/kg)		10–20 cm (mg/kg)		20–30 cm (mg/kg)		30–40 cm (mg/kg)		>40 cm (mg/kg)	
		Mean	Standard error	Mean	Standard Error	Mean	Standard error	Mean	Standard error	Mean	Standard error	Mean	Standard error
PCB-1260	3.04	0.000	0.000	0.000	0.000	0.000	0.000	0.280	0.089	1.689	0.364	4.265	0.537
Se	3.04	0.000	0.000	0.290	0.019	0.290	0.019	0.000	0.000	0.294	0.023	0.347	0.039
As	4.01	0.019	0.005	0.073	0.013	0.073	0.013	0.000	0.000	0.164	0.044	0.209	0.087
Hg	4.01	0.000	0.000	0.204	0.031	0.204	0.031	0.051	0.002	0.174	0.024	0.278	0.070
PCB-1254	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.213	0.029	0.971	0.154	1.538	0.264
PCB-1260	4.01	0.000	0.000	0.000	0.000	0.000	0.000	0.157	0.038	1.713	0.388	2.760	0.493
Se	4.01	0.000	0.000	0.642	0.065	0.642	0.065	0.000	0.000	0.192	0.058	0.524	0.183
As	4.04	0.002	0.000	0.000	0.000	0.083	0.008	0.000	0.000	0.295	0.045	0.224	0.024
Hg	4.04	0.000	0.000	0.000	0.000	0.074	0.010	0.000	0.000	0.147	0.021	0.204	0.018
PCB-1254	4.04	0.000	0.000	0.100	0.000	0.000	0.000	0.106	0.008	0.539	0.077	1.840	0.143
PCB-1260	4.04	0.000	0.000	0.090	0.000	0.000	0.000	0.159	0.012	1.267	0.313	3.812	0.322
Se	4.04	0.000	0.000	0.000	0.000	0.477	0.019	0.000	0.000	0.404	0.051	0.312	0.033
Hg	5	0.000	0.000	0.000	0.000	0.048	0.003	0.000	0.000	0.112	0.012	0.178	0.013
PCB-1254	5	0.000	0.000	0.080	0.003	0.000	0.000	0.123	0.029	0.384	0.047	1.606	0.111
PCB-1260	5	0.000	0.000	0.085	0.002	0.000	0.000	0.118	0.016	0.889	0.126	3.889	0.267
Se	5	0.000	0.000	0.000	0.000	0.459	0.023	0.000	0.000	0.394	0.054	0.320	0.024
As	10	0.000	0.000	0.000	0.000	0.073	0.010	0.124	0.017	0.381	0.023	0.200	0.036
Hg	10	0.000	0.000	0.000	0.000	0.045	0.004	0.084	0.007	0.166	0.011	0.299	0.025

Table F4.12 (continued)

Analyte	Subreach	Water (mg/L)		0–10 cm (mg/kg)		10–20 cm (mg/kg)		20–30 cm (mg/kg)		30–40 cm (mg/kg)		>40 cm (mg/kg)	
		Mean	Standard error	Mean	Standard Error	Mean	Standard error	Mean	Standard error	Mean	Standard error	Mean	Standard error
Se	10	0.000	0.000	0.000	0.000	0.417	0.028	0.476	0.057	0.493	0.020	0.518	0.027
Hg	13	0.000	0.000	0.119	0.047	0.119	0.047	0.059	0.023	0.000	0.000	0.000	0.000
PCB-1254	13	0.000	0.000	0.000	0.000	0.000	0.000	0.362	0.000	0.724	0.000	0.152	0.000
PCB-1260	13	0.000	0.000	0.000	0.000	0.000	0.000	0.683	0.164	1.365	0.328	1.884	0.246
As	15	0.000	0.000	0.130	0.026	0.130	0.026	0.115	0.022	.0.100	0.018	0.112	0.014
Hg	15	0.000	0.000	0.060	0.010	0.060	0.010	0.095	0.010	0.131	0.010	0.208	0.048
PCB-1254	15	0.000	0.000	0.000	0.000	0.000	0.000	0.152	0.000	0.305	0.000	0.559	0.111
PCB-1260	15	0.000	0.000	0.000	0.000	0.000	0.000	0.273	0.000	0.546	0.000	2.657	0.639
Se	15	0.000	0.000	0.754	0.029	0.754	0.029	0.657	0.027	0.560	0.025	0.000	0.000
As	18	0.000	0.000	0.000	0.000	0.055	0.005	0.000	0.000	0.301	0.049	0.336	0.024
Hg	18	0.000	0.000	0.000	0.000	0.045	0.003	0.000	0.000	0.149	0.012	0.201	0.018
PCB-1254	18	0.000	0.000	0.090	0.000	0.000	0.000	0.121	0.013	0.780	0.129	1.565	0.159
PCB-1260	18	0.000	0.000	0.070	0.000	0.000	0.000	0.185	0.032	1.462	0.512	3.630	0.404
Se	18	0.000	0.000	0.000	0.000	0.266	0.021	0.000	0.000	0.214	0.034	0.240	0.014

Table F4.13. Results of Monte Carlo simulation of piscivore contaminant exposure estimates in the Clinch River/Poplar Creek system

Endpoint	Subreach	Analyte	Simulation results (mg/kg/d)		
			Mean	Standard deviation	80th percentile
Osprey	10	Hg	0.014	0.001	0.016
Osprey	0	Hg	0.010	0.001	0.011
Osprey	2.01	Hg	0.004	0.001	0.005
Osprey	2.02	Hg	0.012	0.001	0.013
Osprey	13	Hg	0.016	0.005	0.020
Osprey	3.01	Hg	0.075	0.007	0.082
Osprey	3.02	Hg	0.062	0.010	0.070
Osprey	3.03	Hg	0.042	0.004	0.046
Osprey	3.04	Hg	0.024	0.003	0.026
Osprey	4.01	Hg	0.026	0.003	0.028
Osprey	4.04	Hg	0.008	0.001	0.009
Osprey	18	Hg	0.006	0.001	0.007
Osprey	5	Hg	0.006	0.001	0.006
Osprey	15	Hg	0.016	0.002	0.018
Osprey	2.04	PCB	0.756	0.316	1.011
Osprey	13	PCB	0.118	0.011	0.128
Osprey	3.01	PCB	0.080	0.010	0.089
Osprey	3.02	PCB	0.242	0.067	0.297
Osprey	3.01	DDT	0.006	0.001	0.007
Great Blue Heron	10	Hg	0.006	0.001	0.007
Great Blue Heron	0	Hg	0.009	0.002	0.010
Great Blue Heron	2.02	Hg	0.012	0.002	0.013
Great Blue Heron	13	Hg	0.022	0.007	0.027
Great Blue Heron	3.01	Hg	0.068	0.012	0.077
Great Blue Heron	3.02	Hg	0.062	0.011	0.071
Great Blue Heron	3.03	Hg	0.040	0.008	0.045
Great Blue Heron	3.04	Hg	0.035	0.007	0.040
Great Blue Heron	4.01	Hg	0.036	0.008	0.041
Great Blue Heron	4.04	Hg	0.007	0.001	0.008
Great Blue Heron	15	Hg	0.013	0.002	0.014

Table F4.13 (continued)

Endpoint	Subreach	Analyte	Simulation results (mg/kg/d)		
			Mean	Standard deviation	80th percentile
Great Blue Heron	2.04	PCB	0.738	0.329	0.984
Great Blue Heron	3.02	PCB	0.061	0.021	0.079
Great Blue Heron	2.01	Cu	7.354	4.775	11.162
Mink	0	Se	0.067	0.035	0.092
Mink	1	Se	0.074	0.036	0.099
Mink	2.01	Se	0.041	0.020	0.055
Mink	2.02	Se	0.040	0.020	0.055
Mink	3.01	Se	0.044	0.022	0.060
Mink	3.02	Se	0.039	0.019	0.054
Mink	3.04	Se	0.023	0.011	0.032
Mink	4.01	Se	0.052	0.025	0.071
Mink	15	Se	0.063	0.032	0.085
Mink	13	Hg	0.010	0.006	0.014
Mink	3.01	Hg	0.027	0.013	0.037
Mink	3.02	Hg	0.026	0.013	0.035
Mink	3.03	Hg	0.015	0.008	0.021
Mink	3.04	Hg	0.017	0.008	0.022
Mink	4.01	Hg	0.017	0.008	0.023
Mink	2.04	PCB	0.311	0.223	0.475
River Otter	10	As	0.020	0.003	0.022
River Otter	0	As	0.021	0.003	0.024
River Otter	1	As	0.014	0.002	0.016
River Otter	2.01	As	0.028	0.004	0.032
River Otter	2.02	As	0.024	0.004	0.027
River Otter	3.02	As	0.015	0.003	0.018
River Otter	3.04	As	0.020	0.003	0.022
River Otter	4.01	As	0.015	0.003	0.017
River Otter	4.04	As	0.016	0.002	0.018
River Otter	18	As	0.019	0.003	0.021
River Otter	15	As	0.013	0.002	0.015
River Otter	10	Hg	0.016	0.002	0.017
River Otter	0	Hg	0.007	0.001	0.008
River Otter	2.01	Hg	0.008	0.001	0.009
River Otter	2.02	Hg	0.014	0.002	0.016
River Otter	13	Hg	0.006	0.002	0.007
River Otter	3.01	Hg	0.070	0.008	0.077

Table F4.13 (continued)

Endpoint	Subreach	Analyte	Simulation results (mg/kg/d)		
			Mean	Standard deviation	80th percentile
River Otter	3.02	Hg	0.053	0.008	0.059
River Otter	3.03	Hg	0.022	0.003	0.025
River Otter	3.04	Hg	0.030	0.005	0.035
River Otter	4.01	Hg	0.021	0.003	0.024
River Otter	4.04	Hg	0.011	0.002	0.013
River Otter	18	Hg	0.011	0.001	0.012
River Otter	5	Hg	0.009	0.001	0.010
River Otter	15	Hg	0.014	0.002	0.015
River Otter	10	Se	0.045	0.005	0.050
River Otter	0	Se	0.064	0.008	0.071
River Otter	1	Se	0.063	0.008	0.070
River Otter	2.01	Se	0.049	0.006	0.055
River Otter	2.02	Se	0.051	0.007	0.056
River Otter	3.01	Se	0.032	0.004	0.035
River Otter	3.02	Se	0.041	0.006	0.045
River Otter	3.04	Se	0.029	0.004	0.032
River Otter	4.01	Se	0.045	0.008	0.051
River Otter	4.04	Se	0.029	0.004	0.032
River Otter	18	Se	0.018	0.002	0.019
River Otter	5	Se	0.029	0.004	0.032
River Otter	15	Se	0.056	0.007	0.062
River Otter	0	PCB	0.161	0.066	0.215
River Otter	2.01	PCB	0.081	0.013	0.092
River Otter	2.02	PCB	0.240	0.035	0.269
River Otter	2.04	PCB	0.445	0.121	0.547
River Otter	13	PCB	0.139	0.020	0.156
River Otter	3.01	PCB	0.193	0.031	0.219
River Otter	3.02	PCB	0.185	0.052	0.228
River Otter	3.03	PCB	0.191	0.040	0.223
River Otter	3.04	PCB	0.253	0.037	0.283
River Otter	4.01	PCB	0.205	0.031	0.231
River Otter	4.04	PCB	0.220	0.029	0.245
River Otter	18	PCB	0.220	0.033	0.249
River Otter	5	PCB	0.199	0.025	0.222
River Otter	15	PCB	0.124	0.024	0.142
River Otter	2.01	Cu	1.681	1.023	2.518

Table F4.14. Estimated NOAELs[a] and LOAELs[a] for osprey and great blue heron

Contaminant	Form	Test species	Experimental information: NOAEL (mg/kg/d) and duration	Experimental information: LOAEL (mg/kg/d) and duration	Endpoint	Citation	Estimated NOAEL (mg/kg/d): Osprey	Estimated NOAEL (mg/kg/d): Great Blue Heron	Estimated LOAEL (mg/kg/d): Osprey	Estimated LOAEL (mg/kg/d): Great Blue Heron
Arsenic	arsenite	mallard duck	5.14 128d	12.84 128d	mortality	USFWS 1964	4.49	3.9	11.2	9.6
Copper	oxide	chicken	33.2 10 wk	46.97 10 wk	growth/ mortality	Mehring et al. 1960	23.6	20.25	33.4	28.6
Mercury	methyl	mallard duck	0.0064[b] 3 gen.	0.064 3 gen.	reproduction	Heinz 1979	0.006	0.005	0.056	0.048
Selenium	selenite	mallard duck	0.5 10 wk	1.0 10 wk	reproduction	Heinz et al. 1987	0.44	0.38	0.87	0.75
Zinc	zinc sulfate	chicken	14.5 44 wk	130.9 44 wk	reproduction	Stahl et al. 1990	15.8	13.5	138.2	118.5
Aldrin	dieldrin	barn owl	0.077 2 yr		reproduction	Mendenhall et al. 1983	0.05	0.045		
Bis(2-ethylhexyl) Phthalate		ring dove	1.11 4 wk		reproduction	Peakall 1974	0.53	0.45		
Chlordane		redwinged blackbird	2.14 84 d	10.7 84 d	mortality	Stickel et al. 1983	0.76	0.65	3.8	3.2
DDT and metabolites		Brown Pelican	0.0028[c] >1 yr	0.028[c] >1 yr	reproduction	Anderson et al. 1975	0.004	0.003	0.037	0.03

Table F4.14 (continued)

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)		Estimated LOAEL (mg/kg/d)	
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation	Osprey	Great Blue Heron	Osprey	Great Blue Heron
PCBs	Aroclor 1254	Ring-necked Pheasant	0.18[b] 17 wk	0.18 17 wk	reproduction	Dahlgren et al. 1972	0.16	0.14	1.6	1.4

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor of 10 applied.
[c] NOAEL and LOAEL as determined in EPA 1993b.

Table F4.15. Estimated NOAELs[a] and LOAELs[a] for mink and river otter

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)		Estimated LOAEL (mg/kg/d)	
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation	Mink	River Otter	Mink	River Otter
Arsenic	As+3	mouse	0.126[b] 3 gen.	1.26 3 gen.	reproduction	Schroeder and Mitchner 1971	0.04	0.02	0.4	0.2
Beryllium	sulfate	rat	0.66 1126 d		longevity/ wt. loss	Schroeder and Mitchner 1975	0.47	0.24		
Copper	sulfate	mink	11.71 1 yr	15.14 1 yr	reproduction	Aulerich et al. 1982	11.7	5.9	15.1	7.6
Mercury	methyl	mink	0.015[c] 93 d		mortality	Wobeser et al. 1976	0.015	0.008		
Mercury	methyl	rat		0.16 3 gen.	reproduction	Verschuuren et al. 1976			0.11	0.06
Selenium	selenate	mouse	0.075[b] 3 gen	0.75 3 gen	reproduction	Schroeder and Mitchner 1971	0.024	0.012	0.24	0.12
Zinc	oxide	rat	160 gestation	320 gestation	reproduction	Schlicker and Cox 1968	113.2	57	226.3	114
Aldrin		rat	0.2 3 gen	1.0 3 gen	reproduction	Treon and Cleveland 1955	0.14	0.07	0.7	0.36
Bis(2-ethylhexyl) Phthalate		mouse	18.33 105 d	183.3 105 d	reproduction	Lamb et al. 1987	5.76	2.88	57.6	28.8

Table F4.15 (continued)

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)		Estimated LOAEL (mg/kg/d)	
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation	Mink	River Otter	Mink	River Otter
Chlordane		mouse	4.6 6 gen	9.2 6 gen	reproduction	WHO 1984	1.4	0.73	2.9	1.5
DDT and metabolites		rat	0.8 2 yr	4.0 2 yr	reproduction	Fitzhugh 1948	0.57	0.29	2.8	1.4
PCB's	Aroclor 1254	mink	0.137 4.5 mo.	0.685 4.5 mo.	reproduction	Aulerich and Ringer 1987	0.14	0.07	0.69	0.35

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor of 10 applied.
[c] Estimated NOAEL: subchronic to chronic factor of 10 applied.

Table F4.16. Water benchmarks for osprey, great blue heron, and mink[a]

Analyte	Water benchmark (mg/L)			
	Osprey	Great Blue Heron	Mink	River Otter
1,1-Dichloroethane	-	-	-	
1,2-Dichloroethene	-	-	143.5	89.4
Acetone	-	-	71.4	44.5
Aluminum	1026.1	1020.3	6.1	3.8
Antimony	-	-	0.4	0.25
Arsenic	87.5	87.0	0.4	0.25
Barium	177.1	176.1	38.8	24.4
Beryllium	-	-	4.7	2.9
Bis(2-ethylhexyl)phthalate	10.2	10.2	58.2	36.2
Cadmium	25.9	25.8	0.6	0.36
Chlordane, total	14.7	14.6	14.5	9.1
Chloroform	-	-	107.2	66.8
Chromium	18.3	18.2	23.4	14.6
Cobalt	-	-	-	
Copper	460.1	457.5	118.3	73.6
Di-n-butylphthalate	1.1	1.1	1746.6	1088
Diethylphthalate	-	-	14553	9067
Endosulfan sulfate	125.9	125.2	1.1	0.67
Endrin ketone	5.4	5.3	0.3	0.18
Fluoride	75.6	75.2	316.9	197
Lead	33.5	33.3	57.1	35.6
Manganese	-	-	628.6	391
Mercury	0.11	0.11	0.15	0.09
Methoxychlor	-	-	28.6	17.8
Methyl Mercury	0.11	0.11	0.15	0.09
Methylene chloride	-	-	41.8	26
Nickel	1216.2	1209.3	285.7	178
Nitrate	-	-	4872.6	3035
PCB-1254	3.1	3.1	1.4	0.88

Table F4.16 (continued)

Analyte	Water benchmark (mg/L)			
	Osprey	Great Blue Heron	Mink	River Otter
Selenium	8.5	8.5	0.24	0.15
Tetrachloroethene	-	-	4.45	2.8
Thallium	-	-	0.05	0.033
Toluene	-	-	82.5	51.4
Trichloroethene	-	-	2.2	1.4
Uranium	293.5	291.8	9.5	5.9
Vanadium	204.2	203.1	1.4	0.85
Vinyl chloride	-	-	1.2	0.76
Zinc	51.1	50.8	1.2	712
alpha-BHC	5.1	5.1	0.14	0.09

[a] Water benchmarks for great blue heron and mink from Opresko et al. (1984). Benchmarks for osprey and river otter calculated using methods and data presented in Opresko et al. (1984) and body weight and water ingestion rates presented in Sect. 6.4.1.1.

Table F4.17. Surface water concentrations and hazard assessment for mink, great blue heron, and osprey

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
1,1-Dichloroethane	21	0.0012	-[c]	-	-	-
1,2-Dichloroethene	21	0.02002	-	-	0.0001	0.0002
Acetone	0	0.0097	-	-	0.0001	0.0002
Acetone	1	0.007	-	-	0.0001	0.0002
Acetone	2.02	0.014	-	-	0.0002	0.0003
Acetone	3.03	0.013	-	-	0.0002	0.0003
Acetone	13	0.045	-	-	0.0006	0.0010
Acetone	18	0.003	-	-	0.0000	0.0001
Acetone	20.02	0.003	-	-	0.0000	0.0001
Acetone	22	0.0078	-	-	0.0001	0.0002
Aluminum	0	0.50129	0.0005	0.0005	0.0818	0.1319
Aluminum	1	0.33313	0.0003	0.0003	0.0544	0.0877
Aluminum	2.01	0.29901	0.0003	0.0003	0.0488	0.0787
Aluminum	2.02	0.34387	0.0003	0.0003	0.0561	0.0905
Aluminum	2.03	0.32668	0.0003	0.0003	0.0533	0.0860
Aluminum	2.04	0.30986	0.0003	0.0003	0.0506	0.0815
Aluminum	3.01	0.53873	0.0005	0.0005	0.0879	0.1418
Aluminum	3.02	0.47787	0.0005	0.0005	0.0780	0.1258
Aluminum	3.03	0.65273	0.0006	0.0006	0.1065	0.1718
Aluminum	3.04	0.48615	0.0005	0.0005	0.0793	0.1279
Aluminum	4.01	0.43062	0.0004	0.0004	0.0703	0.1133
Aluminum	4.02	0.26664	0.0003	0.0003	0.0435	0.0702
Aluminum	4.04	0.29473	0.0003	0.0003	0.0481	0.0776
Aluminum	7.01	0.23407	0.0002	0.0002	0.0382	0.0616
Aluminum	7.02	0.19494	0.0002	0.0002	0.0318	0.0513
Aluminum	8	0.25849	0.0003	0.0003	0.0422	0.0680
Aluminum	13	0.491	0.0005	0.0005	0.0801	0.1292
Aluminum	18	0.93591	0.0009	0.0009	0.1527	0.2463

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Aluminum	20.01	0.347	0.0003	0.0003	0.0566	0.0913
Aluminum	20.02	0.30419	0.0003	0.0003	0.0496	0.0801
Aluminum	21	2.1069	0.0021	0.0021	0.3438	0.5544
Aluminum	22	1.41099	0.0014	0.0014	0.2302	0.3713
Antimony	2.01	0.0013	-	-	0.0033	0.0052
Antimony	3.01	0.00142	-	-	0.0036	0.0057
Antimony	3.02	0.0012	-	-	0.0030	0.0048
Antimony	3.04	0.00175	-	-	0.0044	0.0070
Antimony	4.01	0.00176	-	-	0.0044	0.0070
Antimony	4.02	0.00166	-	-	0.0042	0.0066
Antimony	7.02	0.0012	-	-	0.0030	0.0048
Antimony	13	0.00118	-	-	0.0030	0.0047
Arsenic	0	0.05	0.0006	0.0006	0.1645	0.2000
Arsenic	1	0.0012	0.0000	0.0000	0.0039	0.0048
Arsenic	2.02	0.0011	0.0000	0.0000	0.0036	0.0044
Arsenic	2.04	0.0012	0.0000	0.0000	0.0039	0.0048
Arsenic	3.02	0.0014	0.0000	0.0000	0.0046	0.0056
Arsenic	3.03	0.00145	0.0000	0.0000	0.0048	0.0058
Arsenic	3.04	0.0012	0.0000	0.0000	0.0039	0.0048
Arsenic	4.01	0.00107	0.0000	0.0000	0.0035	0.0043
Arsenic	4.02	0.0013	0.0000	0.0000	0.0043	0.0052
Arsenic	4.04	0.00166	0.0000	0.0000	0.0055	0.0066
Arsenic	7.01	0.00523	0.0001	0.0001	0.0172	0.0209
Arsenic	7.02	0.00129	0.0000	0.0000	0.0042	0.0052
Arsenic	13	0.00366	0.0000	0.0000	0.0120	0.0146
Arsenic	20.01	0.0545	0.0006	0.0006	0.1793	0.2180
Barium	0	0.07445	0.0004	0.0004	0.0019	0.0031
Barium	1	0.03457	0.0002	0.0002	0.0009	0.0014

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Barium	2.01	0.03561	0.0002	0.0002	0.0009	0.0015
Barium	2.02	0.03178	0.0002	0.0002	0.0008	0.0013
Barium	2.03	0.03045	0.0002	0.0002	0.0008	0.0012
Barium	2.04	0.03302	0.0002	0.0002	0.0009	0.0014
Barium	3.01	0.03636	0.0002	0.0002	0.0009	0.0015
Barium	3.02	0.040289	0.0002	0.0002	0.0010	0.0017
Barium	3.03	0.037231	0.0002	0.0002	0.0010	0.0015
Barium	3.04	0.03642	0.0002	0.0002	0.0009	0.0015
Barium	4.01	0.03123	0.0002	0.0002	0.0008	0.0013
Barium	4.02	0.028902	0.0002	0.0002	0.0007	0.0012
Barium	4.04	0.028776	0.0002	0.0002	0.0007	0.0012
Barium	7.01	0.037219	0.0002	0.0002	0.0010	0.0015
Barium	7.02	0.028599	0.0002	0.0002	0.0007	0.0012
Barium	8	0.029057	0.0002	0.0002	0.0007	0.0012
Barium	13	0.045121	0.0003	0.0003	0.0012	0.0018
Barium	18	0.030569	0.0002	0.0002	0.0008	0.0013
Barium	20.01	0.034383	0.0002	0.0002	0.0009	0.0014
Barium	20.02	0.090238	0.0005	0.0005	0.0023	0.0037
Barium	21	0.061382	0.0003	0.0003	0.0016	0.0025
Barium	22	0.079053	0.0004	0.0004	0.0020	0.0032
Beryllium	0	0.0012	-	-	0.0003	0.0004
Beryllium	1	0.0014	-	-	0.0003	0.0005
Beryllium	20.02	0.001	-	-	0.0002	0.0003
Bis(2-ethylhexyl)phthalate	1	0.002239	0.0002	0.0002	0.0000	0.0001
Bis(2-ethylhexyl)phthalate	2.02	0.004322	0.0004	0.0004	0.0001	0.0001
Bis(2-ethylhexyl)phthalate	2.03	0.001	0.0001	0.0001	0.0000	0.0000
Bis(2-ethylhexyl)phthalate	2.04	0.07	0.0068	0.0069	0.0012	0.0019
Bis(2-ethylhexyl)phthalate	3.01	0.002391	0.0002	0.0002	0.0000	0.0001

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Bis(2-ethylhexyl)phthalate	3.02	0.004339	0.0004	0.0004	0.0001	0.0001
Bis(2-ethylhexyl)phthalate	3.03	0.002391	0.0002	0.0002	0.0000	0.0001
Bis(2-ethylhexyl)phthalate	3.04	0.00169	0.0002	0.0002	0.0000	0.0000
Bis(2-ethylhexyl)phthalate	4.01	0.001	0.0001	0.0001	0.0000	0.0000
Bis(2-ethylhexyl)phthalate	4.02	0.00301	0.0003	0.0003	0.0001	0.0001
Bis(2-ethylhexyl)phthalate	4.04	0.007913	0.0008	0.0008	0.0001	0.0002
Bis(2-ethylhexyl)phthalate	7.01	0.001	0.0001	0.0001	0.0000	0.0000
Bis(2-ethylhexyl)phthalate	7.02	0.002342	0.0002	0.0002	0.0000	0.0001
Bis(2-ethylhexyl)phthalate	10	0.005	0.0005	0.0005	0.0001	0.0001
Bis(2-ethylhexyl)phthalate	13	0.004208	0.0004	0.0004	0.0001	0.0001
Cadmium	22	0.00036	0.0000	0.0000	0.0006	0.0010
Chlordane, total	13	0.000002	0.0000	0.0000	0.0000	0.0000
Chloroform	3.03	0.004	-	-	0.0000	0.0001
Chloroform	21	0.002863	-	-	0.0000	0.0000
Chromium	0	0.006217	0.0003	0.0003	0.0003	0.0004
Chromium	1	0.003127	0.0002	0.0002	0.0001	0.0002
Chromium	2.01	0.003926	0.0002	0.0002	0.0002	0.0003
Chromium	2.02	0.005427	0.0003	0.0003	0.0002	0.0004
Chromium	2.03	0.002622	0.0001	0.0001	0.0001	0.0002
Chromium	2.04	0.0017	0.0001	0.0001	0.0001	0.0001
Chromium	3.01	0.002072	0.0001	0.0001	0.0001	0.0001
Chromium	3.02	0.001851	0.0001	0.0001	0.0001	0.0001
Chromium	3.03	0.002601	0.0001	0.0001	0.0001	0.0002
Chromium	3.04	0.002291	0.0001	0.0001	0.0001	0.0002
Chromium	4.01	0.001873	0.0001	0.0001	0.0001	0.0001
Chromium	4.02	0.001895	0.0001	0.0001	0.0001	0.0001
Chromium	4.04	0.003832	0.0002	0.0002	0.0002	0.0003
Chromium	7.01	0.001812	0.0001	0.0001	0.0001	0.0001

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Chromium	7.02	0.001777	0.0001	0.0001	0.0001	0.0001
Chromium	8	0.001	0.0001	0.0001	0.0000	0.0001
Chromium	13	0.002523	0.0001	0.0001	0.0001	0.0002
Chromium	18	0.005493	0.0003	0.0003	0.0002	0.0004
Chromium	20.02	0.011603	0.0006	0.0006	0.0005	0.0008
Chromium	21	0.008189	0.0004	0.0004	0.0003	0.0006
Chromium	22	0.016961	0.0009	0.0009	0.0007	0.0012
Cobalt	1	0.0045	-	-	-	-
Cobalt	2.02	0.0045	-	-	-	-
Cobalt	3.01	0.0012	-	-	-	-
Cobalt	3.03	0.0019	-	-	-	-
Cobalt	3.04	0.00117	-	-	-	-
Cobalt	13	0.00123	-	-	-	-
Cobalt	18	0.0052	-	-	-	-
Cobalt	21	0.00629	-	-	-	-
Cobalt	22	0.0077	-	-	-	-
Copper	0	0.0023	0.0000	0.0000	0.0000	0.0000
Copper	1	0.00807	0.0000	0.0000	0.0001	0.0001
Copper	2.01	0.00741	0.0000	0.0000	0.0001	0.0001
Copper	2.02	0.0065	0.0000	0.0000	0.0001	0.0001
Copper	2.03	0.01329	0.0000	0.0000	0.0001	0.0002
Copper	2.04	0.00873	0.0000	0.0000	0.0001	0.0001
Copper	3.01	0.00425	0.0000	0.0000	0.0000	0.0001
Copper	3.02	0.00336	0.0000	0.0000	0.0000	0.0000
Copper	3.03	0.00494	0.0000	0.0000	0.0000	0.0001
Copper	3.04	0.00529	0.0000	0.0000	0.0000	0.0001
Copper	4.01	0.01784	0.0000	0.0000	0.0002	0.0002
Copper	4.02	0.00366	0.0000	0.0000	0.0000	0.0000

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Copper	4.04	0.00597	0.0000	0.0000	0.0001	0.0001
Copper	7.01	0.01614	0.0000	0.0000	0.0001	0.0002
Copper	7.02	0.01263	0.0000	0.0000	0.0001	0.0002
Copper	8	0.0187	0.0000	0.0000	0.0002	0.0003
Copper	13	0.0047	0.0000	0.0000	0.0000	0.0001
Copper	21	0.01341	0.0000	0.0000	0.0001	0.0002
Di-n-butylphthalate	0	0.002	0.0020	0.0020	0.0000	0.0000
Di-n-butylphthalate	1	0.00241	0.0024	0.0024	0.0000	0.0000
Di-n-butylphthalate	2.02	0.00309	0.0030	0.0030	0.0000	0.0000
Di-n-butylphthalate	2.03	0.00396	0.0039	0.0039	0.0000	0.0000
Di-n-butylphthalate	3.01	0.00364	0.0036	0.0036	0.0000	0.0000
Di-n-butylphthalate	3.02	0.00304	0.0030	0.0030	0.0000	0.0000
Di-n-butylphthalate	3.03	0.00201	0.0020	0.0020	0.0000	0.0000
Di-n-butylphthalate	3.04	0.00355	0.0035	0.0035	0.0000	0.0000
Di-n-butylphthalate	4.01	0.00189	0.0018	0.0019	0.0000	0.0000
Di-n-butylphthalate	4.04	0.002	0.0020	0.0020	0.0000	0.0000
Di-n-butylphthalate	7.01	0.003	0.0029	0.0029	0.0000	0.0000
Di-n-butylphthalate	7.02	0.00294	0.0029	0.0029	0.0000	0.0000
Di-n-butylphthalate	8	0.004	0.0039	0.0039	0.0000	0.0000
Di-n-butylphthalate	13	0.00259	0.0025	0.0025	0.0000	0.0000
Diethylphthalate	2.02	0.001	-	-	0.0000	0.0000
Diethylphthalate	3.03	0.002	-	-	0.0000	0.0000
Diethylphthalate	13	0.00167	-	-	0.0000	0.0000
Endosulfan sulfate	13	0	0.0000	0.0000	0.0000	0.0000
Endrin ketone	13	0	0.0000	0.0000	0.0000	0.0000
Fluoride	0	0.11755	0.0016	0.0016	0.0004	0.0006
Fluoride	1	0.13308	0.0018	0.0018	0.0004	0.0007
Fluoride	2.02	0.11421	0.0015	0.0015	0.0004	0.0006

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Fluoride	2.04	0.1135	0.0015	0.0015	0.0004	0.0006
Fluoride	3.03	0.24979	0.0033	0.0033	0.0008	0.0013
Fluoride	4.01	0.10336	0.0014	0.0014	0.0003	0.0005
Fluoride	13	0.16039	0.0021	0.0021	0.0005	0.0008
Fluoride	18	0.29294	0.0039	0.0039	0.0009	0.0015
Fluoride	20.01	6.46241	0.0855	0.0859	0.0204	0.0328
Fluoride	20.02	0.25661	0.0034	0.0034	0.0008	0.0013
Fluoride	21	0.28813	0.0038	0.0038	0.0009	0.0015
Fluoride	22	0.80315	0.0106	0.0107	0.0025	0.0041
Lead	0	0.001	0.0000	0.0000	0.0000	0.0000
Lead	1	0.00173	0.0001	0.0001	0.0000	0.0000
Lead	2.01	0.00348	0.0001	0.0001	0.0001	0.0001
Lead	2.02	0.00136	0.0000	0.0000	0.0000	0.0000
Lead	2.03	0.002	0.0001	0.0001	0.0000	0.0001
Lead	3.01	0.00172	0.0001	0.0001	0.0000	0.0000
Lead	3.02	0.00131	0.0000	0.0000	0.0000	0.0000
Lead	3.03	0.00193	0.0001	0.0001	0.0000	0.0001
Lead	3.04	0.00186	0.0001	0.0001	0.0000	0.0001
Lead	4.01	0.00176	0.0001	0.0001	0.0000	0.0000
Lead	4.02	0.0028	0.0001	0.0001	0.0000	0.0001
Lead	4.04	0.00133	0.0000	0.0000	0.0000	0.0000
Lead	7.01	0.00155	0.0000	0.0000	0.0000	0.0000
Lead	7.02	0.0015	0.0000	0.0000	0.0000	0.0000
Lead	8	0.0023	0.0001	0.0001	0.0000	0.0001
Lead	13	0.00162	0.0000	0.0000	0.0000	0.0000
Manganese	0	0.10362	-	-	0.0002	0.0003
Manganese	1	0.06231	-	-	0.0001	0.0002
Manganese	2.01	0.05211	-	-	0.0001	0.0001

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Manganese	2.02	0.05545	-	-	0.0001	0.0001
Manganese	2.03	0.05192	-	-	0.0001	0.0001
Manganese	2.04	0.14384	-	-	0.0002	0.0004
Manganese	3.01	0.0908	-	-	0.0001	0.0002
Manganese	3.02	0.08856	-	-	0.0001	0.0002
Manganese	3.03	0.08943	-	-	0.0001	0.0002
Manganese	3.04	0.08827	-	-	0.0001	0.0002
Manganese	4.01	0.0578	-	-	0.0001	0.0001
Manganese	4.02	0.06947	-	-	0.0001	0.0002
Manganese	4.04	0.07159	-	-	0.0001	0.0002
Manganese	7.01	0.05739	-	-	0.0001	0.0001
Manganese	7.02	0.07628	-	-	0.0001	0.0002
Manganese	8	0.10297	-	-	0.0002	0.0003
Manganese	13	0.13031	-	-	0.0002	0.0003
Manganese	18	0.08551	-	-	0.0001	0.0002
Manganese	20.01	0.03178	-	-	0.0001	0.0001
Manganese	20.02	0.03272	-	-	0.0001	0.0001
Manganese	21	0.40127	-	-	0.0006	0.0010
Manganese	22	0.15068	-	-	0.0002	0.0004
Mercury	0	0.00003	0.0003	0.0003	0.0007	0.0003
Mercury	1	0.00001	0.0001	0.0001	0.0002	0.0001
Mercury	2.01	0.00001	0.0001	0.0001	0.0002	0.0001
Mercury	2.02	0.00007	0.0006	0.0006	0.0015	0.0008
Mercury	2.03	0.00001	0.0001	0.0001	0.0002	0.0001
Mercury	2.04	0.00002	0.0002	0.0002	0.0004	0.0002
Mercury	3.01	0.00013	0.0012	0.0012	0.0028	0.0014
Mercury	3.02	0.00012	0.0011	0.0011	0.0026	0.0013
Mercury	3.03	0.00013	0.0012	0.0012	0.0028	0.0014

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Mercury	3.04	0.00025	0.0023	0.0023	0.0054	0.0028
Mercury	4.01	0.00005	0.0005	0.0005	0.0011	0.0006
Mercury	4.02	0.00004	0.0004	0.0004	0.0009	0.0004
Mercury	4.04	0.00003	0.0003	0.0003	0.0007	0.0003
Mercury	7.01	0.00001	0.0001	0.0001	0.0002	0.0001
Mercury	7.02	0	0.0000	0.0000	0.0000	0.0000
Mercury	8	0.00001	0.0001	0.0001	0.0002	0.0001
Mercury	13	0.00002	0.0002	0.0002	0.0004	0.0002
Mercury	18	0.00007	0.0006	0.0006	0.0015	0.0008
Mercury	20.01	0.00009	0.0008	0.0008	0.0020	0.0010
Mercury	20.02	0.00008	0.0007	0.0007	0.0017	0.0009
Mercury	21	0.00007	0.0006	0.0006	0.0015	0.0008
Mercury	22	0.00013	0.0012	0.0012	0.0028	0.0014
Methoxychlor	13	0	-	-	0.0000	0.0000
Methyl Mercury	0	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	1	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	2.01	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	2.03	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	2.04	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	3.01	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	3.02	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	3.03	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	3.04	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	4.01	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	4.02	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	4.04	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	7.01	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	7.02	0	0.0000	0.0000	0.0000	0.0000

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Methyl Mercury	8	0	0.0000	0.0000	0.0000	0.0000
Methyl Mercury	13	0	0.0000	0.0000	0.0000	0.0000
Methylene chloride	20.02	0.0026	-	-	0.0001	0.0001
Nickel	0	0.0055	0.0000	0.0000	0.0000	0.0000
Nickel	1	0.0036	0.0000	0.0000	0.0000	0.0000
Nickel	2.01	0.0139	0.0000	0.0000	0.0000	0.0001
Nickel	2.02	0.0045	0.0000	0.0000	0.0000	0.0000
Nickel	2.03	0.0051	0.0000	0.0000	0.0000	0.0000
Nickel	2.04	0.0021	0.0000	0.0000	0.0000	0.0000
Nickel	3.01	0.0047	0.0000	0.0000	0.0000	0.0000
Nickel	3.02	0.0042	0.0000	0.0000	0.0000	0.0000
Nickel	3.03	0.0042	0.0000	0.0000	0.0000	0.0000
Nickel	3.04	0.0042	0.0000	0.0000	0.0000	0.0000
Nickel	4.01	0.0027	0.0000	0.0000	0.0000	0.0000
Nickel	4.02	0.0029	0.0000	0.0000	0.0000	0.0000
Nickel	4.04	0.0034	0.0000	0.0000	0.0000	0.0000
Nickel	7.01	0.0046	0.0000	0.0000	0.0000	0.0000
Nickel	7.02	0.0042	0.0000	0.0000	0.0000	0.0000
Nickel	8	0.0029	0.0000	0.0000	0.0000	0.0000
Nickel	13	0.0045	0.0000	0.0000	0.0000	0.0000
Nickel	21	0.0219	0.0000	0.0000	0.0001	0.0001
Nitrate	0	2.8427	-	-	0.0006	0.0009
Nitrate	1	4.9984	-	-	0.0010	0.0016
Nitrate	2.02	3.7003	-	-	0.0008	0.0012
Nitrate	2.04	3.6173	-	-	0.0007	0.0012
Nitrate	3.03	5.0741	-	-	0.0010	0.0017
Nitrate	4.01	4.3661	-	-	0.0009	0.0014
Nitrate	13	2.3615	-	-	0.0005	0.0008

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Nitrate	18	4.634	-	-	0.0010	0.0015
Nitrate	20.01	23.9563	-	-	0.0049	0.0079
Nitrate	20.02	14.9497	-	-	0.0031	0.0049
Nitrate	21	2.5481	-	-	0.0005	0.0008
Nitrate	22	2.0365	-	-	0.0004	0.0007
PCB-1254	3.01	0.0003	0.0001	0.0001	0.0002	0.0003
PCB-1254	3.04	0.0001	0.0000	0.0000	0.0001	0.0001
PCB-1254	13	0.0005	0.0002	0.0002	0.0004	0.0006
PCB-1254	13	0.001	0.0003	0.0003	0.0007	0.0011
Selenium	7.02	0.0011	0.0001	0.0001	0.0046	0.0073
Selenium	13	0.0012	0.0001	0.0001	0.0050	0.0080
Tetrachloroethene	21	0.0013	-	-	0.0003	0.0005
Thallium	1	1.1	-	-	20.3704	33.3333
Thallium	3.03	0.007	-	-	0.1296	0.2121
Thallium	20.02	0.0056	-	-	0.1037	0.1697
Toluene	2.04	0.001	-	-	0.0000	0.0000
Trichloroethene	2.02	0.003	-	-	0.0013	0.0021
Trichloroethene	21	0.0256	-	-	0.0115	0.0183
Uranium	0	0.0003	0.0000	0.0000	0.0000	0.0001
Uranium	1	0.0004	0.0000	0.0000	0.0000	0.0001
Uranium	2.02	0.0009	0.0000	0.0000	0.0001	0.0002
Uranium	2.04	0.0004	0.0000	0.0000	0.0000	0.0001
Uranium	3.01	0.0033	0.0000	0.0000	0.0003	0.0006
Uranium	3.02	0.0027	0.0000	0.0000	0.0003	0.0005
Uranium	3.03	0.0031	0.0000	0.0000	0.0003	0.0005
Uranium	3.04	0.00223	0.0000	0.0000	0.0002	0.0004
Uranium	4.01	0.00071	0.0000	0.0000	0.0001	0.0001
Uranium	7.01	0.0021	0.0000	0.0000	0.0002	0.0004

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Uranium	7.02	0.0054	0.0000	0.0000	0.0006	0.0009
Uranium	13	0.00026	0.0000	0.0000	0.0000	0.0000
Uranium	18	0.00052	0.0000	0.0000	0.0001	0.0001
Uranium	20.01	0.01031	0.0000	0.0000	0.0011	0.0017
Uranium	20.02	0.02658	0.0001	0.0001	0.0028	0.0045
Uranium	21	0.00933	0.0000	0.0000	0.0010	0.0016
Uranium	22	0.00491	0.0000	0.0000	0.0005	0.0008
Vanadium	0	0.00868	0.0000	0.0000	0.0064	0.0102
Vanadium	1	0.00281	0.0000	0.0000	0.0021	0.0033
Vanadium	2.02	0.00173	0.0000	0.0000	0.0013	0.0020
Vanadium	2.04	0.0024	0.0000	0.0000	0.0018	0.0028
Vanadium	3.01	0.00139	0.0000	0.0000	0.0010	0.0016
Vanadium	3.02	0.00127	0.0000	0.0000	0.0009	0.0015
Vanadium	3.03	0.00185	0.0000	0.0000	0.0014	0.0022
Vanadium	3.04	0.00154	0.0000	0.0000	0.0011	0.0018
Vanadium	4.01	0.00162	0.0000	0.0000	0.0012	0.0019
Vanadium	4.02	0.0012	0.0000	0.0000	0.0009	0.0014
Vanadium	4.04	0.00138	0.0000	0.0000	0.0010	0.0016
Vanadium	7.01	0.00155	0.0000	0.0000	0.0011	0.0018
Vanadium	7.02	0.00103	0.0000	0.0000	0.0008	0.0012
Vanadium	13	0.00133	0.0000	0.0000	0.0010	0.0016
Vanadium	18	0.0066	0.0000	0.0000	0.0049	0.0078
Vanadium	20.01	0.002	0.0000	0.0000	0.0015	0.0024
Vanadium	20.02	0.00959	0.0000	0.0000	0.0071	0.0113
Vanadium	21	0.00534	0.0000	0.0000	0.0039	0.0063
Vanadium	22	0.00311	0.0000	0.0000	0.0023	0.0037
Vinyl chloride	21	0.00498	-	-	0.0041	0.0066
Zinc	0	0.01524	0.0003	0.0003	0.0126	0.0000

Table F4.17 (continued)

Analyte	Subreach	Water 95% UCL[b] (mg/L)	Hazard quotients[a]			
			Osprey	Heron	Mink	River Otter
Zinc	1	0.01774	0.0003	0.0003	0.0146	0.0000
Zinc	2.01	0.01984	0.0004	0.0004	0.0163	0.0000
Zinc	2.02	0.01559	0.0003	0.0003	0.0128	0.0000
Zinc	2.03	0.01938	0.0004	0.0004	0.0160	0.0000
Zinc	2.04	0.01656	0.0003	0.0003	0.0136	0.0000
Zinc	3.01	0.01718	0.0003	0.0003	0.0142	0.0000
Zinc	3.02	0.01217	0.0002	0.0002	0.0100	0.0000
Zinc	3.03	0.01404	0.0003	0.0003	0.0116	0.0000
Zinc	3.04	0.01882	0.0004	0.0004	0.0155	0.0000
Zinc	4.01	0.04214	0.0008	0.0008	0.0347	0.0001
Zinc	4.02	0.00844	0.0002	0.0002	0.0070	0.0000
Zinc	4.04	0.0161	0.0003	0.0003	0.0133	0.0000
Zinc	7.01	0.02273	0.0004	0.0004	0.0187	0.0000
Zinc	7.02	0.01407	0.0003	0.0003	0.0116	0.0000
Zinc	8	0.11776	0.0023	0.0023	0.0970	0.0002
Zinc	13	0.01312	0.0003	0.0003	0.0108	0.0000
Zinc	18	0.01058	0.0002	0.0002	0.0087	0.0000
Zinc	20.01	0.0152	0.0003	0.0003	0.0125	0.0000
Zinc	20.02	0.0297	0.0006	0.0006	0.0245	0.0000
Zinc	21	0.03175	0.0006	0.0006	0.0262	0.0000
Zinc	22	0.02649	0.0005	0.0005	0.0218	0.0000

[a] Hazard quotient = water concentration/water benchmark (from Table F4.16).
[b] UCL = Upper confidence limit.
[c] - = no water benchmark available.

Table F4.18. Comparison of Monte Carlo simulation of piscivore contaminant exposure estimates to literature-based NOAELs[a] and LOAELs[a]

Endpoint	Subreach	Analyte	Within subreach exposure estimate	
			% > NOAEL	% > LOAEL
Osprey	10	Hg	>99%	<1%
Osprey	0	Hg	>99%	<1%
Osprey	2.01	Hg	<1%	<1%
Osprey	2.02	Hg	>99%	<1%
Osprey	13	Hg	>99%	<1%
Osprey	3.01	Hg	>99%	>99%
Osprey	3.02	Hg	>99%	70%
Osprey	3.03	Hg	>99%	1%
Osprey	3.04	Hg	>99%	<1%
Osprey	4.01	Hg	>99%	<1%
Osprey	4.04	Hg	>99%	<1%
Osprey	18	Hg	>99%	<1%
Osprey	5	Hg	>99%	<1%
Osprey	15	Hg	>99%	<1%
Osprey	2.04	PCB	>99%	<1%
Osprey	13	PCB	<1%	<1%
Osprey	3.01	PCB	<1%	<1%
Osprey	3.02	PCB	90%	<1%
Osprey	3.01	DDT	>99%	<1%
Great Blue Heron	10	Hg	95%	<1%
Great Blue Heron	0	Hg	>99%	<1%
Great Blue Heron	2.02	Hg	>99%	<1%
Great Blue Heron	13	Hg	>99%	<1%
Great Blue Heron	3.01	Hg	>99%	>99%
Great Blue Heron	3.02	Hg	>99%	90–95%
Great Blue Heron	3.03	Hg	>99%	10%
Great Blue Heron	3.04	Hg	>99%	5%
Great Blue Heron	4.01	Hg	>99%	5%
Great Blue Heron	4.04	Hg	95%	<1%
Great Blue Heron	15	Hg	>99%	<1%
Great Blue Heron	2.04	PCB	>99%	<1%
Great Blue Heron	3.02	PCB	<1%	<1%
Great Blue Heron	2.01	Cu	<1%	<1%
Mink	0	Se	90–95%	<1%
Mink	1	Se	90–95%	<1%
Mink	2.01	Se	80%	<1%
Mink	2.02	Se	80%	<1%
Mink	3.01	Se	85%	<1%
Mink	3.02	Se	75–80%	<1%
Mink	3.04	Se	40%	<1%
Mink	4.01	Se	85%	<1%

Table F4.18 (continued)

Endpoint	Subreach	Analyte	Within subreach exposure estimate	
			% > NOAEL	% > LOAEL
Mink	15	Se	90–95%	<1%
Mink	13	Hg	15%	<1%
Mink	3.01	Hg	85%	<1%
Mink	3.02	Hg	80%	<1%
Mink	3.03	Hg	45–50%	<1%
Mink	3.04	Hg	50–55%	<1%
Mink	4.01	Hg	50–55%	<1%
Mink	2.04	PCB	75–80%	5%
River Otter	10	As	45%	<1%
River Otter	0	As	65%	<1%
River Otter	1	As	<5%	<1%
River Otter	2.01	As	>99%	<1%
River Otter	2.02	As	90%	<1%
River Otter	3.02	As	5%	<1%
River Otter	3.04	As	45%	<1%
River Otter	4.01	As	10%	<1%
River Otter	4.04	As	10%	<1%
River Otter	18	As	30%	<1%
River Otter	15	As	<1%	<1%
River Otter	10	Hg	>99%	<1%
River Otter	0	Hg	10–15%	<1%
River Otter	2.01	Hg	45–50%	<1%
River Otter	2.02	Hg	>99%	<1%
River Otter	13	Hg	5%	<1%
River Otter	3.01	Hg	>99%	85%
River Otter	3.02	Hg	>99%	15%
River Otter	3.03	Hg	>99%	<1%
River Otter	3.04	Hg	>99%	<1%
River Otter	4.01	Hg	>99%	<1%
River Otter	4.04	Hg	>99%	<1%
River Otter	18	Hg	>99%	<1%
River Otter	5	Hg	80%	<1%
River Otter	15	Hg	>99%	<1%
River Otter	10	Se	>99%	<1%
River Otter	0	Se	>99%	<1%
River Otter	1	Se	>99%	<1%
River Otter	2.01	Se	>99%	<1%
River Otter	2.02	Se	>99%	<1%
River Otter	3.01	Se	>99%	<1%
River Otter	3.02	Se	>99%	<1%

Table F4.18 (continued)

Endpoint	Subreach	Analyte	Within subreach exposure estimate	
			% > NOAEL	% > LOAEL
River Otter	3.04	Se	>99%	<1%
River Otter	4.01	Se	>99%	<1%
River Otter	4.04	Se	>99%	<1%
River Otter	18	Se	>99%	<1%
River Otter	5	Se	>99%	<1%
River Otter	15	Se	>99%	<1%
River Otter	0	PCB	90–95%	<1%
River Otter	2.01	PCB	80%	<1%
River Otter	2.02	PCB	99%	<1%
River Otter	2.04	PCB	>99%	80%
River Otter	13	PCB	>99%	<1%
River Otter	3.01	PCB	>99%	<1%
River Otter	3.02	PCB	>99%	<1%
River Otter	3.03	PCB	>99%	<1%
River Otter	3.04	PCB	>99%	<1%
River Otter	4.01	PCB	>99%	<1%
River Otter	4.04	PCB	>99%	<1%
River Otter	18	PCB	>99%	<1%
River Otter	5	PCB	>99%	<1%
River Otter	15	PCB	>99%	<1%
River Otter	2.01	Cu	<1%	<1%

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.

Table F4.19. Summary of number of individuals of piscivore endpoint species estimated to be experiencing adverse effects within Clinch River/Poplar Creek subreaches

Subreach	Endpoint	Analyte	%>LOAEL[a]	Number in subreach	Number adversely affected	Percent adversely affected
2.02	Great Blue Heron	Hg	<1	24	0	0
3.01	Great Blue Heron	Hg	99	7	7	100
3.02	Great Blue Heron	Hg	95	13	13	100
3.03	Great Blue Heron	Hg	10	22	0	0
3.04	Great Blue Heron	Hg	5	10	0	0
4.01	Great Blue Heron	Hg	5	44	0	0
4.04	Great Blue Heron	Hg	1	17	0	0
Total	Great Blue Heron	Hg		360	20	6
2.04	Great Blue Heron	PCB	1	53	0	0
3.02	Great Blue Heron	PCB	1	13	0	0
2.01	Great Blue Heron	Cu	1	18	0	0
2.01	Mink	Se	1	5	0	0
2.02	Mink	Se	1	6	0	0
3.01	Mink	Se	1	2	0	0
3.02	Mink	Se	1	3	0	0
3.04	Mink	Se	1	3	0	0
4.01	Mink	Se	1	12	0	0
3.01	Mink	Hg	1	2	0	0
3.02	Mink	Hg	1	3	0	0
3.03	Mink	Hg	1	6	0	0

Table F4.19 (continued)

Subreach	Endpoint	Analyte	%>LOAEL[a]	Number in subreach	Number adversely affected	Percent adversely affected
3.04	Mink	Hg	1	3	0	0
4.01	Mink	Hg	1	12	0	0
2.04	Mink	PCB	5	14	0	0
2.01	Otter	As	1	3	0	0
2.02	Otter	As	1	4	0	0
3.02	Otter	As	1	2	0	0
3.04	Otter	As	1	2	0	0
4.01	Otter	As	1	7	0	0
4.04	Otter	As	1	7	0	0
2.01	Otter	Hg	1	3	0	0
2.02	Otter	Hg	1	4	0	0
3.01	Otter	Hg	85	1	1	100
3.02	Otter	Hg	15	2	0	0
3.03	Otter	Hg	1	4	0	0
3.04	Otter	Hg	1	2	0	0
4.01	Otter	Hg	1	7	0	0
4.04	Otter	Hg	1	3	0	0
2.01	Otter	Se	1	3	0	0
2.02	Otter	Se	1	4	0	0
3.01	Otter	Se	1	1	0	0
3.02	Otter	Se	1	2	0	0
3.04	Otter	Se	1	2	0	0
4.01	Otter	Se	1	7	0	0
4.04	Otter	Se	1	3	0	0
2.01	Otter	PCB	1	3	0	0
2.02	Otter	PCB	1	4	0	0
2.04	Otter	PCB	80	9	9	100
3.01	Otter	PCB	1	1	0	0

Table F4.19 (continued)

Subreach	Endpoint	Analyte	%>LOAEL[a]	Number in subreach	Number adversely affected	Percent adversely affected
3.02	Otter	PCB	1	2	0	0
3.03	Otter	PCB	1	4	0	0
3.04	Otter	PCB	1	2	0	0
4.01	Otter	PCB	1	7	0	0
4.04	Otter	PCB	1	3	0	0
2.01	Otter	Cu	1	3	0	0

[a] LOAEL = Lowest observed adverse effect level.

Table F4.20. Simulation of exposure of mink to mercury and PCBs in toxicity test diets

Diet	Analyte	Concentration in diet				Distribution used in simulation	Modeled exposure (mg/kg/d)			% > NOAEL[b]	% > LOAEL[b]
		Mean	STD[a]	Min	Max		Mean	STD	80th Percentile		
A	Mercury	0.02	0	0.02	0.03	Triangular	0.0034	0.0009	0.0042	<1%	0%
B	Mercury	0.05	0	0.04	0.06	Triangular	0.0074	0.0019	0.0088	1–5%	<0.01%
C	Mercury	0.09	0	0.08	0.11	Triangular	0.0138	0.0035	0.016	30%	<0.01%
D	Mercury	0.15	0.01			Normal	0.022	0.0059	0.026	90–95%	<0.01%
E	Mercury	0.22	0.01			Normal	0.033	0.008	0.038	>99%	<1%
A	Aroclor 1260	0.169	0.002			Normal	0.025	0.0063	0.029	<1%	<1%
B	Aroclor 1260	11.44	0.327			Normal	1.70	0.43	1.97	>99%	>99%
C	Aroclor 1260	4.697	0.174			Normal	0.698	0.18	0.82	>99%	40–45%
D	Aroclor 1260	10.41	0.25			Normal	1.54	0.39	1.79	>99%	>99%
E	Aroclor 1260	20.67	0.458			Normal	3.07	0.77	3.55	>99%	>99%

[a] STD = standard deviation.
[b] Aroclor 1260 evaluated by comparison to NOAEL and LOAEL for Aroclor 1254. NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.

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Appendix F5

INSECTIVOROUS WILDLIFE

Table F5.1. Life history parameters for rough-winged swallows (*Stelgidopteryx serripennis*)

Parameter	Value[a]	Comments	Reference
Body Weight	**0.0159 ± 0.00058 kg**		Dunning 1984
Food Consumption Rate	**0.012 kg/d**	0.0042 kg/d (dry; calculation according to Nagy 1987); adjusted to wet weight using 65% water content reported for terrestrial insects in EPA 1993a	Nagy 1987
Water Consumption Rate	**0.0037 L/d**	estimated using allometric equation [b] assuming 0.0159 kg bw	Calder and Braun 1983
Soil Consumption Rate	as an aerial insectivore, assumed to be negligible		
Diet Composition	Diptera (32.89%) Hymenoptera (30.9%), Hemiptera (14.9%), Coleoptera (14.83%), Lepidoptera (1.11%), Ephemeroptera (5.04%), Orthoptera (.12%) and vegetation (.21%)	percent occurence in 136 stomachs collected from 15 states, the District of Columbia, and Canada	Beal 1918
Home Range	≤ .5 mile from nesting site		Stoner and Stoner 1941
Habitat Requirements	during breeding season: abandoned burrows along river banks migration south in fall foraging habitat: primarily over water, forests and field,		Lunk 1962
Population Density	no data		

[a] Suggested values for use in exposure assessment are in bold.

[b] Allometric equation for estimation of water consumption for rough-winged swallows is:

$$WIR = 0.059(BW)^{0.67}$$

where: WIR= water ingestion rate (L water/individual/day).

Table F5.2. Life history parameters for little brown bats (*Myotis lucifugus*)[a]

Parameter	Value[b]	Comments	Reference
Body Weight	**0.0075** kg		Gould 1955
Food Consumption Rate	**0.0025** kg/d	pregnant ♂ (field)	Anthony and Kunz 1977
	0.0037 kg/d	lactating ♂ (field)	
	0.0018 kg/d	juvenile (field)	
Water Consumption Rate	**0.0012** L/d	estimated using allometric equation[c] assuming 0.0075 kg bw	
Soil Consumption Rate	as an aerial insectivore, assumed to be negligible		
Diet Composition	highly variable; mostly flying insects, taken opportunistically as available.		Fenton and Barclay 1980
	Chironomidae 39.5% Trichoptera 31.5% Lepidoptera 11.0% Misc. Insects 9.4% Coleoptera 5.5% Neuroptera 3.1%	percent volume in diet in Ontario, Nova Scotia, and New York	Belwood and Fenton 1976
Home Range	8.5 km from roost.	Gray bats (*Myotis gresescens & M. sodalis*).	LaVal et al. 1977
Habitat Requirements	day roosts: buildings, trees, occasionally in caves.		Fenton and Barclay 1980
	night roosts: similar to day roosts but more confined space		
	hibernation sites: caves, abandoned mines		
	foraging habitat: forest and edge	Missouri	LaVal et al. 1977
	Forest, field, and over streams and ponds	Ontario	Fenton and Bell 1979

Table F5.2 (continued)

Parameter	Value[b]	Comments	Reference
Population Density	no data, however populations may be limited by availability of roost sites not by food		Fenton and Barclay 1980
Behavior	nocturnal; bimodal activity pattern: ~2200–2400 and ~0330–0500		Anthony and Kunz 1977
	hibernation September–May (north) November–March (south)		Fenton and Barclay 1980
Other	long-lived; may live up to 30 yrs mean life expectancy: ♂ = 4.9 yrs ♀ = 2.9 yrs		Keen and Hitchcock, 1980

[a] The little brown bat is considered a surrogate species for the federally endangered gray bat. Since the gray bat is appoximately the same size as the little brown bat, the exposure parameters for the two species are similar.
[b] Suggested values for use in exposure assessment are in bold.
[c] Allometric equation for estimation of water consumption for bats is:

$$WIR = 0.099(BW)^{0.90}$$

where: WIR= water ingestion rate (L water/individual/day).

Table F5.3. Contaminant concentrations found in mayflies used for Monte Carlo simulations

Analyte	Subreach	Detects	Mininum (mg/kg)	Maximum (mg/kg)	PLE[a] Mean
Arsenic	3.03	3	0.0265	0.0490	0.0344
	4.04	3	0.0260	0.0453	0.0331
	18	3	0.0288	0.0440	0.0349
Lead	3.03	3	0.0697	0.2020	0.1206
	4.04	2	0.0398	0.1350	0.0717
	18	2	0.0400	0.0540	0.0499
Mercury	3.03	3	0.0251	0.0290	0.0276
	4.04	3	0.0188	0.0259	0.0231
	18	3	0.0189	0.0249	0.0212
Aroclor 1254	3.03	3	0.0850	0.1000	0.0940
	4.04	3	0.1200	0.1400	0.1300
	18	3	0.1300	0.1600	0.1400
Zinc	3.03	3	58.124	73.200	63.408
	4.04	3	66.700	89.200	77.800
	18	3	77.100	80.500	78.833

[a] PLE = Product limit estimate.

Table F5.4. Sediment to mayfly uptake factors for the Clinch River

Analyte	Subreach	Sediment PLE mean[a] (mg/kg)	Mayfly PLE mean (mg/kg)	Uptake factor	Mean	Standard error
Arsenic	3.03	19.646	0.034	0.002	0.003946	0.001389
	4.04	9.271	0.033	0.004		
	18	5.355	0.035	0.007		
Lead	3.03	22.23	0.121	0.005	0.00325	0.0011
	4.04	29.216	0.072	0.003		
	18	26.657	0.050	0.002		
Mercury	3.03	7.169	0.028	0.004		
	4.04	1.636	0.023	0.014		
	18	0.11	0.021	0.193	0.008985[b]	0.005135[b]
Aroclor 1254	3.03	0.142	0.094	0.682	0.354267	0.307705
	4.04	2.792	0.130	0.047		
	18		0.140			
Zinc	3.03	102.093	63.41	0.621	0.621574	0.013144
	4.04	120.7	77.8	0.645		
	18	131.592	78.83	0.599		

[a] PLE = Product limit estimate. Sediment data for subreach 3.03 is from PCM 1.1, 1.3, 1.4, 2.2, 2.5, and 2.7. Sediment data for subreach 18 is from TRM 570.8 only.

[b] Average mercury uptake factor was not calculated using the mayfly uptake factor from subreach 18 in the Tennessee River. The mercury concentrations in mayflies and sediment in subreach 18 showed obvious differences compared to ORR sites. This may be a result of mercury speciation found off-site.

Table F5.5. Average actual and estimated contaminant concentrations in Clinch River mayflies

Analyte	Actual mayfly concentration		Estimated mayfly concentration[a]	
	Mean	Standard error	Mean	Standard error
Arsenic	0.0341	0.000536	0.0451	0.0168
Mercury	0.0240	0.00190	0.0267	0.0193
Lead	0.0807	0.0209	0.0846	0.00662
PCBs	0.121	0.0140	0.346	0.322
Zinc	73.348	4.978	73.426	5.353

[a] Estimated mayfly contaminant concentrations were calculated with the sediment concentrations at the site and the mayfly uptake factor.

Table F5.6. Estimated arsenic exposure and hazard assessment for rough-winged swallows

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	6.875	0.000	0.027	0.008	0.000	0.008	0.000	0.000
0	4.727	0.050	0.019	0.005	0.012	0.017	0.001	0.000
1	25.856	0.001	0.102	0.029	0.000	0.029	0.001	0.001
7.01	97.114	0.005	0.383	0.110	0.001	0.111	0.006	0.002
7.02	15.376	0.001	0.061	0.017	0.000	0.018	0.001	0.000
8	7.900	0.000	0.031	0.009	0.000	0.009	0.000	0.000
2.01	1.800	0.000	0.007	0.002	0.000	0.002	0.000	0.000
22	3.859	0.000	0.015	0.004	0.000	0.004	0.000	0.000
2.02	3.091	0.001	0.012	0.003	0.000	0.004	0.000	0.000
2.03	2.038	0.000	0.008	0.002	0.000	0.002	0.000	0.000
2.04	7.832	0.001	0.031	0.009	0.000	0.009	0.000	0.000
13	4.035	0.004	0.016	0.005	0.001	0.005	0.000	0.000
3.01	10.742	0.000	0.042	0.012	0.000	0.012	0.001	0.000
3.02	8.665	0.001	0.034	0.010	0.000	0.010	0.001	0.000
3.03	6.012	0.001	0.056	0.016	0.000	0.016	0.001	0.000
3.04	42.485	0.001	0.168	0.048	0.000	0.048	0.002	0.001
4.01	4.502	0.001	0.018	0.005	0.000	0.005	0.000	0.000
4.02	7.548	0.001	0.030	0.009	0.000	0.009	0.000	0.000

Table F5.6 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	9.819	0.000	0.039	0.011	0.000	0.011	0.001	0.000
4.04	10.920	0.002	0.051	0.015	0.000	0.015	0.001	0.000
18	6.226	0.000	0.048	0.014	0.000	0.014	0.001	0.000
5	11.265	0.000	0.044	0.013	0.000	0.013	0.001	0.000

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.7. Estimated lead exposure and hazard assessment for rough-winged swallows

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	37.979	0.000	0.123	0.035	0.000	0.035	0.005	0.001
0	26.161	0.001	0.085	0.024	0.000	0.025	0.003	0.001
1	72.825	0.002	0.237	0.068	0.000	0.068	0.009	0.003
7.01	16.361	0.002	0.053	0.015	0.000	0.016	0.002	0.001
7.02	24.695	0.002	0.080	0.023	0.000	0.023	0.003	0.001
8	27.700	0.002	0.090	0.026	0.001	0.026	0.003	0.001
2.01	5.400	0.003	0.018	0.005	0.001	0.006	0.001	0.000
22	120.208	0.000	0.391	0.112	0.000	0.112	0.015	0.005
2.02	9.735	0.001	0.032	0.009	0.000	0.009	0.001	0.000
2.03	8.567	0.002	0.028	0.008	0.000	0.008	0.001	0.000
2.04	39.110	0.000	0.127	0.036	0.000	0.036	0.005	0.002
13	17.241	0.002	0.056	0.016	0.000	0.016	0.002	0.001
3.01	44.140	0.002	0.143	0.041	0.000	0.041	0.005	0.002
3.02	33.475	0.001	0.109	0.031	0.000	0.031	0.004	0.001
3.03	29.141	0.002	0.241	0.069	0.000	0.069	0.009	0.003
3.04	25.843	0.002	0.084	0.024	0.000	0.024	0.003	0.001
4.01	22.601	0.002	0.073	0.021	0.000	0.021	0.003	0.001
4.02	25.757	0.003	0.084	0.024	0.001	0.025	0.003	0.001

Table F5.7 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	46.629	0.000	0.152	0.043	0.000	0.043	0.006	0.002
4.04	35.445	0.001	0.178	0.051	0.000	0.051	0.007	0.002
18	29.114	0.000	0.057	0.016	0.000	0.016	0.002	0.001
5	48.009	0.000	0.156	0.045	0.000	0.045	0.006	0.002

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.8. Estimated mercury concentrations and hazard assessment for rough-winged swallows

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	0.070	0.000	0.001	0.000	0.000	0.000	0.007	0.001
0	0.063	0.000	0.001	0.000	0.000	0.000	0.007	0.001
1	0.427	0.000	0.004	0.001	0.000	0.001	0.044	0.004
7.01	0.160	0.000	0.001	0.000	0.000	0.000	0.017	0.002
7.02	0.109	0.000	0.001	0.000	0.000	0.000	0.011	0.001
8	0.764	0.000	0.007	0.002	0.000	0.002	0.079	0.008
2.01	0.237	0.000	0.002	0.001	0.000	0.001	0.024	0.002
22	114.073	0.000	1.025	0.293	0.000	0.293	11.737	1.174
2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
2.03	0.026	0.000	0.000	0.000	0.000	0.000	0.003	0.000
2.04	0.286	0.000	0.003	0.001	0.000	0.001	0.030	0.003
13	0.818	0.000	0.007	0.002	0.000	0.002	0.084	0.008
3.01	16.762	0.000	0.151	0.043	0.000	0.043	1.726	0.173
3.02	20.237	0.000	0.182	0.052	0.000	0.052	2.083	0.208
3.03	7.442	0.000	0.031	0.009	0.000	0.009	0.361	0.036
3.04	60.959	0.000	0.548	0.157	0.000	0.157	6.274	0.627
4.01	4.163	0.000	0.037	0.011	0.000	0.011	0.429	0.043

Table F5.8 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.02	1.963	0.000	0.018	0.005	0.000	0.005	0.202	0.020
4.03	2.991	0.000	0.027	0.008	0.000	0.008	0.308	0.031
4.04	1.832	0.000	0.029	0.008	0.000	0.008	0.337	0.034
18	0.132	0.000	0.027	0.008	0.000	0.008	0.306	0.031
5	1.141	0.000	0.010	0.003	0.000	0.003	0.117	0.012

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.9. Estimated PCB exposure and hazard assessment for rough-winged swallows

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	1.594	0.000	0.565	0.162	0.000	0.162	0.229	0.023
2.02	1.167	0.000	0.413	0.118	0.000	0.118	0.168	0.017
2.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	0.017	0.001	0.006	0.002	0.000	0.002	0.003	0.000
3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.02	0.621	0.000	0.220	0.063	0.000	0.063	0.089	0.009
3.03	0.230	0.000	0.107	0.031	0.000	0.031	0.044	0.004
3.04	0.154	0.000	0.055	0.016	0.000	0.016	0.022	0.002
4.01	0.263	0.000	0.093	0.027	0.000	0.027	0.038	0.004
4.02	0.036	0.000	0.013	0.004	0.000	0.004	0.005	0.001

Table F5.9 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	0.069	0.000	0.024	0.007	0.000	0.007	0.010	0.001
4.04	2.792	0.000	0.147	0.042	0.000	0.042	0.060	0.006
18	0.000	0.000	0.169	0.048	0.000	0.048	0.069	0.007
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.10. Estimated zinc exposure and hazard assessment for rough-winged swallows

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	98.765	0.000	61.392	17.574	0.000	17.574	0.249	0.028
0	81.296	0.015	50.534	14.466	0.004	14.470	0.205	0.023
1	232.565	0.018	144.562	41.383	0.004	41.387	0.586	0.067
7.01	97.479	0.023	60.593	17.346	0.005	17.351	0.246	0.028
7.02	91.189	0.014	56.683	16.226	0.003	16.230	0.230	0.026
8	91.700	0.000	57.001	16.317	0.000	16.317	0.231	0.026
2.01	29.900	0.020	18.586	5.320	0.005	5.325	0.075	0.009
22	112.840	0.026	70.141	20.079	0.006	20.085	0.284	0.032
2.02	40.247	0.016	25.018	7.162	0.004	7.165	0.101	0.012
2.03	52.778	0.019	32.807	9.391	0.005	9.396	0.133	0.015
2.04	70.760	0.017	43.984	12.591	0.004	12.595	0.178	0.020
13	88.195	0.013	54.822	15.694	0.003	15.697	0.222	0.025
3.01	192.043	0.017	119.374	34.172	0.004	34.176	0.484	0.055
3.02	156.543	0.012	97.307	27.856	0.003	27.858	0.394	0.045
3.03	125.700	0.014	77.720	22.248	0.003	22.252	0.315	0.036
3.04	101.683	0.019	63.206	18.094	0.004	18.098	0.256	0.029
4.01	54.066	0.042	33.607	9.621	0.010	9.630	0.136	0.016
4.02	68.528	0.008	42.597	12.194	0.002	12.196	0.173	0.020

Table F5.10 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	88.214	0.000	54.834	15.697	0.000	15.697	0.222	0.025
4.04	135.919	0.016	96.770	27.702	0.004	27.706	0.392	0.045
18	143.469	0.011	81.700	23.388	0.002	23.390	0.331	0.038
5	265.305	0.000	164.914	47.209	0.000	47.209	0.668	0.076

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.11. Estimated arsenic exposure and hazard assessment for little brown and gray bats

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	6.875	0.000	0.027	0.009	0.000	0.009	0.060	0.005
0	4.727	0.050	0.019	0.006	0.008	0.014	0.094	0.007
1	25.856	0.001	0.102	0.034	0.000	0.034	0.226	0.017
7.01	97.114	0.005	0.383	0.128	0.001	0.129	0.851	0.065
7.02	15.376	0.001	0.061	0.020	0.000	0.020	0.135	0.010
8	7.900	0.000	0.031	0.010	0.000	0.010	0.069	0.005
2.01	1.800	0.000	0.007	0.002	0.000	0.002	0.016	0.001
22	3.859	0.000	0.015	0.005	0.000	0.005	0.034	0.003
2.02	3.091	0.001	0.012	0.004	0.000	0.004	0.028	0.002
2.03	2.038	0.000	0.008	0.003	0.000	0.003	0.018	0.001
2.04	7.832	0.001	0.031	0.010	0.000	0.010	0.069	0.005
13	4.035	0.004	0.016	0.005	0.001	0.006	0.039	0.003
3.01	10.742	0.000	0.042	0.014	0.000	0.014	0.094	0.007
3.02	8.665	0.001	0.034	0.011	0.000	0.012	0.077	0.006
3.03	6.012	0.001	0.056	0.019	0.000	0.019	0.124	0.009
3.04	42.485	0.001	0.168	0.056	0.000	0.056	0.371	0.028
4.01	4.502	0.001	0.018	0.006	0.000	0.006	0.040	0.003
4.02	7.548	0.001	0.030	0.010	0.000	0.010	0.067	0.005

Table F5.11 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	9.819	0.000	0.039	0.013	0.000	0.013	0.086	0.006
4.04	10.920	0.002	0.051	0.017	0.000	0.017	0.114	0.009
18	6.226	0.000	0.048	0.016	0.000	0.016	0.107	0.008
5	11.265	0.000	0.044	0.015	0.000	0.015	0.098	0.007

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.12. Estimated lead exposure and hazard assessment for little brown bats and gray bats

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated eayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	37.979	0.000	0.123	0.041	0.000	0.041	0.001	0.000
0	26.161	0.001	0.085	0.028	0.000	0.029	0.001	0.000
1	72.825	0.002	0.237	0.079	0.000	0.079	0.003	0.000
7.01	16.361	0.002	0.053	0.018	0.000	0.018	0.001	0.000
7.02	24.695	0.002	0.080	0.027	0.000	0.027	0.001	0.000
8	27.700	0.002	0.090	0.030	0.000	0.030	0.001	0.000
2.01	5.400	0.003	0.018	0.006	0.001	0.006	0.000	0.000
22	120.208	0.000	0.391	0.130	0.000	0.130	0.005	0.000
2.02	9.735	0.001	0.032	0.011	0.000	0.011	0.000	0.000
2.03	8.567	0.002	0.028	0.009	0.000	0.010	0.000	0.000
2.04	39.110	0.000	0.127	0.042	0.000	0.042	0.001	0.000
13	17.241	0.002	0.056	0.019	0.000	0.019	0.001	0.000
3.01	44.140	0.002	0.143	0.048	0.000	0.048	0.002	0.000
3.02	33.475	0.001	0.109	0.036	0.000	0.036	0.001	0.000
3.03	29.141	0.002	0.241	0.080	0.000	0.081	0.003	0.000
3.04	25.843	0.002	0.084	0.028	0.000	0.028	0.001	0.000
4.01	22.601	0.002	0.073	0.024	0.000	0.025	0.001	0.000
4.02	25.757	0.003	0.084	0.028	0.000	0.028	0.001	0.000

Table F5.12 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated eayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	46.629	0.000	0.152	0.051	0.000	0.051	0.002	0.000
4.04	35.445	0.001	0.178	0.059	0.000	0.060	0.002	0.000
18	29.114	0.000	0.057	0.019	0.000	0.019	0.001	0.000
5	48.009	0.000	0.156	0.052	0.000	0.052	0.002	0.000

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.13. Estimated mercury concentrations and hazard assessment in little brown and gray bats

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	0.070	0.000	0.001	0.000	0.000	0.000	0.002	0.000
0	0.063	0.000	0.001	0.000	0.000	0.000	0.002	0.000
1	0.427	0.000	0.004	0.001	0.000	0.001	0.011	0.002
7.01	0.160	0.000	0.001	0.000	0.000	0.000	0.004	0.001
7.02	0.109	0.000	0.001	0.000	0.000	0.000	0.003	0.001
8	0.764	0.000	0.007	0.002	0.000	0.002	0.020	0.004
2.01	0.237	0.000	0.002	0.001	0.000	0.001	0.006	0.001
22	114.073	0.000	1.025	0.342	0.000	0.342	2.997	0.599
2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.03	0.026	0.000	0.000	0.000	0.000	0.000	0.001	0.000
2.04	0.286	0.000	0.003	0.001	0.000	0.001	0.008	0.002
13	0.818	0.000	0.007	0.002	0.000	0.002	0.022	0.004
3.01	16.762	0.000	0.151	0.050	0.000	0.050	0.441	0.088
3.02	20.237	0.000	0.182	0.061	0.000	0.061	0.532	0.106
3.03	7.442	0.000	0.031	0.010	0.000	0.010	0.092	0.018
3.04	60.959	0.000	0.548	0.183	0.000	0.183	1.602	0.320
4.01	4.163	0.000	0.037	0.012	0.000	0.012	0.109	0.022
4.02	1.963	0.000	0.018	0.006	0.000	0.006	0.052	0.010

Table F5.13 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	2.991	0.000	0.027	0.009	0.000	0.009	0.079	0.016
4.04	1.832	0.000	0.029	0.010	0.000	0.010	0.086	0.017
18	0.132	0.000	0.027	0.009	0.000	0.009	0.078	0.016
5	1.141	0.000	0.010	0.003	0.000	0.003	0.030	0.006

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.14. Estimated PCB exposure and hazard assessment for little brown and gray bats

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22	1.594	0.000	0.565	0.188	0.000	0.188	1.007	0.101
2.02	1.167	0.000	0.413	0.138	0.000	0.138	0.737	0.074
2.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	0.017	0.001	0.006	0.002	0.000	0.002	0.012	0.001
3.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.02	0.621	0.000	0.220	0.073	0.000	0.073	0.392	0.039
3.03	0.230	0.000	0.107	0.036	0.000	0.036	0.191	0.019
3.04	0.154	0.000	0.055	0.018	0.000	0.018	0.097	0.010
4.01	0.263	0.000	0.093	0.031	0.000	0.031	0.166	0.017
4.02	0.036	0.000	0.013	0.004	0.000	0.004	0.023	0.002

Table F5.14 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	0.069	0.000	0.024	0.008	0.000	0.008	0.044	0.004
4.04	2.792	0.000	0.147	0.049	0.000	0.049	0.262	0.026
18	0.000	0.000	0.169	0.056	0.000	0.056	0.302	0.030
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.15. Estimated zinc exposure and hazard assessment for little brown and gray bats

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
10	98.765	0.000	61.392	20.464	0.000	20.464	0.036	0.018
0	81.296	0.015	50.534	16.845	0.002	16.847	0.030	0.015
1	232.565	0.018	144.562	48.187	0.003	48.190	0.085	0.042
7.01	97.479	0.023	60.593	20.198	0.004	20.201	0.036	0.018
7.02	91.189	0.014	56.683	18.894	0.002	18.897	0.033	0.017
8	91.700	0.000	57.001	19.000	0.000	19.000	0.033	0.017
2.01	29.900	0.020	18.586	6.195	0.003	6.198	0.011	0.005
22	112.840	0.026	70.141	23.380	0.004	23.385	0.041	0.021
2.02	40.247	0.016	25.018	8.339	0.002	8.342	0.015	0.007
2.03	52.778	0.019	32.807	10.936	0.003	10.939	0.019	0.010
2.04	70.760	0.017	43.984	14.661	0.003	14.664	0.026	0.013
13	88.195	0.013	54.822	18.274	0.002	18.276	0.032	0.016
3.01	192.043	0.017	119.374	39.791	0.003	39.794	0.070	0.035
3.02	156.543	0.012	97.307	32.436	0.002	32.438	0.057	0.029
3.03	125.700	0.014	77.720	25.907	0.002	25.909	0.046	0.023
3.04	101.683	0.019	63.206	21.069	0.003	21.072	0.037	0.019
4.01	54.066	0.042	33.607	11.202	0.007	11.209	0.020	0.010
4.02	68.528	0.008	42.597	14.199	0.001	14.200	0.025	0.012

Table F5.15 (continued)

Subreach	Sediment (95% UCL)[a]	Water (95% UCL)[a]	Estimated mayfly (95% UCL)[a]	Food exposure (mg/kg/d)	Water exposure (mg/kg/d)	Total exposure (mg/kg/d)	NOAEL HQ[b]	LOAEL HQ[b]
4.03	88.214	0.000	54.834	18.278	0.000	18.278	0.032	0.016
4.04	135.919	0.016	96.770	32.257	0.003	32.259	0.057	0.028
18	143.469	0.011	81.700	27.233	0.002	27.235	0.048	0.024
5	265.305	0.000	164.914	54.971	0.000	54.971	0.097	0.048

[a] UCL = Upper confidence limit.
[b] NOAEL HQ = No observed adverse effect level hazard quotient; LOAEL HQ = Lowest observed adverse effect level hazard quotient.

Table F5.16. Subreach-contaminant exposure combinations where Monte Carlo simulations were performed

Subreach	Subreach name	Endpoint	
		Rough-winged Swallow	Little Brown or Gray Bats[a]
3.01	Poplar Creek: East Fork Poplar Creek	Hg	Hg
3.02[b]	Poplar Creek: Mitchell Branch	Hg	Hg
3.03[b]	Poplar Creek:	Hg	Hg
3.04	Poplar Creek Mouth	Hg	Hg

[a] The Monte Carlo simulation was performed to determine exposure for little brown/gray bats foraging at multiple subreaches to modify for home range.
[b] Monte Carlo simulation was performed on data from subreaches 3.02 and 3.03 even though hazard quoteints were less than 1. The results were obtained to observe differences in exposure distributions as swallows and bats foraged progressively downstream.

Table F5.17. Measured mercury concentrations in sediment and estimated concentrations in mayflies from Poplar Creek used in the Monte Carlo simulation

Subreach	Lognormal sediment concentration (mg/kg)		Estimated mayfly concentration (mg/kg)	
	Mean	Standard deviation	Mean	Standard error
3.01	-0.9797	2.5071	0.9749	0.2243
3.02	1.9344	0.4206	0.1414	0.0055
3.03	1.5822	0.1844	0.0271[a]	0[a]
3.04	2.2773	0.5394	0.2938	0.0139

[a] Actual mercury concentration found in mayflies at subreach 3.03.

Table F5.18. Contaminant concentrations in surface water used in the Monte Carlo simulations

Analyte	Subreach	Mean	Standard error
Mercury	3.01	0.00016	0.000016
	3.02	0.00015	0.000016
	3.03	0.00014	0.000015
	3.04	0.00022	0.000041

Table F5.19. Estimated NOAELs[a] and LOAELs[a] for rough-winged swallows

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)	Estimated LOAEL (mg/kg/d)
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation		
Arsenic	arsenite	mallard duck	5.14 128d	12.84 128d	mortality	USFWS 1964	20.141	50.36
Lead	metal	American kestrel	3.85 7 mo		reproduction	Pattee 1984	7.7	
Lead	acetate	Japanese quail		11.26 12 wk	reproduction	Edens et al. 1976		23.61
Mercury	methyl	mallard duck	0.0064[b] 3 gen.	0.064 3 gen.	reproduction	Heinz 1979	0.025	0.25
Zinc	zinc sulfate	chicken	14.5 44 wk	130.9 44 wk	reproduction	Stahl et al. 1990	70.66	619.42
PCBs	Aroclor 1254	Ring-necked Pheasant	0.18[b] 17 wk	0.18 17 wk	reproduction	Dahlgren et al. 1972	0.706	7.06

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor applied.

Table F5.20. Estimated NOAELs[a] and LOAELs[a] for little brown bats and gray bats

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)	Estimated LOAEL (mg/kg/d)
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation		
Arsenic	As+3	mouse	0.126[b] 3 gen.	1.26 3 gen.	reproduction	Schroeder and Mitchner 1971	0.199	1.99
Lead	acetate	rat	8 3 gen	80 3 gen	reproduction	Azar et al. 1973	28.43	284.35
Mercury	methyl	rat	0.032 3 gen.	0.16 3 gen.	reproduction	Verschuuren et al. 1976	0.114	0.57
Zinc	oxide	rat	160 gestation	320 gestation	reproduction	Schlicker and Cox 1968	568	904
PCBs	Aroclor 1254	white-footed mouse	0.135[b] 18 mo.	1.35 18 mo.	reproduction	Linzey 1987	0.187	1.87

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor applied.

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Appendix F6

DREDGE SPOIL ECOLOGICAL RISKS

Table F6.1. Life history parameters for the eastern cottontail (*Sylvilagus floridanus*)

Parameter	Value[a]	Comments	Reference
Body Weight	1.134 kg (♂) 1.244 kg (♀) **1.2** kg (mean♂+♀)		Chapman et al. 1980
Food Consumption Rate	**0.237** kg/d		Dalke and Sime 1941
Water Consumption Rate	**0.116** L/d	estimated using Equation 12; assuming 1.2 kg bw	
Soil Consumption Rate	**0.015** kg/d	assumed comparable to that for black-tailed jackrabbit (6.3% of diet) assuming diet of 0.237 kg/d and a 6.3% soil consumption rate	Arthur and Gates 1988
Diet Composition	exclusively herbivorous bark, twigs, buds, dried herbs (fall, winter) herbaceous plants (spring, summer)		Dalke and Sime 1941
Home Range	3.2 ha (♂); 2.1 ha (♀) 7.2 ha (♂); 2.8 ha (♀) 7.8 ha (♂); 2.4 ha (♀) 3.1 ha (♂); 1.5 ha (♀)	winter - Pennsylvania spring summer fall	Althoff and Storm 1989
Habitat Requirements	wide variety of habitats used; old fields preferred		Chapman et al. 1980
Population Density	0.41–2.10 /ha (mean = 1.1/ ha)	Michigan	Eberhardt et al. 1963
Behavior	activity is greatest at dusk and dawn (crepuscular) active year round - does not hibernate		Chapman et al. 1980 EPA 1993a

[a] Suggested values for use in exposure assessment are in bold.

Table F6.2. Chemical concentrations found in deep water sediment (future spoil material) within each subreach

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
1	4,4'-DDD	1	0.256	0.129	1.07	0.127	0.385	0.127
1	4,4'-DDT	1	0.259	0.125	1.052	0.134	0.385	0.134
1	Arsenic	2	8.02	3.014	27.05	5.006	11.034	8.02
1	Benzo(a)anthracene	1	0.653	0.137	1.515	0.516	0.789	0.789
1	Benzo(k)fluoranthene	1	0.653	0.137	1.521	0.516	0.791	0.791
1	Beryllium	2	0.701	0.107	1.377	0.594	0.808	0.701
1	Cadmium	2	0.572	0.155	1.549	0.417	0.727	0.572
1	Chromium	2	14.735	4.869	45.478	9.866	19.604	14.735
1	Chrysene	1	0.655	0.14	1.536	0.516	0.795	0.795
1	Copper	2	27.728	1.359	36.307	26.369	29.087	27.728
1	Fluoranthene	1	0.669	0.153	1.632	0.516	0.821	0.821
1	Lead	2	34.674	4.558	63.455	30.116	39.233	34.674
1	Mercury	2	0.092	0.032	0.295	0.059	0.124	0.092
1	Nickel	2	18.447	4.877	49.209	13.575	23.319	18.447
1	Pyrene	1	0.665	0.149	1.608	0.516	0.815	0.815
1	Selenium	2	0.557	0.138	1.426	0.42	0.695	0.557
1	Silver	2	0.267	0.062	0.661	0.205	0.329	0.267
1	Zinc	2	95.855	26.277	261.763	69.577	122.132	95.855
7	2-Methylnaphthalene	2	0.11	0.041	0.37	0.07	0.15	0.11

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
7	4-Nitrophenol	1	0.694	0.125	1.485	0.569	0.82	0.569
7	Aluminum	2	15469.95	938.86	21397.67	14531.1	16408.81	15469.95
7	Antimony	4	0.37	0.055	0.47	0.2	0.68	0.27
7	Arsenic	10	16.67	5.374	26.52	4.25	63.84	16.67
7	Barium	2	142.99	15.922	243.52	127.06	158.91	142.99
7	Benzo(a)anthracene	2	0.21	0.02	0.31	0.19	0.22	0.21
7	Benzo(a)pyrene	2	0.54	0.08	1.07	0.46	0.63	0.54
7	Benzo(b)fluoranthene	2	0.05	0	0.07	0.04	0.05	0.05
7	Benzo(ghi)perylene	2	0.04	0	0.06	0.04	0.05	0.04
7	Beryllium	10	1.09	0.061	1.21	0.75	1.52	1.09
7	Boron	2	5.27	0.492	8.38	4.78	5.76	5.27
7	Cadmium	5	0.46	0.057	0.57	0.26	0.82	0.4
7	Calcium	2	5507.36	956.747	11548.03	4550.62	6464.11	5507.36
7	Chromium	10	29.73	3.935	36.94	19.15	58.61	29.73
7	Chrysene	2	0.03	0	0.05	0.03	0.04	0.03
7	Cobalt	2	13.36	0.113	14.07	13.24	13.47	13.36
7	Copper	10	23.66	2.404	28.06	14.82	37.25	23.66
7	Fluoranthene	1	0.26	0.09	0.83	0.17	0.35	0.17
7	Indeno(1,2,3-cd)pyrene	2	0.04	0	0.05	0.04	0.04	0.04
7	Iron	2	26615.44	2320.46	41266.26	24294.98	28935.9	26615.44

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
7	Lead	10	20.9	1.87	24.32	13.58	30.09	20.9
7	Magnesium	2	2485.09	186.65	3663.54	2298.44	2671.74	2485.09
7	Manganese	2	1295.65	282.74	3080.82	1012.9	1578.39	1295.65
7	Mercury	2	0.13	0.023	0.17	0.05	0.23	0.12
7	Nickel	10	26.14	1.959	29.73	17.71	41.02	26.14
7	Phenanthrene	2	0.04	0.014	0.13	0.03	0.05	0.04
7	Potassium	2	1720.37	296.896	3594.9	1423.48	2017.27	1720.37
7	Pyrene	2	0.06	0.01	0.13	0.05	0.07	0.06
7	Selenium	8	2.03	0.885	3.66	0.27	9.5	2.04
7	Silver	7	0.09	0.025	0.14	0.02	0.26	0.1
7	Sodium	2	50.82	3.464	72.69	47.35	54.28	50.82
7	Thallium	1	0.4	0.03	0.45	0.25	0.57	0.57
7	Uranium	2	0.76	0.022	0.89	0.73	0.78	0.76
7	Vanadium	2	36.75	5.903	74.02	30.84	42.65	36.75
7	Zinc	10	76.86	6.224	88.27	46.29	103.68	76.86
2.04	2-Methylnaphthalene	4	0.15	0.1	0.38	0.03	0.44	0.15
2.04	4-Nitrophenol	1	0.991	0.497	2.161	0.193	2.444	0.193
2.04	Aluminum	3	9225.09	862.83	11744.55	7583	10505.59	9225.09
2.04	Arsenic	4	6.42	1.41	9.74	4.17	10.21	6.42

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
2.04	Barium	3	101.8	19.56	158.91	65.21	132.06	101.8
2.04	Benzo(a)anthracene	1	0.27	0.08	0.47	0.1	0.5	0.1
2.04	Benzo(a)pyrene	3	0.36	0.07	0.53	0.17	0.5	0.31
2.04	Benzo(b)fluoranthene	3	0.187	0.108	0.441	0.019	0.503	0.082
2.04	Benzo(ghi)perylene	3	0.199	0.104	0.444	0.062	0.503	0.097
2.04	Benzo(k)fluoranthene	1	0.257	0.097	0.485	0.031	0.503	0.031
2.04	Beryllium	4	0.66	0.08	0.85	0.44	0.78	0.66
2.04	Bis(2-ethylhexyl)phthalate	3	0.227	0.128	0.527	0.045	0.589	0.183
2.04	Boron	3	3.42	0.23	4.08	3.16	3.87	3.42
2.04	Cadmium	4	0.34	0.06	0.48	0.2	0.48	0.34
2.04	Calcium	3	6516.11	1376.29	10534.86	4470	9133.72	6516.11
2.04	Chromium	4	14.19	1.09	16.77	11.01	16.02	14.19
2.04	Chrysene	3	0.21	0.1	0.445	0.066	0.503	0.112
2.04	Cobalt	3	15.32	3.29	24.92	9.32	20.65	15.32
2.04	Copper	4	10.12	0.83	12.07	8.45	12.32	10.12
2.04	Di-n-butylphthalate	2	0.33	0.05	0.45	0.22	0.44	0.4
2.04	Dibenzofuran	1	0.257	0.097	0.485	0.03	0.503	0.03
2.04	Diethylphthalate	1	0.26	0.1	0.49	0.03	0.5	0.03
2.04	Fluoranthene	4	0.187	0.051	0.306	0.095	0.331	0.187
2.04	Fluorene	1	0.28	0.08	0.47	0.11	0.5	0.11

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
2.04	Indeno(1,2,3-cd)pyrene	3	0.198	0.104	0.444	0.055	0.503	0.097
2.04	Iron	3	16701.42	2463.58	23895.04	11927.27	20143.64	16701.42
2.04	Kjeldahl nitrogen	3	888.14	290.11	1735.25	314.43	1250	888.14
2.04	Magnesium	3	2933.04	608.91	4711.06	2250	4147.73	2933.04
2.04	Manganese	3	2716.64	1067.54	5833.85	795.7	4484.22	2716.64
2.04	Mercury	4	0.12	0.04	0.23	0.07	0.25	0.12
2.04	Naphthalene	4	0.14	0.11	0.4	0.02	0.47	0.14
2.04	Nickel	4	13.72	0.94	15.93	11.31	15.39	13.72
2.04	Pentachlorophenol	1	1.1	0.69	3.11	0.17	2.44	0.17
2.04	Phenanthrene	4	0.14	0.07	0.3	0.02	0.33	0.14
2.04	Potassium	3	952.54	3.78	963.58	947.64	959.97	952.54
2.04	Pyrene	2	0.234	0.069	0.397	0.035	0.356	0.115
2.04	Selenium	1	1.06	0.69	3.07	0.33	2.44	0.33
2.04	Silver	4	0.24	0.11	0.49	0.07	0.55	0.24
2.04	Sodium	3	32.99	2.52	40.34	28	36.08	32.99
2.04	Total combustible organics (TCO)	3	349377.8	39039.13	463371.5	293000	424346.	2349377.8
2.04	Total organic carbon (TOC)	3	9550	2784.76	17681.75	4050	13058.56	9550.29
2.04	Uranium	3	0.6	0.19	1.14	0.35	0.96	0.6
2.04	Vanadium	3	16.32	2.27	22.96	12.2	20.04	16.32
2.04	Zinc	4	60.84	3.34	68.7	52.6	67.55	60.84

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.01	Aluminum	1	6954.67	.	.	6954.67	6954.67	6954.67
3.01	Arsenic	1	1.31	.	.	1.31	1.31	1.31
3.01	Barium	1	59.54	.	.	59.54	59.54	59.54
3.01	Benzo(b)fluoranthene	1	0.162	.	.	0.162	0.162	0.162
3.01	Beryllium	1	0.53	.	.	0.53	0.53	0.53
3.01	Bis(2-ethylhexyl)phthalate	1	0.025	.	.	0.025	0.025	0.025
3.01	Cadmium	1	0.09	.	.	0.09	0.09	0.09
3.01	Calcium	1	496.15	.	.	496.15	496.15	496.15
3.01	Chromium	1	10.26	.	.	10.26	10.26	10.26
3.01	Chrysene	1	0.158	.	.	0.158	0.158	0.158
3.01	Cobalt	1	9.74	.	.	9.74	9.74	9.74
3.01	Copper	1	5.4	.	.	5.4	5.4	5.4
3.01	Di-n-butylphthalate	1	0.02	.	.	0.02	0.02	0.02
3.01	Diethylphthalate	1	0.08	.	.	0.08	0.08	0.08
3.01	Fluoranthene	1	0.161	.	.	0.161	0.161	0.016
3.01	Heptachlor	1	0	.	.	0	0	0
3.01	Iron	1	10908.23	.	.	10908.23	10908.23	10908.23
3.01	Kjeldahl nitrogen	1	76.84	.	.	76.84	76.84	76.84
3.01	Lead	1	8.48	.	.	8.48	8.48	8.48
3.01	Magnesium	1	950.43	.	.	950.43	950.43	950.43

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.01	Manganese	1	319.04	.	.	319.04	319.04	319.04
3.01	Mercury	1	0.04	.	.	0.04	0.04	0.04
3.01	Nickel	1	10.34	.	.	10.34	10.34	10.34
3.01	Pentachlorophenol	1	0.15	.	.	0.15	0.15	0.15
3.01	Phenanthrene	1	0.16	.	.	0.16	0.16	0.16
3.01	Potassium	1	606.14	.	.	606.14	606.14	606.14
3.01	Pyrene	1	0.026	.	.	0.026	0.026	0.026
3.01	Silver	1	0.03	.	.	0.03	0.03	0.03
3.01	Sodium	1	22.62	.	.	22.62	22.62	22.62
3.01	Total combustible organics (TCO)	1	33449.94	.	.	33449.94	33449.9	433449.94
3.01	Total organic carbon (TOC)	1	6287.04	.	.	6287.04	6287.04	6287.04
3.01	Uranium	1	0.61	.	.	0.61	0.61	0.61
3.01	Vanadium	1	10.55	.	.	10.55	10.55	10.55
3.01	Zinc	1	28.21	.	.	28.21	28.21	28.21
3.02	2-Methylnaphthalene	3	0.2	0.08	0.38	0.06	0.41	0.13
3.02	3-Nitroaniline	3	652.94	234.97	1339.05	369.06	1119.21	652.94
3.02	Acenaphthene	2	0.25	0.05	0.38	0.17	0.41	0.19
3.02	Acenaphthylene	1	0.251	0.061	0.395	0.119	0.414	0.119
3.02	Aluminum	3	12227.09	2036.55	18173.79	9444.22	16194.25	12227.09

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Anthracene	2	0.258	0.053	0.382	0.183	0.414	0.196
3.02	Antimony	1	0.46	0.08	0.7	0.3	0.59	0.3
3.02	Arsenic	5	3.36	0.79	5.05	1.45	6.26	3.36
3.02	Barium	3	107.76	3	116.51	101.85	111.61	107.76
3.02	Benzo(a)anthracene	2	0.413	0.193	0.867	0.062	0.95	0.284
3.02	Benzo(a)pyrene	3	0.35	0.088	0.556	0.194	0.568	0.299
3.02	Benzo(b)fluoranthene	3	0.397	0.208	0.887	0.056	0.978	0.318
3.02	Benzo(ghi)perylene	1	0.284	0.044	0.387	0.224	0.414	0.25
3.02	Benzo(k)fluoranthene	3	0.311	0.053	0.436	0.213	0.408	0.308
3.02	Beryllium	5	0.55	0.1	0.77	0.3	0.81	0.55
3.02	Bis(2-ethylhexyl)phthalate	3	0.265	0.076	0.443	0.125	0.401	0.22
3.02	Boron	3	5.04	2.17	11.36	2.57	9.36	5.04
3.02	Butylbenzylphthalate	1	0.23	0.08	0.41	0.03	0.41	0.03
3.02	Cadmium	5	0.51	0.19	0.91	0.23	1.24	0.51
3.02	Calcium	3	2226.89	562.48	3869.32	1309.63	3249.54	2226.89
3.02	Carbazole	2	0.18	0.03	0.27	0.12	0.22	0.16
3.02	Chromium	5	17.79	3.07	24.32	9.28	28.16	17.79
3.02	Chrysene	2	0.35	0.143	0.686	0.047	0.715	0.214
3.02	Cobalt	3	17.23	1.87	22.69	13.83	20.28	17.23
3.02	Copper	5	18.28	5.21	29.39	9.26	37.95	18.28

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Dibenz(a,h)anthracene	1	0.237	0.072	0.406	0.064	0.414	0.064
3.02	Dibenzofuran	2	0.241	0.063	0.389	0.113	0.414	0.164
3.02	Fluoranthene	3	0.527	0.292	1.214	0.084	1.378	0.492
3.02	Fluorene	2	0.26	0.05	0.38	0.2	0.41	0.2
3.02	Indeno(1,2,3-cd)pyrene	2	0.294	0.047	0.404	0.214	0.414	0.25
3.02	Iron	3	19420.86	911.48	22082.35	17598.69	20378.28	19420.86
3.02	Magnesium	3	1761.5	280.02	2579.14	1209.94	2121.32	1761.5
3.02	Manganese	3	855.85	144.22	1276.96	575.99	1056.22	855.85
3.02	Mercury	5	1.68	1.12	4.07	0.03	6.1	1.68
3.02	Naphthalene	2	0.21	0.08	0.39	0.04	0.41	0.1
3.02	Nickel	5	29.58	10.7	52.39	7.78	70.58	29.58
3.02	PCB-1248	1	0.154	0.091	0.368	0.009	0.388	0.208
3.02	PCB-1254	3	0.32	0.181	0.745	0.01	0.73	0.32
3.02	PCB-1260	1	0.27	0.183	0.704	0.01	0.79	0.28
3.02	Phenanthrene	3	0.52	0.3	1.23	0.04	1.4	0.47
3.02	Phenol	1	0.28	0.467	0.385	0.22	0.41	0.22
3.02	Potassium	3	1262.24	229.87	1933.45	921.29	1699.79	1262.24
3.02	Pyrene	3	0.501	0.272	1.141	0.076	1.29	0.464
3.02	Selenium	2	0.73	0.28	1.39	0.25	1.4	0.28
3.02	Silver	5	0.3	0.22	0.76	0.02	1.17	0.3

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Sodium	3	49.96	0.14	50.36	49.69	50.15	49.96
3.02	Uranium	3	6.96	4.8	20.99	1.17	16.49	6.96
3.02	Vanadium	3	18.63	1.94	24.29	15.41	22.12	18.63
3.02	Zinc	5	76.88	18.74	116.83	49.74	149.85	76.88
3.03	Acenaphthene	1	0.03	.	.	0.03	0.03	0.03
3.03	Acenaphthylene	1	0.121	.	.	0.121	0.121	0.121
3.03	Aluminum	1	14985.24	.	.	14985.24	14985.24	14985.24
3.03	Anthracene	1	0.042	.	.	0.042	0.042	0.042
3.03	Arsenic	1	5.28	.	.	5.28	5.28	5.28
3.03	Barium	1	120.6	.	.	120.6	120.6	120.6
3.03	Benzo(a)anthracene	1	0.231	.	.	0.231	0.231	0.231
3.03	Benzo(a)pyrene	1	0.159	.	.	0.159	0.159	0.159
3.03	Benzo(b)fluoranthene	1	0.285	.	.	0.285	0.285	0.285
3.03	Benzo(ghi)perylene	1	0.175	.	.	0.175	0.175	0.175
3.03	Benzo(k)fluoranthene	1	0.067	.	.	0.067	0.067	0.067
3.03	Beryllium	1	0.92	.	.	0.92	0.92	0.92
3.03	Boron	1	12	.	.	12	12	12
3.03	Cadmium	1	3.31	.	.	3.31	3.31	3.31
3.03	Calcium	1	2594.28	.	.	2594.28	2594.28	2594.28

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.03	Carbazole	1	0.05	.	.	0.05	0.05	0.05
3.03	Chromium	1	44.36	.	.	44.36	44.36	44.36
3.03	Chrysene	1	0.238	.	.	0.238	0.238	0.238
3.03	Cobalt	1	20.12	.	.	20.12	20.12	20.12
3.03	Copper	1	36.3	.	.	36.3	36.3	36.3
3.03	Dibenz(a,h)anthracene	1	0.036	.	.	0.036	0.036	0.036
3.03	Dibenzofuran	1	0.105	.	.	0.105	0.105	0.105
3.03	Fluoranthene	1	0.479	.	.	0.479	0.479	0.479
3.03	Fluorene	1	0.05	.	.	0.05	0.05	0.05
3.03	Indeno(1,2,3-cd)pyrene	1	0.162	.	.	0.162	0.162	0.162
3.03	Iron	1	24873.89	.	.	24873.89	24873.89	24873.89
3.03	Kjeldahl nitrogen	1	608.8	.	.	608.8	608.8	608.8
3.03	Lead	1	37.73	.	.	37.73	37.73	37.73
3.03	Magnesium	1	2238.63	.	.	2238.63	2238.63	2238.63
3.03	Manganese	1	692.45	.	.	692.45	692.45	692.45
3.03	Mercury	1	6.67	.	.	6.67	6.67	6.67
3.03	Naphthalene	1	0.21	.	.	0.21	0.21	0.21
3.03	Nickel	1	62.44	.	.	62.44	62.44	62.44
3.03	Phenanthrene	1	0.38	.	.	0.38	0.38	0.38
3.03	Phenol	1	0.21	.	.	0.21	0.21	0.21

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.03	Potassium	1	1719.32	.	.	1719.32	1719.32	1719.32
3.03	Pyrene	1	0.296	.	.	0.296	0.296	0.296
3.03	Silver	1	3.32	.	.	3.32	3.32	3.32
3.03	Sodium	1	74.33	.	.	74.33	74.33	74.33
3.03	Total combustible organics (TCO)	1	89231.29	.	.	89231.29	89231.2	989231.29
3.03	Total organic carbon (TOC)	1	16964.8	.	.	16964.8	16964.8	16964.8
3.03	Uranium	1	8.7	.	.	8.7	8.7	8.7
3.03	Vanadium	1	21.52	.	.	21.52	21.52	21.52
3.03	Zinc	1	160.94	.	.	160.94	160.94	160.94
3.04	1,4-Dichlorobenzene	1	0.25	0.016	0.298	0.23	0.28	0.23
3.04	2-Methylnaphthalene	3	0.12	0.07	0.32	0.04	0.26	0.12
3.04	4-Chloro-3-methylphenol	1	0.241	0.027	0.319	0.19	0.281	0.19
3.04	4-Methylphenol	1	0.26	0.011	0.294	0.25	0.28	0.28
3.04	Acenaphthene	3	0.17	0.01	0.2	0.15	0.19	0.17
3.04	Acenaphthylene	2	0.211	0.036	0.315	0.165	0.281	0.176
3.04	Aluminum	3	16118.21	2700.13	24002.55	11183.31	20484.92	16118.21
3.04	Anthracene	1	0.216	0.034	0.315	0.149	0.253	0.149
3.04	Arsenic	3	40.96	26.96	119.69	5.32	93.83	40.96
3.04	Barium	3	195.4	53.77	352.41	104.12	290.28	195.4

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Benzo(a)anthracene	3	0.123	0.023	0.19	0.09	0.167	0.123
3.04	Benzo(a)pyrene	3	0.13	0.045	0.263	0.084	0.221	0.13
3.04	Benzo(b)fluoranthene	3	0.169	0.035	0.272	0.115	0.235	0.169
3.04	Benzo(ghi)perylene	2	0.17	0.044	0.298	0.096	0.247	0.132
3.04	Benzo(k)fluoranthene	1	0.179	0.071	0.386	0.037	0.253	0.037
3.04	Beryllium	3	1.23	0.27	2.02	0.75	1.69	1.23
3.04	Bis(2-ethylhexyl)phthalate	2	0.45	0.258	1.203	0.1	0.95	0.39
3.04	Boron	3	24.25	9.8	52.85	14.2	43.84	24.25
3.04	Butylbenzylphthalate	2	0.22	0.02	0.29	0.17	0.25	0.2
3.04	Cadmium	3	2.39	1.6	7.07	0.79	5.6	2.39
3.04	Calcium	3	4196	1204.27	7712.45	2196	6358.23	4196
3.04	Carbazole	1	0.19	0.06	0.37	0.06	0.25	0.06
3.04	Chromium	3	33.71	4.98	48.26	23.76	39.19	33.71
3.04	Chrysene	3	0.121	0.015	0.163	0.093	0.143	0.121
3.04	Cobalt	3	16.71	0.97	19.55	14.87	18.18	16.71
3.04	Copper	3	52.36	14.02	93.31	24.37	68.03	52.36
3.04	Dibenz(a,h)anthracene	1	0.173	0.077	0.397	0.02	0.253	0.02
3.04	Dibenzofuran	2	0.182	0.057	0.347	0.069	0.247	0.149
3.04	Diethylphthalate	2	0.21	0.06	0.37	0.1	0.28	0.17
3.04	Fluoranthene	3	0.165	0.041	0.284	0.09	0.231	0.165

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Fluorene	2	0.17	0.07	0.37	0.03	0.25	0.13
3.04	Indeno(1,2,3-cd)pyrene	2	0.163	0.049	0.307	0.076	0.247	0.12
3.04	Iron	3	27969.13	4470.86	41023.98	21234.41	36430.46	27969.13
3.04	Kjeldahl nitrogen	3	286.87	77.86	514.23	179.77	438.33	286.87
3.04	Lead	3	25.08	2.02	30.97	21.07	27.43	25.08
3.04	Magnesium	3	1914.53	94.58	2190.71	1732.66	2050.53	1914.53
3.04	Manganese	3	660.01	41.21	780.34	593.54	735.44	660.01
3.04	Mercury	3	12.45	6.66	31.9	4.54	25.69	12.45
3.04	Naphthalene	3	0.16	0.02	0.22	0.13	0.2	0.16
3.04	Nickel	3	44.05	4.94	58.48	34.37	50.61	44.05
3.04	PCB-1248	2	0.032	0.017	0.081	0.011	0.065	0.034
3.04	PCB-1254	3	0.08	0.052	0.23	0.01	0.18	0.08
3.04	PCB-1260	3	0.07	0.03	0.153	0.03	0.13	0.07
3.04	Phenanthrene	3	0.14	0.05	0.28	0.07	0.24	0.14
3.04	Phenol	1	0.19	0.061	0.366	0.07	0.25	0.07
3.04	Potassium	3	1809.08	348.47	2826.6	1218.89	2425.19	1809.08
3.04	Pyrene	3	0.163	0.032	0.258	0.104	0.215	0.163
3.04	Selenium	2	1.03	0.27	1.82	0.74	1.57	1.05
3.04	Silver	3	0.98	0.23	1.64	0.64	1.41	0.98
3.04	Sodium	3	181.92	66.71	376.72	74.69	304.29	181.92

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Thallium	2	0.41	0.16	0.87	0.21	0.72	0.38
3.04	Total combustible organics (TCO)	3	56402.65	9807.72	85041.04	41013.54	74630.74	56402.65
3.04	Total organic carbon (TOC)	1	13474.22	.	.	13474.22	13474.22	13474.22
3.04	Uranium	3	8.52	3.86	19.79	3.44	16.1	8.52
3.04	Vanadium	3	37.79	11.83	72.34	18.27	59.14	37.79
3.04	Zinc	3	103.49	6.66	122.95	92.56	115.56	103.49
4.01	2-Methylnaphthalene	2	0.25	0.13	0.62	0.08	0.5	0.13
4.01	Acenaphthene	1	0.28	0.11	0.61	0.12	0.5	0.12
4.01	Aluminum	2	9432.43	2521.42	25352.03	6911.01	11953.85	9432.43
4.01	Anthracene	1	0.282	0.112	0.609	0.124	0.499	0.124
4.01	Arsenic	3	5.38	2.34	12.21	2.27	9.96	5.38
4.01	Barium	2	70.33	8.7	125.28	61.63	79.04	70.33
4.01	Benzo(a)anthracene	1	0.271	0.12	0.621	0.092	0.499	0.092
4.01	Benzo(a)pyrene	1	0.263	0.1257	0.63048	0.0692	0.499	0.069
4.01	Benzo(b)fluoranthene	1	0.279	0.114	0.612	0.116	0.499	0.116
4.01	Benzo(ghi)perylene	1	0.261	0.128	0.634	0.062	0.499	0.062
4.01	Benzo(k)fluoranthene	1	0.294	0.103	0.595	0.172	0.499	0.172
4.01	Beryllium	3	0.64	0.08	0.88	0.5	0.77	0.64
4.01	Bis(2-ethylhexyl)phthalate	3	0.336	0.316	1.259	0.02	0.968	0.336

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.01	Boron	2	6.29	1.17	13.71	5.12	7.47	6.29
4.01	Cadmium	3	0.36	0.15	0.78	0.17	0.65	0.36
4.01	Calcium	2	2201.81	151.08	3155.72	2050.72	2352.89	2201.81
4.01	Carbazole	1	0.17	0.05	0.49	0.12	0.22	0.12
4.01	Chromium	3	16.89	0.9	19.5	15.23	18.31	16.89
4.01	Chrysene	2	0.251	0.127	0.621	0.082	0.499	0.126
4.01	Cobalt	2	7.83	0.8	12.88	7.02	8.63	7.83
4.01	Copper	3	11.6	4.91	25.94	6.24	21.41	11.6
4.01	Dibenz(a,h)anthracene	1	0.281	0.112	0.61	0.123	0.499	0.123
4.01	Dibenzofuran	1	0.259	0.129	0.636	0.055	0.499	0.055
4.01	Fluoranthene	3	0.28	0.105	0.586	0.174	0.489	0.28
4.01	Fluorene	1	0.29	0.11	0.6	0.15	0.5	0.15
4.01	Heptachlor	2	0.03	0.03	0.13	0	0.1	0
4.01	Iron	2	13266.98	1638.76	23613.69	11628.22	14905.74	13266.98
4.01	Kjeldahl nitrogen	2	341.97	72.11	797.25	269.86	414.08	341.97
4.01	Lead	3	13.84	1.35	17.77	11.74	16.35	13.84
4.01	Magnesium	2	1819.82	239.15	3329.77	1580.67	2058.98	1819.82
4.01	Manganese	2	566.15	275.33	2304.52	290.82	841.48	566.15
4.01	Mercury	3	4.56	3.81	15.68	0.33	12.16	4.56
4.01	N-Nitroso-di-n-propylamine	1	0.31	0.094	0.586	0.21	0.499	0.499

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.01	Naphthalene	2	0.19	0.16	0.64	0.02	0.5	0.03
4.01	Nickel	3	16.11	2.25	22.68	11.88	19.54	16.11
4.01	PCB-1254	3	0.15	0.13	0.52	0.01	0.4	0.15
4.01	PCB-1260	1	0.7	0.68	2.69	0.01	2.06	0.01
4.01	Pentachlorophenol	1	1.13	0.64	3.01	0.44	2.42	0.44
4.01	Phenanthrene	3	0.27	0.12	0.61	0.13	0.5	0.27
4.01	Phenol	1	0.3	0.1	0.59	0.18	0.5	0.18
4.01	Potassium	2	1255.17	331.63	3349.02	923.54	1586.8	1255.17
4.01	Pyrene	3	0.274	0.11	0.594	0.156	0.493	0.274
4.01	Selenium	1	0.26	0.06	0.44	0.19	0.38	0.21
4.01	Silver	3	0.64	0.58	2.33	0.05	1.8	0.64
4.01	Sodium	2	36.23	5.21	69.13	31.02	41.44	36.23
4.01	Total combustible organics (TCO)	2	43818.41	2505.17	59635.46	41313.24	46323.59	43818.41
4.01	Total organic carbon (TOC)	2	8983.19	737.75	13641.17	8245.44	9720.94	8983.19
4.01	Uranium	2	0.55	0.16	1.55	0.39	0.71	0.55
4.01	Vanadium	2	13.75	2.13	27.23	11.62	15.89	13.75
4.01	Zinc	3	57.37	5.7	74.02	46.37	65.48	57.37
4.02	2-Methylnaphthalene	1	0.03	.	.	0.03	0.03	0.03
4.02	Aluminum	1	7610	.	.	7610	7610	7610

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.02	Arsenic	1	11.2	.	. .	11.2	11.2	11.2
4.02	Barium	1	107	.	.	107	107	107
4.02	Benzo(b)fluoranthene	1	0.016	.	.	0.016	0.016	0.016
4.02	Beryllium	1	0.67	.	.	0.67	0.67	0.67
4.02	Bis(2-ethylhexyl)phthalate	1	0.058	.	.	0.058	0.058	0.058
4.02	Boron	1	3.5	.	.	3.5	3.5	3.5
4.02	Cadmium	1	0.19	.	.	0.19	0.19	0.19
4.02	Calcium	1	1500	.	.	1500	1500	1500
4.02	Chromium	1	14.3	.	.	14.3	14.3	14.3
4.02	Cobalt	1	8	.	.	8	8	8
4.02	Copper	1	6.3	.	.	6.3	6.3	6.3
4.02	Iron	1	13300	.	.	13300	13300	13300
4.02	Kjeldahl nitrogen	1	394	.	.	394	394	394
4.02	Lead	1	9.7	.	.	9.7	9.7	9.7
4.02	Magnesium	1	1180	.	.	1180	1180	1180
4.02	Manganese	1	665	.	.	665	665	665
4.02	Mercury	1	0.34	.	.	0.34	0.34	0.34
4.02	Naphthalene	1	0.02	.	.	0.02	0.02	0.02
4.02	Nickel	1	13.3	.	.	13.3	13.3	13.3
4.02	Phenanthrene	1	0.02	.	.	0.02	0.02	0.02

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.02	Potassium	1	849	.	.	849	849	849
4.02	Pyrene	1	0.017	.	.	0.017	0.017	0.017
4.02	Silver	1	0.04	.	.	0.04	0.04	0.04
4.02	Sodium	1	21.1	.	.	21.1	21.1	21.1
4.02	Uranium	1	0.31	.	.	0.31	0.31	0.31
4.02	Vanadium	1	12.2	.	.	12.2	12.2	12.2
4.02	Zinc	1	46.8	.	.	46.8	46.8	46.8
4.03	2-Methylnaphthalene	2	0.16	0.07	0.58	0.09	0.23	0.16
4.03	Acenaphthene	1	0.19	0.08	0.68	0.11	0.27	0.11
4.03	Aluminum	2	13152.81	1448.24	22296.65	11704.57	14601.05	13152.81
4.03	Anthracene	1	0.189	0.078	0.681	0.111	0.267	0.111
4.03	Arsenic	2	6.56	1.28	14.63	5.29	7.84	6.56
4.03	Barium	2	116.63	13.01	198.77	103.62	129.64	116.63
4.03	Benzo(a)anthracene	2	0.089	0.023	0.231	0.066	0.111	0.089
4.03	Benzo(a)pyrene	2	0.262	0.221	1.655	0.041	0.482	0.262
4.03	Benzo(b)fluoranthene	2	0.126	0.05	0.445	0.076	0.177	0.126
4.03	Benzo(ghi)perylene	2	0.063	0.026	0.225	0.038	0.089	0.063
4.03	Benzo(k)fluoranthene	2	0.032	0.01	0.094	0.022	0.042	0.032
4.03	Beryllium	2	0.93	0.16	1.92	0.77	1.08	0.93

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.03	Bis(2-ethylhexyl)phthalate	2	0.176	0.108	0.86	0.067	0.284	0.176
4.03	Boron	2	3.75	0.2	5	3.55	3.95	3.75
4.03	Cadmium	2	0.58	0.02	0.71	0.55	0.6	0.58
4.03	Calcium	2	3729.12	629.85	7705.84	3099.27	4358.97	3729.12
4.03	Chromium	2	34.13	2.78	51.67	31.35	36.91	34.13
4.03	Chrysene	2	0.102	0.032	0.302	0.07	0.133	0.102
4.03	Cobalt	2	19.61	5.38	53.59	14.23	24.99	19.61
4.03	Copper	2	29.26	6.63	71.15	22.63	35.9	29.26
4.03	Dibenz(a,h)anthracene	1	0.145	0.122	0.913	0.023	0.267	0.023
4.03	Dibenzofuran	2	0.04	0.017	0.149	0.023	0.057	0.04
4.03	Fluoranthene	2	0.133	0.028	0.307	0.105	0.16	0.133
4.03	Fluorene	1	0.15	0.12	0.9	0.03	0.27	0.03
4.03	Indeno(1,2,3-cd)pyrene	2	0.065	0.024	0.219	0.041	0.089	0.065
4.03	Iron	2	23180.05	2543.58	39239.56	20636.47	25723.62	23180.05
4.03	Kjeldahl nitrogen	2	1216.87	288.86	3040.65	928.01	1505.72	1216.87
4.03	Lead	2	34.38	4.37	61.96	30.01	38.75	34.38
4.03	Magnesium	2	2561.2	162.28	3585.8	2398.92	2723.48	2561.2
4.03	Manganese	2	1451.33	116.68	2188.01	1334.65	1568.01	1451.33
4.03	Mercury	2	3.36	0.16	4.37	3.2	3.52	3.36
4.03	Naphthalene	2	0.08	0.03	0.27	0.06	0.11	0.08

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.03	Nickel	2	35.8	4.38	63.44	31.43	40.18	35.8
4.03	PCB-1254	2	0.05	0.017	0.154	0.03	0.06	0.05
4.03	PCB-1260	2	0.03	0.003	0.051	0.03	0.03	0.03
4.03	Phenanthrene	2	0.15	0.06	0.5	0.09	0.2	0.15
4.03	Potassium	2	1235.07	124.41	2020.57	1110.66	1359.48	1235.07
4.03	Pyrene	2	0.136	0.034	0.349	0.103	0.17	0.136
4.03	Selenium	1	0.65	0.29	2.5	0.35	0.94	0.35
4.03	Silver	2	0.4	0.01	0.48	0.39	0.41	0.4
4.03	Sodium	2	46.19	0.43	48.88	45.77	46.62	46.19
4.03	Uranium	2	1.95	0.23	3.38	1.73	2.18	1.95
4.03	Vanadium	2	24.31	2.85	42.31	21.46	27.16	24.31
4.03	Zinc	2	102.31	12.09	178.63	90.22	114.4	102.31
4.04	2-Methylnaphthalene	11	0.5	0.284	1.01	0.07	3.54	0.22
4.04	Aluminum	11	14502.77	1228.59	16729.55	7370	20260.22	14502.77
4.04	Antimony	1	0.6	0.055	0.7	0.27	0.78	0.41
4.04	Arsenic	12	9.36	0.536	10.33	6.02	12.16	9.36
4.04	Barium	11	123.32	8.219	138.22	76.4	154.28	123.32
4.04	Benzo(a)anthracene	10	0.54	0.29	1.06	0.07	3.54	0.17
4.04	Benzo(a)pyrene	8	1.12	0.25	1.56	0.06	3.54	0.77

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.04	Benzo(b)fluoranthene	11	0.421	0.284	0.93	0.085	3.539	0.137
4.04	Benzo(ghi)perylene	6	0.937	0.27	1.422	0.071	3.539	0.345
4.04	Beryllium	12	1.14	0.05	1.23	0.82	1.42	1.14
4.04	Bis(2-ethylhexyl)phthalate	8	0.528	0.188	0.864	0.07	1.868	0.104
4.04	Boron	11	5.46	0.346	6.09	3.67	7.33	5.46
4.04	Cadmium	12	0.58	0.078	0.73	0.45	1.41	0.58
4.04	Calcium	11	2794.18	120.63	3012.82	1815.76	3313.96	2794.18
4.04	Chromium	12	22.46	2.064	26.17	10.7	33.38	22.46
4.04	Chrysene	8	0.673	0.296	1.206	0.066	3.539	0.113
4.04	Cobalt	11	18.71	1.544	21.5	11.6	26.01	18.71
4.04	Copper	12	37.09	3.173	42.79	18.8	53.42	37.09
4.04	Dibenz(a,h)anthracene	1	1.2	0.22	1.6	0.41	3.54	0.41
4.04	Fluoranthene	11	0.428	0.283	0.936	0.092	3.539	0.145
4.04	Indeno(1,2,3-cd)pyrene	2	1.185	0.223	1.584	0.447	3.539	0.63
4.04	Iron	11	23862.38	1855.06	27224.6	12900	30564.46	23862.38
4.04	Lead	12	30.28	2.32	34.45	14.8	46.38	30.28
4.04	Magnesium	11	2007.91	134.63	2251.92	1270	2697.99	2007.91
4.04	Manganese	11	1408.81	141.42	1665.12	617	2009.59	1408.81
4.04	Mercury	12	2.47	0.33	3.05	1.04	5.56	2.47
4.04	Naphthalene	8	0.73	0.292	1.26	0.05	3.54	0.21

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.04	Nickel	12	32.01	1.95	35.51	20.5	40.12	32.01
4.04	PCB-1254	1	0.093	0.08	0.237	0.011	0.975	0.975
4.04	Phenanthrene	11	0.44	0.282	0.94	0.1	3.54	0.15
4.04	Potassium	11	1178.5	118.79	1393.79	478	1744	1178.5
4.04	Pyrene	11	0.442	0.282	0.948	0.099	3.539	0.16
4.04	Selenium	8	0.63	0.114	0.84	0.18	1.24	0.63
4.04	Silver	11	0.39	0.07	0.51	0.2	1	0.39
4.04	Sodium	11	61.57	3.581	68.06	39.72	76.48	61.57
4.04	Uranium	11	1.45	0.128	1.69	0.95	2.21	1.45
4.04	Vanadium	11	25.63	1.706	28.72	15.7	33.4	25.63
4.04	Zinc	12	129.22	6.847	141.51	91.58	156.8	129.22
13	2,4-Dimethylphenol	1	0.232	0.004	0.241	0.22	0.245	0.236
13	Phenol	1	0.248	0.033	0.319	0.174	0.373	0.174
13	PCB-1254	1	0.01	0	0.011	0.009	0.012	0.012
13	Bis(2-ethylhexyl)phthalate	5	0.072	0.008	0.089	0.054	0.094	0.072
13	Anthracene	1	0.246	0.035	0.32	0.163	0.373	0.163
13	Pyrene	4	0.132	0.035	0.207	0.048	0.23	0.107
13	Dibenzofuran	4	0.245	0.063	0.378	0.164	0.491	0.233
13	Benzo(ghi)perylene	4	0.169	0.034	0.241	0.044	0.23	0.154

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
13	Indeno(1,2,3-cd)pyrene	4	0.166	0.034	0.238	0.04	0.23	0.15
13	Benzo(b)fluoranthene	4	0.114	0.037	0.193	0.04	0.245	0.082
13	Fluoranthene	4	0.142	0.041	0.229	0.045	0.236	0.112
13	Benzo(k)fluoranthene	2	0.181	0.067	0.324	0.021	0.373	0.029
13	Acenaphthylene	1	0.245	0.036	0.322	0.149	0.373	0.149
13	Chrysene	4	0.105	0.034	0.176	0.042	0.23	0.073
13	Benzo(a)pyrene	5	0.255	0.087	0.441	0.036	0.441	0.255
13	Dibenz(a,h)anthracene	1	0.246	0.036	0.322	0.152	0.373	0.152
13	Benzo(a)anthracene	3	0.214	0.044	0.308	0.11	0.373	0.155
13	Benzoic acid	2	0.505	0.125	0.772	0.127	0.881	0.249
13	Aluminum	5	11100	675	12500	9620	13400	11100
13	Iron	5	16800	815	18600	14900	19100	16800
13	Lead	5	15.3	0.445	16.2	13.8	16.4	15.3
13	Magnesium	5	1550	56.4	1680	1390	1690	1550
13	Manganese	5	585	122	845	240	905	585
13	Mercury	5	0.941	0.856	2.77	0.037	4.37	0.941
13	Nickel	5	24.2	4.24	33.2	17.5	40	24.2
13	Potassium	5	1260	53.9	1380	1120	1440	1260
13	Silver	5	0.058	0.011	0.082	0.037	0.094	0.058
13	Sodium	5	46.6	4.7	56.6	28.8	55.4	46.6

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
13	Arsenic	5	3.23	0.261	3.79	2.56	4.04	3.23
13	Barium	5	97.6	6.67	112	82.8	122	97.6
13	Beryllium	5	0.696	0.04	0.783	0.6	0.834	0.696
13	Boron	5	7.14	1.29	9.89	2.08	9.15	7.14
13	Cadmium	5	0.201	0.055	0.319	0.08	0.376	0.201
13	Chromium	5	16	0.664	17.5	14.1	17.7	16
13	Cobalt	5	14.7	1.21	17.3	11.2	18.3	14.7
13	Copper	5	11	0.923	13	8.89	14.4	11
13	Uranium	5	1.17	0.387	1.99	0.714	2.71	1.17
13	Vanadium	5	17.7	0.754	19.3	16.3	20.1	17.7
13	Zinc	5	61.9	7.48	77.9	45.2	85.3	61.9
13	Calcium	5	1120	47.5	1220	997	1210	1120
13	Selenium	1	0.668	0.433	1.59	0.2	2.4	0.315
13	Acenaphthene	1	0.23	0.004	0.239	0.22	0.245	0.224
13	Di-n-butylphthalate	1	0.27	0.051	0.378	0.114	0.433	0.114
13	Phenanthrene	5	0.189	0.097	0.395	0.039	0.568	0.189
13	Butylbenzylphthalate	4	0.169	0.031	0.236	0.091	0.245	0.15
13	Fluorene	2	0.218	0.017	0.254	0.151	0.245	0.172
13	Carbazole	3	0.203	0.019	0.244	0.151	0.245	0.181
13	Naphthalene	5	0.306	0.236	0.81	0.041	1.25	0.306
13	2-Methylnaphthalene	5	0.423	0.31	1.08	0.052	1.66	0.423

[a] SEM = Standard error of the mean.
[b] UCL = Upper confidence limit.
[c] PLE = Product limit estimate.

Table F6.3. Deep water sediment concentrations within each subreach compared to background concentrations from reach 13 (a reference site)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
1	Arsenic	27.05	11.034	6.46	yes
1	Beryllium	1.377	0.808	1.392	no
1	Cadmium	1.549	0.727	0.402	yes
1	Chromium	45.478	19.604	32	no
1	Copper	36.307	29.087	22	yes
1	Lead	63.455	39.233	30.6	yes
1	Mercury	0.295	0.124	1.882	no
1	Nickel	49.209	23.319	48.4	no
1	Selenium	1.426	0.695	1.336	no
1	Silver	0.661	0.329	0.116	yes
1	Zinc	261.763	122.132	123.8	no
7	Aluminum	21397.67	16408.81	22200	no
7	Antimony	0.47	0.68	NA	yes
7	Arsenic	26.52	63.84	6.46	yes
7	Barium	243.52	158.91	195.2	no
7	Beryllium	1.21	1.52	1.392	yes
7	Boron	8.38	5.76	14.28	no
7	Cadmium	0.57	0.82	0.402	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
7	Calcium	11548.03	6464.11	2240	yes
7	Chromium	36.94	58.61	32	yes
7	Cobalt	14.07	13.47	29.4	no
7	Copper	28.06	37.25	22	yes
7	Iron	41266.26	28935.9	33600	no
7	Lead	24.32	30.09	30.6	no
7	Magnesium	3663.54	2671.74	3100	no
7	Manganese	3080.82	1578.39	1170	yes
7	Mercury	0.17	0.23	1.882	no
7	Nickel	29.73	41.02	48.4	no
7	Potassium	3594.9	2017.27	2520	no
7	Selenium	3.66	9.5	1.336	yes
7	Silver	0.14	0.26	0.116	yes
7	Sodium	72.69	54.28	93.2	no
7	Thallium	0.45	0.57	NA	yes
7	Uranium	0.89	0.78	2.34	no
7	Vanadium	74.02	42.65	35.4	yes
7	Zinc	88.27	103.68	123.8	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
2.04	Aluminum	11744.55	10505.59	22200	no
2.04	Arsenic	9.74	10.21	6.46	yes
2.04	Barium	158.91	132.06	195.2	no
2.04	Beryllium	0.85	0.78	1.392	no
2.04	Boron	4.08	3.87	14.28	no
2.04	Cadmium	0.48	0.48	0.402	yes
2.04	Calcium	10534.86	9133.72	2240	yes
2.04	Chromium	16.77	16.02	32	no
2.04	Cobalt	24.92	20.65	29.4	no
2.04	Copper	12.07	12.32	22	no
2.04	Iron	23895.04	20143.64	33600	no
2.04	Magnesium	4711.06	4147.73	3100	yes
2.04	Manganese	5833.85	4484.22	1170	yes
2.04	Mercury	0.23	0.25	1.882	no
2.04	Nickel	15.93	15.39	48.4	no
2.04	Potassium	963.58	959.97	2520	no
2.04	Selenium	3.07	2.44	1.336	yes
2.04	Silver	0.49	0.55	0.116	yes
2.04	Sodium	40.34	36.08	93.2	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
2.04	Uranium	1.14	0.96	2.34	no
2.04	Vanadium	22.96	20.04	35.4	no
2.04	Zinc	68.7	67.55	123.8	no
3.01	Aluminum	.	6954.67	22200	no
3.01	Arsenic	.	1.31	6.46	no
3.01	Barium	.	59.54	195.2	no
3.01	Beryllium	.	0.53	1.392	no
3.01	Cadmium	.	0.09	0.402	no
3.01	Calcium	.	496.15	2240	no
3.01	Chromium	.	10.26	32	no
3.01	Cobalt	.	9.74	29.4	no
3.01	Copper	.	5.4	22	no
3.01	Iron	.	10908.23	33600	no
3.01	Lead	.	8.48	30.6	no
3.01	Magnesium	.	950.43	3100	no
3.01	Manganese	.	319.04	1170	no
3.01	Mercury	.	0.04	1.882	no
3.01	Nickel	.	10.34	48.4	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.01	Potassium	.	606.14	2520	no
3.01	Silver	.	0.03	0.116	no
3.01	Sodium	.	22.62	93.2	no
3.01	Uranium	.	0.61	2.34	no
3.01	Vanadium	.	10.55	35.4	no
3.01	Zinc	.	28.21	123.8	no
3.02	Aluminum	18173.79	16194.25	22200	no
3.02	Antimony	0.7	0.59	NA	yes
3.02	Arsenic	5.05	6.26	6.46	no
3.02	Barium	116.51	111.61	195.2	no
3.02	Beryllium	0.77	0.81	1.392	no
3.02	Boron	11.36	9.36	14.28	no
3.02	Cadmium	0.91	1.24	0.402	yes
3.02	Calcium	3869.32	3249.54	2240	yes
3.02	Chromium	24.32	28.16	32	no
3.02	Cobalt	22.69	20.28	29.4	no
3.02	Copper	29.39	37.95	22	yes
3.02	Iron	22082.35	20378.28	33600	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.02	Magnesium	2579.14	2121.32	3100	no
3.02	Manganese	1276.96	1056.22	1170	no
3.02	Mercury	4.07	6.1	1.882	yes
3.02	Nickel	52.39	70.58	48.4	yes
3.02	Selenium	1.39	1.4	1.336	yes
3.02	Silver	0.76	1.17	0.116	yes
3.02	Sodium	50.36	50.15	93.2	no
3.02	Uranium	20.99	16.49	2.34	yes
3.02	Vanadium	24.29	22.12	35.4	no
3.02	Zinc	116.83	149.85	123.8	yes
3.03	Aluminum	.	14985.24	22200	no
3.03	Arsenic	.	5.28	6.46	no
3.03	Barium	.	120.6	195.2	no
3.03	Beryllium	.	0.92	1.392	no
3.03	Boron	.	12	14.28	no
3.03	Cadmium	.	3.31	0.402	yes
3.03	Calcium	.	2594.28	2240	yes
3.03	Chromium	.	44.36	32	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.03	Cobalt	.	20.12	29.4	no
3.03	Copper	.	36.3	22	yes
3.03	Iron	.	24873.89	33600	no
3.03	Lead	.	37.73	30.6	yes
3.03	Magnesium	.	2238.63	3100	no
3.03	Manganese	.	692.45	1170	no
3.03	Mercury	.	6.67	1.882	yes
3.03	Nickel	.	62.44	48.4	yes
3.03	Potassium	.	1719.32	2520	no
3.03	Silver	.	3.32	0.116	yes
3.03	Sodium	.	74.33	93.2	no
3.03	Uranium	.	8.7	2.34	yes
3.03	Vanadium	.	21.52	35.4	no
3.03	Zinc	.	160.94	123.8	yes
3.04	Aluminum	24002.55	20484.92	22200	no
3.04	Arsenic	119.69	93.83	6.46	yes
3.04	Barium	352.41	290.28	195.2	yes
3.04	Beryllium	2.02	1.69	1.392	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.04	Boron	52.85	43.84	14.28	yes
3.04	Cadmium	7.07	5.6	0.402	yes
3.04	Calcium	7712.45	6358.23	2240	yes
3.04	Chromium	48.26	39.19	32	yes
3.04	Cobalt	19.55	18.18	29.4	no
3.04	Copper	93.31	68.03	22	yes
3.04	Iron	41023.98	36430.46	33600	yes
3.04	Lead	30.97	27.43	30.6	no
3.04	Magnesium	2190.71	2050.53	3100	no
3.04	Manganese	780.34	735.44	1170	no
3.04	Mercury	31.9	25.69	1.882	yes
3.04	Nickel	58.48	50.61	48.4	yes
3.04	Potassium	2826.6	2425.19	2520	no
3.04	Selenium	1.82	1.57	1.336	yes
3.04	Silver	1.64	1.41	0.116	yes
3.04	Sodium	376.72	304.29	93.2	yes
3.04	Thallium	0.87	0.72	NA	yes
3.04	Uranium	19.79	16.1	2.34	yes
3.04	Vanadium	72.34	59.14	35.4	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.04	Zinc	122.95	115.56	123.8	no
4.01	Aluminum	25352.03	11953.85	22200	no
4.01	Arsenic	12.21	9.96	6.46	yes
4.01	Barium	125.28	79.04	195.2	no
4.01	Beryllium	0.88	0.77	1.392	no
4.01	Boron	13.71	7.47	14.28	no
4.01	Cadmium	0.78	0.65	0.402	yes
4.01	Calcium	3155.72	2352.89	2240	yes
4.01	Chromium	19.5	18.31	32	no
4.01	Cobalt	12.88	8.63	29.4	no
4.01	Copper	25.94	21.41	22	no
4.01	Iron	23613.69	14905.74	33600	no
4.01	Lead	17.77	16.35	30.6	no
4.01	Magnesium	3329.77	2058.98	3100	no
4.01	Manganese	2304.52	841.48	1170	no
4.01	Mercury	15.68	12.16	1.882	yes
4.01	Nickel	22.68	19.54	48.4	no
4.01	Potassium	3349.02	1586.8	2520	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.01	Selenium	0.44	0.38	1.336	no
4.01	Silver	2.33	1.8	0.116	yes
4.01	Sodium	69.13	41.44	93.2	no
4.01	Uranium	1.55	0.71	2.34	no
4.01	Vanadium	27.23	15.89	35.4	no
4.01	Zinc	74.02	65.48	123.8	no
4.02	Aluminum	.	7610	22200	no
4.02	Arsenic	.	11.2	6.46	yes
4.02	Barium	.	107	195.2	no
4.02	Beryllium	.	0.67	1.392	no
4.02	Boron	.	3.5	14.28	no
4.02	Cadmium	.	0.19	0.402	no
4.02	Calcium	.	1500	2240	no
4.02	Chromium	.	14.3	32	no
4.02	Cobalt	.	8	29.4	no
4.02	Copper	.	6.3	22	no
4.02	Iron	.	13300	33600	no
4.02	Lead	.	9.7	30.6	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.02	Magnesium	.	1180	3100	no
4.02	Manganese	.	665	1170	no
4.02	Mercury	.	0.34	1.882	no
4.02	Nickel	.	13.3	48.4	no
4.02	Potassium	.	849	2520	no
4.02	Silver	.	0.04	0.116	no
4.02	Sodium	.	21.1	93.2	no
4.02	Uranium	.	0.31	2.34	no
4.02	Vanadium	.	12.2	35.4	no
4.02	Zinc	.	46.8	123.8	no
4.03	Aluminum	22296.65	14601.05	22200	no
4.03	Arsenic	14.63	7.84	6.46	yes
4.03	Barium	198.77	129.64	195.2	no
4.03	Beryllium	1.92	1.08	1.392	no
4.03	Boron	5	3.95	14.28	no
4.03	Cadmium	0.71	0.6	0.402	yes
4.03	Calcium	7705.84	4358.97	2240	yes
4.03	Chromium	51.67	36.91	32	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.03	Cobalt	53.59	24.99	29.4	no
4.03	Copper	71.15	35.9	22	yes
4.03	Iron	39239.56	25723.62	33600	no
4.03	Lead	61.96	38.75	30.6	yes
4.03	Magnesium	3585.8	2723.48	3100	no
4.03	Manganese	2188.01	1568.01	1170	yes
4.03	Mercury	4.37	3.52	1.882	yes
4.03	Nickel	63.44	40.18	48.4	no
4.03	Potassium	2020.57	1359.48	2520	no
4.03	Selenium	2.5	0.94	1.336	no
4.03	Silver	0.48	0.41	0.116	yes
4.03	Sodium	48.88	46.62	93.2	no
4.03	Uranium	3.38	2.18	2.34	no
4.03	Vanadium	42.31	27.16	35.4	no
4.03	Zinc	178.63	114.4	123.8	no
4.04	Aluminum	16729.55	20260.22	22200	no
4.04	Antimony	0.7	0.78	NA	yes
4.04	Arsenic	10.33	12.16	6.46	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.04	Barium	138.22	154.28	195.2	no
4.04	Beryllium	1.23	1.42	1.392	yes
4.04	Boron	6.09	7.33	14.28	no
4.04	Cadmium	0.73	1.41	0.402	yes
4.04	Calcium	3012.82	3313.96	2240	yes
4.04	Chromium	26.17	33.38	32	yes
4.04	Cobalt	21.5	26.01	29.4	no
4.04	Copper	42.79	53.42	22	yes
4.04	Iron	27224.6	30564.46	33600	no
4.04	Lead	34.45	46.38	30.6	yes
4.04	Magnesium	2251.92	2697.99	3100	no
4.04	Manganese	1665.12	2009.59	1170	yes
4.04	Mercury	3.05	5.56	1.882	yes
4.04	Nickel	35.51	40.12	48.4	no
4.04	Potassium	1393.79	1744	2520	no
4.04	Selenium	0.84	1.24	1.336	no
4.04	Silver	0.51	1	0.116	yes
4.04	Sodium	68.06	76.48	93.2	no
4.04	Uranium	1.69	2.21	2.34	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.04	Vanadium	28.72	33.4	35.4	no
4.04	Zinc	141.51	156.8	123.8	yes

[a] UCL = Upper confidence limit.

Table F6.4. Total contaminant exposure and hazard quotients (HQs) for cottontail rabbits foraging on future spoils within each subreach

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
1	4,4'-DDD	0.385	0.002	0.0048	0.0004	0.0052	0.53	0.01
1	4,4'-DDT	0.385	0.001	0.0048	0.0002	0.005	0.53	0.01
1	Arsenic	11.034	0.013	0.1379	0.0026	0.1405	0.037	3.8
1	Benzo(a)anthracene	0.789	0.005	0.0099	0.001	0.0109	-	-
1	Benzo(k)fluoranthene	0.791	0.002	0.0099	0.0004	0.0103	-	-
1	Cadmium	0.727	0.007	0.0091	0.0014	0.0105	0.005	2.1
1	Chrysene	0.795	0.005	0.0099	0.001	0.0109	-	-
1	Copper	29.087	11.63	0.3636	2.2969	2.6605	11	0.24
1	Fluoranthene	0.821	0.082	0.0103	0.0162	0.0265	-	-
1	Lead	39.233	1.765	0.4904	0.3486	0.839	5.3	0.16
1	Pyrene	0.815	0.013	0.0102	0.0026	0.0128	-	-
1	Silver	0.329	0.017	0.0041	0.0034	0.0075	-	-
7	2-Methylnaphthalene	0.15		0.0019	0	0.0019	-	-
7	4-Nitrophenol	0.82		0.0103	0	0.0103	-	-
7	Antimony	0.47	0.001	0.0059	0.0002	0.0061	0.037	0.16
7	Arsenic	26.52	0.03	0.3315	0.0059	0.3374	0.037	9.12

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
7	Benzo(a)anthracene	0.22	0.001	0.0028	0.0002	0.0029	-	-
7	Benzo(a)pyrene	0.63	0.002	0.0079	0.0004	0.0083	0.296	0.03
7	Benzo(b)fluoranthene	0.05	0	0.0006	0	0.0006	-	-
7	Benzo(ghi)perylene	0.05		0.0006	0	0.0006	-	-
7	Beryllium	1.21	0.001	0.0151	0.0002	0.0153	0.44	0.03
7	Cadmium	0.57	0.005	0.0071	0.001	0.0081	0.005	1.62
7	Calcium	6464.11		80.8014	0	80.8014	-	-
7	Chromium	36.94	0.12	0.4618	0.0237	0.4855	1822.596	0
7	Chrysene	0.04	0	0.0005	0	0.0005	-	-
7	Copper	28.06	11.224	0.3508	2.2167	2.5675	11	0.23
7	Fluoranthene	0.35	0.005	0.0044	0.001	0.0054	-	-
7	Indeno(1,2,3-cd)pyrene	0.04	0	0.0005	0	0.0005	-	-
7	Manganese	1578.39	160	19.7299	31.6	51.3299	58.6	0.88
7	Phenanthrene	0.05	0.0051	0.0006	0.001	0.0016	-	-
7	Pyrene	0.07	0.001	0.0009	0.0002	0.0011	-	-
7	Selenium	3.66	0.095	0.0458	0.0188	0.0645	0.023	2.8
7	Silver	0.14	0.007	0.0018	0.0014	0.0031	-	-
7	Thallium	0.45		0.0056	0	0.0056	0.005	1.13

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
7	Vanadium	42.65	0.047	0.5331	0.0093	0.5424	0.13	4.17
2.04	2-Methylnaphthalene	0.38		0.0048	0	0.0048	-	-
2.04	4-Nitrophenol	2.161		0.027	0	0.027	-	-
2.04	Arsenic	9.74	0.011	0.1218	0.0022	0.1239	0.028	4.43
2.04	Benzo(a)anthracene	0.47	0.003	0.0059	0.0006	0.0065	-	-
2.04	Benzo(a)pyrene	0.5	0.002	0.0063	0.0004	0.0066	0.296	0.02
2.04	Benzo(b)fluoranthene	0.441	0.001	0.0055	0.0002	0.0057	-	-
2.04	Benzo(ghi)perylene	0.444		0.0056	0	0.0056	-	-
2.04	Benzo(k)fluoranthene	0.485	0.001	0.0061	0.0002	0.0063	-	-
2.04	Bis(2-ethylhexyl)phthalate	0.527	0.008	0.0066	0.0016	0.0082	5.4	0
2.04	Cadmium	0.48	0.005	0.006	0.001	0.007	0.005	1.4
2.04	Calcium	9133.72		114.1715	0	114.1715	-	-
2.04	Chrysene	0.445	0.001	0.0056	0.0002	0.0058	-	-
2.04	Di-n-butylphthalate	0.44	0.007	0.0055	0.0014	0.0069	163	0
2.04	Dibenzofuran	0.485	0.078	0.0061	0.0154	0.0215	-	-
2.04	Diethylphthalate	0.49	0.18	0.0061	0.0356	0.0417	1357	0
2.04	Fluoranthene	0.306	0.0153	0.0038	0.003	0.0068	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
2.04	Fluorene	0.47	0.015	0.0059	0.003	0.0088	-	-
2.04	Indeno(1,2,3-cd)pyrene	0.444	0	0.0056	0	0.0056	-	-
2.04	Magnesium	4147.73		51.8466	0	51.8466	-	-
2.04	Manganese	4484.22	450	56.0528	88.875	144.9278	58.6	2.47
2.04	Naphthalene	0.4	0.208	0.005	0.0411	0.0461	-	-
2.04	Pentachlorophenol	2.44	0.012	0.0305	0.0024	0.0329	0.16	0.21
2.04	Phenanthrene	0.3	0.031	0.0038	0.0061	0.0099	-	-
2.04	Pyrene	0.356	0.005	0.0045	0.001	0.0054	-	-
2.04	Selenium	2.44	0.063	0.0305	0.0124	0.0429	0.023	1.87
2.04	Silver	0.49	0.025	0.0061	0.0049	0.0111	-	-
3.01	Benzo(b)fluoranthene	0.162	0.001	0.002	0.0002	0.0022	-	-
3.01	Bis(2-ethylhexyl)phthalate	0.025	0	0.0003	0	0.0003	5.4	0
3.01	Chrysene	0.158	0.001	0.002	0.0002	0.0022	-	-
3.01	Di-n-butylphthalate	0.02	0	0.0003	0	0.0003	163	0
3.01	Diethylphthalate	0.08	0.029	0.001	0.0057	0.0067	1357	0
3.01	Fluoranthene	0.161	0.0081	0.002	0.0016	0.0036	-	-
3.01	Heptachlor	0	0	0	0	0	0.09	0

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.01	Pentachlorophenol	0.15	0.001	0.0019	0.0002	0.0021	0.16	0.01
3.01	Phenanthrene	0.16	0.016	0.002	0.0032	0.0052	-	-
3.01	Pyrene	0.026	0	0.0003	0	0.0003	-	-
3.02	2-Methylnaphthalene	0.38		0.0048	0	0.0048	-	-
3.02	3-Nitroaniline	1119.21		13.9901	0	13.9901	-	-
3.02	Acenaphthene	0.38	0.007	0.0048	0.0014	0.0061	-	-
3.02	Acenaphthylene	0.395	0.103	0.0049	0.0203	0.0253	-	-
3.02	Anthracene	0.382	0.006	0.0048	0.0012	0.006	-	-
3.02	Antimony	0.59	0.002	0.0074	0.0004	0.0078	0.037	0.21
3.02	Benzo(a)anthracene	0.867	0.006	0.0108	0.0012	0.012	-	-
3.02	Benzo(a)pyrene	0.556	0.002	0.007	0.0004	0.0073	0.296	0.02
3.02	Benzo(b)fluoranthene	0.887	0.003	0.0111	0.0006	0.0117	-	-
3.02	Benzo(ghi)perylene	0.387		0.0048	0	0.0048	-	-
3.02	Benzo(k)fluoranthene	0.408	0.001	0.0051	0.0002	0.0053	-	-
3.02	Bis(2-ethylhexyl)phthalate	0.401	0.006	0.005	0.0012	0.0062	5.4	0
3.02	Butylbenzylphthalate	0.41	0.006	0.0051	0.0012	0.0063	-	-
3.02	Cadmium	0.91	0.009	0.0114	0.0018	0.0132	0.005	2.64

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.02	Carbazole	0.22	0.015	0.0028	0.003	0.0057	-	-
3.02	Chrysene	0.686	0.004	0.0086	0.0008	0.0094	-	-
3.02	Copper	29.39	11.756	0.3674	2.3218	2.6892	11	0.24
3.02	Dibenz(a,h)anthracene	0.406	0.001	0.0051	0.0002	0.0053	-	-
3.02	Dibenzofuran	0.389	0.063	0.0049	0.0124	0.0173	-	-
3.02	Fluoranthene	1.214	0.0608	0.0152	0.012	0.0272	-	-
3.02	Fluorene	0.38	0.006	0.0048	0.0012	0.0059	-	-
3.02	Indeno(1,2,3-cd)pyrene	0.404	0.001	0.0051	0.0002	0.0052	-	-
3.02	Mercury	4.07	0.31	0.0509	0.0612	0.1121	0.021	5.34
3.02	Naphthalene	0.39	0.202	0.0049	0.0399	0.0448	-	-
3.02	Nickel	52.39	0.7	0.6549	0.1383	0.7931	26.636	0.03
3.02	PCB-1248	0.368	0.002	0.0046	0.0004	0.005	0.02	0.25
3.02	PCB-1254	0.73	0.003	0.0091	0.0006	0.0097	0.016	0.61
3.02	PCB-1260	0.704	0.001	0.0088	0.0002	0.009	0.016	0.56
3.02	Phenanthrene	1.23	0.126	0.0154	0.0249	0.0403	-	-
3.02	Phenol	0.385	0.58	0.0048	0.1146	0.1194	-	-
3.02	Potassium	1699.79		21.2474	0	21.2474	-	-
3.02	Pyrene	1.141	0.018	0.0143	0.0036	0.0178	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.02	Selenium	1.39	0.009	0.0174	0.0018	0.0192	0.023	0.83
3.02	Silver	0.76	0.039	0.0095	0.0077	0.0172	-	-
3.02	Uranium	16.49	0.1039	0.2061	0.0205	0.2266	0.89	0.25
3.02	Zinc	116.83	12	1.4604	2.37	3.8304	106.546	0.04
3.03	2-Methylnaphthalene	0.35		0.0044	0	0.0044	-	-
3.03	Acenaphthene	0.03	0.001	0.0004	0.0002	0.0006	-	-
3.03	Acenaphthylene	0.121	0.031	0.0015	0.0061	0.0076	-	-
3.03	Anthracene	0.042	0.001	0.0005	0.0002	0.0007	-	-
3.03	Benzo(a)anthracene	0.231	0.001	0.0029	0.0002	0.0031	-	-
3.03	Benzo(a)pyrene	0.159	0.001	0.002	0.0002	0.0022	0.296	0.01
3.03	Benzo(b)fluoranthene	0.285	0.001	0.0036	0.0002	0.0038	-	-
3.03	Benzo(ghi)perylene	0.175		0.0022	0	0.0022	-	-
3.03	Benzo(k)fluoranthene	0.067	0	0.0008	0	0.0008	-	-
3.03	Cadmium	3.31	0.034	0.0414	0.0067	0.0481	0.005	9.62
3.03	Carbazole	0.05	0.003	0.0006	0.0006	0.0012	-	-
3.03	Chromium	44.36	0.14	0.5545	0.0277	0.5822	1822.596	0
3.03	Chrysene	0.238	0.001	0.003	0.0002	0.0032	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.03	Copper	36.3	14.52	0.4538	2.8677	3.3215	11	0.3
3.03	Dibenz(a,h)anthracene	0.036	0	0.0005	0	0.0005	-	-
3.03	Dibenzofuran	0.105	1.69	0.0013	0.3338	0.3351	-	-
3.03	Fluoranthene	0.479	0.024	0.006	0.0047	0.0107	-	-
3.03	Fluorene	0.05	0.001	0.0006	0.0002	0.0008	-	-
3.03	Indeno(1,2,3-cd)pyrene	0.162	0	0.002	0	0.002	-	-
3.03	Lead	37.73	1.698	0.4716	0.3354	0.807	5.3	0.15
3.03	Mercury	6.67	0.5	0.0834	0.0988	0.1821	0.021	8.67
3.03	Naphthalene	0.21	0.109	0.0026	0.0215	0.0242	-	-
3.03	Nickel	62.44	0.83	0.7805	0.1639	0.9444	26.636	0.04
3.03	Phenanthrene	0.38	0.039	0.0048	0.0077	0.0125	-	-
3.03	Phenol	0.21	0.29	0.0026	0.0573	0.0599	-	-
3.03	Pyrene	0.296	0.005	0.0037	0.001	0.0047	-	-
3.03	Silver	3.32		0.0415	0	0.0415	-	-
3.03	Uranium	8.7	0.055	0.1088	0.0109	0.1196	0.89	0.13
3.03	Zinc	160.94	16	2.0118	3.16	5.1718	106.546	0.05
3.04	1,4-Dichlorobenzene	0.28	0.03	0.0035	0.0059	0.0094	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	2-Methylnaphthalene	0.26		0.0033	0	0.0033	-	-
3.04	4-Chloro-3-methylphenol	0.281		0.0035	0	0.0035	-	-
3.04	4-Methylphenol	0.28	0.21	0.0035	0.0415	0.045	-	-
3.04	Acenaphthene	0.19	0.006	0.0024	0.0012	0.0036	-	-
3.04	Acenaphthylene	0.281	0.0731	0.0035	0.0144	0.0179	-	-
3.04	Anthracene	0.253	0.007	0.0032	0.0014	0.0045	-	-
3.04	Arsenic	93.83	0.11	1.1729	0.0217	1.1946	-	-
3.04	Barium	290.28	0.95	3.6285	0.1876	3.8161	3.6	1.06
3.04	Benzo(a)anthracene	0.167	0.001	0.0021	0.0002	0.0023	-	-
3.04	Benzo(a)pyrene	0.221	0.001	0.0028	0.0002	0.003	0.296	0.01
3.04	Benzo(b)fluoranthene	0.235	0.001	0.0029	0.0002	0.0031	-	-
3.04	Benzo(ghi)perylene	0.247		0.0031	0	0.0031	-	-
3.04	Benzo(k)fluoranthene	0.253	0	0.0032	0	0.0032	-	-
3.04	Beryllium	1.69	0.002	0.0211	0.0004	0.0215	0.44	0.05
3.04	Bis(2-ethylhexyl)phthalate	0.95	0.015	0.0119	0.003	0.0148	5.4	0
3.04	Boron	43.84	1.3	0.548	0.2568	0.8048	-	-
3.04	Butylbenzylphthalate	0.25	0.004	0.0031	0.0008	0.0039	-	-
3.04	Cadmium	5.6	0.057	0.07	0.0113	0.0813	0.005	16.2

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	Calcium	6358.23		79.4779	0	79.4779	-	-
3.04	Carbazole	0.25	0.017	0.0031	0.0034	0.0065	-	-
3.04	Chromium	39.19	0.13	0.4899	0.0257	0.5156	1822.596	0
3.04	Chrysene	0.143	0.001	0.0018	0.0002	0.002	-	-
3.04	Copper	68.03	27.212	0.8504	5.3744	6.2247	11	0.57
3.04	Dibenz(a,h)anthracene	0.253	0	0.0032	0	0.0032	-	-
3.04	Dibenzofuran	0.247	0.0397	0.0031	0.0078	0.0109	-	-
3.04	Diethylphthalate	0.28	0.1	0.0035	0.0198	0.0233	1357	0
3.04	Fluoranthene	0.231	0.01158	0.0029	0.0023	0.0052	-	-
3.04	Fluorene	0.25	0.007	0.0031	0.0014	0.0045	-	-
3.04	Indeno(1,2,3-cd)pyrene	0.247	0.001	0.0031	0.0002	0.0033	-	-
3.04	Mercury	25.69	1.9	0.3211	0.3753	0.6964	0.021	33.16
3.04	Naphthalene	0.2	0.1038	0.0025	0.0205	0.023	-	-
3.04	Nickel	50.61	0.67	0.6326	0.1323	0.765	26.636	0.03
3.04	PCB-1248	0.065	0	0.0008	0	0.0008	0.02	0.04
3.04	PCB-1254	0.18	0.001	0.0023	0.0002	0.0024	0.016	0.15
3.04	PCB-1260	0.13	0	0.0016	0	0.0016	0.016	0.1
3.04	Phenanthrene	0.24	0.02457	0.003	0.0049	0.0079	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	Phenol	0.25	0.35	0.0031	0.0691	0.0723	-	-
3.04	Pyrene	0.215	0.003	0.0027	0.0006	0.0033	-	-
3.04	Selenium	1.57	0.041	0.0196	0.0081	0.0277	0.023	1.21
3.04	Silver	1.41	0.072	0.0176	0.0142	0.0318	-	-
3.04	Thallium	0.72		0.009	0	0.009	0.005	1.8
3.04	Uranium	16.1	0.101	0.2013	0.0199	0.2212	0.89	0.25
3.04	Vanadium	59.14	0.065	0.7393	0.0128	0.7521	0.13	5.79
4.01	2-Methylnaphthalene	0.5		0.0063	0	0.0063	-	-
4.01	Acenaphthene	0.5	0.016	0.0063	0.0032	0.0094	-	-
4.01	Anthracene	0.499	0.013	0.0062	0.0026	0.0088	-	-
4.01	Arsenic	9.96	0.011	0.1245	0.0022	0.1267	0.028	4.52
4.01	Benzo(a)anthracene	0.499	0.003	0.0062	0.0006	0.0068	-	-
4.01	Benzo(a)pyrene	0.499	0.002	0.0062	0.0004	0.0066	0.296	0.02
4.01	Benzo(b)fluoranthene	0.499	0.002	0.0062	0.0004	0.0066	-	-
4.01	Benzo(ghi)perylene	0.499		0.0062	0	0.0062	-	-
4.01	Benzo(k)fluoranthene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Bis(2-ethylhexyl)phthalate	0.968	0.015	0.0121	0.003	0.0151	5.4	0

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.01	Cadmium	0.65	0.007	0.0081	0.0014	0.0095	0.005	1.9
4.01	Calcium	2352.89		29.4111	0	29.4111	-	-
4.01	Carbazole	0.22	0.015	0.0028	0.003	0.0057	-	-
4.01	Chrysene	0.499	0.002	0.0062	0.0004	0.0066	-	-
4.01	Dibenz(a,h)anthracene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Dibenzofuran	0.499	0.0803	0.0062	0.0159	0.0221	-	-
4.01	Fluoranthene	0.489	0.0245	0.0061	0.0048	0.011	-	-
4.01	Fluorene	0.5	0.015	0.0063	0.003	0.0092	-	-
4.01	Heptachlor	0.1	0	0.0013	0	0.0013	0.533	0
4.01	Indeno(1,2,3-cd)pyrene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Mercury	12.16	0.92	0.152	0.1817	0.3337	0.021	15.89
4.01	N-Nitroso-di-n-propylamine	0.499	0.79	0.0062	0.156	0.1623	-	-
4.01	Naphthalene	0.5	0.25956	0.0063	0.0513	0.0575	-	-
4.01	PCB-1254	0.4	0.002	0.005	0.0004	0.0054	0.016	0.34
4.01	PCB-1260	2.06	0.003	0.0258	0.0006	0.0263	0.016	1.65
4.01	Pentachlorophenol	2.42	0.011	0.0303	0.0022	0.0324	-	-
4.01	Phenanthrene	0.5	0.0512	0.0063	0.0101	0.0164	-	-
4.01	Phenol	0.5	0.69	0.0063	0.1363	0.1425	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.01	Pyrene	0.493	0.008	0.0062	0.0016	0.0077	-	-
4.01	Silver	1.8	0.091	0.0225	0.018	0.0405	-	-
4.02	2-Methylnaphthalene	0.03		0.0004	0	0.0004	-	-
4.02	Arsenic	11.2	0.013	0.14	0.0026	0.1426	0.028	5.09
4.02	Benzo(b)fluoranthene	0.016	0	0.0002	0	0.0002	-	-
4.02	Bis(2-ethylhexyl)phthalate	0.058	0.001	0.0007	0.0002	0.0009	5.4	0
4.02	Naphthalene	0.02	0.01	0.0003	0.002	0.0022	-	-
4.02	Phenanthrene	0.02	0.002	0.0003	0.0004	0.0006	-	-
4.02	Pyrene	0.017	0	0.0002	0	0.0002	-	-
4.03	2-Methylnaphthalene	0.23		0.0029	0	0.0029	-	-
4.03	Acenaphthene	0.27	0.008	0.0034	0.0016	0.005	-	-
4.03	Anthracene	0.267	0.007	0.0033	0.0014	0.0047	-	-
4.03	Arsenic	7.84	0.009	0.098	0.0018	0.0998	0.028	3.56
4.03	Benzo(a)anthracene	0.111	0.001	0.0014	0.0002	0.0016	-	-
4.03	Benzo(a)pyrene	0.482	0.002	0.006	0.0004	0.0064	0.296	0.02
4.03	Benzo(b)fluoranthene	0.177	0.001	0.0022	0.0002	0.0024	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.03	Benzo(ghi)perylene	0.089		0.0011	0	0.0011	-	-
4.03	Benzo(k)fluoranthene	0.042	0	0.0005	0	0.0005	-	-
4.03	Bis(2-ethylhexyl)phthalate	0.284	0.004	0.0036	0.0008	0.0043	5.4	0
4.03	Cadmium	0.6	0.006	0.0075	0.0012	0.0087	0.005	1.74
4.03	Calcium	4358.97		54.4871	0	54.4871	-	-
4.03	Chromium	36.91	0.12	0.4614	0.0237	0.4851	1822.596	0
4.03	Chrysene	0.133	0.001	0.0017	0.0002	0.0019	-	-
4.03	Copper	35.9	14.36	0.4488	2.8361	3.2849	11	0.3
4.03	Dibenz(a,h)anthracene	0.267	0	0.0033	0	0.0033	-	-
4.03	Dibenzofuran	0.057	0.0092	0.0007	0.0018	0.0025	-	-
4.03	Fluoranthene	0.16	0.00802	0.002	0.0016	0.0036	-	-
4.03	Fluorene	0.27	0.008	0.0034	0.0016	0.005	-	-
4.03	Indeno(1,2,3-cd)pyrene	0.089	0	0.0011	0	0.0011	-	-
4.03	Lead	38.75	2.788	0.4844	0.5506	1.035	5.3	0.2
4.03	Manganese	1568.01	160	19.6001	31.6	51.2001	58.6	0.87
4.03	Mercury	3.52	0.27	0.044	0.0533	0.0973	0.021	4.63
4.03	Naphthalene	0.11	0.0571	0.0014	0.0113	0.0127	-	-
4.03	PCB-1254	0.06	0	0.0008	0	0.0008	0.016	0.05

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.03	PCB-1260	0.03	0	0.0004	0	0.0004	0.016	0.02
4.03	Phenanthrene	0.2	0.0205	0.0025	0.004	0.0065	-	-
4.03	Pyrene	0.17	0.003	0.0021	0.0006	0.0027	-	-
4.03	Silver	0.41	0.021	0.0051	0.0041	0.0093	-	-
4.04	2-Methylnaphthalene	1.01		0.0126	0	0.0126	-	-
4.04	Antimony	0.7	0.003	0.0088	0.0006	0.0093	0.037	0.25
4.04	Arsenic	10.33	0.012	0.1291	0.0024	0.1315	0.028	4.7
4.04	Benzo(a)anthracene	1.06	0.002	0.0133	0.0004	0.0136	-	-
4.04	Benzo(a)pyrene	1.56	0.004	0.0195	0.0008	0.0203	0.296	0.07
4.04	Benzo(b)fluoranthene	0.93	0.001	0.0116	0.0002	0.0118	-	-
4.04	Benzo(ghi)perylene	1.422		0.0178	0	0.0178	-	-
4.04	Beryllium	1.23	0.001	0.0154	0.0002	0.0156	0.44	0.04
4.04	Bis(2-ethylhexyl)phthalate	0.864	0.002	0.0108	0.0004	0.0112	5.4	0
4.04	Cadmium	0.73	0.007	0.0091	0.0014	0.0105	0.005	2.1
4.04	Chromium	26.17	0.085	0.3271	0.0168	0.3439	1822.596	0
4.04	Chrysene	1.206	0.001	0.0151	0.0002	0.0153	-	-
4.04	Copper	42.79	17.116	0.5349	3.3804	3.9153	11	0.36

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.04	Dibenz(a,h)anthracene	1.6	0.007	0.02	0.0014	0.0214	-	-
4.04	Fluoranthene	0.936	0.002	0.0117	0.0004	0.0121	-	-
4.04	Indeno(1,2,3-cd)pyrene	1.584	0.002	0.0198	0.0004	0.0202	-	-
4.04	Lead	34.45	1.55	0.4306	0.3061	0.7368	5.3	0.14
4.04	Manganese	1665.12	170	20.814	33.575	54.389	58.6	0.93
4.04	Mercury	3.05	0.23	0.0381	0.0454	0.0836	0.021	3.98
4.04	Naphthalene	1.26	0.654	0.0158	0.1292	0.1449	-	-
4.04	PCB-1254	0.237	0.004	0.003	0.0008	0.0038	0.016	0.23
4.04	Phenanthrene	0.94	0.096	0.0118	0.019	0.0307	-	-
4.04	Pyrene	0.948	0.003	0.0119	0.0006	0.0124	-	-
4.04	Silver	0.51	0.026	0.0064	0.0051	0.0115	-	-
4.04	Zinc	141.51	14	1.7689	2.765	4.5339	106.546	0.04

[a] NOAEL = No observed adverse effect level.

Table F6.5. Comparison of contaminant concentrations found in deep sediments (future spoil) in each Clinch River reach to screening benchmarks for toxicity to plants

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
1	Arsenic	11.034	10	**1.1**
1	Cadmium	0.727	3	0.24
1	Copper	29.087	100	0.29
1	Lead	39.233	50	0.78
1	Silver	0.329	2	0.16
7	Antimony	0.68	5	0.14
7	Arsenic	63.84	10	**6.38**
7	Beryllium	1.52	10	0.15
7	Cadmium	0.82	3	0.27
7	Chromium	58.61	1	**58.61**
7	Copper	37.25	100	0.37
7	Manganese	1578.39	500	**3.16**
7	Selenium	9.5	1	**9.5**
7	Silver	0.26	2	0.13
7	Thallium	0.57	1	0.57
7	Vanadium	42.65	2	**21.33**
2.04	Arsenic	10.21	10	**1.02**
2.04	Cadmium	0.48	3	0.16
2.04	Di-n-butylphthalate	0.44	200	0
2.04	Manganese	4484.22	500	**8.97**
2.04	Selenium	2.44	1	**2.44**
2.04	Silver	0.55	2	0.28
3.01	Di-n-butylphthalate	0.02	200	0
3.02	Antimony	0.59	5	0.12
3.02	Cadmium	1.24	3	0.41

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
3.02	Copper	37.95	100	0.38
3.02	Mercury	6.1	0.3	**20.33**
3.02	Nickel	70.58	30	**2.35**
3.02	PCB-1248	0.388	40	0.01
3.02	PCB-1254	0.73	40	0.02
3.02	PCB-1260	0.79	40	0.02
3.02	Selenium	1.4	1	**1.4**
3.02	Silver	1.17	2	0.59
3.02	Uranium	16.49	5	**3.3**
3.02	Zinc	149.85	50	**3**
3.03	Cadmium	3.31	3	**1.1**
3.03	Chromium	44.36	1	**44.36**
3.03	Copper	36.3	100	0.36
3.03	Lead	37.73	50	0.75
3.03	Mercury	6.67	0.3	**22.23**
3.03	Nickel	62.44	30	**2.08**
3.03	Silver	3.32	2	**1.66**
3.03	Uranium	8.7	5	**1.74**
3.03	Zinc	160.94	50	**3.22**
3.04	Arsenic	93.83	10	**9.38**
3.04	Barium	290.28	500	0.58
3.04	Beryllium	1.69	10	0.17
3.04	Boron	43.84	0.5	**87.68**
3.04	Cadmium	5.6	3	**1.87**
3.04	Chromium	39.19	1	**39.19**
3.04	Copper	68.03	100	0.68
3.04	Mercury	25.69	0.3	**85.63**
3.04	Nickel	50.61	30	**1.69**
3.04	PCB-1248	0.065	40	0

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
3.04	PCB-1254	0.18	40	0
3.04	PCB-1260	0.13	40	0
3.04	Selenium	1.57	1	**1.57**
3.04	Silver	1.41	2	0.71
3.04	Thallium	0.72	1	0.72
3.04	Uranium	16.1	5	**3.22**
3.04	Vanadium	59.14	2	**29.57**
4.01	Arsenic	9.96	10	**1**
4.01	Cadmium	0.65	3	0.22
4.01	Mercury	12.16	0.3	**40.53**
4.01	PCB-1254	0.4	40	0.01
4.01	PCB-1260	2.06	40	0.05
4.01	Silver	1.8	2	0.9
4.02	Arsenic	11.2	10	**1.12**
4.03	Arsenic	7.84	10	0.78
4.03	Cadmium	0.6	3	0.2
4.03	Chromium	36.91	1	**36.91**
4.03	Copper	35.9	100	0.36
4.03	Lead	38.75	50	0.78
4.03	Manganese	1568.01	500	**3.14**
4.03	Mercury	3.52	0.3	**11.73**
4.03	PCB-1254	0.06	40	0
4.03	PCB-1260	0.03	40	0
4.03	Silver	0.41	2	0.21
4.04	Antimony	0.78	5	0.16
4.04	Arsenic	12.16	10	**1.22**
4.04	Beryllium	1.42	10	0.14

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
4.04	Cadmium	1.41	3	0.47
4.04	Chromium	33.38	1	**33.38**
4.04	Copper	53.42	100	0.53
4.04	Lead	46.38	50	0.93
4.04	Manganese	2009.59	500	**4.02**
4.04	Mercury	5.56	0.3	**18.53**
4.04	PCB-1254	0.975	40	0.02
4.04	Silver	1	2	0.5
4.04	Zinc	156.8	50	**3.14**

Table F6.6. Estimated NOAELs[a] and LOAELs[a] for the eastern cottontail

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)	Estimated LOAEL (mg/kg/d)
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation		
Arsenic	As+3	mouse	0.126[b] 3 gen.	1.26 3 gen.	reproduction	Schroeder and Mitchner 1971	0.037	0.37
Barium	chloride	rat	1.98 16 mo.		growth	Perry et al. 1983	3.6	13.2
	chloride			19.8 10 days	mortality	Borzelleca et al. 1988		
Cadmium	salt	rat	0.008 4 gen.	0.01	reproduction	Wills et al. 1981	0.005	0.007
Manganese	oxide	rat	88 gestation	284	reproduction	Laskey et al. 1992	58.6	189.0
Mercury	methyl	rat	0.032 3 gen.	0.16 3 gen.	reproduction	Verschuuren et al. 1976	0.021	0.110
PCBs	Aroclor 1254	oldfield mouse	0.068[b] 12 mo.	0.68 18 mo.	reproduction	McCoy et al. 1995	0.016	0.16
Selenium	selanate	mouse	0.076[b] 3 gen.	0.76 3 gen.	reproduction	Schroeder and Mitchner 1971	0.023	0.22
Thallium	sulfate	rat	0.0074[b] 60 days	0.074 60 days	reproduction	Formigli et al. 1986	0.005	0.05
Vanadium	sodium metavanadate	rat	0.21[b] 60 days	2.1 60 days	reproduction	Domingo et al. 1986	0.13	1.3

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor applied.

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Appendix F7

RADIOLOGICAL RISKS

F7. RADIOLOGICAL RISKS

Estimation of Radiation Doses to Biota

Applicable methodologies for estimating radiation doses to biota have been published by Woodhead (1979), NCRP (1991), Baker and Soldat (1992), and Blaylock et al. (1993). An additional useful reference for general application to external dosimetry was published by Eckerman and Ryman (1992). These references represent the primary source of equations and data used to calculate doses for the exposure scenarios evaluated in this report.

Radiation Dose to Benthic Invertebrates

The highest concentrations of radionuclides in the Clinch River, Poplar Creek, and Watts Bar Reservoir occur in the sediments. The mayfly *Hexagenia bilineata* was chosen as the model organism for evaluating the biological risk to benthic invertebrates. This organism was chosen because it lives almost all of its life cycle in the sediments and is an important part of the natural aquatic food-chain web. Mayfly adults hatch and leave the sediment/water environment after a year of larval development in sediments. An organism which lives imbedded in sediments would be expected to receive a maximized environmental dose. Thus, the mayfly model should represent an upper limit of exposure for the benthic class of invertebrate organisms.

The Blaylock et al. (1993) model for gamma-radiation dose rate to a small organism completely immersed in a mixture of radionuclides in sediments is written:

Immersed in Sediments

$$D_\gamma \text{ (mayfly)} = 18.7 \sum_i E_{\gamma,i}\, n_i (1 - \Phi)\, C_{s,I} \text{ mrad/year} \qquad \text{(F.1)}$$

where

$E_{\gamma,i}$ is the photon energy per disintegration during transition from a higher to a lower energy state (Mev/disintegration),

n_i is the proportion of disintegrations producing a gamma ray (dimensionless),

Φ is the fraction of energy $E_{\gamma,i}$ (dimensionless), absorbed by organism (figures appear in Blaylock et al. 1993),

$C_{s,i}$ is the concentration of the radionuclide in sediments (pCi/gm), and

18.7 is a constant for converting $E_{\gamma,i}$ and $C_{s,i}$ to mrad/year.

The total dose from a mixture of gamma-emitters is calculated by solving equation F.1 for each radionuclide and summing over radionuclides.

The comparable equation for beta-radiation dose is similar but substitutes the average beta energy per disintegration, the proportion of the transitions producing a beta particle of that average energy, and an absorbed fraction for the appropriate beta particles. This equation is written :

Immersed in Sediments

$$D_\beta \text{ (mayfly)} = 18.7 \sum_i E_{\beta,i}\, n_i\, (1 - \Phi)\, C_{s,I} \text{ mrad/year} \qquad \text{(F.2)}$$

where

$E_{\beta, i}$ is the average energy per disintegration of the beta-particle (Mev/disintegration),

n_i is the proportion of transitions producing a beta-particle of energy $E_{\beta, i}$,

Φ is the absorbed fraction for the appropriate beta particle (figures appear in Blaylock et al. 1993), and

$C_{s, i}$ is the concentration of the beta-emitting radionuclide in sediments (pCi/gm).

The remaining terms are as defined in equation F.1, and the total beta dose from a mixture of radionuclides is obtained by summation similar to the treatment of gamma emitters.

The dose from internally deposited radionuclides was neglected because mayfly larvae attain an average size of only 25 mm before hatching, and the resulting dose would be a minor fraction of the dose received from immersion in an extensive body of sediments.

Radiation Dose to Epibenthic Fish

The epibenthic fish size is represented by the large fish model in Blaylock et al. (1993). Dimensions of this organism are 1 kg for mass and an ellipsoid geometry of 45 cm x 8.7 cm x 4.9 cm for the major and two minor axes, respectively. Carp (*Cyprinus*), suckers and redhorse (*Moxastoma*), and catfish (*Ictalurus* and *Ameiurus*) are all representative epibenthic fish for Poplar Creek, the Clinch River, and Watts Bar Lake. The exposure scenario assumes that the model fish lies in close proximity to the bottom sediments and is irradiated by radionuclides in the bottom sediments, water, and by ingestion of natural food contaminated with radionuclides. Because self-absorption/shielding of beta particle emissions originating from water and sediment immersion results in a negligible contribution to absorbed dose to the large fish, the beta-emission component of dose was not included in the total dose rate for epibenthic fish. The dose components included are gamma dose rates from water immersion and sediment surface, and beta and gamma dose rates from internally deposited radionuclides.

The equation for estimating the dose received from immersion in water and exposure to sediments is the same as equation F.1, but the appropriate concentration (pCi/gm) of each radionuclide in water is used for the water immersion dose. The absorbed fractions for the large fish model of Blaylock et al. (1993) are used for the gamma-ray energies of the radionuclides under consideration. It is also appropriate to multiply the dose from sediments by 0.5 because the model fish is above an infinite plane of sediments and not immersed. With these considerations noted, the dose rate to a large epibenthic fish from exposure to gamma-emitting radionuclides in sediments is written:

Above Sediments

$$D_\gamma \text{ (fish)} = 9.4 \sum_i E_{\gamma,i}\, n_i\, (1 - \Phi)\, C_{s,i} \text{ mrad/year} \qquad \text{(F.3)}$$

where the terms have been defined above.

Estimation of the immersion dose rate to a large fish is also derived from equation F.1, with the concentration of the gamma-emitting radionuclides in water, $C_{w, i}$ (pCi/gm), used in place of the sediment concentration. The equation is written:

Immersed in Water

$$D_\gamma \text{ (fish)} = 18.7 \sum_i E_{\gamma,i}\, n_i\, (1 - \Phi)\, C_{w,I} \text{ mrad/year} \qquad \text{(F.4)}$$

where the terms have been defined above.

Internal dose from food-chain intake results from both gamma and beta emitters deposited in tissues. This deposition can be determined from direct measurements of radionuclides in fish tissues, or estimated by multiplying a bioaccumulation factor times the concentration of the radionuclide in water under equilibrium conditions. Bioaccumulation factors are listed by Blaylock et al. (1993). The equation for calculating the dose to an epibenthic fish from internal exposure to gamma-emitting radionuclides is written:

Ingestion

$$D_\gamma \text{ (fish)} = 18.7 \sum_i E_{\gamma,i}\, n_i\, \Phi\, C_{f,i} \text{ mrad/year} \qquad \text{(F.5)}$$

where

$C_{f,i}$ is the concentration of radionuclide i in the fish (pCi/gm) and may be calculated from the relationship

$$C_{f,i} = C_{w,i} \times \text{Bioaccumulation Factor for radionuclide i in fish pCi/gm} \qquad \text{(F.6)}$$

The dose rate to an epibenthic fish from beta-emitting radionuclides deposited internally is written

Ingestion

$$D_\beta \text{ (fish)} = 18.7 \sum_i E_{\beta,i}\, n_i\, C_{f,i} \text{ mrad/year} \qquad \text{(F.7)}$$

where the terms have been defined above.

Radiation Dose to Great Blue Heron

The great blue heron is one of the most common large water birds that completes its entire life cycle in the environs of Poplar Creek, the Clinch River, and Watts Bar Reservoir. Adults stand over one meter tall and they spend most of their time wading at the water's edge catching fish for food. The internal dose to a heron from consumption of fish contaminated with radionuclides in their flesh was treated in detail by Baker and Soldat (1992). Their model for internal dose rate to a heron, D (heron), is written:

Ingestion

$$D \text{ (heron)} = \sum_i b_i\, U_h\, f_{l,i}\, E_{h,i}\, (1 - \exp - \lambda_{h,i}\, T_e) / m_h\, \lambda_{h,i} \text{ rad/day} \qquad \text{(F.8)}$$

where

b_i = body burden concentration of radionuclide i in fish eaten by heron (Ci/kg),
U_h = rate of consumption of fish by heron (0.42 kg/day),
$f_{l,i}$ = uptake fraction of radionuclide i in heron (dimensionless),
m_h = mass of heron (2.39 kg),
$\lambda_{h,i}$ = effective decay constant of radionuclide i in heron (1/days),
T_e = time of exposure (365 days), and
$E_{h,i} = 5.12E10+4\ \epsilon_{h,i}$, where $\epsilon_{h,i}$ is the effective absorbed energy (kg - rad/Ci - day).

Simplification of the constants in equation F.8 and conversion of b_i to units of pCi/gm gives the equation for mrad/year which is written:

Ingestion

$$D\ (heron) = 3.28 \sum_i b_i f_{l,i} \epsilon_{h,i} (1 - exp - 365\ \lambda_{h,i})/\lambda_{h,i}\ mrad/year \qquad (F.9)$$

Baker and Soldat (1992) also discuss the exposure a heron could receive from immersion in contaminated water and direct irradiation from a contaminated shoreline. They recommend an exposure-time reduction factor of 0.3 for both modes of exposure, e. g., the heron receives external exposure from sediments approximately one-third of the time, external exposure from contaminated water one-third of the time, and no external exposure the remaining one-third of the time. This is in contrast to internal exposure which continues uninterrupted after ingestion of contaminated fish. The immersion dose coefficient is also further reduced by 0.5 because the heron's body is above the water, not immersed. They also recommend a dose reduction factor of 0.2 for shoreline roughness and height of the heron above the shoreline. The equations to estimate external dose rates, D (heron), received by the model great blue heron were calculated with the dose coefficients published by Eckerman and Ryman (1992) and are written:

Shoreline

$$D\ (heron) = 1.87E+17 \times 0.3 \times 0.2 \sum_i K_i\ C_{s,i}\ \ mrad/year \qquad (F.10)$$

where

1.87E+17 = a conversion factor to change Sv/sec per Bq/kg to mrad/year per Ci/kg,

0.3 = dose rate reduction factor to account for the fraction of the time the heron is exposed to shoreline radiation,

0.2 = dose rate reduction factor to account for shoreline roughness, and

Above Water

$$D\ (heron) = 1.17E+17 \times 0.3 \times 0.5 \sum_i K_i\ C_{w,I}\ mrad/year \qquad (F.11)$$

where

0.3 = dose reduction factor to account for the fraction of the time the heron is exposed above water, and

0.5 = dose reduction factor to account for one-half of an immersion dose.

Radiation Dose to Rabbit

If dredged sediments were deposited on land and allowed to support vegetation through secondary plant succession, or cultivated and planted in forage, the area would attract animal life as a habitat providing food and shelter. This section provides the biological assumptions (USEPA 1993) and dosimetry equations for a model rabbit that might inhabit an hypothetical area of dredged sediments.

Assume that the rabbit is a typical eastern cottontail (*Sylvilagus floridanus*) and lives its entire life cycle on the area covered by sediments. The model rabbit is assumed to weigh 1.2 kg, consume 0.24 kg of fresh vegetation per day, and spend time above and below ground in equal proportion. Equation F.8 from Baker and Soldat (1992) can be modified to compute the dose rate to a rabbit that consumes radioactive vegetation growing on the dredged sediments contaminated with radionuclides. These changes result in redefining b_i and U_h in terms of vegetation consumption by a rabbit, and the mass in

the denominator is changed to 1.2 kg. The internal dose rate, D (rabbit), from ingestion is written:

Ingestion

$$D\,(\text{rabbit}) = \Sigma_i\, p_i\, U_r\, f_{1,i}\, E_{r,i}(1 - \exp - \lambda_{r,i}T_e)\, m_r\, \lambda_{r,i}\ \text{rad/day} \qquad \text{(F.12)}$$

where

p_i = concentration of radionuclide i in vegetation eaten by rabbit (Ci/kg),
U_r = rate of consumption of vegetation by rabbit (0.24 kg/day),
m_r = mass of rabbit (1.2 kg),

and the remainder of the terms are similar to equation F.8, but are defined as pertaining to a rabbit. Simplification of the constants in equation F.12 and conversion of the dose rate units to mrad/year gives

Ingestion

$$D\,(\text{rabbit}) = 3.73\ \Sigma_i\, p_i\, f_{1,i}\, \epsilon_{r,i}\, (1 - \exp - 365\lambda_{r,i})/\ \lambda_{r,I}\ \text{mrad/year} \qquad \text{(F.13)}$$

It is also possible for the model rabbit to receive an additional internal dose from inhalation of dust originating from the radioactively contaminated sediments. The expression for estimating intake of radionuclide i by inhalation, $I_{r,i}$, is written:

$$I_{r,i} = C_{s,i}\ \text{x}\ A\ \text{x}\ B_r\ \text{Ci/day} \qquad \text{(F.14)}$$

where

$C_{s,i}$ = concentration of radionuclide i in sediments (Ci/kg),
A = mass of sediment dust per volume of air breathed (1E10-4 kg/m^3), and
B_r = inhalation rate of rabbit (0.63 m^3/day).

The value for mass of respirable dust, A, is an arbitrary choice that is believed to be conservative. After substitution of constants for inhalation rate and mass of sediment dust per volume of air breathed, the final form of the equation for dose rate (mrad/year) due to inhalation is written:

Inhalation

$$D\,(\text{rabbit}) = 0.944\ \Sigma_i\, C_{s,i} f_{1,i} \epsilon_{r,i}\, (1 - \exp - 365\lambda_{r,i})/\lambda_{r,I}\ \text{mrad/day} \qquad \text{(F.15)}$$

The total dose rate to the rabbit from internal irradiation is obtained by summation of equations F.13 and F.15.

The external dose rates received by the model rabbit were calculated with the dose coefficients published by Eckerman and Ryman (1992). The equation for calculating the external dose rate, D (rabbit), from residence on a landscape contaminated by radioactive sediments is written:

Above Soil

$$D\,(\text{rabbit}) = 1.87\text{E+17 x } 0.5\ \Sigma_i\ K_i\ C_{s,i}\ \text{mrad/year} \qquad \text{(F.16)}$$

where

0.5 = dose rate reduction factor to account for the fraction of the total time that is spent above ground.

The equation for calculating external dose rate received by a model rabbit residing in a burrow dug in contaminated soil is written:

Burrow in Soil

$$D\,(\text{rabbit}) = 3.74E{+}17 \times 0.5 \sum_i K_i C_{s,i}\ \text{mrad/year} \qquad \text{(F.17)}$$

This mode of exposure was treated as immersion in a continuous soil medium and is simply twice the dose rate from exposure above the soil surface. The dose rate reduction factor in this equation accounts for the other one-half of the rabbit's time.

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Appendix F8

ANALYSIS OF FISH AND BENTHIC INVERTEBRATE COMMUNITIES

F8. ANALYSIS OF FISH AND BENTHIC INVERTEBRATE COMMUNITIES

F8.1 FISH COMMUNITIES

F8.1.1 Data Sets

The Vital Signs Monitoring Program was initiated in 1990 and was expanded in 1991 to include 24 reservoirs. Data for 1991 through 1993 were available for this risk assessment. As explained in Brown et al. (1993), three "zones" were sampled within each reservoir: (1) the forebay immediately upstream of the dam, (2) the transition zone, defined as the mid-reservoir region where the water changes from free-flowing to quiescent, and (3) the inflow or headwater region of the reservoir. Sampling occurred in the fall of each year. Within each zone, two types of samples were collected. Ten electrofishing transects were sampled during daylight hours in the shoreline. Habitats were sampled "in proportion to their occurrence in the zone." Where conditions permitted, 12 overnight gill net samples (100-ft nets with five 20-ft panels with mesh sizes ranging from 1 to 3 inches) were collected in each reservoir zone. Because these two gears have greatly different efficiencies at collecting fish of different species and sizes, separate analyses were performed for each gear type.

TVA survey data were obtained in electronic form from TVA's Norris Laboratory. For purposes of our analysis, data for the 13 mainstem reservoirs were aggregated in two different ways. To examine between-year differences, the 13 mainstem reservoirs were grouped (Table F8.1) into seven river systems: French Broad, Tennessee (split into eastern and western portions), Watts Bar, Clinch, Powell, and Holston. Alternatively, the differences among the thirteen reservoirs were examined by combining the three years of data for each gear type.

A similar survey for the Clinch River Remedial Investigation was conducted in 1992 and 1993. This survey included three sites in the Clinch River arm of Watts Bar Reservoir, three sites in Poplar Creek Embayment, and one site each in lower Watts Bar, the Tennessee River arm of Watts Bar, and Norris Reservoir. Sampling techniques were the same as those used in the Vital Signs Monitoring Program, except that only five electrofishing runs and five gill net sets were performed during each sampling period.

F8.1.2 Methods

We used discriminant analysis to explore the differences in fish community composition of river systems and reservoirs. Our objective was to determine whether the samples of fish communities from Watts Bar reservoir are unusual when compared with the communities of ecologically similar reservoirs in the Tennessee Valley. Discriminant analysis answers this question by identifying the equations that best predict the source of a sample based on its species composition. If this discriminant function is unable to predict the source well, then it is safe to say that we do not have enough statistical power to detect differences in community composition between reservoirs.

Because the variables used to discriminate must be interval, we used species abundances as our discriminating variables. When abundances are used as discriminating variables, species or age classes with inherently high spatial or temporal variability can create spurious variation that hides meaningful patterns in the data. Gizzard shad, threadfin shad, and young-of-the-year fish in general are both abundant and highly variable. To address concerns about seasonal and spatial variation in abundances,

Table F8.1. Assignment of fish sampling stations[a] to river systems

	River System						
Reservoir	Clinch	Powell	French Broad	Holston	Tennessee	Watts Bar	West Tennessee
Norris	F, T, T1	T2					
Douglas			I, FB, T				
Cherokee				I, FB, T			
Melton Hill	I, FB, T						
Ft. Loudon					I, FB, T		
Watts Bar						I1, I2, FB, T	
Chicka-mauga					I, FB, T		
Nickajack					I, FB, T		
Pickwick							I, FB, T
Wilson							I, FB
Wheeler							I, FB, T
Gunters-ville							I, FB, T
Kentucky							I, FB, T

[a]Station codes: I = reservoir inflow; T = reservoir transition zone; F = reservoir forebay.

we removed gizzard and threadfin shad and young-of-the-year fish of all species from the analysis. Abundances of all remaining species were log-transformed to improve normality. Finally, we used a stepwise procedure to remove species that failed to contribute to (or reduced) our ability to discriminate between samples from different rivers. In the stepwise analysis, we retained species that contributed an additional 5% to the canonical correlation between species and sections of river.

We used a canonical discriminant method that assumes that the species abundances are drawn from a multivariate normal distribution with a common underlying variance- covariance matrix. This assumption is needed mainly for the hypothesis testing, and not for the development of discriminant functions and classification. Although the assumption can never be definitively tested, more replicates in each river section would have enabled us to compare the variance-covariance matrices of the samples. We used cross-validation to compare the parametric and non-parametric methods of discriminant

analysis provided in SAS's DISCRIM procedure. We found that the ability of the discriminant functions to classify observations was better for the multivariate normal, parametric method.

We chose canonical discriminant analysis for several reasons. First, canonical discriminant functions allowed us to visualize the reservoirs in a reduced-dimensional space. Second, the pooled-within river correlation matrix allowed us to identify species making the largest contributions to differences in fish communities between rivers. Finally, canonical discriminant functions are numerically stable in comparison to other multivariate methods because colinearity between species is less influential.

Klecka (1980) describes these functions as linear combinations of the discriminating variables (species abundances):

$$f_{km} = u_0 + u_1X_{1km} + u_2X_{2km} + \ldots + u_pX_{pkm},$$

where f_{km} is the weight of sample m in group (e.g., reservoir) k on the canonical discriminant function; X_{ikm} is the abundance of species i for sample m in group k. The coefficients u_i of the first canonical discriminant function are calculated such that they maximize the distances among all group means. The coefficients of subsequent functions also maximize distances among group means, but with the added constraint that they are orthogonal to each other. In general, the classification resulting from canonical discriminant analysis with all axes is the same as that from regular discriminant analysis except when colinearity exists among river sections. In that situation, the canonical analysis is more robust (Klecka 1980).

To classify a sample, a posterior probability of group (river) membership is estimated. The probability depends on two factors: the fraction of samples in each group and the Mahalanobis distance from the sample to each group centroid (mean). The sample is assigned to the group with the highest posterior probability. The Mahalanobis distance measure accounts for correlations between species abundances and scales species according the variability in their observed abundances. It turns out that the squared Mahalanobis distance between group means has a chi-square distribution with p-degrees of freedom. This fact allows us to test the significance of distances between reservoirs or groups of reservoirs. The Mahalanobis distance (in species abundance space) between all pairs of river sections can be observed in the results. In general, the river with the lowest cross-validation error rate shows the most unique species composition.

Multivariate methods provide useful graphical summaries and rigorous statistical criteria for determining differences between sites. However, because they incorporate both species composition and relative abundance, they are subject to errors introduced by spatial and temporal variability of species distributions (due to weather or current changes or simple random fluctuations) that can introduce extraneous variability and either mask real differences between sites or introduce spurious differences. Therefore, a second analysis based only on species richness, defined as number of species per sample, was performed.

We evaluated differences in species richness among reservoirs. The data set included all species, but excluded young-of-the-year. The counts were transformed using a square-root transformation to obtain approximately normal distributions of richness. Differences among reservoirs and among locations within the Clinch River/Poplar Creek system were evaluated using SAS statistical software (GLM procedure). Mean transformed fish species richness values were compared using the Waller-Duncan k-ratio t-test. We used a k-ratio of 100. This ratio reflects the ratio of type 1 to type 2 error and roughly corresponds to an alpha level of 0.05. This method minimizes the Bayes risk under additive loss, where the loss function is the difference between means. It assumes that the population means have a

normal prior distribution with unknown variance, the log of which has a uniform prior distribution. For the Vital Signs data, richness values were square-root-transformed prior to analysis. For the Clinch River/Poplar Creek data, no transformation was necessary.

Results: TVA Vital Signs Data

Results of the canonical discriminant analyses of the Vital Signs data are summarized in Figures F8.1 through F8.10. Figures F8.1 through F8.6 display results by year, with the reservoirs grouped into river systems. Figures F8.7 and F8.8 display comparisons among individual reservoirs, with all years combined. Only the first two canonical variables are plotted for each data set. However, plots of the third through sixth variates show similar patterns to those of the first two. The symbols represent individual sample values; the names of the river systems are printed at the location of the mean value for each system. For all three years, and both gear types, all river systems were significantly different from all other systems. A regional pattern is, however, apparent. Regardless of year or gear type, West Tennessee, Tennessee, and Watts Bar cluster together near the center of the plots. The reservoirs comprising all three of these systems are mainstem, run-of-the-river reservoirs. The most extreme reservoirs for each year and gear type are always storage reservoirs located in the upper Tennessee Valley: the Powell (Powell Arm of Norris Lake) in 1991, the Holston (Cherokee Lake) and French Broad (Douglas Lake) in 1992, and the Powell, Clinch, Holston, and French Broad in 1993. Results for the combined-years analysis were similar. For the gill net data (Fig. F8.7), the three storage reservoirs stand out as distinctly different from the run-of-the-river reservoirs. For the electrofishing data (Fig. F8.8), mean canonical variate values for all reservoirs upstream from Watts Bar reservoir are located on the left side of the plot; means for all reservoirs downstream from Watts Bar are located on the right side.

We also looked at "loadings," i.e., the contribution of different fish species to the discriminant functions. Species with high (>0.30) correlations with any of the first four canonical variables for each year and data set are listed in Table F8.2. The most obvious visible pattern in this table is that different sets of species are important for each gear type. For the electrofishing data, more than half of the species with high loadings are centrarchids (largemouth bass, spotted bass, readear/redbreast/longear sunfish, white/black crappie). These species are, for the most part, non migratory. They have relatively small home ranges and are relatively invulnerable to static gear such as gill nets. In contrast, relatively few of the species making major contributions to the discriminant functions for the gill net data sets are centrarchids. Fish with high loadings in the gill net are predominantly mobile species such as quillback, striped bass, and suckers. The only species that is frequently important for both gear types is the walleye, a species that is found predominantly in the upper Tennessee Valley because of temperature and spawning habitat requirements.

Figure 6.8 and 6.9 (Sect. 6, Vol. 1) show results of the species richness analysis for all three years and both gear types. Melton Hill Reservoir is either lowest or next-to-lowest in species richness for every year and gear type. Results of the Waller-Duncan K-ratio test show that Melton Hill falls into the lowest significance group for every data set except the 1993 gill net data. For most data sets, the reservoirs with the highest species richness are located in the lower Tennessee Valley (i.e., below Chattanooga): Kentucky Reservoir in the 1992 and 1993 gill net data and the 1991 and 1992 electrofishing data; Wilson Reservoir in the 1991 gill net data, and Nickajack Reservoir in the 1993 electrofishing data. Among the seven upper-valley reservoirs (Chickamauga, Watts Bar, Ft. Loudon, Melton Hill, Norris, Cherokee, and Douglas), Chickamauga Reservoir had the highest species richness in every data set except the 1991 gill net and 1992 electrofishing data; Watts Bar reservoir ranked first or second among the upper valley reservoirs for every data set except the 1992 gillnet and the 1991 electofishing. The different gear types give substantially different results. For the gill net data, no geographic trends are apparent except that Melton Hill is the lowest. For the electrofishing data, Chickamauga Reservoir is the only upper valley reservoir in the top half of the rankings; the five reservoirs upstream

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
2.04	Barium	3	101.8	19.56	158.91	65.21	132.06	101.8
2.04	Benzo(a)anthracene	1	0.27	0.08	0.47	0.1	0.5	0.1
2.04	Benzo(a)pyrene	3	0.36	0.07	0.53	0.17	0.5	0.31
2.04	Benzo(b)fluoranthene	3	0.187	0.108	0.441	0.019	0.503	0.082
2.04	Benzo(ghi)perylene	3	0.199	0.104	0.444	0.062	0.503	0.097
2.04	Benzo(k)fluoranthene	1	0.257	0.097	0.485	0.031	0.503	0.031
2.04	Beryllium	4	0.66	0.08	0.85	0.44	0.78	0.66
2.04	Bis(2-ethylhexyl)phthalate	3	0.227	0.128	0.527	0.045	0.589	0.183
2.04	Boron	3	3.42	0.23	4.08	3.16	3.87	3.42
2.04	Cadmium	4	0.34	0.06	0.48	0.2	0.48	0.34
2.04	Calcium	3	6516.11	1376.29	10534.86	4470	9133.72	6516.11
2.04	Chromium	4	14.19	1.09	16.77	11.01	16.02	14.19
2.04	Chrysene	3	0.21	0.1	0.445	0.066	0.503	0.112
2.04	Cobalt	3	15.32	3.29	24.92	9.32	20.65	15.32
2.04	Copper	4	10.12	0.83	12.07	8.45	12.32	10.12
2.04	Di-n-butylphthalate	2	0.33	0.05	0.45	0.22	0.44	0.4
2.04	Dibenzofuran	1	0.257	0.097	0.485	0.03	0.503	0.03
2.04	Diethylphthalate	1	0.26	0.1	0.49	0.03	0.5	0.03
2.04	Fluoranthene	4	0.187	0.051	0.306	0.095	0.331	0.187
2.04	Fluorene	1	0.28	0.08	0.47	0.11	0.5	0.11

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
2.04	Indeno(1,2,3-cd)pyrene	3	0.198	0.104	0.444	0.055	0.503	0.097
2.04	Iron	3	16701.42	2463.58	23895.04	11927.27	20143.64	16701.42
2.04	Kjeldahl nitrogen	3	888.14	290.11	1735.25	314.43	1250	888.14
2.04	Magnesium	3	2933.04	608.91	4711.06	2250	4147.73	2933.04
2.04	Manganese	3	2716.64	1067.54	5833.85	795.7	4484.22	2716.64
2.04	Mercury	4	0.12	0.04	0.23	0.07	0.25	0.12
2.04	Naphthalene	4	0.14	0.11	0.4	0.02	0.47	0.14
2.04	Nickel	4	13.72	0.94	15.93	11.31	15.39	13.72
2.04	Pentachlorophenol	1	1.1	0.69	3.11	0.17	2.44	0.17
2.04	Phenanthrene	4	0.14	0.07	0.3	0.02	0.33	0.14
2.04	Potassium	3	952.54	3.78	963.58	947.64	959.97	952.54
2.04	Pyrene	2	0.234	0.069	0.397	0.035	0.356	0.115
2.04	Selenium	1	1.06	0.69	3.07	0.33	2.44	0.33
2.04	Silver	4	0.24	0.11	0.49	0.07	0.55	0.24
2.04	Sodium	3	32.99	2.52	40.34	28	36.08	32.99
2.04	Total combustible organics (TCO)	3	349377.8	39039.13	463371.5	293000	424346.	2349377.8
2.04	Total organic carbon (TOC)	3	9550	2784.76	17681.75	4050	13058.56	9550.29
2.04	Uranium	3	0.6	0.19	1.14	0.35	0.96	0.6
2.04	Vanadium	3	16.32	2.27	22.96	12.2	20.04	16.32
2.04	Zinc	4	60.84	3.34	68.7	52.6	67.55	60.84

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.01	Aluminum	1	6954.67	.	.	6954.67	6954.67	6954.67
3.01	Arsenic	1	1.31	.	.	1.31	1.31	1.31
3.01	Barium	1	59.54	.	.	59.54	59.54	59.54
3.01	Benzo(b)fluoranthene	1	0.162	.	.	0.162	0.162	0.162
3.01	Beryllium	1	0.53	.	.	0.53	0.53	0.53
3.01	Bis(2-ethylhexyl)phthalate	1	0.025	.	.	0.025	0.025	0.025
3.01	Cadmium	1	0.09	.	.	0.09	0.09	0.09
3.01	Calcium	1	496.15	.	.	496.15	496.15	496.15
3.01	Chromium	1	10.26	.	.	10.26	10.26	10.26
3.01	Chrysene	1	0.158	.	.	0.158	0.158	0.158
3.01	Cobalt	1	9.74	.	.	9.74	9.74	9.74
3.01	Copper	1	5.4	.	.	5.4	5.4	5.4
3.01	Di-n-butylphthalate	1	0.02	.	.	0.02	0.02	0.02
3.01	Diethylphthalate	1	0.08	.	.	0.08	0.08	0.08
3.01	Fluoranthene	1	0.161	.	.	0.161	0.161	0.016
3.01	Heptachlor	1	0	.	.	0	0	0
3.01	Iron	1	10908.23	.	.	10908.23	10908.23	10908.23
3.01	Kjeldahl nitrogen	1	76.84	.	.	76.84	76.84	76.84
3.01	Lead	1	8.48	.	.	8.48	8.48	8.48
3.01	Magnesium	1	950.43	.	.	950.43	950.43	950.43

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.01	Manganese	1	319.04	.	.	319.04	319.04	319.04
3.01	Mercury	1	0.04	.	.	0.04	0.04	0.04
3.01	Nickel	1	10.34	.	.	10.34	10.34	10.34
3.01	Pentachlorophenol	1	0.15	.	.	0.15	0.15	0.15
3.01	Phenanthrene	1	0.16	.	.	0.16	0.16	0.16
3.01	Potassium	1	606.14	.	.	606.14	606.14	606.14
3.01	Pyrene	1	0.026	.	.	0.026	0.026	0.026
3.01	Silver	1	0.03	.	.	0.03	0.03	0.03
3.01	Sodium	1	22.62	.	.	22.62	22.62	22.62
3.01	Total combustible organics (TCO)	1	33449.94	.	.	33449.94	33449.9	433449.94
3.01	Total organic carbon (TOC)	1	6287.04	.	.	6287.04	6287.04	6287.04
3.01	Uranium	1	0.61	.	.	0.61	0.61	0.61
3.01	Vanadium	1	10.55	.	.	10.55	10.55	10.55
3.01	Zinc	1	28.21	.	.	28.21	28.21	28.21
3.02	2-Methylnaphthalene	3	0.2	0.08	0.38	0.06	0.41	0.13
3.02	3-Nitroaniline	3	652.94	234.97	1339.05	369.06	1119.21	652.94
3.02	Acenaphthene	2	0.25	0.05	0.38	0.17	0.41	0.19
3.02	Acenaphthylene	1	0.251	0.061	0.395	0.119	0.414	0.119
3.02	Aluminum	3	12227.09	2036.55	18173.79	9444.22	16194.25	12227.09

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Anthracene	2	0.258	0.053	0.382	0.183	0.414	0.196
3.02	Antimony	1	0.46	0.08	0.7	0.3	0.59	0.3
3.02	Arsenic	5	3.36	0.79	5.05	1.45	6.26	3.36
3.02	Barium	3	107.76	3	116.51	101.85	111.61	107.76
3.02	Benzo(a)anthracene	2	0.413	0.193	0.867	0.062	0.95	0.284
3.02	Benzo(a)pyrene	3	0.35	0.088	0.556	0.194	0.568	0.299
3.02	Benzo(b)fluoranthene	3	0.397	0.208	0.887	0.056	0.978	0.318
3.02	Benzo(ghi)perylene	1	0.284	0.044	0.387	0.224	0.414	0.25
3.02	Benzo(k)fluoranthene	3	0.311	0.053	0.436	0.213	0.408	0.308
3.02	Beryllium	5	0.55	0.1	0.77	0.3	0.81	0.55
3.02	Bis(2-ethylhexyl)phthalate	3	0.265	0.076	0.443	0.125	0.401	0.22
3.02	Boron	3	5.04	2.17	11.36	2.57	9.36	5.04
3.02	Butylbenzylphthalate	1	0.23	0.08	0.41	0.03	0.41	0.03
3.02	Cadmium	5	0.51	0.19	0.91	0.23	1.24	0.51
3.02	Calcium	3	2226.89	562.48	3869.32	1309.63	3249.54	2226.89
3.02	Carbazole	2	0.18	0.03	0.27	0.12	0.22	0.16
3.02	Chromium	5	17.79	3.07	24.32	9.28	28.16	17.79
3.02	Chrysene	2	0.35	0.143	0.686	0.047	0.715	0.214
3.02	Cobalt	3	17.23	1.87	22.69	13.83	20.28	17.23
3.02	Copper	5	18.28	5.21	29.39	9.26	37.95	18.28

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Dibenz(a,h)anthracene	1	0.237	0.072	0.406	0.064	0.414	0.064
3.02	Dibenzofuran	2	0.241	0.063	0.389	0.113	0.414	0.164
3.02	Fluoranthene	3	0.527	0.292	1.214	0.084	1.378	0.492
3.02	Fluorene	2	0.26	0.05	0.38	0.2	0.41	0.2
3.02	Indeno(1,2,3-cd)pyrene	2	0.294	0.047	0.404	0.214	0.414	0.25
3.02	Iron	3	19420.86	911.48	22082.35	17598.69	20378.28	19420.86
3.02	Magnesium	3	1761.5	280.02	2579.14	1209.94	2121.32	1761.5
3.02	Manganese	3	855.85	144.22	1276.96	575.99	1056.22	855.85
3.02	Mercury	5	1.68	1.12	4.07	0.03	6.1	1.68
3.02	Naphthalene	2	0.21	0.08	0.39	0.04	0.41	0.1
3.02	Nickel	5	29.58	10.7	52.39	7.78	70.58	29.58
3.02	PCB-1248	1	0.154	0.091	0.368	0.009	0.388	0.208
3.02	PCB-1254	3	0.32	0.181	0.745	0.01	0.73	0.32
3.02	PCB-1260	1	0.27	0.183	0.704	0.01	0.79	0.28
3.02	Phenanthrene	3	0.52	0.3	1.23	0.04	1.4	0.47
3.02	Phenol	1	0.28	0.467	0.385	0.22	0.41	0.22
3.02	Potassium	3	1262.24	229.87	1933.45	921.29	1699.79	1262.24
3.02	Pyrene	3	0.501	0.272	1.141	0.076	1.29	0.464
3.02	Selenium	2	0.73	0.28	1.39	0.25	1.4	0.28
3.02	Silver	5	0.3	0.22	0.76	0.02	1.17	0.3

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.02	Sodium	3	49.96	0.14	50.36	49.69	50.15	49.96
3.02	Uranium	3	6.96	4.8	20.99	1.17	16.49	6.96
3.02	Vanadium	3	18.63	1.94	24.29	15.41	22.12	18.63
3.02	Zinc	5	76.88	18.74	116.83	49.74	149.85	76.88
3.03	Acenaphthene	1	0.03	.	.	0.03	0.03	0.03
3.03	Acenaphthylene	1	0.121	.	.	0.121	0.121	0.121
3.03	Aluminum	1	14985.24	.	.	14985.24	14985.24	14985.24
3.03	Anthracene	1	0.042	.	.	0.042	0.042	0.042
3.03	Arsenic	1	5.28	.	.	5.28	5.28	5.28
3.03	Barium	1	120.6	.	.	120.6	120.6	120.6
3.03	Benzo(a)anthracene	1	0.231	.	.	0.231	0.231	0.231
3.03	Benzo(a)pyrene	1	0.159	.	.	0.159	0.159	0.159
3.03	Benzo(b)fluoranthene	1	0.285	.	.	0.285	0.285	0.285
3.03	Benzo(ghi)perylene	1	0.175	.	.	0.175	0.175	0.175
3.03	Benzo(k)fluoranthene	1	0.067	.	.	0.067	0.067	0.067
3.03	Beryllium	1	0.92	.	.	0.92	0.92	0.92
3.03	Boron	1	12	.	.	12	12	12
3.03	Cadmium	1	3.31	.	.	3.31	3.31	3.31
3.03	Calcium	1	2594.28	.	.	2594.28	2594.28	2594.28

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.03	Carbazole	1	0.05	.	.	0.05	0.05	0.05
3.03	Chromium	1	44.36	.	.	44.36	44.36	44.36
3.03	Chrysene	1	0.238	.	.	0.238	0.238	0.238
3.03	Cobalt	1	20.12	.	.	20.12	20.12	20.12
3.03	Copper	1	36.3	.	.	36.3	36.3	36.3
3.03	Dibenz(a,h)anthracene	1	0.036	.	.	0.036	0.036	0.036
3.03	Dibenzofuran	1	0.105	.	.	0.105	0.105	0.105
3.03	Fluoranthene	1	0.479	.	.	0.479	0.479	0.479
3.03	Fluorene	1	0.05	.	.	0.05	0.05	0.05
3.03	Indeno(1,2,3-cd)pyrene	1	0.162	.	.	0.162	0.162	0.162
3.03	Iron	1	24873.89	.	.	24873.89	24873.89	24873.89
3.03	Kjeldahl nitrogen	1	608.8	.	.	608.8	608.8	608.8
3.03	Lead	1	37.73	.	.	37.73	37.73	37.73
3.03	Magnesium	1	2238.63	.	.	2238.63	2238.63	2238.63
3.03	Manganese	1	692.45	.	.	692.45	692.45	692.45
3.03	Mercury	1	6.67	.	.	6.67	6.67	6.67
3.03	Naphthalene	1	0.21	.	.	0.21	0.21	0.21
3.03	Nickel	1	62.44	.	.	62.44	62.44	62.44
3.03	Phenanthrene	1	0.38	.	.	0.38	0.38	0.38
3.03	Phenol	1	0.21	.	.	0.21	0.21	0.21

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.03	Potassium	1	1719.32	.	.	1719.32	1719.32	1719.32
3.03	Pyrene	1	0.296	.	.	0.296	0.296	0.296
3.03	Silver	1	3.32	.	.	3.32	3.32	3.32
3.03	Sodium	1	74.33	.	.	74.33	74.33	74.33
3.03	Total combustible organics (TCO)	1	89231.29	.	.	89231.29	89231.2	989231.29
3.03	Total organic carbon (TOC)	1	16964.8	.	.	16964.8	16964.8	16964.8
3.03	Uranium	1	8.7	.	.	8.7	8.7	8.7
3.03	Vanadium	1	21.52	.	.	21.52	21.52	21.52
3.03	Zinc	1	160.94	.	.	160.94	160.94	160.94
3.04	1,4-Dichlorobenzene	1	0.25	0.016	0.298	0.23	0.28	0.23
3.04	2-Methylnaphthalene	3	0.12	0.07	0.32	0.04	0.26	0.12
3.04	4-Chloro-3-methylphenol	1	0.241	0.027	0.319	0.19	0.281	0.19
3.04	4-Methylphenol	1	0.26	0.011	0.294	0.25	0.28	0.28
3.04	Acenaphthene	3	0.17	0.01	0.2	0.15	0.19	0.17
3.04	Acenaphthylene	2	0.211	0.036	0.315	0.165	0.281	0.176
3.04	Aluminum	3	16118.21	2700.13	24002.55	11183.31	20484.92	16118.21
3.04	Anthracene	1	0.216	0.034	0.315	0.149	0.253	0.149
3.04	Arsenic	3	40.96	26.96	119.69	5.32	93.83	40.96
3.04	Barium	3	195.4	53.77	352.41	104.12	290.28	195.4

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Benzo(a)anthracene	3	0.123	0.023	0.19	0.09	0.167	0.123
3.04	Benzo(a)pyrene	3	0.13	0.045	0.263	0.084	0.221	0.13
3.04	Benzo(b)fluoranthene	3	0.169	0.035	0.272	0.115	0.235	0.169
3.04	Benzo(ghi)perylene	2	0.17	0.044	0.298	0.096	0.247	0.132
3.04	Benzo(k)fluoranthene	1	0.179	0.071	0.386	0.037	0.253	0.037
3.04	Beryllium	3	1.23	0.27	2.02	0.75	1.69	1.23
3.04	Bis(2-ethylhexyl)phthalate	2	0.45	0.258	1.203	0.1	0.95	0.39
3.04	Boron	3	24.25	9.8	52.85	14.2	43.84	24.25
3.04	Butylbenzylphthalate	2	0.22	0.02	0.29	0.17	0.25	0.2
3.04	Cadmium	3	2.39	1.6	7.07	0.79	5.6	2.39
3.04	Calcium	3	4196	1204.27	7712.45	2196	6358.23	4196
3.04	Carbazole	1	0.19	0.06	0.37	0.06	0.25	0.06
3.04	Chromium	3	33.71	4.98	48.26	23.76	39.19	33.71
3.04	Chrysene	3	0.121	0.015	0.163	0.093	0.143	0.121
3.04	Cobalt	3	16.71	0.97	19.55	14.87	18.18	16.71
3.04	Copper	3	52.36	14.02	93.31	24.37	68.03	52.36
3.04	Dibenz(a,h)anthracene	1	0.173	0.077	0.397	0.02	0.253	0.02
3.04	Dibenzofuran	2	0.182	0.057	0.347	0.069	0.247	0.149
3.04	Diethylphthalate	2	0.21	0.06	0.37	0.1	0.28	0.17
3.04	Fluoranthene	3	0.165	0.041	0.284	0.09	0.231	0.165

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Fluorene	2	0.17	0.07	0.37	0.03	0.25	0.13
3.04	Indeno(1,2,3-cd)pyrene	2	0.163	0.049	0.307	0.076	0.247	0.12
3.04	Iron	3	27969.13	4470.86	41023.98	21234.41	36430.46	27969.13
3.04	Kjeldahl nitrogen	3	286.87	77.86	514.23	179.77	438.33	286.87
3.04	Lead	3	25.08	2.02	30.97	21.07	27.43	25.08
3.04	Magnesium	3	1914.53	94.58	2190.71	1732.66	2050.53	1914.53
3.04	Manganese	3	660.01	41.21	780.34	593.54	735.44	660.01
3.04	Mercury	3	12.45	6.66	31.9	4.54	25.69	12.45
3.04	Naphthalene	3	0.16	0.02	0.22	0.13	0.2	0.16
3.04	Nickel	3	44.05	4.94	58.48	34.37	50.61	44.05
3.04	PCB-1248	2	0.032	0.017	0.081	0.011	0.065	0.034
3.04	PCB-1254	3	0.08	0.052	0.23	0.01	0.18	0.08
3.04	PCB-1260	3	0.07	0.03	0.153	0.03	0.13	0.07
3.04	Phenanthrene	3	0.14	0.05	0.28	0.07	0.24	0.14
3.04	Phenol	1	0.19	0.061	0.366	0.07	0.25	0.07
3.04	Potassium	3	1809.08	348.47	2826.6	1218.89	2425.19	1809.08
3.04	Pyrene	3	0.163	0.032	0.258	0.104	0.215	0.163
3.04	Selenium	2	1.03	0.27	1.82	0.74	1.57	1.05
3.04	Silver	3	0.98	0.23	1.64	0.64	1.41	0.98
3.04	Sodium	3	181.92	66.71	376.72	74.69	304.29	181.92

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
3.04	Thallium	2	0.41	0.16	0.87	0.21	0.72	0.38
3.04	Total combustible organics (TCO)	3	56402.65	9807.72	85041.04	41013.54	74630.74	56402.65
3.04	Total organic carbon (TOC)	1	13474.22	.	.	13474.22	13474.22	13474.22
3.04	Uranium	3	8.52	3.86	19.79	3.44	16.1	8.52
3.04	Vanadium	3	37.79	11.83	72.34	18.27	59.14	37.79
3.04	Zinc	3	103.49	6.66	122.95	92.56	115.56	103.49
4.01	2-Methylnaphthalene	2	0.25	0.13	0.62	0.08	0.5	0.13
4.01	Acenaphthene	1	0.28	0.11	0.61	0.12	0.5	0.12
4.01	Aluminum	2	9432.43	2521.42	25352.03	6911.01	11953.85	9432.43
4.01	Anthracene	1	0.282	0.112	0.609	0.124	0.499	0.124
4.01	Arsenic	3	5.38	2.34	12.21	2.27	9.96	5.38
4.01	Barium	2	70.33	8.7	125.28	61.63	79.04	70.33
4.01	Benzo(a)anthracene	1	0.271	0.12	0.621	0.092	0.499	0.092
4.01	Benzo(a)pyrene	1	0.263	0.1257	0.63048	0.0692	0.499	0.069
4.01	Benzo(b)fluoranthene	1	0.279	0.114	0.612	0.116	0.499	0.116
4.01	Benzo(ghi)perylene	1	0.261	0.128	0.634	0.062	0.499	0.062
4.01	Benzo(k)fluoranthene	1	0.294	0.103	0.595	0.172	0.499	0.172
4.01	Beryllium	3	0.64	0.08	0.88	0.5	0.77	0.64
4.01	Bis(2-ethylhexyl)phthalate	3	0.336	0.316	1.259	0.02	0.968	0.336

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.01	Boron	2	6.29	1.17	13.71	5.12	7.47	6.29
4.01	Cadmium	3	0.36	0.15	0.78	0.17	0.65	0.36
4.01	Calcium	2	2201.81	151.08	3155.72	2050.72	2352.89	2201.81
4.01	Carbazole	1	0.17	0.05	0.49	0.12	0.22	0.12
4.01	Chromium	3	16.89	0.9	19.5	15.23	18.31	16.89
4.01	Chrysene	2	0.251	0.127	0.621	0.082	0.499	0.126
4.01	Cobalt	2	7.83	0.8	12.88	7.02	8.63	7.83
4.01	Copper	3	11.6	4.91	25.94	6.24	21.41	11.6
4.01	Dibenz(a,h)anthracene	1	0.281	0.112	0.61	0.123	0.499	0.123
4.01	Dibenzofuran	1	0.259	0.129	0.636	0.055	0.499	0.055
4.01	Fluoranthene	3	0.28	0.105	0.586	0.174	0.489	0.28
4.01	Fluorene	1	0.29	0.11	0.6	0.15	0.5	0.15
4.01	Heptachlor	2	0.03	0.03	0.13	0	0.1	0
4.01	Iron	2	13266.98	1638.76	23613.69	11628.22	14905.74	13266.98
4.01	Kjeldahl nitrogen	2	341.97	72.11	797.25	269.86	414.08	341.97
4.01	Lead	3	13.84	1.35	17.77	11.74	16.35	13.84
4.01	Magnesium	2	1819.82	239.15	3329.77	1580.67	2058.98	1819.82
4.01	Manganese	2	566.15	275.33	2304.52	290.82	841.48	566.15
4.01	Mercury	3	4.56	3.81	15.68	0.33	12.16	4.56
4.01	N-Nitroso-di-n-propylamine	1	0.31	0.094	0.586	0.21	0.499	0.499

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.01	Naphthalene	2	0.19	0.16	0.64	0.02	0.5	0.03
4.01	Nickel	3	16.11	2.25	22.68	11.88	19.54	16.11
4.01	PCB-1254	3	0.15	0.13	0.52	0.01	0.4	0.15
4.01	PCB-1260	1	0.7	0.68	2.69	0.01	2.06	0.01
4.01	Pentachlorophenol	1	1.13	0.64	3.01	0.44	2.42	0.44
4.01	Phenanthrene	3	0.27	0.12	0.61	0.13	0.5	0.27
4.01	Phenol	1	0.3	0.1	0.59	0.18	0.5	0.18
4.01	Potassium	2	1255.17	331.63	3349.02	923.54	1586.8	1255.17
4.01	Pyrene	3	0.274	0.11	0.594	0.156	0.493	0.274
4.01	Selenium	1	0.26	0.06	0.44	0.19	0.38	0.21
4.01	Silver	3	0.64	0.58	2.33	0.05	1.8	0.64
4.01	Sodium	2	36.23	5.21	69.13	31.02	41.44	36.23
4.01	Total combustible organics (TCO)	2	43818.41	2505.17	59635.46	41313.24	46323.59	43818.41
4.01	Total organic carbon (TOC)	2	8983.19	737.75	13641.17	8245.44	9720.94	8983.19
4.01	Uranium	2	0.55	0.16	1.55	0.39	0.71	0.55
4.01	Vanadium	2	13.75	2.13	27.23	11.62	15.89	13.75
4.01	Zinc	3	57.37	5.7	74.02	46.37	65.48	57.37
4.02	2-Methylnaphthalene	1	0.03	.	.	0.03	0.03	0.03
4.02	Aluminum	1	7610	.	.	7610	7610	7610

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.02	Arsenic	1	11.2	.	. .	11.2	11.2	11.2
4.02	Barium	1	107	.	.	107	107	107
4.02	Benzo(b)fluoranthene	1	0.016	.	.	0.016	0.016	0.016
4.02	Beryllium	1	0.67	.	.	0.67	0.67	0.67
4.02	Bis(2-ethylhexyl)phthalate	1	0.058	.	.	0.058	0.058	0.058
4.02	Boron	1	3.5	.	.	3.5	3.5	3.5
4.02	Cadmium	1	0.19	.	.	0.19	0.19	0.19
4.02	Calcium	1	1500	.	.	1500	1500	1500
4.02	Chromium	1	14.3	.	.	14.3	14.3	14.3
4.02	Cobalt	1	8	.	.	8	8	8
4.02	Copper	1	6.3	.	.	6.3	6.3	6.3
4.02	Iron	1	13300	.	.	13300	13300	13300
4.02	Kjeldahl nitrogen	1	394	.	.	394	394	394
4.02	Lead	1	9.7	.	.	9.7	9.7	9.7
4.02	Magnesium	1	1180	.	.	1180	1180	1180
4.02	Manganese	1	665	.	.	665	665	665
4.02	Mercury	1	0.34	.	.	0.34	0.34	0.34
4.02	Naphthalene	1	0.02	.	.	0.02	0.02	0.02
4.02	Nickel	1	13.3	.	.	13.3	13.3	13.3
4.02	Phenanthrene	1	0.02	.	.	0.02	0.02	0.02

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.02	Potassium	1	849	.	.	849	849	849
4.02	Pyrene	1	0.017	.	.	0.017	0.017	0.017
4.02	Silver	1	0.04	.	.	0.04	0.04	0.04
4.02	Sodium	1	21.1	.	.	21.1	21.1	21.1
4.02	Uranium	1	0.31	.	.	0.31	0.31	0.31
4.02	Vanadium	1	12.2	.	.	12.2	12.2	12.2
4.02	Zinc	1	46.8	.	.	46.8	46.8	46.8
4.03	2-Methylnaphthalene	2	0.16	0.07	0.58	0.09	0.23	0.16
4.03	Acenaphthene	1	0.19	0.08	0.68	0.11	0.27	0.11
4.03	Aluminum	2	13152.81	1448.24	22296.65	11704.57	14601.05	13152.81
4.03	Anthracene	1	0.189	0.078	0.681	0.111	0.267	0.111
4.03	Arsenic	2	6.56	1.28	14.63	5.29	7.84	6.56
4.03	Barium	2	116.63	13.01	198.77	103.62	129.64	116.63
4.03	Benzo(a)anthracene	2	0.089	0.023	0.231	0.066	0.111	0.089
4.03	Benzo(a)pyrene	2	0.262	0.221	1.655	0.041	0.482	0.262
4.03	Benzo(b)fluoranthene	2	0.126	0.05	0.445	0.076	0.177	0.126
4.03	Benzo(ghi)perylene	2	0.063	0.026	0.225	0.038	0.089	0.063
4.03	Benzo(k)fluoranthene	2	0.032	0.01	0.094	0.022	0.042	0.032
4.03	Beryllium	2	0.93	0.16	1.92	0.77	1.08	0.93

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.03	Bis(2-ethylhexyl)phthalate	2	0.176	0.108	0.86	0.067	0.284	0.176
4.03	Boron	2	3.75	0.2	5	3.55	3.95	3.75
4.03	Cadmium	2	0.58	0.02	0.71	0.55	0.6	0.58
4.03	Calcium	2	3729.12	629.85	7705.84	3099.27	4358.97	3729.12
4.03	Chromium	2	34.13	2.78	51.67	31.35	36.91	34.13
4.03	Chrysene	2	0.102	0.032	0.302	0.07	0.133	0.102
4.03	Cobalt	2	19.61	5.38	53.59	14.23	24.99	19.61
4.03	Copper	2	29.26	6.63	71.15	22.63	35.9	29.26
4.03	Dibenz(a,h)anthracene	1	0.145	0.122	0.913	0.023	0.267	0.023
4.03	Dibenzofuran	2	0.04	0.017	0.149	0.023	0.057	0.04
4.03	Fluoranthene	2	0.133	0.028	0.307	0.105	0.16	0.133
4.03	Fluorene	1	0.15	0.12	0.9	0.03	0.27	0.03
4.03	Indeno(1,2,3-cd)pyrene	2	0.065	0.024	0.219	0.041	0.089	0.065
4.03	Iron	2	23180.05	2543.58	39239.56	20636.47	25723.62	23180.05
4.03	Kjeldahl nitrogen	2	1216.87	288.86	3040.65	928.01	1505.72	1216.87
4.03	Lead	2	34.38	4.37	61.96	30.01	38.75	34.38
4.03	Magnesium	2	2561.2	162.28	3585.8	2398.92	2723.48	2561.2
4.03	Manganese	2	1451.33	116.68	2188.01	1334.65	1568.01	1451.33
4.03	Mercury	2	3.36	0.16	4.37	3.2	3.52	3.36
4.03	Naphthalene	2	0.08	0.03	0.27	0.06	0.11	0.08

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.03	Nickel	2	35.8	4.38	63.44	31.43	40.18	35.8
4.03	PCB-1254	2	0.05	0.017	0.154	0.03	0.06	0.05
4.03	PCB-1260	2	0.03	0.003	0.051	0.03	0.03	0.03
4.03	Phenanthrene	2	0.15	0.06	0.5	0.09	0.2	0.15
4.03	Potassium	2	1235.07	124.41	2020.57	1110.66	1359.48	1235.07
4.03	Pyrene	2	0.136	0.034	0.349	0.103	0.17	0.136
4.03	Selenium	1	0.65	0.29	2.5	0.35	0.94	0.35
4.03	Silver	2	0.4	0.01	0.48	0.39	0.41	0.4
4.03	Sodium	2	46.19	0.43	48.88	45.77	46.62	46.19
4.03	Uranium	2	1.95	0.23	3.38	1.73	2.18	1.95
4.03	Vanadium	2	24.31	2.85	42.31	21.46	27.16	24.31
4.03	Zinc	2	102.31	12.09	178.63	90.22	114.4	102.31
4.04	2-Methylnaphthalene	11	0.5	0.284	1.01	0.07	3.54	0.22
4.04	Aluminum	11	14502.77	1228.59	16729.55	7370	20260.22	14502.77
4.04	Antimony	1	0.6	0.055	0.7	0.27	0.78	0.41
4.04	Arsenic	12	9.36	0.536	10.33	6.02	12.16	9.36
4.04	Barium	11	123.32	8.219	138.22	76.4	154.28	123.32
4.04	Benzo(a)anthracene	10	0.54	0.29	1.06	0.07	3.54	0.17
4.04	Benzo(a)pyrene	8	1.12	0.25	1.56	0.06	3.54	0.77

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.04	Benzo(b)fluoranthene	11	0.421	0.284	0.93	0.085	3.539	0.137
4.04	Benzo(ghi)perylene	6	0.937	0.27	1.422	0.071	3.539	0.345
4.04	Beryllium	12	1.14	0.05	1.23	0.82	1.42	1.14
4.04	Bis(2-ethylhexyl)phthalate	8	0.528	0.188	0.864	0.07	1.868	0.104
4.04	Boron	11	5.46	0.346	6.09	3.67	7.33	5.46
4.04	Cadmium	12	0.58	0.078	0.73	0.45	1.41	0.58
4.04	Calcium	11	2794.18	120.63	3012.82	1815.76	3313.96	2794.18
4.04	Chromium	12	22.46	2.064	26.17	10.7	33.38	22.46
4.04	Chrysene	8	0.673	0.296	1.206	0.066	3.539	0.113
4.04	Cobalt	11	18.71	1.544	21.5	11.6	26.01	18.71
4.04	Copper	12	37.09	3.173	42.79	18.8	53.42	37.09
4.04	Dibenz(a,h)anthracene	1	1.2	0.22	1.6	0.41	3.54	0.41
4.04	Fluoranthene	11	0.428	0.283	0.936	0.092	3.539	0.145
4.04	Indeno(1,2,3-cd)pyrene	2	1.185	0.223	1.584	0.447	3.539	0.63
4.04	Iron	11	23862.38	1855.06	27224.6	12900	30564.46	23862.38
4.04	Lead	12	30.28	2.32	34.45	14.8	46.38	30.28
4.04	Magnesium	11	2007.91	134.63	2251.92	1270	2697.99	2007.91
4.04	Manganese	11	1408.81	141.42	1665.12	617	2009.59	1408.81
4.04	Mercury	12	2.47	0.33	3.05	1.04	5.56	2.47
4.04	Naphthalene	8	0.73	0.292	1.26	0.05	3.54	0.21

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
4.04	Nickel	12	32.01	1.95	35.51	20.5	40.12	32.01
4.04	PCB-1254	1	0.093	0.08	0.237	0.011	0.975	0.975
4.04	Phenanthrene	11	0.44	0.282	0.94	0.1	3.54	0.15
4.04	Potassium	11	1178.5	118.79	1393.79	478	1744	1178.5
4.04	Pyrene	11	0.442	0.282	0.948	0.099	3.539	0.16
4.04	Selenium	8	0.63	0.114	0.84	0.18	1.24	0.63
4.04	Silver	11	0.39	0.07	0.51	0.2	1	0.39
4.04	Sodium	11	61.57	3.581	68.06	39.72	76.48	61.57
4.04	Uranium	11	1.45	0.128	1.69	0.95	2.21	1.45
4.04	Vanadium	11	25.63	1.706	28.72	15.7	33.4	25.63
4.04	Zinc	12	129.22	6.847	141.51	91.58	156.8	129.22
13	2,4-Dimethylphenol	1	0.232	0.004	0.241	0.22	0.245	0.236
13	Phenol	1	0.248	0.033	0.319	0.174	0.373	0.174
13	PCB-1254	1	0.01	0	0.011	0.009	0.012	0.012
13	Bis(2-ethylhexyl)phthalate	5	0.072	0.008	0.089	0.054	0.094	0.072
13	Anthracene	1	0.246	0.035	0.32	0.163	0.373	0.163
13	Pyrene	4	0.132	0.035	0.207	0.048	0.23	0.107
13	Dibenzofuran	4	0.245	0.063	0.378	0.164	0.491	0.233
13	Benzo(ghi)perylene	4	0.169	0.034	0.241	0.044	0.23	0.154

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
13	Indeno(1,2,3-cd)pyrene	4	0.166	0.034	0.238	0.04	0.23	0.15
13	Benzo(b)fluoranthene	4	0.114	0.037	0.193	0.04	0.245	0.082
13	Fluoranthene	4	0.142	0.041	0.229	0.045	0.236	0.112
13	Benzo(k)fluoranthene	2	0.181	0.067	0.324	0.021	0.373	0.029
13	Acenaphthylene	1	0.245	0.036	0.322	0.149	0.373	0.149
13	Chrysene	4	0.105	0.034	0.176	0.042	0.23	0.073
13	Benzo(a)pyrene	5	0.255	0.087	0.441	0.036	0.441	0.255
13	Dibenz(a,h)anthracene	1	0.246	0.036	0.322	0.152	0.373	0.152
13	Benzo(a)anthracene	3	0.214	0.044	0.308	0.11	0.373	0.155
13	Benzoic acid	2	0.505	0.125	0.772	0.127	0.881	0.249
13	Aluminum	5	11100	675	12500	9620	13400	11100
13	Iron	5	16800	815	18600	14900	19100	16800
13	Lead	5	15.3	0.445	16.2	13.8	16.4	15.3
13	Magnesium	5	1550	56.4	1680	1390	1690	1550
13	Manganese	5	585	122	845	240	905	585
13	Mercury	5	0.941	0.856	2.77	0.037	4.37	0.941
13	Nickel	5	24.2	4.24	33.2	17.5	40	24.2
13	Potassium	5	1260	53.9	1380	1120	1440	1260
13	Silver	5	0.058	0.011	0.082	0.037	0.094	0.058
13	Sodium	5	46.6	4.7	56.6	28.8	55.4	46.6

Table F6.2 (continued)

Reach	Chemical	Detects	Mean	SEM[a]	95% UCL[b]	Min	Max	PLE[c] Mean
13	Arsenic	5	3.23	0.261	3.79	2.56	4.04	3.23
13	Barium	5	97.6	6.67	112	82.8	122	97.6
13	Beryllium	5	0.696	0.04	0.783	0.6	0.834	0.696
13	Boron	5	7.14	1.29	9.89	2.08	9.15	7.14
13	Cadmium	5	0.201	0.055	0.319	0.08	0.376	0.201
13	Chromium	5	16	0.664	17.5	14.1	17.7	16
13	Cobalt	5	14.7	1.21	17.3	11.2	18.3	14.7
13	Copper	5	11	0.923	13	8.89	14.4	11
13	Uranium	5	1.17	0.387	1.99	0.714	2.71	1.17
13	Vanadium	5	17.7	0.754	19.3	16.3	20.1	17.7
13	Zinc	5	61.9	7.48	77.9	45.2	85.3	61.9
13	Calcium	5	1120	47.5	1220	997	1210	1120
13	Selenium	1	0.668	0.433	1.59	0.2	2.4	0.315
13	Acenaphthene	1	0.23	0.004	0.239	0.22	0.245	0.224
13	Di-n-butylphthalate	1	0.27	0.051	0.378	0.114	0.433	0.114
13	Phenanthrene	5	0.189	0.097	0.395	0.039	0.568	0.189
13	Butylbenzylphthalate	4	0.169	0.031	0.236	0.091	0.245	0.15
13	Fluorene	2	0.218	0.017	0.254	0.151	0.245	0.172
13	Carbazole	3	0.203	0.019	0.244	0.151	0.245	0.181
13	Naphthalene	5	0.306	0.236	0.81	0.041	1.25	0.306
13	2-Methylnaphthalene	5	0.423	0.31	1.08	0.052	1.66	0.423

[a] SEM = Standard error of the mean.
[b] UCL = Upper confidence limit.
[c] PLE = Product limit estimate.

Table F6.3. Deep water sediment concentrations within each subreach compared to background concentrations from reach 13 (a reference site)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
1	Arsenic	27.05	11.034	6.46	yes
1	Beryllium	1.377	0.808	1.392	no
1	Cadmium	1.549	0.727	0.402	yes
1	Chromium	45.478	19.604	32	no
1	Copper	36.307	29.087	22	yes
1	Lead	63.455	39.233	30.6	yes
1	Mercury	0.295	0.124	1.882	no
1	Nickel	49.209	23.319	48.4	no
1	Selenium	1.426	0.695	1.336	no
1	Silver	0.661	0.329	0.116	yes
1	Zinc	261.763	122.132	123.8	no
7	Aluminum	21397.67	16408.81	22200	no
7	Antimony	0.47	0.68	NA	yes
7	Arsenic	26.52	63.84	6.46	yes
7	Barium	243.52	158.91	195.2	no
7	Beryllium	1.21	1.52	1.392	yes
7	Boron	8.38	5.76	14.28	no
7	Cadmium	0.57	0.82	0.402	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
7	Calcium	11548.03	6464.11	2240	yes
7	Chromium	36.94	58.61	32	yes
7	Cobalt	14.07	13.47	29.4	no
7	Copper	28.06	37.25	22	yes
7	Iron	41266.26	28935.9	33600	no
7	Lead	24.32	30.09	30.6	no
7	Magnesium	3663.54	2671.74	3100	no
7	Manganese	3080.82	1578.39	1170	yes
7	Mercury	0.17	0.23	1.882	no
7	Nickel	29.73	41.02	48.4	no
7	Potassium	3594.9	2017.27	2520	no
7	Selenium	3.66	9.5	1.336	yes
7	Silver	0.14	0.26	0.116	yes
7	Sodium	72.69	54.28	93.2	no
7	Thallium	0.45	0.57	NA	yes
7	Uranium	0.89	0.78	2.34	no
7	Vanadium	74.02	42.65	35.4	yes
7	Zinc	88.27	103.68	123.8	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
2.04	Aluminum	11744.55	10505.59	22200	no
2.04	Arsenic	9.74	10.21	6.46	yes
2.04	Barium	158.91	132.06	195.2	no
2.04	Beryllium	0.85	0.78	1.392	no
2.04	Boron	4.08	3.87	14.28	no
2.04	Cadmium	0.48	0.48	0.402	yes
2.04	Calcium	10534.86	9133.72	2240	yes
2.04	Chromium	16.77	16.02	32	no
2.04	Cobalt	24.92	20.65	29.4	no
2.04	Copper	12.07	12.32	22	no
2.04	Iron	23895.04	20143.64	33600	no
2.04	Magnesium	4711.06	4147.73	3100	yes
2.04	Manganese	5833.85	4484.22	1170	yes
2.04	Mercury	0.23	0.25	1.882	no
2.04	Nickel	15.93	15.39	48.4	no
2.04	Potassium	963.58	959.97	2520	no
2.04	Selenium	3.07	2.44	1.336	yes
2.04	Silver	0.49	0.55	0.116	yes
2.04	Sodium	40.34	36.08	93.2	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
2.04	Uranium	1.14	0.96	2.34	no
2.04	Vanadium	22.96	20.04	35.4	no
2.04	Zinc	68.7	67.55	123.8	no
3.01	Aluminum	.	6954.67	22200	no
3.01	Arsenic	.	1.31	6.46	no
3.01	Barium	.	59.54	195.2	no
3.01	Beryllium	.	0.53	1.392	no
3.01	Cadmium	.	0.09	0.402	no
3.01	Calcium	.	496.15	2240	no
3.01	Chromium	.	10.26	32	no
3.01	Cobalt	.	9.74	29.4	no
3.01	Copper	.	5.4	22	no
3.01	Iron	.	10908.23	33600	no
3.01	Lead	.	8.48	30.6	no
3.01	Magnesium	.	950.43	3100	no
3.01	Manganese	.	319.04	1170	no
3.01	Mercury	.	0.04	1.882	no
3.01	Nickel	.	10.34	48.4	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.01	Potassium	.	606.14	2520	no
3.01	Silver	.	0.03	0.116	no
3.01	Sodium	.	22.62	93.2	no
3.01	Uranium	.	0.61	2.34	no
3.01	Vanadium	.	10.55	35.4	no
3.01	Zinc	.	28.21	123.8	no
3.02	Aluminum	18173.79	16194.25	22200	no
3.02	Antimony	0.7	0.59	NA	yes
3.02	Arsenic	5.05	6.26	6.46	no
3.02	Barium	116.51	111.61	195.2	no
3.02	Beryllium	0.77	0.81	1.392	no
3.02	Boron	11.36	9.36	14.28	no
3.02	Cadmium	0.91	1.24	0.402	yes
3.02	Calcium	3869.32	3249.54	2240	yes
3.02	Chromium	24.32	28.16	32	no
3.02	Cobalt	22.69	20.28	29.4	no
3.02	Copper	29.39	37.95	22	yes
3.02	Iron	22082.35	20378.28	33600	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.02	Magnesium	2579.14	2121.32	3100	no
3.02	Manganese	1276.96	1056.22	1170	no
3.02	Mercury	4.07	6.1	1.882	yes
3.02	Nickel	52.39	70.58	48.4	yes
3.02	Selenium	1.39	1.4	1.336	yes
3.02	Silver	0.76	1.17	0.116	yes
3.02	Sodium	50.36	50.15	93.2	no
3.02	Uranium	20.99	16.49	2.34	yes
3.02	Vanadium	24.29	22.12	35.4	no
3.02	Zinc	116.83	149.85	123.8	yes
3.03	Aluminum	.	14985.24	22200	no
3.03	Arsenic	.	5.28	6.46	no
3.03	Barium	.	120.6	195.2	no
3.03	Beryllium	.	0.92	1.392	no
3.03	Boron	.	12	14.28	no
3.03	Cadmium	.	3.31	0.402	yes
3.03	Calcium	.	2594.28	2240	yes
3.03	Chromium	.	44.36	32	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.03	Cobalt	.	20.12	29.4	no
3.03	Copper	.	36.3	22	yes
3.03	Iron	.	24873.89	33600	no
3.03	Lead	.	37.73	30.6	yes
3.03	Magnesium	.	2238.63	3100	no
3.03	Manganese	.	692.45	1170	no
3.03	Mercury	.	6.67	1.882	yes
3.03	Nickel	.	62.44	48.4	yes
3.03	Potassium	.	1719.32	2520	no
3.03	Silver	.	3.32	0.116	yes
3.03	Sodium	.	74.33	93.2	no
3.03	Uranium	.	8.7	2.34	yes
3.03	Vanadium	.	21.52	35.4	no
3.03	Zinc	.	160.94	123.8	yes
3.04	Aluminum	24002.55	20484.92	22200	no
3.04	Arsenic	119.69	93.83	6.46	yes
3.04	Barium	352.41	290.28	195.2	yes
3.04	Beryllium	2.02	1.69	1.392	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.04	Boron	52.85	43.84	14.28	yes
3.04	Cadmium	7.07	5.6	0.402	yes
3.04	Calcium	7712.45	6358.23	2240	yes
3.04	Chromium	48.26	39.19	32	yes
3.04	Cobalt	19.55	18.18	29.4	no
3.04	Copper	93.31	68.03	22	yes
3.04	Iron	41023.98	36430.46	33600	yes
3.04	Lead	30.97	27.43	30.6	no
3.04	Magnesium	2190.71	2050.53	3100	no
3.04	Manganese	780.34	735.44	1170	no
3.04	Mercury	31.9	25.69	1.882	yes
3.04	Nickel	58.48	50.61	48.4	yes
3.04	Potassium	2826.6	2425.19	2520	no
3.04	Selenium	1.82	1.57	1.336	yes
3.04	Silver	1.64	1.41	0.116	yes
3.04	Sodium	376.72	304.29	93.2	yes
3.04	Thallium	0.87	0.72	NA	yes
3.04	Uranium	19.79	16.1	2.34	yes
3.04	Vanadium	72.34	59.14	35.4	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
3.04	Zinc	122.95	115.56	123.8	no
4.01	Aluminum	25352.03	11953.85	22200	no
4.01	Arsenic	12.21	9.96	6.46	yes
4.01	Barium	125.28	79.04	195.2	no
4.01	Beryllium	0.88	0.77	1.392	no
4.01	Boron	13.71	7.47	14.28	no
4.01	Cadmium	0.78	0.65	0.402	yes
4.01	Calcium	3155.72	2352.89	2240	yes
4.01	Chromium	19.5	18.31	32	no
4.01	Cobalt	12.88	8.63	29.4	no
4.01	Copper	25.94	21.41	22	no
4.01	Iron	23613.69	14905.74	33600	no
4.01	Lead	17.77	16.35	30.6	no
4.01	Magnesium	3329.77	2058.98	3100	no
4.01	Manganese	2304.52	841.48	1170	no
4.01	Mercury	15.68	12.16	1.882	yes
4.01	Nickel	22.68	19.54	48.4	no
4.01	Potassium	3349.02	1586.8	2520	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.01	Selenium	0.44	0.38	1.336	no
4.01	Silver	2.33	1.8	0.116	yes
4.01	Sodium	69.13	41.44	93.2	no
4.01	Uranium	1.55	0.71	2.34	no
4.01	Vanadium	27.23	15.89	35.4	no
4.01	Zinc	74.02	65.48	123.8	no
4.02	Aluminum	.	7610	22200	no
4.02	Arsenic	.	11.2	6.46	yes
4.02	Barium	.	107	195.2	no
4.02	Beryllium	.	0.67	1.392	no
4.02	Boron	.	3.5	14.28	no
4.02	Cadmium	.	0.19	0.402	no
4.02	Calcium	.	1500	2240	no
4.02	Chromium	.	14.3	32	no
4.02	Cobalt	.	8	29.4	no
4.02	Copper	.	6.3	22	no
4.02	Iron	.	13300	33600	no
4.02	Lead	.	9.7	30.6	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.02	Magnesium	.	1180	3100	no
4.02	Manganese	.	665	1170	no
4.02	Mercury	.	0.34	1.882	no
4.02	Nickel	.	13.3	48.4	no
4.02	Potassium	.	849	2520	no
4.02	Silver	.	0.04	0.116	no
4.02	Sodium	.	21.1	93.2	no
4.02	Uranium	.	0.31	2.34	no
4.02	Vanadium	.	12.2	35.4	no
4.02	Zinc	.	46.8	123.8	no
4.03	Aluminum	22296.65	14601.05	22200	no
4.03	Arsenic	14.63	7.84	6.46	yes
4.03	Barium	198.77	129.64	195.2	no
4.03	Beryllium	1.92	1.08	1.392	no
4.03	Boron	5	3.95	14.28	no
4.03	Cadmium	0.71	0.6	0.402	yes
4.03	Calcium	7705.84	4358.97	2240	yes
4.03	Chromium	51.67	36.91	32	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.03	Cobalt	53.59	24.99	29.4	no
4.03	Copper	71.15	35.9	22	yes
4.03	Iron	39239.56	25723.62	33600	no
4.03	Lead	61.96	38.75	30.6	yes
4.03	Magnesium	3585.8	2723.48	3100	no
4.03	Manganese	2188.01	1568.01	1170	yes
4.03	Mercury	4.37	3.52	1.882	yes
4.03	Nickel	63.44	40.18	48.4	no
4.03	Potassium	2020.57	1359.48	2520	no
4.03	Selenium	2.5	0.94	1.336	no
4.03	Silver	0.48	0.41	0.116	yes
4.03	Sodium	48.88	46.62	93.2	no
4.03	Uranium	3.38	2.18	2.34	no
4.03	Vanadium	42.31	27.16	35.4	no
4.03	Zinc	178.63	114.4	123.8	no
4.04	Aluminum	16729.55	20260.22	22200	no
4.04	Antimony	0.7	0.78	NA	yes
4.04	Arsenic	10.33	12.16	6.46	yes

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.04	Barium	138.22	154.28	195.2	no
4.04	Beryllium	1.23	1.42	1.392	yes
4.04	Boron	6.09	7.33	14.28	no
4.04	Cadmium	0.73	1.41	0.402	yes
4.04	Calcium	3012.82	3313.96	2240	yes
4.04	Chromium	26.17	33.38	32	yes
4.04	Cobalt	21.5	26.01	29.4	no
4.04	Copper	42.79	53.42	22	yes
4.04	Iron	27224.6	30564.46	33600	no
4.04	Lead	34.45	46.38	30.6	yes
4.04	Magnesium	2251.92	2697.99	3100	no
4.04	Manganese	1665.12	2009.59	1170	yes
4.04	Mercury	3.05	5.56	1.882	yes
4.04	Nickel	35.51	40.12	48.4	no
4.04	Potassium	1393.79	1744	2520	no
4.04	Selenium	0.84	1.24	1.336	no
4.04	Silver	0.51	1	0.116	yes
4.04	Sodium	68.06	76.48	93.2	no
4.04	Uranium	1.69	2.21	2.34	no

Table F6.3 (continued)

Subreach	Chemical	Sediment concentration		Mean background X 2 (mg/kg)	Retained?
		95% UCL[a]	Max		
4.04	Vanadium	28.72	33.4	35.4	no
4.04	Zinc	141.51	156.8	123.8	yes

[a] UCL = Upper confidence limit.

Table F6.4. Total contaminant exposure and hazard quotients (HQs) for cottontail rabbits foraging on future spoils within each subreach

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
1	4,4'-DDD	0.385	0.002	0.0048	0.0004	0.0052	0.53	0.01
1	4,4'-DDT	0.385	0.001	0.0048	0.0002	0.005	0.53	0.01
1	Arsenic	11.034	0.013	0.1379	0.0026	0.1405	0.037	3.8
1	Benzo(a)anthracene	0.789	0.005	0.0099	0.001	0.0109	-	-
1	Benzo(k)fluoranthene	0.791	0.002	0.0099	0.0004	0.0103	-	-
1	Cadmium	0.727	0.007	0.0091	0.0014	0.0105	0.005	2.1
1	Chrysene	0.795	0.005	0.0099	0.001	0.0109	-	-
1	Copper	29.087	11.63	0.3636	2.2969	2.6605	11	0.24
1	Fluoranthene	0.821	0.082	0.0103	0.0162	0.0265	-	-
1	Lead	39.233	1.765	0.4904	0.3486	0.839	5.3	0.16
1	Pyrene	0.815	0.013	0.0102	0.0026	0.0128	-	-
1	Silver	0.329	0.017	0.0041	0.0034	0.0075	-	-
7	2-Methylnaphthalene	0.15		0.0019	0	0.0019	-	-
7	4-Nitrophenol	0.82		0.0103	0	0.0103	-	-
7	Antimony	0.47	0.001	0.0059	0.0002	0.0061	0.037	0.16
7	Arsenic	26.52	0.03	0.3315	0.0059	0.3374	0.037	9.12

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
7	Benzo(a)anthracene	0.22	0.001	0.0028	0.0002	0.0029	-	-
7	Benzo(a)pyrene	0.63	0.002	0.0079	0.0004	0.0083	0.296	0.03
7	Benzo(b)fluoranthene	0.05	0	0.0006	0	0.0006	-	-
7	Benzo(ghi)perylene	0.05		0.0006	0	0.0006	-	-
7	Beryllium	1.21	0.001	0.0151	0.0002	0.0153	0.44	0.03
7	Cadmium	0.57	0.005	0.0071	0.001	0.0081	0.005	1.62
7	Calcium	6464.11		80.8014	0	80.8014	-	-
7	Chromium	36.94	0.12	0.4618	0.0237	0.4855	1822.596	0
7	Chrysene	0.04	0	0.0005	0	0.0005	-	-
7	Copper	28.06	11.224	0.3508	2.2167	2.5675	11	0.23
7	Fluoranthene	0.35	0.005	0.0044	0.001	0.0054	-	-
7	Indeno(1,2,3-cd)pyrene	0.04	0	0.0005	0	0.0005	-	-
7	Manganese	1578.39	160	19.7299	31.6	51.3299	58.6	0.88
7	Phenanthrene	0.05	0.0051	0.0006	0.001	0.0016	-	-
7	Pyrene	0.07	0.001	0.0009	0.0002	0.0011	-	-
7	Selenium	3.66	0.095	0.0458	0.0188	0.0645	0.023	2.8
7	Silver	0.14	0.007	0.0018	0.0014	0.0031	-	-
7	Thallium	0.45		0.0056	0	0.0056	0.005	1.13

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
7	Vanadium	42.65	0.047	0.5331	0.0093	0.5424	0.13	4.17
2.04	2-Methylnaphthalene	0.38		0.0048	0	0.0048	-	-
2.04	4-Nitrophenol	2.161		0.027	0	0.027	-	-
2.04	Arsenic	9.74	0.011	0.1218	0.0022	0.1239	0.028	4.43
2.04	Benzo(a)anthracene	0.47	0.003	0.0059	0.0006	0.0065	-	-
2.04	Benzo(a)pyrene	0.5	0.002	0.0063	0.0004	0.0066	0.296	0.02
2.04	Benzo(b)fluoranthene	0.441	0.001	0.0055	0.0002	0.0057	-	-
2.04	Benzo(ghi)perylene	0.444		0.0056	0	0.0056	-	-
2.04	Benzo(k)fluoranthene	0.485	0.001	0.0061	0.0002	0.0063	-	-
2.04	Bis(2-ethylhexyl)phthalate	0.527	0.008	0.0066	0.0016	0.0082	5.4	0
2.04	Cadmium	0.48	0.005	0.006	0.001	0.007	0.005	1.4
2.04	Calcium	9133.72		114.1715	0	114.1715	-	-
2.04	Chrysene	0.445	0.001	0.0056	0.0002	0.0058	-	-
2.04	Di-n-butylphthalate	0.44	0.007	0.0055	0.0014	0.0069	163	0
2.04	Dibenzofuran	0.485	0.078	0.0061	0.0154	0.0215	-	-
2.04	Diethylphthalate	0.49	0.18	0.0061	0.0356	0.0417	1357	0
2.04	Fluoranthene	0.306	0.0153	0.0038	0.003	0.0068	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
2.04	Fluorene	0.47	0.015	0.0059	0.003	0.0088	-	-
2.04	Indeno(1,2,3-cd)pyrene	0.444	0	0.0056	0	0.0056	-	-
2.04	Magnesium	4147.73		51.8466	0	51.8466	-	-
2.04	Manganese	4484.22	450	56.0528	88.875	144.9278	58.6	2.47
2.04	Naphthalene	0.4	0.208	0.005	0.0411	0.0461	-	-
2.04	Pentachlorophenol	2.44	0.012	0.0305	0.0024	0.0329	0.16	0.21
2.04	Phenanthrene	0.3	0.031	0.0038	0.0061	0.0099	-	-
2.04	Pyrene	0.356	0.005	0.0045	0.001	0.0054	-	-
2.04	Selenium	2.44	0.063	0.0305	0.0124	0.0429	0.023	1.87
2.04	Silver	0.49	0.025	0.0061	0.0049	0.0111	-	-
3.01	Benzo(b)fluoranthene	0.162	0.001	0.002	0.0002	0.0022	-	-
3.01	Bis(2-ethylhexyl)phthalate	0.025	0	0.0003	0	0.0003	5.4	0
3.01	Chrysene	0.158	0.001	0.002	0.0002	0.0022	-	-
3.01	Di-n-butylphthalate	0.02	0	0.0003	0	0.0003	163	0
3.01	Diethylphthalate	0.08	0.029	0.001	0.0057	0.0067	1357	0
3.01	Fluoranthene	0.161	0.0081	0.002	0.0016	0.0036	-	-
3.01	Heptachlor	0	0	0	0	0	0.09	0

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.01	Pentachlorophenol	0.15	0.001	0.0019	0.0002	0.0021	0.16	0.01
3.01	Phenanthrene	0.16	0.016	0.002	0.0032	0.0052	-	-
3.01	Pyrene	0.026	0	0.0003	0	0.0003	-	-
3.02	2-Methylnaphthalene	0.38		0.0048	0	0.0048	-	-
3.02	3-Nitroaniline	1119.21		13.9901	0	13.9901	-	-
3.02	Acenaphthene	0.38	0.007	0.0048	0.0014	0.0061	-	-
3.02	Acenaphthylene	0.395	0.103	0.0049	0.0203	0.0253	-	-
3.02	Anthracene	0.382	0.006	0.0048	0.0012	0.006	-	-
3.02	Antimony	0.59	0.002	0.0074	0.0004	0.0078	0.037	0.21
3.02	Benzo(a)anthracene	0.867	0.006	0.0108	0.0012	0.012	-	-
3.02	Benzo(a)pyrene	0.556	0.002	0.007	0.0004	0.0073	0.296	0.02
3.02	Benzo(b)fluoranthene	0.887	0.003	0.0111	0.0006	0.0117	-	-
3.02	Benzo(ghi)perylene	0.387		0.0048	0	0.0048	-	-
3.02	Benzo(k)fluoranthene	0.408	0.001	0.0051	0.0002	0.0053	-	-
3.02	Bis(2-ethylhexyl)phthalate	0.401	0.006	0.005	0.0012	0.0062	5.4	0
3.02	Butylbenzylphthalate	0.41	0.006	0.0051	0.0012	0.0063	-	-
3.02	Cadmium	0.91	0.009	0.0114	0.0018	0.0132	0.005	2.64

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.02	Carbazole	0.22	0.015	0.0028	0.003	0.0057	-	-
3.02	Chrysene	0.686	0.004	0.0086	0.0008	0.0094	-	-
3.02	Copper	29.39	11.756	0.3674	2.3218	2.6892	11	0.24
3.02	Dibenz(a,h)anthracene	0.406	0.001	0.0051	0.0002	0.0053	-	-
3.02	Dibenzofuran	0.389	0.063	0.0049	0.0124	0.0173	-	-
3.02	Fluoranthene	1.214	0.0608	0.0152	0.012	0.0272	-	-
3.02	Fluorene	0.38	0.006	0.0048	0.0012	0.0059	-	-
3.02	Indeno(1,2,3-cd)pyrene	0.404	0.001	0.0051	0.0002	0.0052	-	-
3.02	Mercury	4.07	0.31	0.0509	0.0612	0.1121	0.021	5.34
3.02	Naphthalene	0.39	0.202	0.0049	0.0399	0.0448	-	-
3.02	Nickel	52.39	0.7	0.6549	0.1383	0.7931	26.636	0.03
3.02	PCB-1248	0.368	0.002	0.0046	0.0004	0.005	0.02	0.25
3.02	PCB-1254	0.73	0.003	0.0091	0.0006	0.0097	0.016	0.61
3.02	PCB-1260	0.704	0.001	0.0088	0.0002	0.009	0.016	0.56
3.02	Phenanthrene	1.23	0.126	0.0154	0.0249	0.0403	-	-
3.02	Phenol	0.385	0.58	0.0048	0.1146	0.1194	-	-
3.02	Potassium	1699.79		21.2474	0	21.2474	-	-
3.02	Pyrene	1.141	0.018	0.0143	0.0036	0.0178	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.02	Selenium	1.39	0.009	0.0174	0.0018	0.0192	0.023	0.83
3.02	Silver	0.76	0.039	0.0095	0.0077	0.0172	-	-
3.02	Uranium	16.49	0.1039	0.2061	0.0205	0.2266	0.89	0.25
3.02	Zinc	116.83	12	1.4604	2.37	3.8304	106.546	0.04
3.03	2-Methylnaphthalene	0.35		0.0044	0	0.0044	-	-
3.03	Acenaphthene	0.03	0.001	0.0004	0.0002	0.0006	-	-
3.03	Acenaphthylene	0.121	0.031	0.0015	0.0061	0.0076	-	-
3.03	Anthracene	0.042	0.001	0.0005	0.0002	0.0007	-	-
3.03	Benzo(a)anthracene	0.231	0.001	0.0029	0.0002	0.0031	-	-
3.03	Benzo(a)pyrene	0.159	0.001	0.002	0.0002	0.0022	0.296	0.01
3.03	Benzo(b)fluoranthene	0.285	0.001	0.0036	0.0002	0.0038	-	-
3.03	Benzo(ghi)perylene	0.175		0.0022	0	0.0022	-	-
3.03	Benzo(k)fluoranthene	0.067	0	0.0008	0	0.0008	-	-
3.03	Cadmium	3.31	0.034	0.0414	0.0067	0.0481	0.005	9.62
3.03	Carbazole	0.05	0.003	0.0006	0.0006	0.0012	-	-
3.03	Chromium	44.36	0.14	0.5545	0.0277	0.5822	1822.596	0
3.03	Chrysene	0.238	0.001	0.003	0.0002	0.0032	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.03	Copper	36.3	14.52	0.4538	2.8677	3.3215	11	0.3
3.03	Dibenz(a,h)anthracene	0.036	0	0.0005	0	0.0005	-	-
3.03	Dibenzofuran	0.105	1.69	0.0013	0.3338	0.3351	-	-
3.03	Fluoranthene	0.479	0.024	0.006	0.0047	0.0107	-	-
3.03	Fluorene	0.05	0.001	0.0006	0.0002	0.0008	-	-
3.03	Indeno(1,2,3-cd)pyrene	0.162	0	0.002	0	0.002	-	-
3.03	Lead	37.73	1.698	0.4716	0.3354	0.807	5.3	0.15
3.03	Mercury	6.67	0.5	0.0834	0.0988	0.1821	0.021	8.67
3.03	Naphthalene	0.21	0.109	0.0026	0.0215	0.0242	-	-
3.03	Nickel	62.44	0.83	0.7805	0.1639	0.9444	26.636	0.04
3.03	Phenanthrene	0.38	0.039	0.0048	0.0077	0.0125	-	-
3.03	Phenol	0.21	0.29	0.0026	0.0573	0.0599	-	-
3.03	Pyrene	0.296	0.005	0.0037	0.001	0.0047	-	-
3.03	Silver	3.32		0.0415	0	0.0415	-	-
3.03	Uranium	8.7	0.055	0.1088	0.0109	0.1196	0.89	0.13
3.03	Zinc	160.94	16	2.0118	3.16	5.1718	106.546	0.05
3.04	1,4-Dichlorobenzene	0.28	0.03	0.0035	0.0059	0.0094	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	2-Methylnaphthalene	0.26		0.0033	0	0.0033	-	-
3.04	4-Chloro-3-methylphenol	0.281		0.0035	0	0.0035	-	-
3.04	4-Methylphenol	0.28	0.21	0.0035	0.0415	0.045	-	-
3.04	Acenaphthene	0.19	0.006	0.0024	0.0012	0.0036	-	-
3.04	Acenaphthylene	0.281	0.0731	0.0035	0.0144	0.0179	-	-
3.04	Anthracene	0.253	0.007	0.0032	0.0014	0.0045	-	-
3.04	Arsenic	93.83	0.11	1.1729	0.0217	1.1946	-	-
3.04	Barium	290.28	0.95	3.6285	0.1876	3.8161	3.6	1.06
3.04	Benzo(a)anthracene	0.167	0.001	0.0021	0.0002	0.0023	-	-
3.04	Benzo(a)pyrene	0.221	0.001	0.0028	0.0002	0.003	0.296	0.01
3.04	Benzo(b)fluoranthene	0.235	0.001	0.0029	0.0002	0.0031	-	-
3.04	Benzo(ghi)perylene	0.247		0.0031	0	0.0031	-	-
3.04	Benzo(k)fluoranthene	0.253	0	0.0032	0	0.0032	-	-
3.04	Beryllium	1.69	0.002	0.0211	0.0004	0.0215	0.44	0.05
3.04	Bis(2-ethylhexyl)phthalate	0.95	0.015	0.0119	0.003	0.0148	5.4	0
3.04	Boron	43.84	1.3	0.548	0.2568	0.8048	-	-
3.04	Butylbenzylphthalate	0.25	0.004	0.0031	0.0008	0.0039	-	-
3.04	Cadmium	5.6	0.057	0.07	0.0113	0.0813	0.005	16.2

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	Calcium	6358.23		79.4779	0	79.4779	-	-
3.04	Carbazole	0.25	0.017	0.0031	-0.0034	0.0065	-	-
3.04	Chromium	39.19	0.13	0.4899	0.0257	0.5156	1822.596	0
3.04	Chrysene	0.143	0.001	0.0018	0.0002	0.002	-	-
3.04	Copper	68.03	27.212	0.8504	5.3744	6.2247	11	0.57
3.04	Dibenz(a,h)anthracene	0.253	0	0.0032	0	0.0032	-	-
3.04	Dibenzofuran	0.247	0.0397	0.0031	0.0078	0.0109	-	-
3.04	Diethylphthalate	0.28	0.1	0.0035	0.0198	0.0233	1357	0
3.04	Fluoranthene	0.231	0.01158	0.0029	0.0023	0.0052	-	-
3.04	Fluorene	0.25	0.007	0.0031	0.0014	0.0045	-	-
3.04	Indeno(1,2,3-cd)pyrene	0.247	0.001	0.0031	0.0002	0.0033	-	-
3.04	Mercury	25.69	1.9	0.3211	0.3753	0.6964	0.021	33.16
3.04	Naphthalene	0.2	0.1038	0.0025	0.0205	0.023	-	-
3.04	Nickel	50.61	0.67	0.6326	0.1323	0.765	26.636	0.03
3.04	PCB-1248	0.065	0	0.0008	0	0.0008	0.02	0.04
3.04	PCB-1254	0.18	0.001	0.0023	0.0002	0.0024	0.016	0.15
3.04	PCB-1260	0.13	0	0.0016	0	0.0016	0.016	0.1
3.04	Phenanthrene	0.24	0.02457	0.003	0.0049	0.0079	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
3.04	Phenol	0.25	0.35	0.0031	0.0691	0.0723	-	-
3.04	Pyrene	0.215	0.003	0.0027	0.0006	0.0033	-	-
3.04	Selenium	1.57	0.041	0.0196	0.0081	0.0277	0.023	1.21
3.04	Silver	1.41	0.072	0.0176	0.0142	0.0318	-	-
3.04	Thallium	0.72		0.009	0	0.009	0.005	1.8
3.04	Uranium	16.1	0.101	0.2013	0.0199	0.2212	0.89	0.25
3.04	Vanadium	59.14	0.065	0.7393	0.0128	0.7521	0.13	5.79
4.01	2-Methylnaphthalene	0.5		0.0063	0	0.0063	-	-
4.01	Acenaphthene	0.5	0.016	0.0063	0.0032	0.0094	-	-
4.01	Anthracene	0.499	0.013	0.0062	0.0026	0.0088	-	-
4.01	Arsenic	9.96	0.011	0.1245	0.0022	0.1267	0.028	4.52
4.01	Benzo(a)anthracene	0.499	0.003	0.0062	0.0006	0.0068	-	-
4.01	Benzo(a)pyrene	0.499	0.002	0.0062	0.0004	0.0066	0.296	0.02
4.01	Benzo(b)fluoranthene	0.499	0.002	0.0062	0.0004	0.0066	-	-
4.01	Benzo(ghi)perylene	0.499		0.0062	0	0.0062	-	-
4.01	Benzo(k)fluoranthene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Bis(2-ethylhexyl)phthalate	0.968	0.015	0.0121	0.003	0.0151	5.4	0

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.01	Cadmium	0.65	0.007	0.0081	0.0014	0.0095	0.005	1.9
4.01	Calcium	2352.89		29.4111	0	29.4111	-	-
4.01	Carbazole	0.22	0.015	0.0028	0.003	0.0057	-	-
4.01	Chrysene	0.499	0.002	0.0062	0.0004	0.0066	-	-
4.01	Dibenz(a,h)anthracene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Dibenzofuran	0.499	0.0803	0.0062	0.0159	0.0221	-	-
4.01	Fluoranthene	0.489	0.0245	0.0061	0.0048	0.011	-	-
4.01	Fluorene	0.5	0.015	0.0063	0.003	0.0092	-	-
4.01	Heptachlor	0.1	0	0.0013	0	0.0013	0.533	0
4.01	Indeno(1,2,3-cd)pyrene	0.499	0.001	0.0062	0.0002	0.0064	-	-
4.01	Mercury	12.16	0.92	0.152	0.1817	0.3337	0.021	15.89
4.01	N-Nitroso-di-n-propylamine	0.499	0.79	0.0062	0.156	0.1623	-	-
4.01	Naphthalene	0.5	0.25956	0.0063	0.0513	0.0575	-	-
4.01	PCB-1254	0.4	0.002	0.005	0.0004	0.0054	0.016	0.34
4.01	PCB-1260	2.06	0.003	0.0258	0.0006	0.0263	0.016	1.65
4.01	Pentachlorophenol	2.42	0.011	0.0303	0.0022	0.0324	-	-
4.01	Phenanthrene	0.5	0.0512	0.0063	0.0101	0.0164	-	-
4.01	Phenol	0.5	0.69	0.0063	0.1363	0.1425	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.01	Pyrene	0.493	0.008	0.0062	0.0016	0.0077	-	-
4.01	Silver	1.8	0.091	0.0225	0.018	0.0405	-	-
4.02	2-Methylnaphthalene	0.03		0.0004	0	0.0004	-	-
4.02	Arsenic	11.2	0.013	0.14	0.0026	0.1426	0.028	5.09
4.02	Benzo(b)fluoranthene	0.016	0	0.0002	0	0.0002	-	-
4.02	Bis(2-ethylhexyl)phthalate	0.058	0.001	0.0007	0.0002	0.0009	5.4	0
4.02	Naphthalene	0.02	0.01	0.0003	0.002	0.0022	-	-
4.02	Phenanthrene	0.02	0.002	0.0003	0.0004	0.0006	-	-
4.02	Pyrene	0.017	0	0.0002	0	0.0002	-	-
4.03	2-Methylnaphthalene	0.23		0.0029	0	0.0029	-	-
4.03	Acenaphthene	0.27	0.008	0.0034	0.0016	0.005	-	-
4.03	Anthracene	0.267	0.007	0.0033	0.0014	0.0047	-	-
4.03	Arsenic	7.84	0.009	0.098	0.0018	0.0998	0.028	3.56
4.03	Benzo(a)anthracene	0.111	0.001	0.0014	0.0002	0.0016	-	-
4.03	Benzo(a)pyrene	0.482	0.002	0.006	0.0004	0.0064	0.296	0.02
4.03	Benzo(b)fluoranthene	0.177	0.001	0.0022	0.0002	0.0024	-	-

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.03	Benzo(ghi)perylene	0.089		0.0011	0	0.0011	-	-
4.03	Benzo(k)fluoranthene	0.042	0	0.0005	0	0.0005	-	-
4.03	Bis(2-ethylhexyl)phthalate	0.284	0.004	0.0036	0.0008	0.0043	5.4	0
4.03	Cadmium	0.6	0.006	0.0075	0.0012	0.0087	0.005	1.74
4.03	Calcium	4358.97		54.4871	0	54.4871	-	-
4.03	Chromium	36.91	0.12	0.4614	0.0237	0.4851	1822.596	0
4.03	Chrysene	0.133*	0.001	0.0017	0.0002	0.0019	-	-
4.03	Copper	35.9	14.36	0.4488	2.8361	3.2849	11	0.3
4.03	Dibenz(a,h)anthracene	0.267	0	0.0033	0	0.0033	-	-
4.03	Dibenzofuran	0.057	0.0092	0.0007	0.0018	0.0025	-	-
4.03	Fluoranthene	0.16	0.00802	0.002	0.0016	0.0036	-	-
4.03	Fluorene	0.27	0.008	0.0034	0.0016	0.005	-	-
4.03	Indeno(1,2,3-cd)pyrene	0.089	0	0.0011	0	0.0011	-	-
4.03	Lead	38.75	2.788	0.4844	0.5506	1.035	5.3	0.2
4.03	Manganese	1568.01	160	19.6001	31.6	51.2001	58.6	0.87
4.03	Mercury	3.52	0.27	0.044	0.0533	0.0973	0.021	4.63
4.03	Naphthalene	0.11	0.0571	0.0014	0.0113	0.0127	-	-
4.03	PCB-1254	0.06	0	0.0008	0	0.0008	0.016	0.05

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.03	PCB-1260	0.03	0	0.0004	0	0.0004	0.016	0.02
4.03	Phenanthrene	0.2	0.0205	0.0025	0.004	0.0065	-	-
4.03	Pyrene	0.17	0.003	0.0021	0.0006	0.0027	-	-
4.03	Silver	0.41	0.021	0.0051	0.0041	0.0093	-	-
4.04	2-Methylnaphthalene	1.01		0.0126	0	0.0126	-	-
4.04	Antimony	0.7	0.003	0.0088	0.0006	0.0093	0.037	0.25
4.04	Arsenic	10.33	0.012	0.1291	0.0024	0.1315	0.028	4.7
4.04	Benzo(a)anthracene	1.06	0.002	0.0133	0.0004	0.0136	-	-
4.04	Benzo(a)pyrene	1.56	0.004	0.0195	0.0008	0.0203	0.296	0.07
4.04	Benzo(b)fluoranthene	0.93	0.001	0.0116	0.0002	0.0118	-	-
4.04	Benzo(ghi)perylene	1.422		0.0178	0	0.0178	-	-
4.04	Beryllium	1.23	0.001	0.0154	0.0002	0.0156	0.44	0.04
4.04	Bis(2-ethylhexyl)phthalate	0.864	0.002	0.0108	0.0004	0.0112	5.4	0
4.04	Cadmium	0.73	0.007	0.0091	0.0014	0.0105	0.005	2.1
4.04	Chromium	26.17	0.085	0.3271	0.0168	0.3439	1822.596	0
4.04	Chrysene	1.206	0.001	0.0151	0.0002	0.0153	-	-
4.04	Copper	42.79	17.116	0.5349	3.3804	3.9153	11	0.36

Table F6.4 (continued)

Subreach	Chemical	Sediment (mg/kg)	Modeled vegetation (mg/kg)	Exposure (mg/kg/d)			NOAEL[a] toxicity benchmark	HQ
				Soil	Vegetation	Total		
4.04	Dibenz(a,h)anthracene	1.6	0.007	0.02	0.0014	0.0214	-	-
4.04	Fluoranthene	0.936	0.002	0.0117	0.0004	0.0121	-	-
4.04	Indeno(1,2,3-cd)pyrene	1.584	0.002	0.0198	0.0004	0.0202	-	-
4.04	Lead	34.45	1.55	0.4306	0.3061	0.7368	5.3	0.14
4.04	Manganese	1665.12	170	20.814	33.575	54.389	58.6	0.93
4.04	Mercury	3.05	0.23	0.0381	0.0454	0.0836	0.021	3.98
4.04	Naphthalene	1.26	0.654	0.0158	0.1292	0.1449	-	-
4.04	PCB-1254	0.237	0.004	0.003	0.0008	0.0038	0.016	0.23
4.04	Phenanthrene	0.94	0.096	0.0118	0.019	0.0307	-	-
4.04	Pyrene	0.948	0.003	0.0119	0.0006	0.0124	-	-
4.04	Silver	0.51	0.026	0.0064	0.0051	0.0115	-	-
4.04	Zinc	141.51	14	1.7689	2.765	4.5339	106.546	0.04

[a] NOAEL = No observed adverse effect level.

Table F6.5. Comparison of contaminant concentrations found in deep sediments (future spoil) in each Clinch River reach to screening benchmarks for toxicity to plants

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
1	Arsenic	11.034	10	**1.1**
1	Cadmium	0.727	3	0.24
1	Copper	29.087	100	0.29
1	Lead	39.233	50	0.78
1	Silver	0.329	2	0.16
7	Antimony	0.68	5	0.14
7	Arsenic	63.84	10	**6.38**
7	Beryllium	1.52	10	0.15
7	Cadmium	0.82	3	0.27
7	Chromium	58.61	1	**58.61**
7	Copper	37.25	100	0.37
7	Manganese	1578.39	500	**3.16**
7	Selenium	9.5	1	**9.5**
7	Silver	0.26	2	0.13
7	Thallium	0.57	1	0.57
7	Vanadium	42.65	2	**21.33**
2.04	Arsenic	10.21	10	**1.02**
2.04	Cadmium	0.48	3	0.16
2.04	Di-n-butylphthalate	0.44	200	0
2.04	Manganese	4484.22	500	**8.97**
2.04	Selenium	2.44	1	**2.44**
2.04	Silver	0.55	2	0.28
3.01	Di-n-butylphthalate	0.02	200	0
3.02	Antimony	0.59	5	0.12
3.02	Cadmium	1.24	3	0.41

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
3.02	Copper	37.95	100	0.38
3.02	Mercury	6.1	0.3	**20.33**
3.02	Nickel	70.58	30	**2.35**
3.02	PCB-1248	0.388	40	0.01
3.02	PCB-1254	0.73	40	0.02
3.02	PCB-1260	0.79	40	0.02
3.02	Selenium	1.4	1	**1.4**
3.02	Silver	1.17	2	0.59
3.02	Uranium	16.49	5	**3.3**
3.02	Zinc	149.85	50	**3**
3.03	Cadmium	3.31	3	**1.1**
3.03	Chromium	44.36	1	**44.36**
3.03	Copper	36.3	100	0.36
3.03	Lead	37.73	50	0.75
3.03	Mercury	6.67	0.3	**22.23**
3.03	Nickel	62.44	30	**2.08**
3.03	Silver	3.32	2	**1.66**
3.03	Uranium	8.7	5	**1.74**
3.03	Zinc	160.94	50	**3.22**
3.04	Arsenic	93.83	10	**9.38**
3.04	Barium	290.28	500	0.58
3.04	Beryllium	1.69	10	0.17
3.04	Boron	43.84	0.5	**87.68**
3.04	Cadmium	5.6	3	**1.87**
3.04	Chromium	39.19	1	**39.19**
3.04	Copper	68.03	100	0.68
3.04	Mercury	25.69	0.3	**85.63**
3.04	Nickel	50.61	30	**1.69**
3.04	PCB-1248	0.065	40	0

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
3.04	PCB-1254	0.18	40	0
3.04	PCB-1260	0.13	40	0
3.04	Selenium	1.57	1	**1.57**
3.04	Silver	1.41	2	0.71
3.04	Thallium	0.72	1	0.72
3.04	Uranium	16.1	5	**3.22**
3.04	Vanadium	59.14	2	**29.57**
4.01	Arsenic	9.96	10	**1**
4.01	Cadmium	0.65	3	0.22
4.01	Mercury	12.16	0.3	**40.53**
4.01	PCB-1254	0.4	40	0.01
4.01	PCB-1260	2.06	40	0.05
4.01	Silver	1.8	2	0.9
4.02	Arsenic	11.2	10	**1.12**
4.03	Arsenic	7.84	10	0.78
4.03	Cadmium	0.6	3	0.2
4.03	Chromium	36.91	1	**36.91**
4.03	Copper	35.9	100	0.36
4.03	Lead	38.75	50	0.78
4.03	Manganese	1568.01	500	**3.14**
4.03	Mercury	3.52	0.3	**11.73**
4.03	PCB-1254	0.06	40	0
4.03	PCB-1260	0.03	40	0
4.03	Silver	0.41	2	0.21
4.04	Antimony	0.78	5	0.16
4.04	Arsenic	12.16	10	**1.22**
4.04	Beryllium	1.42	10	0.14

Table F6.5 (continued)

Subreach	Chemical	Sediment concentration maximum (mg/kg)	Phytotoxicity benchmark (mg/kg)	Hazard Quotient
4.04	Cadmium	1.41	3	0.47
4.04	Chromium	33.38	1	**33.38**
4.04	Copper	53.42	100	0.53
4.04	Lead	46.38	50	0.93
4.04	Manganese	2009.59	500	**4.02**
4.04	Mercury	5.56	0.3	**18.53**
4.04	PCB-1254	0.975	40	0.02
4.04	Silver	1	2	0.5
4.04	Zinc	156.8	50	**3.14**

Table F6.6. Estimated NOAELs[a] and LOAELs[a] for the eastern cottontail

Contaminant	Experimental information						Estimated NOAEL (mg/kg/d)	Estimated LOAEL (mg/kg/d)
	Form	Test species	NOAEL (mg/kg/d) and duration	LOAEL (mg/kg/d) and duration	Endpoint	Citation		
Arsenic	As+3	mouse	0.126[b] 3 gen.	1.26 3 gen.	reproduction	Schroeder and Mitchner 1971	0.037	0.37
Barium	chloride	rat	1.98 16 mo.		growth	Perry et al. 1983	3.6	13.2
	chloride			19.8 10 days	mortality	Borzelleca et al. 1988		
Cadmium	salt	rat	0.008 4 gen.	0.01	reproduction	Wills et al. 1981	0.005	0.007
Manganese	oxide	rat	88 gestation	284	reproduction	Laskey et al. 1992	58.6	189.0
Mercury	methyl	rat	0.032 3 gen.	0.16 3 gen.	reproduction	Verschuuren et al. 1976	0.021	0.110
PCBs	Aroclor 1254	oldfield mouse	0.068[b] 12 mo.	0.68 18 mo.	reproduction	McCoy et al. 1995	0.016	0.16
Selenium	selanate	mouse	0.076[b] 3 gen.	0.76 3 gen.	reproduction	Schroeder and Mitchner 1971	0.023	0.22
Thallium	sulfate	rat	0.0074[b] 60 days	0.074 60 days	reproduction	Formigli et al. 1986	0.005	0.05
Vanadium	sodium metavanadate	rat	0.21[b] 60 days	2.1 60 days	reproduction	Domingo et al. 1986	0.13	1.3

[a] NOAEL = No observed adverse effect level; LOAEL = Lowest observed adverse effect level.
[b] Estimated NOAEL: LOAEL to NOAEL factor applied.

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Appendix F7

RADIOLOGICAL RISKS

F7. RADIOLOGICAL RISKS

Estimation of Radiation Doses to Biota

Applicable methodologies for estimating radiation doses to biota have been published by Woodhead (1979), NCRP (1991), Baker and Soldat (1992), and Blaylock et al. (1993). An additional useful reference for general application to external dosimetry was published by Eckerman and Ryman (1992). These references represent the primary source of equations and data used to calculate doses for the exposure scenarios evaluated in this report.

Radiation Dose to Benthic Invertebrates

The highest concentrations of radionuclides in the Clinch River, Poplar Creek, and Watts Bar Reservoir occur in the sediments. The mayfly *Hexagenia bilineata* was chosen as the model organism for evaluating the biological risk to benthic invertebrates. This organism was chosen because it lives almost all of its life cycle in the sediments and is an important part of the natural aquatic food-chain web. Mayfly adults hatch and leave the sediment/water environment after a year of larval development in sediments. An organism which lives imbedded in sediments would be expected to receive a maximized environmental dose. Thus, the mayfly model should represent an upper limit of exposure for the benthic class of invertebrate organisms.

The Blaylock et al. (1993) model for gamma-radiation dose rate to a small organism completely immersed in a mixture of radionuclides in sediments is written:

Immersed in Sediments

$$D_{\gamma}\,(\text{mayfly}) = 18.7 \sum_i E_{\gamma,i}\, n_i\, (1 - \Phi)\, C_{s,I}\ \text{mrad/year} \qquad \text{(F.1)}$$

where

$E_{\gamma,i}$ is the photon energy per disintegration during transition from a higher to a lower energy state (Mev/disintegration),

n_i is the proportion of disintegrations producing a gamma ray (dimensionless),

Φ is the fraction of energy $E_{\gamma,i}$ (dimensionless), absorbed by organism (figures appear in Blaylock et al. 1993),

$C_{s,i}$ is the concentration of the radionuclide in sediments (pCi/gm), and

18.7 is a constant for converting $E_{\gamma,i}$ and $C_{s,i}$ to mrad/year.

The total dose from a mixture of gamma-emitters is calculated by solving equation F.1 for each radionuclide and summing over radionuclides.

The comparable equation for beta-radiation dose is similar but substitutes the average beta energy per disintegration, the proportion of the transitions producing a beta particle of that average energy, and an absorbed fraction for the appropriate beta particles. This equation is written :

Immersed in Sediments

$$D_{\beta}\,(\text{mayfly}) = 18.7 \sum_i E_{\beta,i}\, n_i\, (1 - \Phi)\, C_{s,I}\ \text{mrad/year} \qquad \text{(F.2)}$$

where

$E_{\beta, i}$ is the average energy per disintegration of the beta-particle (Mev/disintegration),

n_i is the proportion of transitions producing a beta-particle of energy $E_{\beta, i}$,

Φ is the absorbed fraction for the appropriate beta particle (figures appear in Blaylock et al. 1993), and

$C_{s, i}$ is the concentration of the beta-emitting radionuclide in sediments (pCi/gm).

The remaining terms are as defined in equation F.1, and the total beta dose from a mixture of radionuclides is obtained by summation similar to the treatment of gamma emitters.

The dose from internally deposited radionuclides was neglected because mayfly larvae attain an average size of only 25 mm before hatching, and the resulting dose would be a minor fraction of the dose received from immersion in an extensive body of sediments.

Radiation Dose to Epibenthic Fish

The epibenthic fish size is represented by the large fish model in Blaylock et al. (1993). Dimensions of this organism are 1 kg for mass and an ellipsoid geometry of 45 cm x 8.7 cm x 4.9 cm for the major and two minor axes, respectively. Carp (*Cyprinus*), suckers and redhorse (*Moxastoma*), and catfish (*Ictalurus* and *Ameiurus*) are all representative epibenthic fish for Poplar Creek, the Clinch River, and Watts Bar Lake. The exposure scenario assumes that the model fish lies in close proximity to the bottom sediments and is irradiated by radionuclides in the bottom sediments, water, and by ingestion of natural food contaminated with radionuclides. Because self-absorption/shielding of beta particle emissions originating from water and sediment immersion results in a negligible contribution to absorbed dose to the large fish, the beta-emission component of dose was not included in the total dose rate for epibenthic fish. The dose components included are gamma dose rates from water immersion and sediment surface, and beta and gamma dose rates from internally deposited radionuclides.

The equation for estimating the dose received from immersion in water and exposure to sediments is the same as equation F.1, but the appropriate concentration (pCi/gm) of each radionuclide in water is used for the water immersion dose. The absorbed fractions for the large fish model of Blaylock et al. (1993) are used for the gamma-ray energies of the radionuclides under consideration. It is also appropriate to multiply the dose from sediments by 0.5 because the model fish is above an infinite plane of sediments and not immersed. With these considerations noted, the dose rate to a large epibenthic fish from exposure to gamma-emitting radionuclides in sediments is written:

Above Sediments

$$D_\gamma \text{ (fish)} = 9.4 \sum_i E_{\gamma,i}\, n_i\, (1 - \Phi)\, C_{s,i} \text{ mrad/year} \qquad \text{(F.3)}$$

where the terms have been defined above.

Estimation of the immersion dose rate to a large fish is also derived from equation F.1, with the concentration of the gamma-emitting radionuclides in water, $C_{w, i}$ (pCi/gm), used in place of the sediment concentration. The equation is written:

Immersed in Water

$$D_\gamma \text{ (fish)} = 18.7 \sum_i E_{\gamma,i}\, n_i\, (1 - \Phi)\, C_{w,i} \text{ mrad/year} \qquad \text{(F.4)}$$

where the terms have been defined above.

Internal dose from food-chain intake results from both gamma and beta emitters deposited in tissues. This deposition can be determined from direct measurements of radionuclides in fish tissues, or estimated by multiplying a bioaccumulation factor times the concentration of the radionuclide in water under equilibrium conditions. Bioaccumulation factors are listed by Blaylock et al. (1993). The equation for calculating the dose to an epibenthic fish from internal exposure to gamma-emitting radionuclides is written:

Ingestion

$$D_\gamma \text{ (fish)} = 18.7 \sum_i E_{\gamma,i}\, n_i\, \Phi\, C_{f,i} \text{ mrad/year} \qquad \text{(F.5)}$$

where

$C_{f,i}$ is the concentration of radionuclide i in the fish (pCi/gm) and may be calculated from the relationship

$$C_{f,i} = C_{w,i} \times \text{Bioaccumulation Factor for radionuclide i in fish pCi/gm} \qquad \text{(F.6)}$$

The dose rate to an epibenthic fish from beta-emitting radionuclides deposited internally is written

Ingestion

$$D_\beta \text{ (fish)} = 18.7 \sum_i E_{\beta,i}\, n_i\, C_{f,i} \text{ mrad/year} \qquad \text{(F.7)}$$

where the terms have been defined above.

Radiation Dose to Great Blue Heron

The great blue heron is one of the most common large water birds that completes its entire life cycle in the environs of Poplar Creek, the Clinch River, and Watts Bar Reservoir. Adults stand over one meter tall and they spend most of their time wading at the water's edge catching fish for food. The internal dose to a heron from consumption of fish contaminated with radionuclides in their flesh was treated in detail by Baker and Soldat (1992). Their model for internal dose rate to a heron, D (heron), is written:

Ingestion

$$D \text{ (heron)} = \sum_i b_i\, U_h\, f_{l,i}\, E_{h,i}\, (1 - \exp - \lambda_{h,i}\, T_e) / m_h\, \lambda_{h,i} \text{ rad/day} \qquad \text{(F.8)}$$

where

b_i = body burden concentration of radionuclide i in fish eaten by heron (Ci/kg),
U_h = rate of consumption of fish by heron (0.42 kg/day),
$f_{l,i}$ = uptake fraction of radionuclide i in heron (dimensionless),
m_h = mass of heron (2.39 kg),
$\lambda_{h,i}$ = effective decay constant of radionuclide i in heron (1/days),
T_e = time of exposure (365 days), and
$E_{h,i}$ = 5.12E10+4 $\epsilon_{h,i}$, where $\epsilon_{h,i}$ is the effective absorbed energy (kg - rad/Ci - day).

Simplification of the constants in equation F.8 and conversion of b_i to units of pCi/gm gives the equation for mrad/year which is written:

Ingestion

$$D\ (heron) = 3.28 \sum_i b_i f_{l,i} \epsilon_{h,i} (1 - exp - 365\ \lambda_{h,i})/\lambda_{h,i}\ mrad/year \qquad (F.9)$$

Baker and Soldat (1992) also discuss the exposure a heron could receive from immersion in contaminated water and direct irradiation from a contaminated shoreline. They recommend an exposure-time reduction factor of 0.3 for both modes of exposure, e. g., the heron receives external exposure from sediments approximately one-third of the time, external exposure from contaminated water one-third of the time, and no external exposure the remaining one-third of the time. This is in contrast to internal exposure which continues uninterrupted after ingestion of contaminated fish. The immersion dose coefficient is also further reduced by 0.5 because the heron's body is above the water, not immersed. They also recommend a dose reduction factor of 0.2 for shoreline roughness and height of the heron above the shoreline. The equations to estimate external dose rates, D (heron), received by the model great blue heron were calculated with the dose coefficients published by Eckerman and Ryman (1992) and are written:

Shoreline

$$D\ (heron) = 1.87E+17 \times 0.3 \times 0.2 \sum_i K_i\ C_{s,i}\ \ mrad/year \qquad (F.10)$$

where

1.87E+17 = a conversion factor to change Sv/sec per Bq/kg to mrad/year per Ci/kg,

0.3 = dose rate reduction factor to account for the fraction of the time the heron is exposed to shoreline radiation,

0.2 = dose rate reduction factor to account for shoreline roughness, and

Above Water

$$D\ (heron) = 1.17E+17 \times 0.3 \times 0.5 \sum_i K_i\ C_{w,I} mrad/year \qquad (F.11)$$

where

0.3 = dose reduction factor to account for the fraction of the time the heron is exposed above water, and

0.5 = dose reduction factor to account for one-half of an immersion dose.

Radiation Dose to Rabbit

If dredged sediments were deposited on land and allowed to support vegetation through secondary plant succession, or cultivated and planted in forage, the area would attract animal life as a habitat providing food and shelter. This section provides the biological assumptions (USEPA 1993) and dosimetry equations for a model rabbit that might inhabit an hypothetical area of dredged sediments.

Assume that the rabbit is a typical eastern cottontail (*Sylvilagus floridanus*) and lives its entire life cycle on the area covered by sediments. The model rabbit is assumed to weigh 1.2 kg, consume 0.24 kg of fresh vegetation per day, and spend time above and below ground in equal proportion. Equation F.8 from Baker and Soldat (1992) can be modified to compute the dose rate to a rabbit that consumes radioactive vegetation growing on the dredged sediments contaminated with radionuclides. These changes result in redefining b_i and U_h in terms of vegetation consumption by a rabbit, and the mass in

the denominator is changed to 1.2 kg. The internal dose rate, D (rabbit), from ingestion is written:

Ingestion

$$D(\text{rabbit}) = \sum_i p_i U_r f_{1,i} E_{r,i} (1 - \exp - \lambda_{r,i} T_e) m_r \lambda_{r,i} \text{ rad/day} \quad \text{(F.12)}$$

where

p_i = concentration of radionuclide i in vegetation eaten by rabbit (Ci/kg),
U_r = rate of consumption of vegetation by rabbit (0.24 kg/day),
m_r = mass of rabbit (1.2 kg),

and the remainder of the terms are similar to equation F.8, but are defined as pertaining to a rabbit. Simplification of the constants in equation F.12 and conversion of the dose rate units to mrad/year gives

Ingestion

$$D(\text{rabbit}) = 3.73 \sum_i p_i f_{1,i} \epsilon_{r,i} (1 - \exp - 365\lambda_{r,i}) / \lambda_{r,I} \text{ mrad/year} \quad \text{(F.13)}$$

It is also possible for the model rabbit to receive an additional internal dose from inhalation of dust originating from the radioactively contaminated sediments. The expression for estimating intake of radionuclide i by inhalation, $I_{r,i}$, is written:

$$I_{r,i} = C_{s,i} \times A \times B_r \text{ Ci/day} \quad \text{(F.14)}$$

where

$C_{s,i}$ = concentration of radionuclide i in sediments (Ci/kg),
A = mass of sediment dust per volume of air breathed (1E10-4 kg/m^3), and
B_r = inhalation rate of rabbit (0.63 m^3/day).

The value for mass of respirable dust, A, is an arbitrary choice that is believed to be conservative. After substitution of constants for inhalation rate and mass of sediment dust per volume of air breathed, the final form of the equation for dose rate (mrad/year) due to inhalation is written:

Inhalation

$$D(\text{rabbit}) = 0.944 \sum_i C_{s,i} f_{1,i} \epsilon_{r,i} (1 - \exp - 365\lambda_{r,i}) / \lambda_{r,I} \text{ mrad/day} \quad \text{(F.15)}$$

The total dose rate to the rabbit from internal irradiation is obtained by summation of equations F.13 and F.15.

The external dose rates received by the model rabbit were calculated with the dose coefficients published by Eckerman and Ryman (1992). The equation for calculating the external dose rate, D (rabbit), from residence on a landscape contaminated by radioactive sediments is written:

Above Soil

$$D(\text{rabbit}) = 1.87\text{E+17} \times 0.5 \sum_i K_i C_{s,i} \text{ mrad/year} \quad \text{(F.16)}$$

where

0.5 = dose rate reduction factor to account for the fraction of the total time that is spent above ground.

The equation for calculating external dose rate received by a model rabbit residing in a burrow dug in contaminated soil is written:

Burrow in Soil

$$D\,(\text{rabbit}) = 3.74E{+}17 \times 0.5 \sum_i K_i C_{s,i}\ \text{mrad/year} \qquad \text{(F.17)}$$

This mode of exposure was treated as immersion in a continuous soil medium and is simply twice the dose rate from exposure above the soil surface. The dose rate reduction factor in this equation accounts for the other one-half of the rabbit's time.

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Appendix F8

ANALYSIS OF FISH AND BENTHIC INVERTEBRATE COMMUNITIES

F8. ANALYSIS OF FISH AND BENTHIC INVERTEBRATE COMMUNITIES

F8.1 FISH COMMUNITIES

F8.1.1 Data Sets

The Vital Signs Monitoring Program was initiated in 1990 and was expanded in 1991 to include 24 reservoirs. Data for 1991 through 1993 were available for this risk assessment. As explained in Brown et al. (1993), three "zones" were sampled within each reservoir: (1) the forebay immediately upstream of the dam, (2) the transition zone, defined as the mid-reservoir region where the water changes from free-flowing to quiescent, and (3) the inflow or headwater region of the reservoir. Sampling occurred in the fall of each year. Within each zone, two types of samples were collected. Ten electrofishing transects were sampled during daylight hours in the shoreline. Habitats were sampled "in proportion to their occurrence in the zone." Where conditions permitted, 12 overnight gill net samples (100-ft nets with five 20-ft panels with mesh sizes ranging from 1 to 3 inches) were collected in each reservoir zone. Because these two gears have greatly different efficiencies at collecting fish of different species and sizes, separate analyses were performed for each gear type.

TVA survey data were obtained in electronic form from TVA's Norris Laboratory. For purposes of our analysis, data for the 13 mainstem reservoirs were aggregated in two different ways. To examine between-year differences, the 13 mainstem reservoirs were grouped (Table F8.1) into seven river systems: French Broad, Tennessee (split into eastern and western portions), Watts Bar, Clinch, Powell, and Holston. Alternatively, the differences among the thirteen reservoirs were examined by combining the three years of data for each gear type.

A similar survey for the Clinch River Remedial Investigation was conducted in 1992 and 1993. This survey included three sites in the Clinch River arm of Watts Bar Reservoir, three sites in Poplar Creek Embayment, and one site each in lower Watts Bar, the Tennessee River arm of Watts Bar, and Norris Reservoir. Sampling techniques were the same as those used in the Vital Signs Monitoring Program, except that only five electrofishing runs and five gill net sets were performed during each sampling period.

F8.1.2 Methods

We used discriminant analysis to explore the differences in fish community composition of river systems and reservoirs. Our objective was to determine whether the samples of fish communities from Watts Bar reservoir are unusual when compared with the communities of ecologically similar reservoirs in the Tennessee Valley. Discriminant analysis answers this question by identifying the equations that best predict the source of a sample based on its species composition. If this discriminant function is unable to predict the source well, then it is safe to say that we do not have enough statistical power to detect differences in community composition between reservoirs.

Because the variables used to discriminate must be interval, we used species abundances as our discriminating variables. When abundances are used as discriminating variables, species or age classes with inherently high spatial or temporal variability can create spurious variation that hides meaningful patterns in the data. Gizzard shad, threadfin shad, and young-of-the-year fish in general are both abundant and highly variable. To address concerns about seasonal and spatial variation in abundances,

Table F8.1. Assignment of fish sampling stations[a] to river systems

	River System						
Reservoir	Clinch	Powell	French Broad	Holston	Tennessee	Watts Bar	West Tennessee
Norris	F, T, T1	T2					
Douglas			I, FB, T				
Cherokee				I, FB, T			
Melton Hill	I, FB, T						
Ft. Loudon					I, FB, T		
Watts Bar						I1, I2, FB, T	
Chicka-mauga					I, FB, T		
Nickajack					I, FB, T		
Pickwick							I, FB, T
Wilson.							I, FB
Wheeler							I, FB, T
Gunters-ville							I, FB, T
Kentucky							I, FB, T

[a]Station codes: I = reservoir inflow; T = reservoir transition zone; F = reservoir forebay.

we removed gizzard and threadfin shad and young-of-the-year fish of all species from the analysis. Abundances of all remaining species were log-transformed to improve normality. Finally, we used a stepwise procedure to remove species that failed to contribute to (or reduced) our ability to discriminate between samples from different rivers. In the stepwise analysis, we retained species that contributed an additional 5% to the canonical correlation between species and sections of river.

We used a canonical discriminant method that assumes that the species abundances are drawn from a multivariate normal distribution with a common underlying variance- covariance matrix. This assumption is needed mainly for the hypothesis testing, and not for the development of discriminant functions and classification. Although the assumption can never be definitively tested, more replicates in each river section would have enabled us to compare the variance-covariance matrices of the samples. We used cross-validation to compare the parametric and non-parametric methods of discriminant

analysis provided in SAS's DISCRIM procedure. We found that the ability of the discriminant functions to classify observations was better for the multivariate normal, parametric method.

We chose canonical discriminant analysis for several reasons. First, canonical discriminant functions allowed us to visualize the reservoirs in a reduced-dimensional space. Second, the pooled-within river correlation matrix allowed us to identify species making the largest contributions to differences in fish communities between rivers. Finally, canonical discriminant functions are numerically stable in comparison to other multivariate methods because colinearity between species is less influential.

Klecka (1980) describes these functions as linear combinations of the discriminating variables (species abundances):

$$f_{km} = u_0 + u_1X_{1km} + u_2X_{2km} + \ldots + u_pX_{pkm},$$

where f_{km} is the weight of sample m in group (e.g., reservoir) k on the canonical discriminant function; X_{ikm} is the abundance of species i for sample m in group k. The coefficients u_i of the first canonical discriminant function are calculated such that they maximize the distances among all group means. The coefficients of subsequent functions also maximize distances among group means, but with the added constraint that they are orthogonal to each other. In general, the classification resulting from canonical discriminant analysis with all axes is the same as that from regular discriminant analysis except when colinearity exists among river sections. In that situation, the canonical analysis is more robust (Klecka 1980).

To classify a sample, a posterior probability of group (river) membership is estimated. The probability depends on two factors: the fraction of samples in each group and the Mahalanobis distance from the sample to each group centroid (mean). The sample is assigned to the group with the highest posterior probability. The Mahalanobis distance measure accounts for correlations between species abundances and scales species according the variability in their observed abundances. It turns out that the squared Mahalanobis distance between group means has a chi-square distribution with p-degrees of freedom. This fact allows us to test the significance of distances between reservoirs or groups of reservoirs. The Mahalanobis distance (in species abundance space) between all pairs of river sections can be observed in the results. In general, the river with the lowest cross-validation error rate shows the most unique species composition.

Multivariate methods provide useful graphical summaries and rigorous statistical criteria for determining differences between sites. However, because they incorporate both species composition and relative abundance, they are subject to errors introduced by spatial and temporal variability of species distributions (due to weather or current changes or simple random fluctuations) that can introduce extraneous variability and either mask real differences between sites or introduce spurious differences. Therefore, a second analysis based only on species richness, defined as number of species per sample, was performed.

We evaluated differences in species richness among reservoirs. The data set included all species, but excluded young-of-the-year. The counts were transformed using a square-root transformation to obtain approximately normal distributions of richness. Differences among reservoirs and among locations within the Clinch River/Poplar Creek system were evaluated using SAS statistical software (GLM procedure). Mean transformed fish species richness values were compared using the Waller-Duncan k-ratio t-test. We used a k-ratio of 100. This ratio reflects the ratio of type 1 to type 2 error and roughly corresponds to an alpha level of 0.05. This method minimizes the Bayes risk under additive loss, where the loss function is the difference between means. It assumes that the population means have a

normal prior distribution with unknown variance, the log of which has a uniform prior distribution. For the Vital Signs data, richness values were square-root-transformed prior to analysis. For the Clinch River/Poplar Creek data, no transformation was necessary.

Results: TVA Vital Signs Data

Results of the canonical discriminant analyses of the Vital Signs data are summarized in Figures F8.1 through F8.10. Figures F8.1 through F8.6 display results by year, with the reservoirs grouped into river systems. Figures F8.7 and F8.8 display comparisons among individual reservoirs, with all years combined. Only the first two canonical variables are plotted for each data set. However, plots of the third through sixth variates show similar patterns to those of the first two. The symbols represent individual sample values; the names of the river systems are printed at the location of the mean value for each system. For all three years, and both gear types, all river systems were significantly different from all other systems. A regional pattern is, however, apparent. Regardless of year or gear type, West Tennessee, Tennessee, and Watts Bar cluster together near the center of the plots. The reservoirs comprising all three of these systems are mainstem, run-of-the-river reservoirs. The most extreme reservoirs for each year and gear type are always storage reservoirs located in the upper Tennessee Valley: the Powell (Powell Arm of Norris Lake) in 1991, the Holston (Cherokee Lake) and French Broad (Douglas Lake) in 1992, and the Powell, Clinch, Holston, and French Broad in 1993. Results for the combined-years analysis were similar. For the gill net data (Fig. F8.7), the three storage reservoirs stand out as distinctly different from the run-of-the-river reservoirs. For the electrofishing data (Fig. F8.8), mean canonical variate values for all reservoirs upstream from Watts Bar reservoir are located on the left side of the plot; means for all reservoirs downstream from Watts Bar are located on the right side.

We also looked at "loadings," i.e., the contribution of different fish species to the discriminant functions. Species with high (>0.30) correlations with any of the first four canonical variables for each year and data set are listed in Table F8.2. The most obvious visible pattern in this table is that different sets of species are important for each gear type. For the electrofishing data, more than half of the species with high loadings are centrarchids (largemouth bass, spotted bass, readear/redbreast/longear sunfish, white/black crappie). These species are, for the most part, non migratory. They have relatively small home ranges and are relatively invulnerable to static gear such as gill nets. In contrast, relatively few of the species making major contributions to the discriminant functions for the gill net data sets are centrarchids. Fish with high loadings in the gill net are predominantly mobile species such as quillback, striped bass, and suckers. The only species that is frequently important for both gear types is the walleye, a species that is found predominantly in the upper Tennessee Valley because of temperature and spawning habitat requirements.

Figure 6.8 and 6.9 (Sect. 6, Vol. 1) show results of the species richness analysis for all three years and both gear types. Melton Hill Reservoir is either lowest or next-to-lowest in species richness for every year and gear type. Results of the Waller-Duncan K-ratio test show that Melton Hill falls into the lowest significance group for every data set except the 1993 gill net data. For most data sets, the reservoirs with the highest species richness are located in the lower Tennessee Valley (i.e., below Chattanooga): Kentucky Reservoir in the 1992 and 1993 gill net data and the 1991 and 1992 electrofishing data; Wilson Reservoir in the 1991 gill net data, and Nickajack Reservoir in the 1993 electrofishing data. Among the seven upper-valley reservoirs (Chickamauga, Watts Bar, Ft. Loudon, Melton Hill, Norris, Cherokee, and Douglas), Chickamauga Reservoir had the highest species richness in every data set except the 1991 gill net and 1992 electrofishing data; Watts Bar reservoir ranked first or second among the upper valley reservoirs for every data set except the 1992 gillnet and the 1991 electofishing. The different gear types give substantially different results. For the gill net data, no geographic trends are apparent except that Melton Hill is the lowest. For the electrofishing data, Chickamauga Reservoir is the only upper valley reservoir in the top half of the rankings; the five reservoirs upstream

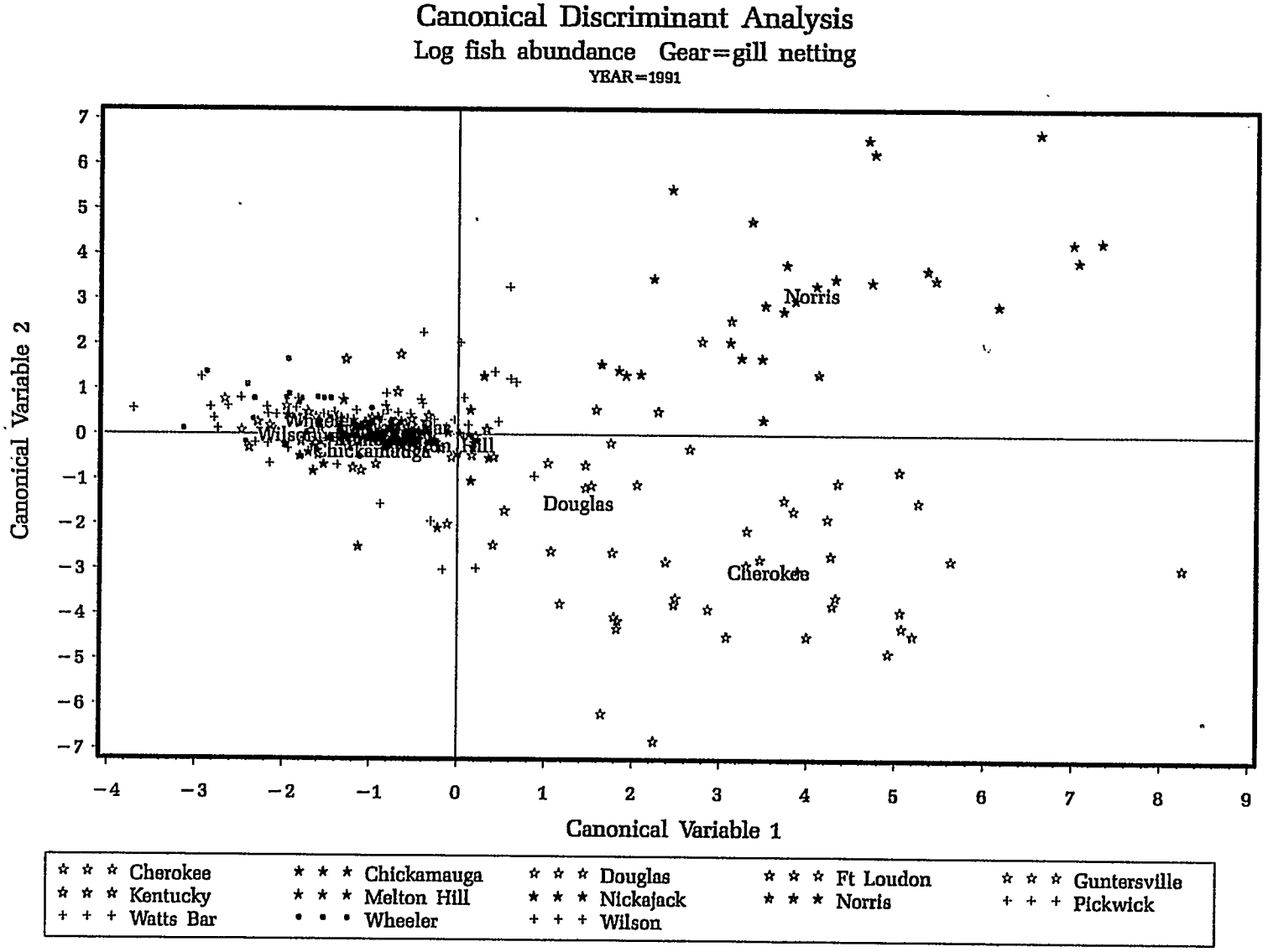


Fig. F8.1. Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1991; grouped by drainage.

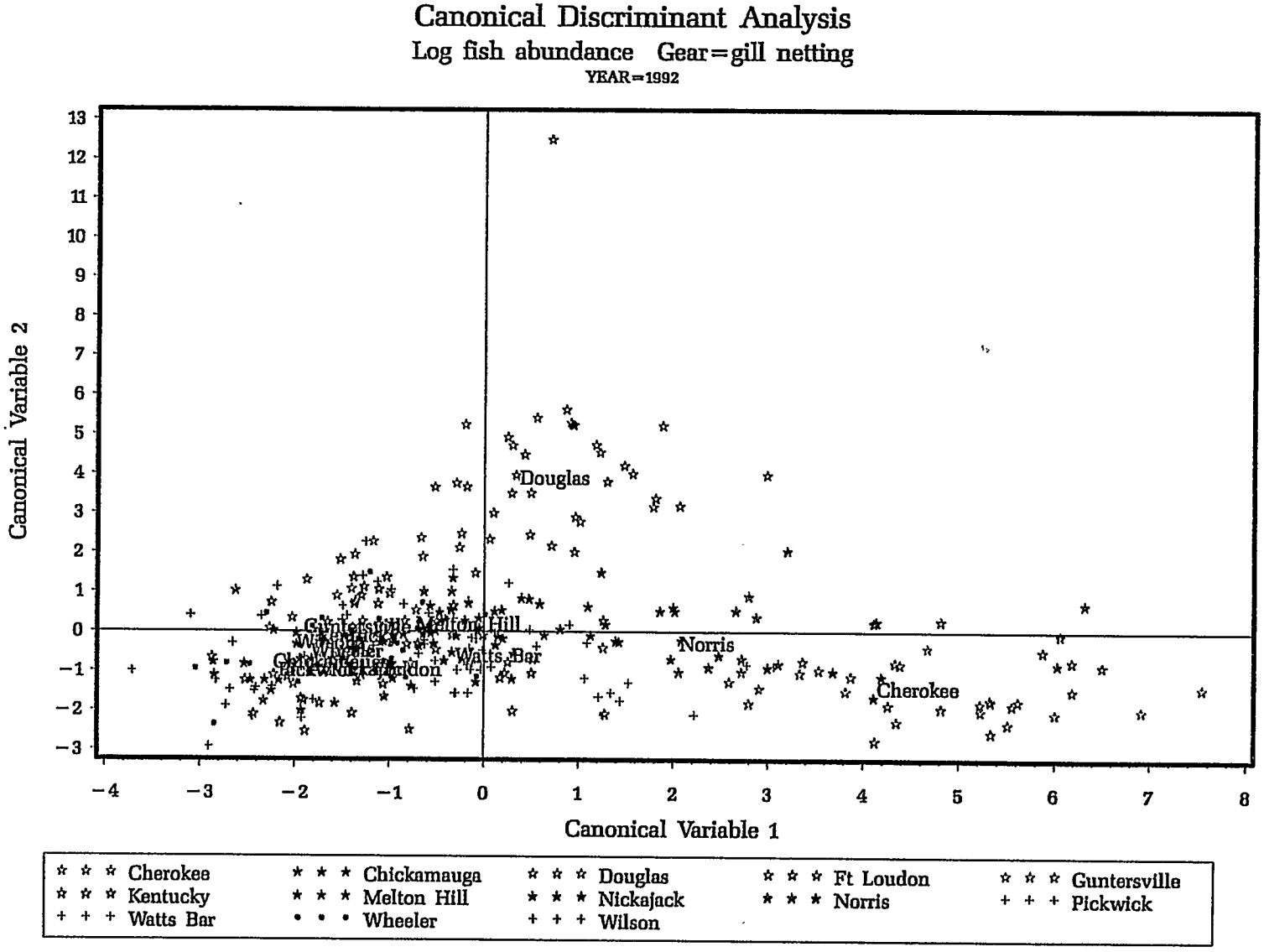


Fig. F8.2. Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1992; grouped by drainage.

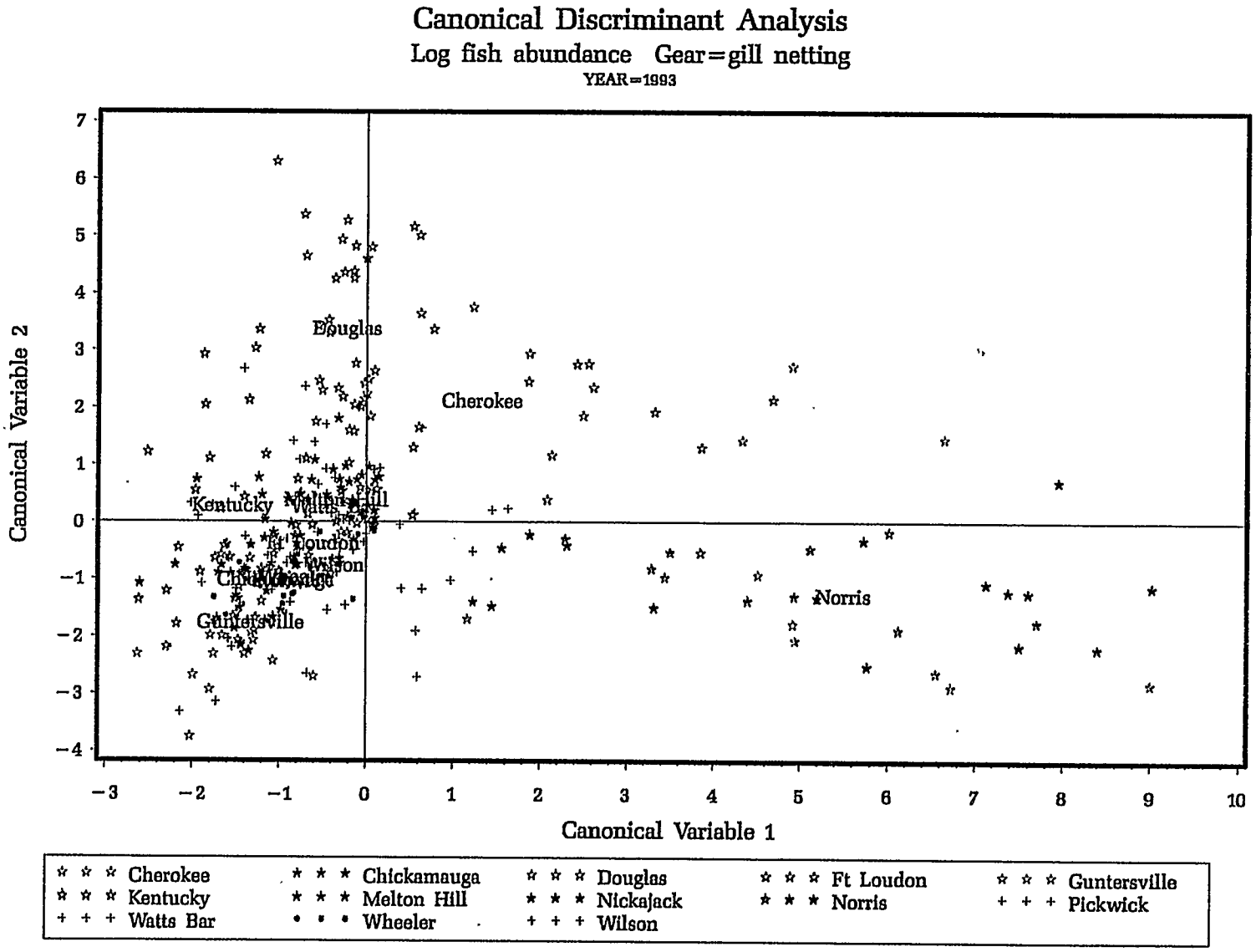


Fig. F8.3. Canonical discriminant analysis of the fish communities sampled by gill netting in Tennessee Valley reservoirs in 1993; grouped by drainage.

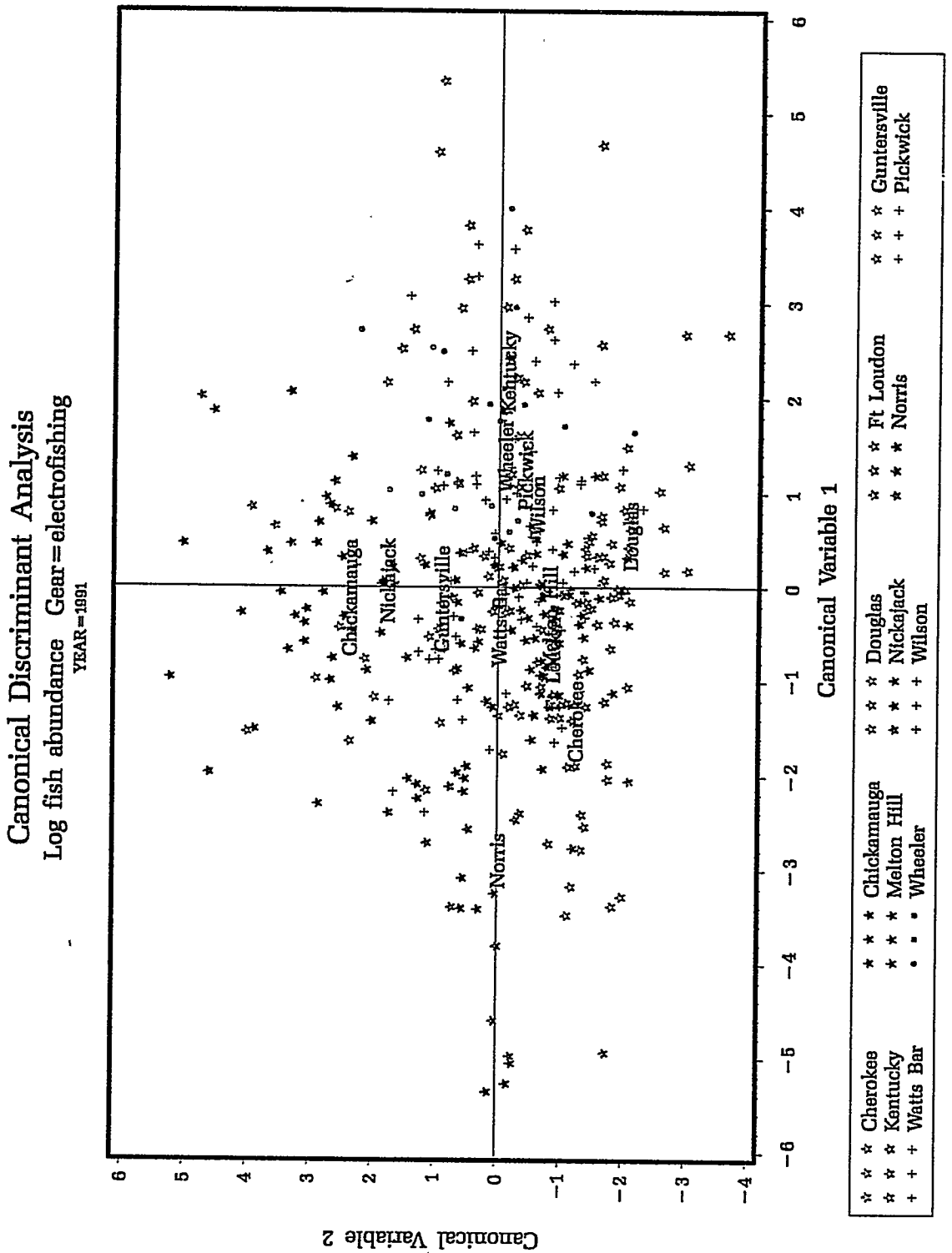


Fig. F8.4. Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1991; grouped by drainage.

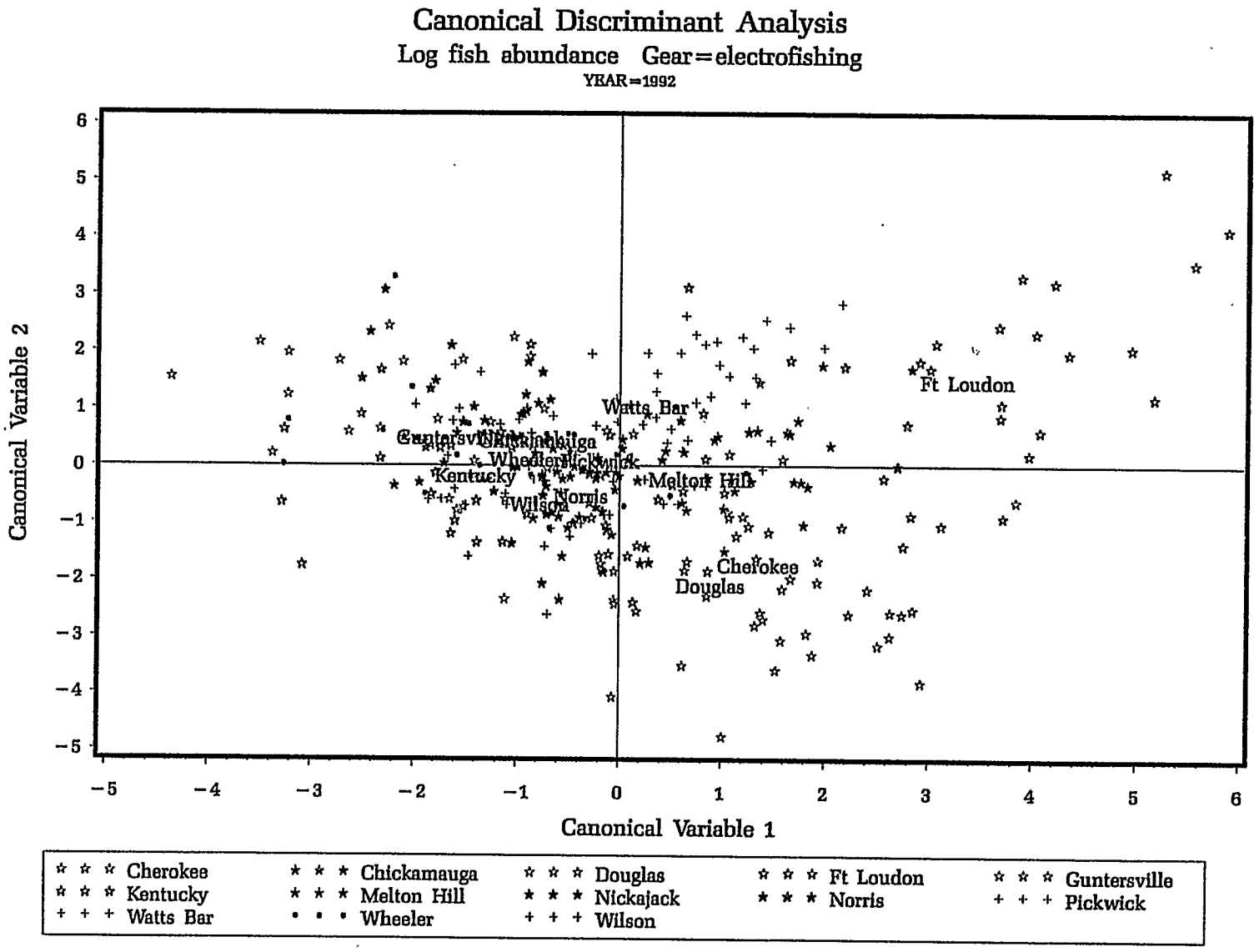


Fig. F8.5. Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1992; grouped by drainage.

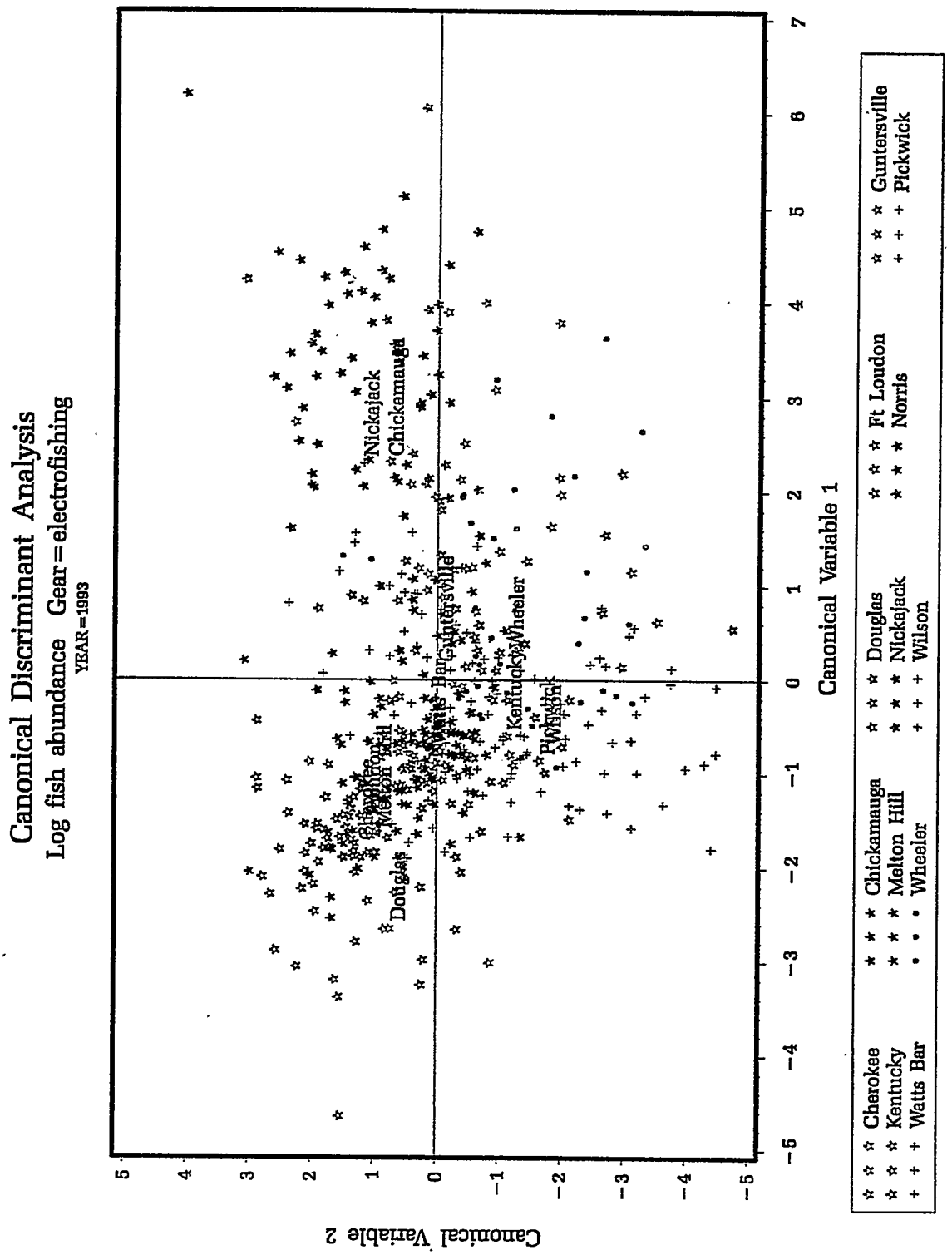


Fig. F8.6. Canonical discriminant analysis of the fish communities sampled by electrofishing in Tennessee Valley reservoirs in 1993; grouped by drainage.

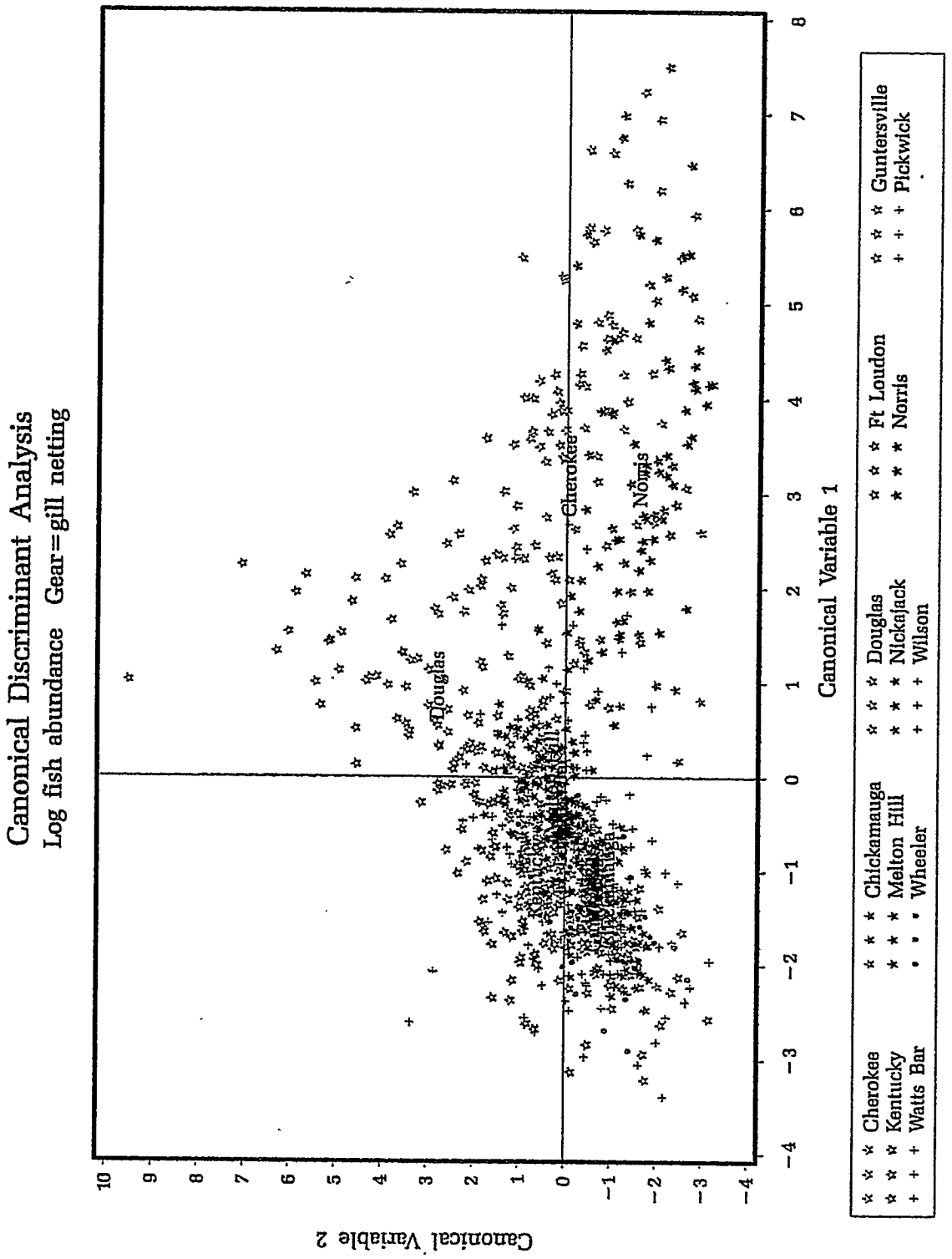


Fig. F8.7. Canonical discriminant analysis of the fish communities sampled by gill netting in individual Tennessee Valley reservoirs.

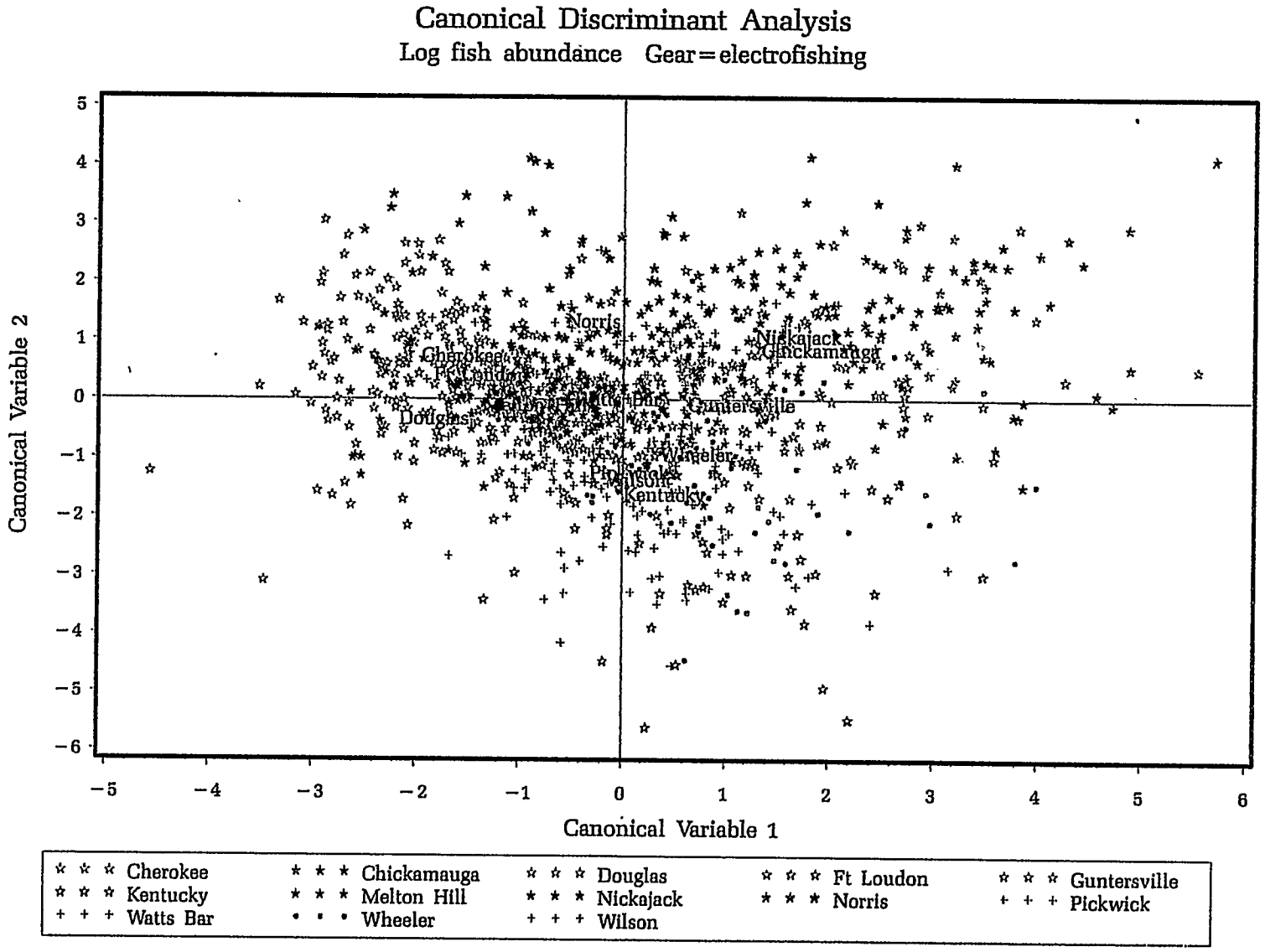


Fig. F8.8. Canonical discriminant analysis of the fish communities sampled by electrofishing in individual Tennessee Valley reservoirs.

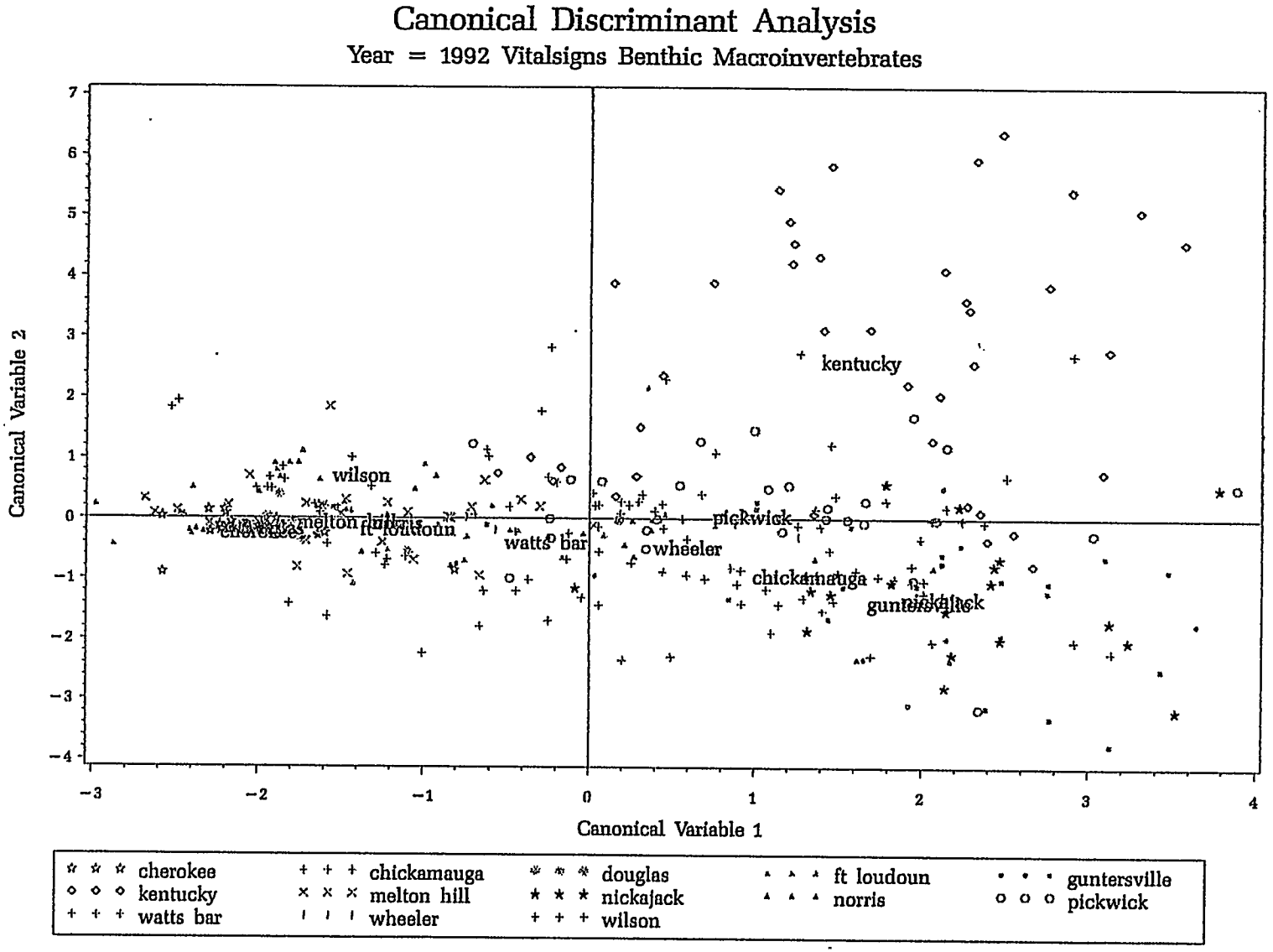


Fig. F8.9. Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1992.

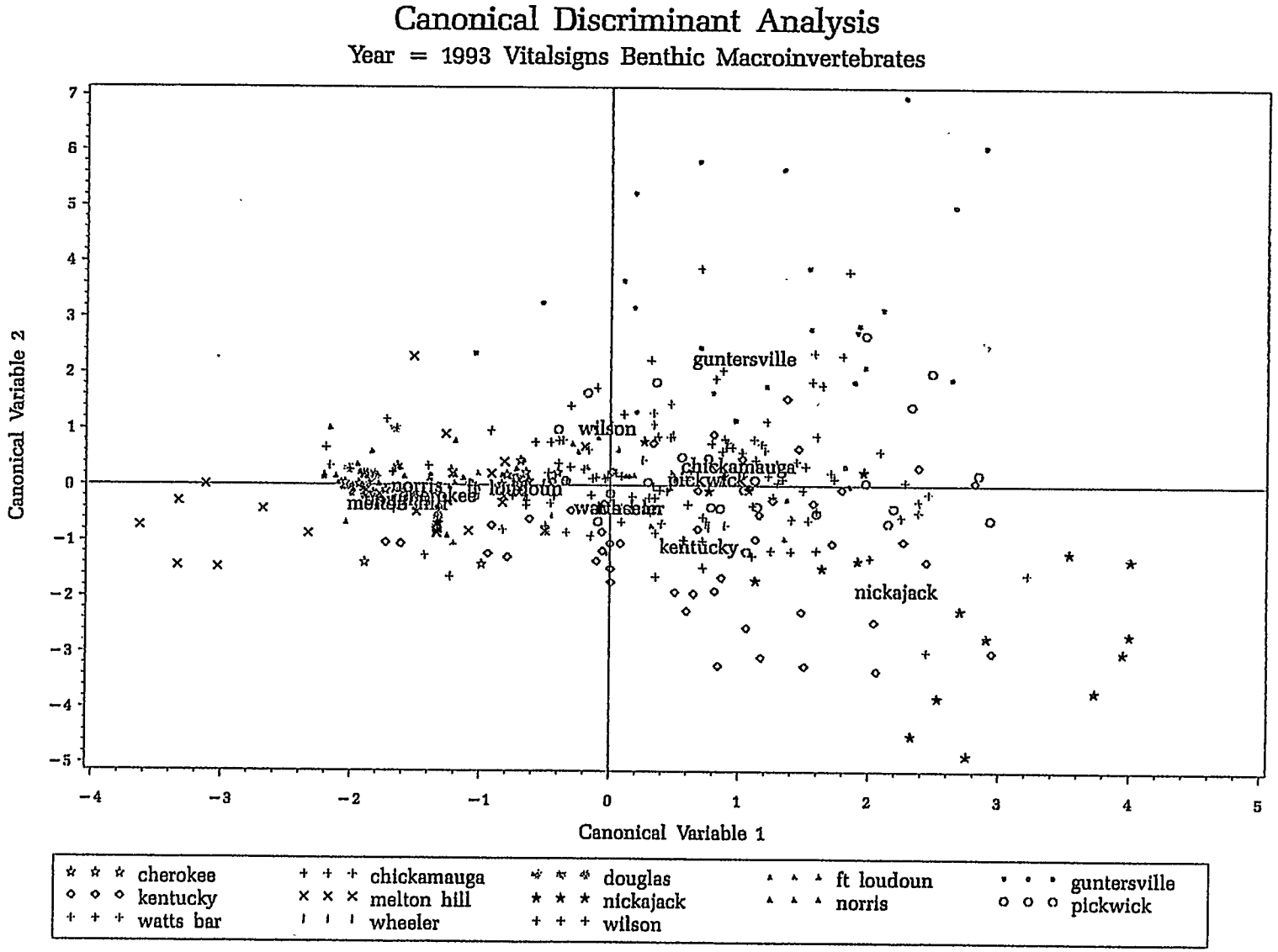


Fig. F8.10. Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1993.

Table F8.2. Species having high contributions to canonical variable values

Data set	1st canonical variable	2nd canonical variable	3rd canonical variable	4th canonical variable
1991 electrofish	walleye black redhorse shorthead red-horse	redbreast sunfish white bass redear sunfish largemouth bass spotted bass	redear sunfish spotted sucker	redbreast sunfish
1991 gill net	quillback silver redhorse walleye	quillback silver redhorse	quillback white crappie river carp-sucker	white crappie walleye black crappie
1992 electrofish	largemouth bass redear sunfish warmouth	redbreast sunfish longear sunfish northern hog-sucker	redear sunfish redbreast sun-fish black redhorse	warmouth white bass
1992 gill net	walleye striped bass quillback skipjack herring	sauger striped bass silver redhorse	walleye sauger silver redhorse black redhorse	walleye striped bass blue catfish
1993 electrofish	spotted bass white bass white crappie redear sunfish	largemouth bass spotted bass longear sunfish common carp redbreast sun-fish northern hog-sucker	white bass longear sunfish black redhorse walleye	white crappie walleye redbreast sun-fish redear sunfish, northern hog-sucker
1993 gill net	skipjack herring river carp-sucker walleye striped bass yellow bass quillback	silver redhorse river carp-sucker walleye	silver redhorse golden red-horse white crappie sauger	striped bass

Table F8.2 (continued)

Electrofish - across years	spotted bass common carp redear sunfish emerald shiner	spotted bass longear sunfish redbreast sunfish	common carp redbreast sunfish shorthead redhorse	largemouth bass white bass
Gill net - across years	quillback striped bass walleye skipjack herring	walleye white crappie sauger	striped bass sauger	goldeye

from Watts Bar are the five lowest in species richness. Cherokee, Norris, Douglas, and Melton Hill are all significantly lower in richness than every other reservoir in the valley.

Parallel analyses were performed for total fish density (individuals per sample), however, it was found that abundance and richness were highly correlated for every data set. Similar patterns were evident, e.g., Melton hill consistently the lowest in fish density, lower valley reservoirs in general with higher fish density than upper valley reservoirs, and Watts Bar intermediate within the valley as a whole.

In spite of the clear differences in species composition between gear types, the overall pattern in river system similarity is the same for both: storage reservoirs are different from run-of-the-river reservoirs, and upper Tennessee Valley reservoirs are different from lower Tennessee Valley reservoirs. These large-scale geographic patterns must be considered when valley-wide ecological data are used to evaluate the condition of a single reservoir. The implication of this result for the Clinch Arm BERA is that no single reservoir can serve as a comparable reference ecosystem. Although upstream reservoirs such as Norris can be presumed unaffected by DOE-derived contaminants, they are ecologically distinct for a variety of reasons unrelated to contaminants.

F8.2 BENTHIC MACROINVERTEBRATES

Sources of data

The Vital Signs Monitoring Program sampled three zones within each reservoir (Masters 1993): (1) the forebay immediately upstream of the dam, (2) the transition zone, defined as the mid-reservoir region where the water changes from free-flowing to quiescent, and (3) the inflow or headwater region of the reservoir. At each sampling location, ten evenly-spaced samples were collected along the length of a line-of-sight transect across the reservoir. Most samples were taken using a Ponar dredge, however, a Peterson dredge was used where rocky substrates predominated.

Vital Signs data were obtained in electronic form from T. McDonough at the TVA Norris laboratory. Planktonic organisms, fish eggs, and terrestrial species recorded during sample sorting were deleted from the data sets prior to analysis. Counts of individual species were standardized to a per m^2 basis. To check for errors introduced during these procedures, total densities (numbers per m^2) per site were calculated and compared to values in TVA's published tables. In the original data sets, organisms were classified "to the lowest practical taxon" (Masters 1993). This classification scheme produced an

excessively large number of total taxa (142–189). For our analysis TVA's taxa were grouped into families, resulting in a more manageable 37–56 unique taxa. Each dredge haul was treated as a separate sample, yielding a total of ten samples per transect. All data were log-transformed prior to analysis. To maximize the ecological similarity of the sites being compared, only mainstem reservoirs (Kentucky, Pickwick, Wilson, Wheeler, Guntersville, Nickajack, Chickamauga, Watts Bar, Ft. Loudoun, Melton Hill, Norris, Douglas, and Cherokee) were included in the analysis.

ER-program data were obtained through Task 9 of the TVA/DOE Interagency Agreement supporting the Clinch River Remedial Investigation. These data were collected at eight stations in the Clinch River between Melton Hill Dam and Watts Bar Reservoir and at eight stations in Poplar Creek. These data were collected using the same sampling protocol used for the Vital Signs data and were transformed prior to analysis using the procedures described above.

For the Vital Signs data, canonical discriminant analyses were performed for each year to identify general patterns in community structure across reservoirs (Sect. 6.2.2.4). A similar analysis was performed for the ER Program data. However, due to sample size considerations it was necessary to combine the sampling sites into three groups: Clinch River above Poplar Creek (CRM-21, CRM-19, and CRM-14.5), Poplar Creek (PCM-8, PCM-7, PCM-6, PCM-5.1, PCM-4.3, PCM-2.9, PCM 1., and PCM-0.5), and Clinch River below Poplar Creek (CRM-11, CRM-9, CRM-6.7, and CRM-3.7). Station CRM-1.0, which is located in the Clinch arm of Watts Bar Reservoir, was considered ecologically distinct from the other Clinch River sites and deleted from this analysis.

One-way analysis of variance was used to investigate patterns in species richness, defined as number of species per m^2. For the Vital Signs data, richness values were square-root-transformed prior to analysis. For the near-field data, no transformation was necessary. For both analyses the ANOVA was followed by a multiple-comparison test (the Ryan-Einot-Gabriel-Welsch Multiple Range Test from the SAS GLM Procedure) to determine significant differences between reservoirs.

A multiple linear regression analysis was performed to investigate the influence of physical characteristics and contaminant concentrations on benthic community structure in the Clinch River and in Poplar Creek. Physical and Chemical data were obtained from the CRRI database.

Benthic community measures investigated using multiple linear regression analysis included (1) total species richness and dominance, and (2) the abundance of five major invertebrate taxa: Tubificidae, Chironomidae, Diptera, Hexagenia, and Veneroida. Explanatory variables investigated included depth; substrate characteristics (% sand, % silt, % clay, % gravel); total organic carbon (TOC); total PCBs, total PAH, and toxic metals in whole sediment samples; and ammonia nitrogen and aluminum in sediment pore water. The metals investigated included arsenic, cadmium, chromium, lead, mercury, nickel, silver, and zinc. Because all of these were found to be highly intercorrelated in initial exploratory analyses, the concentrations of the individual metals (except for aluminum) were combined into toxic units (TUs) prior to analysis. TUs were calculated by normalizing the concentration of each metal to the ER-L for that metal and then summing the TUs for all metals.

The Clinch River and Poplar Creek data were analyzed separately. First, a step-wise backward elimination procedure was used to develop explanatory models for each of the community measures. In most of these analyses toxic metals were eliminated. PCB and PAH were retained in most of the final models. However, because of the high collinearity of many of the explanatory variables (especially correlations between PAH, PCB, and TOC), it was not possible to identify influences of specific contaminants on benthic macroinvertebrate communities. To provide a more robust analysis (i.e., one less influenced by collinearity among variables), a two-stage analysis of physical vs. chemical effects

was performed. In the first stage, a regression model that included only the physical variables (i.e., depth, % sand % silt, % clay, % gravel, and TOC) was developed. No backward elimination step was performed. In the second stage, a model that included both the physical variables and all of the chemical variables was developed. The significance of the influence of the chemical variables on the benthic community measures was tested by comparing the residual sums of squares for the two models.

Results: Vital Signs Data

Results of the canonical discriminant analyses of the Vital Signs data are summarized in figures F8.9 through F8.11. Only the first two canonical variables are plotted. The symbols represent individual sample values; the names of the reservoirs are printed at the location of the mean value for each reservoir. For all three years, most reservoirs were significantly different from all other reservoirs. Some regional patterns are, however, apparent. Reservoirs in the upper Tennessee Valley (Watts Bar, Ft. Loudoun, Melton Hill, Norris, Douglas, and Cherokee), were more similar to each other than to reservoirs below Watts Bar Dam. Figures F8.9 through F8.11 show that these six reservoirs consistently tend to cluster together. Reservoirs in the lower Tennessee Valley (Wilson, Wheeler, Pickwick, Chicamauga, Guntersville, Nickajack, and Kentucky) are more dispersed and therefore more distinct from each other. Benthic invertebrate families with high (>0.30) correlations with any of the first four canonical variables for each data set are listed in Table F8.3. The Corbiculidae and the Hydropsychidae are the most important families in terms of contributions to the discriminant functions. The Corbiculidae have high correlations with the first canonical variable for all three Vital Signs data sets; the Hydropsychidae contribute to the first canonical variable in two of the three data sets and contribute to one or more of the canonical variables in every data set. Of the 56 benthic macroinvertebrate families represented in the Vital Signs data, only 18 are highly correlated with any canonical variable. Note that, in spite of their high abundance and frequent numerical dominance, Tubificidae and Chironomidae are relatively unimportant contributors to the discriminant analyses for the Vital Signs data. Hence, Tennessee Valley reservoirs in general differ more with respect to rarer taxa than with respect to the abundant and widely-distributed tubificids and chironomids.

Results from the richness analyses were similar. The six upper reservoirs were consistently in the lower half of the data set when ranked by species richness. Melton Hill in 1992 is the only exception to this pattern. Douglas Lake had the lowest species richness in every year and Ft. Loudoun, Cherokee, and Douglas were among the four lowest in two of the three years. Watts Bar Reservoir ranked 8th in richness in 1992, 12th in 1993, and 9th in 1994. Figure F8.12 displays this pattern graphically. A general decline in richness is evident above Nickajack Reservoir in 1992 and 1994 and above Chickamauga Reservoir in 1993.

Figure F8.13 shows that these trends are generally unrelated to benthic invertebrate density (#/m^2), for which the only apparent trend is consistently lower density in Douglas and Cherokee Reservoirs. Figures F8.14 and F8.15, however, show a visible trend in species composition: the per cent of tubificids and, to a lesser extent, chironomids in benthic samples is higher in the upper reservoirs than in the lower reservoirs.

Thus, valley-wide benthic invertebrate communities show a consistent geographic pattern: reservoirs in the lower Tennessee Valley are relatively diverse and distinct from each other; reservoirs in the upper valley are less diverse and more similar to each other.

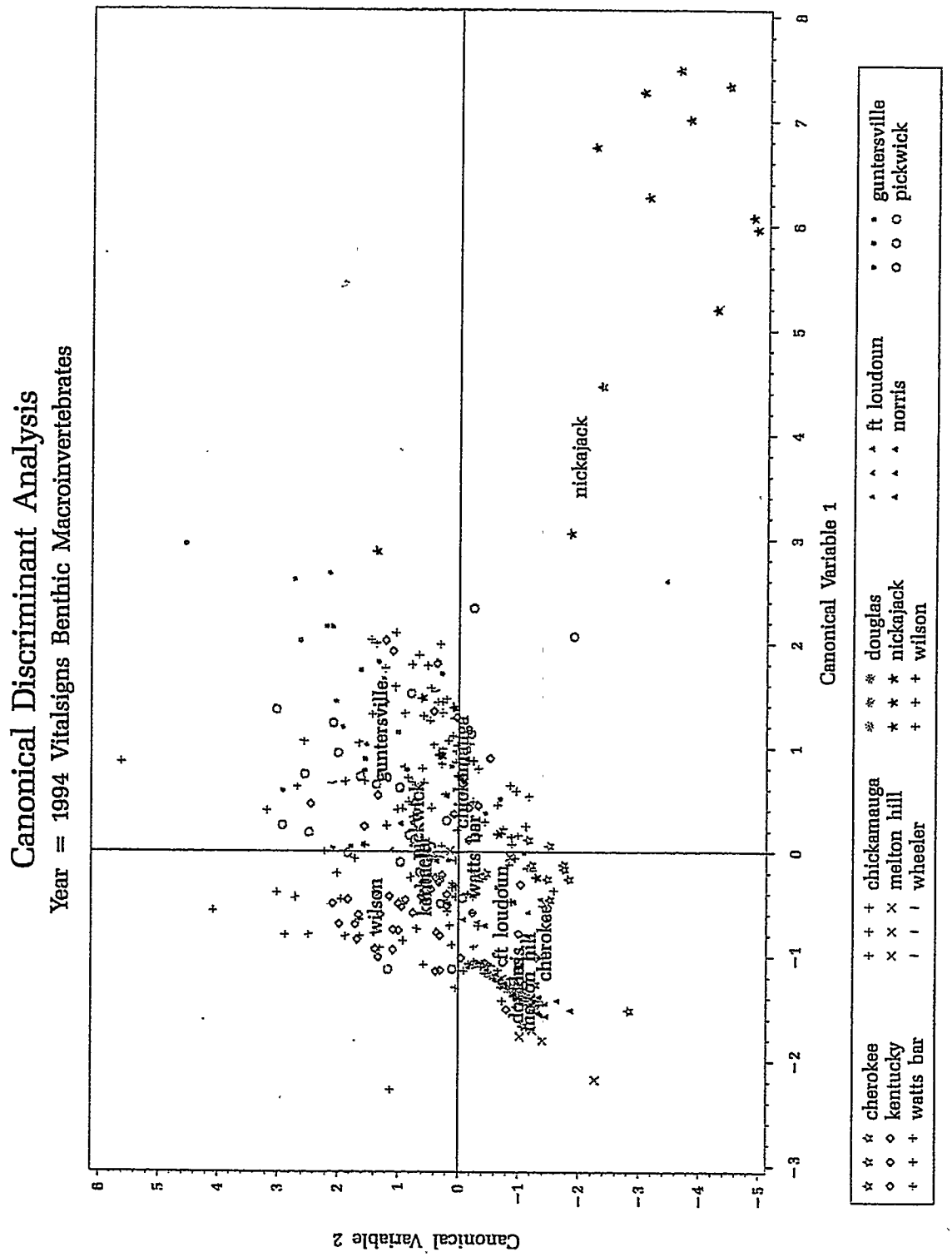


Fig. F8.11 Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Vitalsigns Program in individual Tennessee Valley reservoirs in 1994.

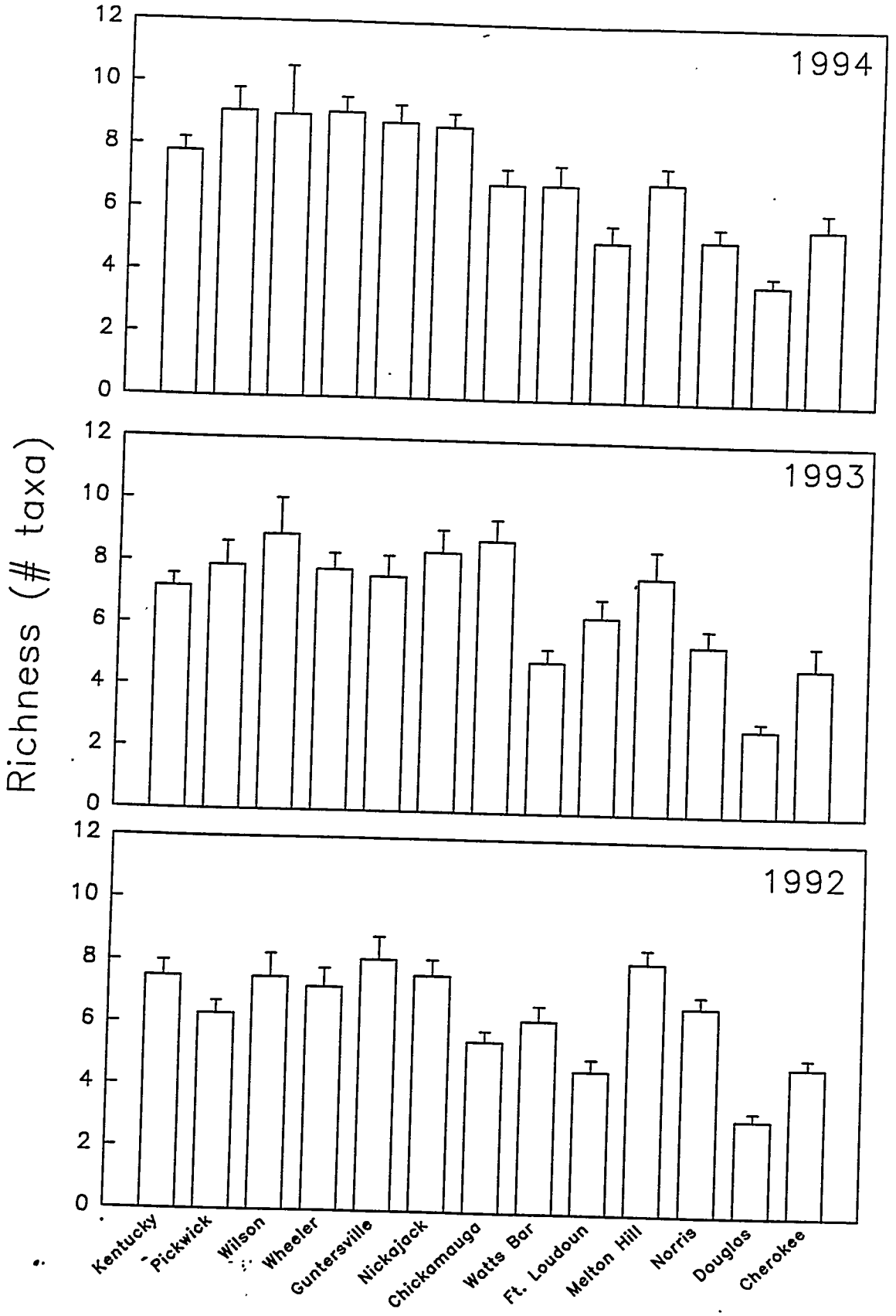


Fig. F8.12. Taxonomic richness (Mean ± SE) of benthic macroinvertebrates sampled for the Vitalsigns Program in individual reservoirs in 1992–1994.

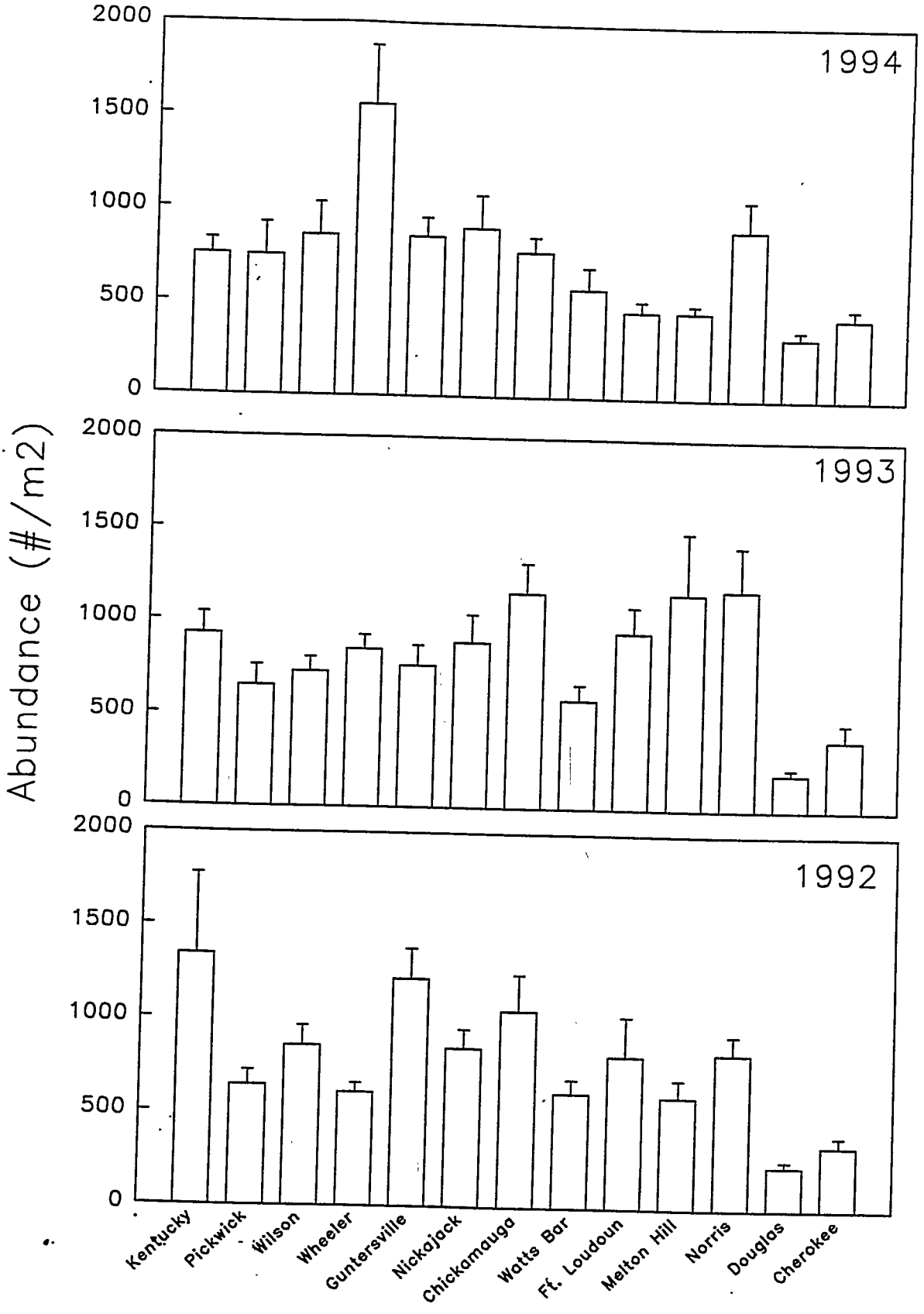


Fig. F8.13. Abundance (Mean ± SE) of benthic macroinvertebrates sampled for the Vitalsigns Program in individual reservoirs in 1992–1994.

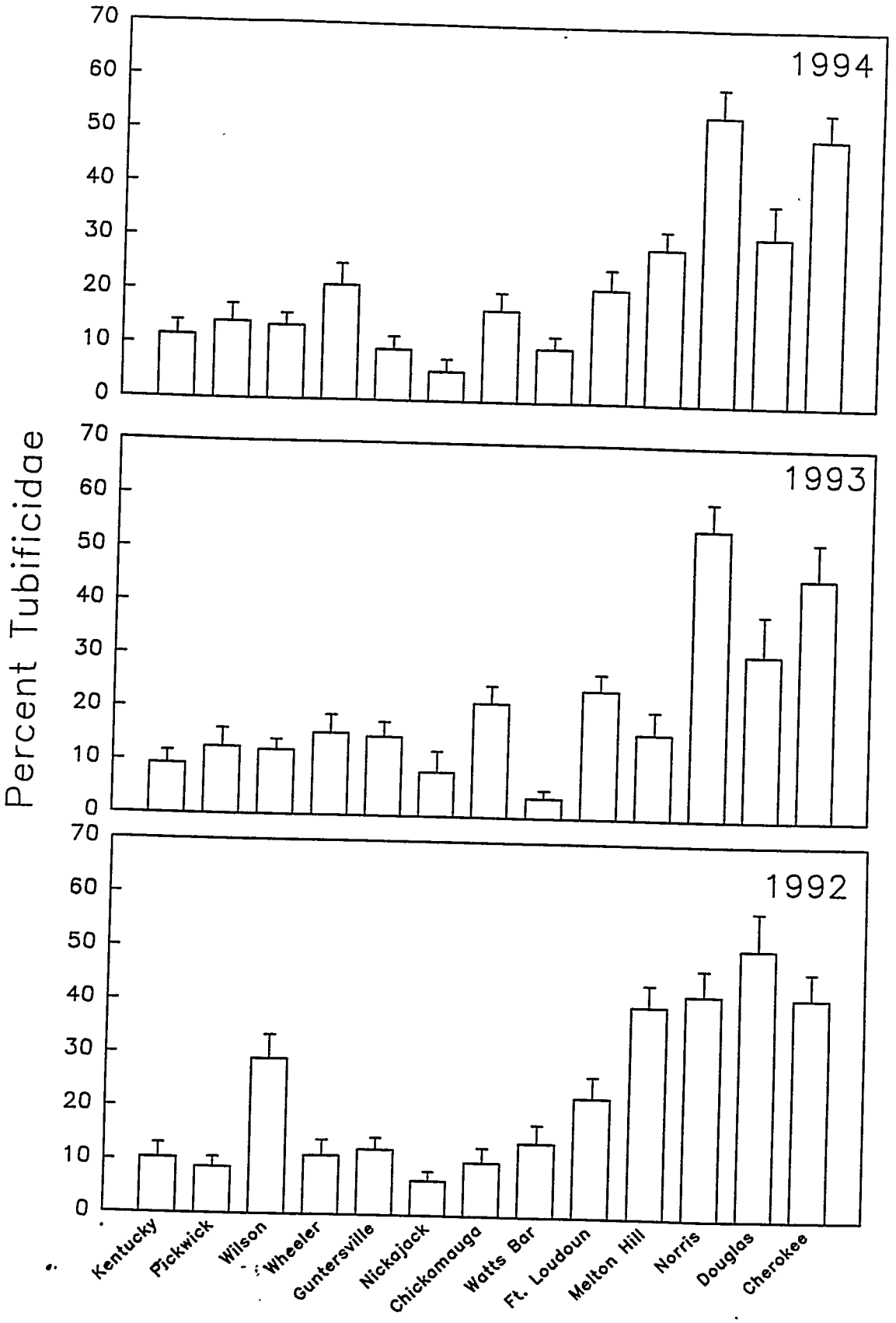


Fig. F8.14. Percentage (Mean ± SE) of benthic macroinvertebrate community represented by *Tubificidae* in individual reservoirs in 1992–1994.

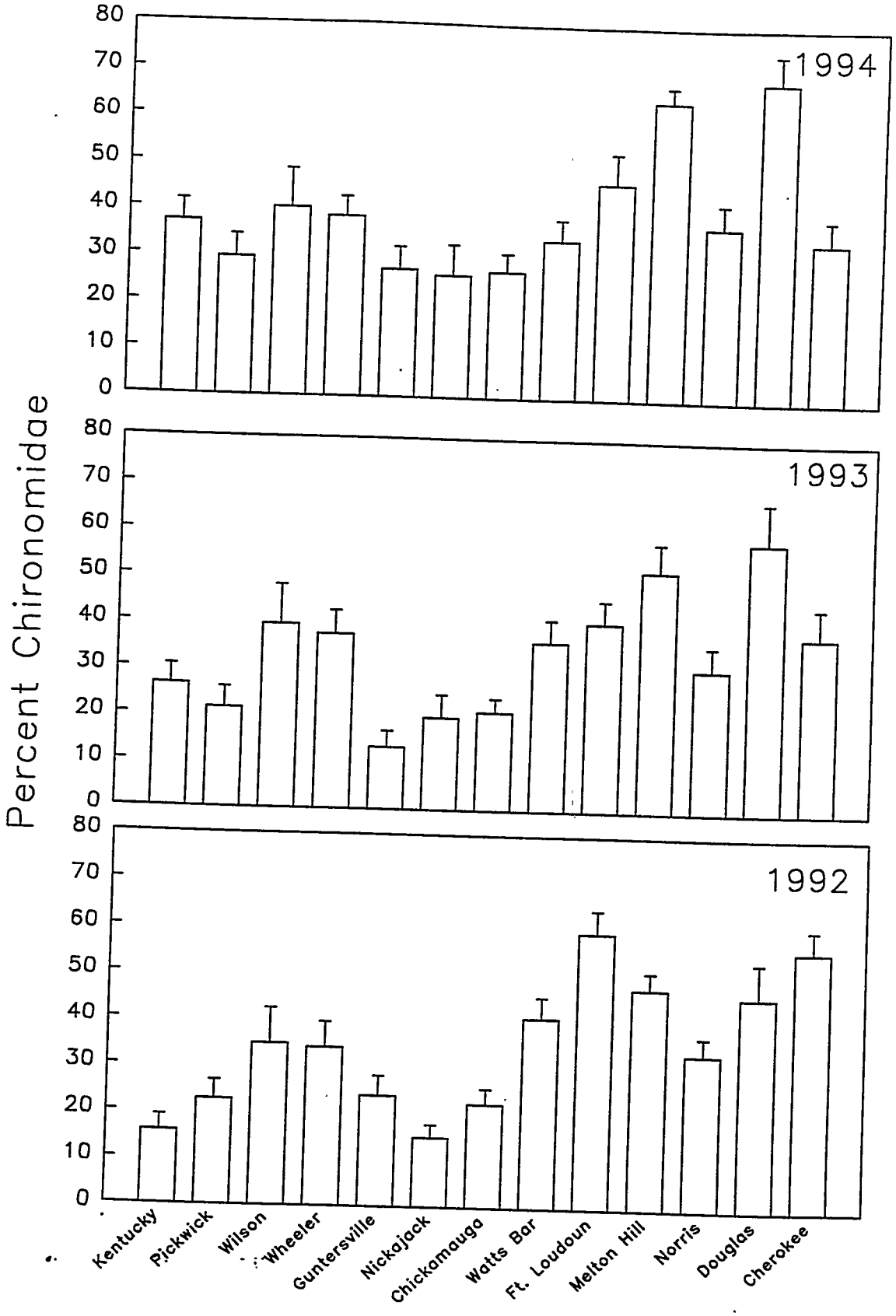


Fig. F8.15. Percentage (Mean ± SE) of benthic macroinvertebrate community represented by *Chironomidae* in individual reservoirs in 1992–1994.

Table F8.3. Invertebrate families having high (>0.3) correlations with canonical variables

Data set	1st canonical variable	2nd canonical variable	3rd canonical variable	4th canonical variable
ER Program	Ephemeridae Ceratopogonidae Chironomidae	Ephemeridae Tubificidae Chironomidae Corbiculidae	N/A	N/A
Vital Signs 1992	Corbiculidae	Gammaridae Unionidae Pleuroceridae Asellidae	Erpobdellidae Sphaeriidae Polycentropodidae	Hydropsychidae
Vital Signs 1993	Corbiculidae Hydropsychidae Ephemeridae	Hydropsychidae Viviparidae Glossiphoniadae	Tubificidae	Naididae Tubificidae Sphaeriidae Asellidae
Vital Signs 1994	Hydropsychidae Corbiculidae Planariidae	Hydropsychidae Corbiculidae Glossiphoniidae Pleuroceridae	Hydropsychidae Ephemeridae Pleuroceridae Hydrobiidae	Glossiphoniidae Crangonyctidae

Results: Near-Field Data

Results of the discriminant analysis of ER Program data are summarized in Figure F8.16. The three groups of sites are roughly equally different from each other, as shown by the positions of the mean canonical variable values. In particular, the two groups of Clinch River sites are roughly as different from each other in terms of benthic community structure as either is from Poplar Creek. The "below" sites and the Poplar Creek sites differ primarily in terms of the first canonical variable (X-axis on Figure F8.16). Table F8.3 shows that the families making important contributions to this variable are the Ephemeridae, Ceratopogonidae, and Chironomidae. Differences in abundance of these three families are therefore the most important in distinguishing Poplar Creek from the Clinch River below Poplar Creek. Similarly, Canonical Variable 2 separates the "above" sites from Poplar creek and the Clinch River below Poplar Creek. Table F8.3 shows that the Ephemeridae, Tubificidae, Chironomidae, and Corbiculidae are the families that distinguish the Clinch River above Poplar Creek from the other two reaches. Because it was necessary to group sites to achieve sufficient replication for an analysis, it was not possible to use the discriminant analysis to check for gradients in community structure along the length of the Clinch River.

Some spatial information is, however, available from the analysis of taxonomic richness. Figure 6.16 (Sect. 6, Vol. 1) shows spatial trends in benthic invertebrate abundance and richness. A clear trend is evident in abundance, with abundance generally increasing with decreasing distance from Watts Bar Reservoir. The analysis of variance showed that benthic invertebrate abundance is significantly higher at the three lower-most stations (CRM-1, CRM-3.7, and CRM-6.7) than at stations CRM-9 and higher. Species richness shows a generally increasing trend, except for the very high richness ar CRM-14.5.

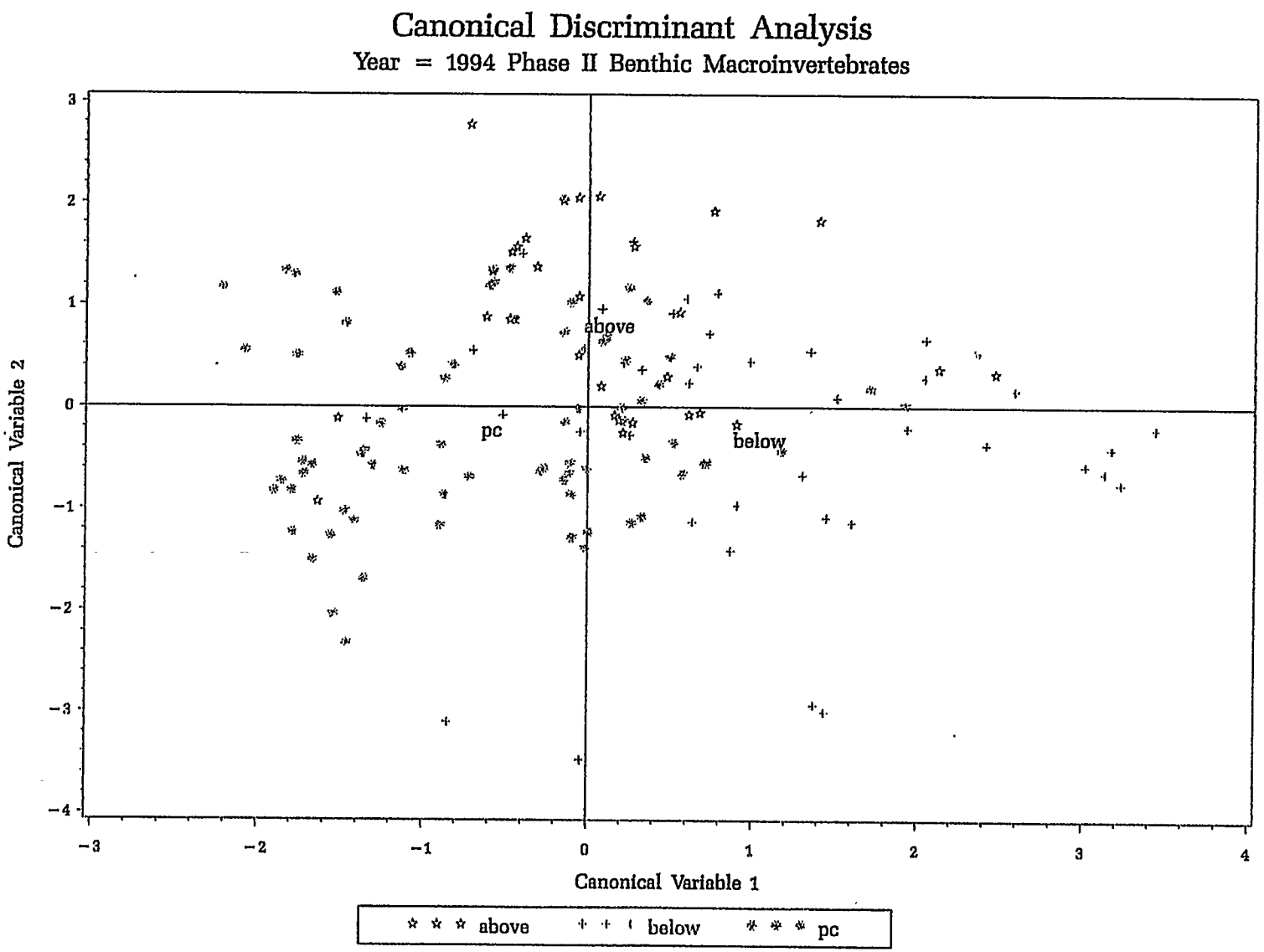


Fig. F8.16. Canonical discriminant analysis of the benthic macroinvertebrate communities sampled for the Environmental Restoration Program in the Clinch River/Poplar Creek system in 1994; grouped by location relative to Poplar Creek.

Figure 6.17 (Sect. 6, Vol. 1) shows trends in % Chironomidae and Tubificidae. Chironomids were relatively more abundant at CRM-1 and CRM-3.7 than at upstream sites, otherwise no trend is evident. Tubificids, in contrast, were relatively less abundant at CRM-1, CRM-3.7, and CRM-6.7 than at upstream sites. None of the above trends show distinct changes in abundance, richness, or composition immediately above or below the mouth of Poplar Creek (CRM-14.5 and CRM-11, respectively).

Few consistent trends are evident for stations within Poplar Creek. The two most-upstream sites, PCM-8 and PCM-7, had lower invertebrate abundance and richness than did other poplar creek sites (Figure 6.18 - Sect. 6, Vol. 1), however, because of high within-transect variability most of the differences are not statistically significant. There is some indication chironomids were relatively more abundant, and tubificids relatively less abundant, at upstream sites (Figure 6.19 - Sect. 6, Vol. 1). Again, because of high variability, these differences are not statistically significant.

Tables 6.9 and 6.10 (Sect. 6, Vol. 1) present results of the two-stage multiple linear regression analysis of the influence of physical characteristics and contaminant concentrations on benthic community structure. Table 6.9 presents (1) the % of the total variance in each community measure explained by the physical model alone, (2) the additional variance explained by inclusion of chemical variables, and (3) results of a significance test for the chemical variables. Table 6.9 shows that, for both the Clinch River and Poplar Creek, physical variables are much more important than chemical variables. Depth and TOC were by far the most important variables. Chemical variables did, however, explain significant additional amounts of variance over that explained by the physical variables alone. An analysis of the signs of coefficients for each of these variables is presented in Table 6.10 Chironimidae and Tubificidae are generally recognized as indicators of poor water quality. Abundance of these families should, therefore, be positively correlated with contaminant concentrations in sediment. Dominance, i.e., the % of total benthic invertebrates belonging to the two most abundant taxa, should also be positively correlated with contaminant concentrations. Species richness and the abundance of all of the other invertebrate taxa is expected to be negatively correlated with sediment contamination. Table 6.10 presents, from the analysis of the full model with physical and chemical variables, (1) the number of times each chemical variable was significantly correlated with a community measure, (2) the consistency of the signs of the correlations with expectation, and (3) the number of correlations that were not significant.

Table 6.10 (Sect. 6, Vol. 1) provides no evidence for an effect of any specific contaminants on benthic invertebrates. Although all of the contaminants other than ammonia nitrogen are significantly correlated with community measures more often than not, the signs of the correlation coefficients are roughly equally divided between "consistent" and "inconsistent" with the hypothesis that contaminants are affecting benthic invertebrates. For Poplar Creek, PAH and aluminum in pore water were significantly correlated with community measures more often than not, and the signs of the correlations were consistent with the "contaminant effects" hypothesis more often than not. Toxic metals, however, were not significantly correlated with community measures more often than not, and none of the signs of the correlations were consistent with the "contaminant effects" hypothesis.

The fact that chemical variables explain a significant additional amount of variance over the physical variables in a variety of community measures for the Clinch River and Poplar Creek provides some (admittedly weak) evidence that contaminants may be adversely affecting the benthic community in some locations. Of the contaminants included in the analysis, PAH would appear to be the most likely to be important, however, the evidence is weak. Also, toxic metals in Poplar Creek would appear to be the least likely to be important.