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US Army Corps of Engineers

INFORMATION SUMMARY, AREA OF CONCERN: BUFFALO RIVER, NEW YORK

by

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13. ABSTRACT *(Maximum 200 words)*

The Water Quality Act of 1987, Section 118, authorizes the Great Lakes National Program Office (GLNPO) to carry out a 5-year study and demonstration project, Assessment and Remediation of Contaminated Sediments (ARCS), with emphasis on the removal of toxic pollutants from bottom sediments. Information from the ARCS program is to be used to guide the development of Remedial Action Plans (RAPs) for 42 identified Great Lakes Areas of Concern (AOCs) as well as Lake-wide Management Plans. The AOCs are areas where serious impairment of beneficial uses of water or biota (drinking, swimming, fishing, navigation, etc.) is known to exist, or where environmental quality criteria are exceeded to the point that such impairment is likely. Priority consideration was given to the following AOCs: Saginaw Bay, Michigan; Sheboygan Harbor, Wisconsin; Grand Calumet River, Indiana; Ashtabula River, Ohio; and Buffalo River, New York.

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This report summarizes the information obtained for the Buffalo River. It is arranged for information retrieval by subject in a quick and easy manner (GLNPO Subject-Reference Matrix). Data and information from numerous reports have been included as figures and tables; wherever possible, the reference sources are identified.

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Fish tissue concentrations
Groundwater
Land use
Metal contamination
Pesticides
Point and nonpoint source discharges
Risk assessment
Spills
Toxicity bioassay
Water quality

SUMMARY

The Water Quality Act of 1987, Section 118, authorizes the Great Lakes National Program Office (GLNPO) to carry out a 5-year study and demonstration project, Assessment and Remediation of Contaminated Sediment (ARCS), with emphasis on the removal of toxic pollutants from bottom sediments. Information from the ARCS program is to be used to guide the development of Remedial Action Plans (RAPs) for 42 identified Great Lakes Areas of Concern (AOC) as well as Lake-wide Management Plans. The AOCs are areas where serious impairment of beneficial uses of water or biota (drinking, swimming, fishing, navigation, etc.) is known to exist, or where environmental quality criteria are exceeded to the point that such impairment is likely.

Priority consideration was given to the following five AOCs: Saginaw Bay, Michigan; Sheboygan Harbor, Wisconsin; Grand Calumet River, Indiana; Ashtabula River, Ohio; and Buffalo River, New York.

The ARCS program is to be completed during the period 1988-1992. The overall objectives of the program are to

a. Assess the nature and extent of bottom sediment contamination at selected Great Lakes AOC.

b. Evaluate and demonstrate remedial options, including removal, immobilization, and advanced treatment technologies, as well as "no-action" alternatives.

c. Provide guidance on assessment and remedial action to the various levels of government in the United States and Canada in the implementation of RAPs for the areas of concern, as well as direction for future evaluations in other areas.

The Environmental Laboratory of the US Army Engineer Waterways Experiment Station (WES) was asked to review existing data and information for each of the five priority AOCs. The approach used by WES was to bring together WES scientists who have been conducting research on the various aspects of contaminant mobility in the aquatic environment and develop a list of information required to evaluate the potential for contaminant mobility (see Table 1 of main text). All contaminant migration pathways were considered, as shown in Figure 1 (main text). A team of WES scientists then visited the RAP coordinator and associated staff for each AOC. Corps Districts responsible for the navigation projects in each AOC were also visited. During these meetings, discussions centered around what information was available for each item on the list of information developed by WES. Sources of additional information were obtained from the discussions.

This report summarizes the information obtained for the Buffalo River AOC. It is arranged for information retrieval by subject in a quick and easy manner (GLNPO Subject-Reference Matrix). Data and information from numerous reports have been included as figures and tables; wherever possible, the reference sources are identified.

PREFACE

The study reported herein was conducted by the US Army Engineer Waterways Experiment Station (WES) for the US Environmental Protection Agency (USEPA) Great Lakes National Program Office (GLNPO). The work was monitored by the US Army Engineer Division, North Central.

The report was prepared by Dr. C. R. Lee, Soil Scientist, Mr. D. L. Brandon, Statistician, Dr. J. W. Simmers, Research Biologist, Dr. H. E. Tatem, Aquatic Biologist, and Mr. J. G. Skogerboe, Physical Scientist, of the Contaminant Mobility and Regulatory Criteria Group (CMRCG), Ecosystem Research and Simulation Division (ERSD), Environmental Laboratory (EL), WES.

Generous cooperation and assistance in locating existing data and information were provided by Mr. R. Leonard, Agronomist; Mr. D. Melfi, Hydraulics Engineer, and Mr. S. Yaksich, Chief, Water Quality Branch, US Army Engineer District, Buffalo; Mr. J. McMahon, Chief, Division of Water, New York State Department of Environmental Conservation (NYSDEC), Buffalo, NY; and Dr. Simon Litten, Research Biologist, NYSDEC, Albany, NY. Mr. Larry Bird, ERSD, provided technical assistance in the preparation of tabulated data and the manuscript for publication.

The work was conducted under the supervision of Dr. L. H. Saunders, Chief, CMRCG; Mr. D. L. Robey, Chief, ERSD; and Dr. John Harrison, Chief, EL. General supervision was provided by Mr. D. Cowgill, NCD, and Mr. T. Kizlauskas, USEPA GLNPO, initially, and later by Mr. J. Miller, NCD, and Mr. D. Cowgill, USEPA GLNPO.

Commander and Director of WES was COL Larry B. Fulton, EN. Technical Director was Dr. Robert W. Whalin.

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CONTENTS

LIST OF TABLES

No.	Title
22	Core Length Collected in Buffalo River Sediment Survey Study (R-4, Table 12).
23a	USACOE 1983 Grain Size Data (4).
23b	Total Solids Contents of Samples (1, Table I).
23c	Metals (1, Table II).
23d	Non-Metals (1, Table III).
23e	PCBS, Pesticides, and Phthalates (1, Table IV).
23f	Aromatic Hydrocarbons (1, Table V).
23g	Contaminant Concentrations in Buffalo River Bottom Sediments for Parameters Quantified, Erie County Sampling-1985 (R-16, Table A.6).
23h	Buffalo River Sediments - 1989 Data (3).
24	Summary of Water Quality Monitoring Activities in the Buffalo River AOC.
25	Dissolved Oxygen and Associated Parameter Sampling Data, Buffalo River (R-16, Table 4.7).
25b	Chemical Sampling Data, Buffalo River, 1982 (R-16, Table 4.8).
26	Buffalo Harbor Nutrient/Quality Indicators - Sediment Analysis (2, Table 4).
27	Contaminant Concentrations in Buffalo River Water Samples, Ohio Street Bridge, April 1982-March 1982 (R-16, Table A.1).
28a	New York State Water Quality Standards and Criteria Exceedances of Buffalo River Water Samples, Ohio Street Bridge, April 1982-March 1986 (R-16, Table A.2).
28b	Inventory of Samples (5, Table I).
28c	Analyses Conducted on Water Samples Collected at Buffalo River, Buffalo, NY (5, Table II).
28d	Analyses Conducted on Suspended Sediment Samples Collected at Buffalo River, Buffalo, NY. Inorganic Parameters (5, Table III).
28e	Analyses Conducted on Suspended Sediment Samples Collected at Buffalo River, Buffalo, NY. Organic Parameters (5, Table IV).
29	Groundwater Sampling at Hazardous Waste Sites (R-16, Table B-62).
30	Mean Priority Pollutant Concentrations in Groundwater Samples at Significant Hazardous Sites (R-16, Table B.2).
31	EPA Priority Pollutant and Special Category Loadings for Parameters Quantified from December 1981-82 Sampling (R-21, Table 2.4).
32	Significant Discharges of EPA Priority and Special Category Pollutants to the Niagara River Based on Quantitative Data (R-21, Table 2.9).
33	EPA Priority Pollutants and Special Category Loadings from Significant Sources by Categories/Parameters from December 1981-82 Sampling (Quantified Parameters only) (R-21, Table 2.14).
34	PAH Concentrations in Water from Allied Chemical Outfalls to Buffalo River (R-7, Table 4).

No.	Title
35	PAH Concentrations in Water from Buffalo Color Water Outfalls and Intake (R-7, Table A.2).
36	Storm Sewer Sediment Analyses for Priority and Selected Category Pollutants (R-21, Table A.2).
37	Sediment Discharge Relationship for the Buffalo River (R-29).
38	Summary of Shoaling Rates (R-29).
39	Concentration of Selected Inorganic and Organic Compounds in Dredged Material Samples at Times Beach Confined Dispoal Facility. 241 (915080) (R-21).
40	Concentration of Parameters in Subsurface and Surface Water Samples at Times Beach Confined Disposal Facility (R-21).
41	Concentrations of Parameters in Subsurface and Surface Water Samples at Small Boat Harbor Site and Buffalo Outer Harbor Site.
42	Concentrations of Parameters in Soil Samples from Mobil Oil Corporation-Site 141 (915040) (R-21).
43	Concentrations of Parameters in Four Soil Samples from McNaughton-Brooks, Inc.-Site 138 (915034) (R-21).
44	Concentrations of Parameters in Additional Soil Samples from McNaughton-Brooks, Inc.-Site 138 (915034) (R-21).
45	Concentrations of Metals in Groundwater Samples from Allied Chemical-Site 107 (915004) R-21).
46	Concentrations of Parameters in Soil Samples from Buffalo Color Corporation-Site 120-122 (915012-a,b,c) (R-21).
47	Significant Hazardous Waste Sites Buffalo-Lackawanna Sub-Area (R-21).
48	Sites Having Significant Potential for Contamirant Migration Along the Niagara River (New York and Ontario) (R-21).
49	Buffalo River Fish Contaminant Data, December Sampling 1977-1984 (R-16, Table 4.4).
50	Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), 1980 (R-21, Table C.29).
51	Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), June 1981 (R-21, Table C.30).
52	Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), July 1981 (R-21, Table C.31).
53	Key to Polychlorinated Biphenyl (PCB) Nomenclature Designated by International Union of Pure and Applied Chemists (IUPAC) Numbers (R-11).
54	Concentrations of PCBs and Pesticides in the Soft Tissue of *Elliptio dilatata* (ug/kg wet weight) (R-11).
55	Organochlorine Contaminants Accumulated by Clams (*Elliptio dilatata*) Exposed to Lake Erie and Niagara River Waters in 1981.
56	Organochlorine Contaminants Accumulated by Clams (*Elliptio dilatata*) Exposed to Lake Erie and Niagara River Waters in 1980.

No.	Title
57	Benthic Macroinvertebrate Data, Buffalo River, 1982 (R-16, Table 4.10).
58	Typical Exposures for Incidental Ingestion of Water While Swimming (3, Table 6.13).
59	Reasonable Worst Case Exposures for Incidental Ingestion of Water While Swimming (3, Table 6.14).
60	Typical Exposures for Dermal Contact with Surface Water While Swimming (3, Table 6.15).
61	Reasonable Worst Case Exposures for Dermal Contact with Surface Water While Swimming (3, Table 6.16).
62	Typical Exposures for Dermal Contact with Suspended Sediments While Swimming (3, Table 6.17).
63	Reasonable Worst Case Exposures for Dermal Contact with Suspended Sediments While Swimming (3, Table 6.18).
64	Typical Exposures for Ingestion of Contaminated Fish (3, Table 6.19).
65	Reasonable Worst Case Exposures for Ingestion of Contaminated Fish (3, Table 6.20).
66	Human Health Risk Resulting from Dermal Contact with Sediments: Typical Case (3, Table 8.1).
67	Human Health Risk Resulting from Dermal Contact with Water: Typical Case (3, Table 8.2).
68	Human Health Risk Resulting from Incidental Ingestion of Water: Typical Case (3, Table 8.3).
69	Human Health Risk Resulting from Ingestion of Fish: Typical Case (3, Table 8.4).
70	Total Human Health Risk Summed over all Pathways (Typical Case) (3, Table 8.5).
71	Human Health Risk Resulting from Dermal Contact with Sediments: Reasonable Worst-Case (3, Table 8.6).
72	Human Health Risk Resulting from Dermal Contact with Water: Reasonable Worst-Case (3, Table 8.7).
73	Human Health Risk Resulting from Incidental Ingestion of Water: Reasonable Worst-Case (3, Table 8.8).
74	Human Health Risk Resulting from Ingestion of Fish: Reasonable Worst-Case (3, Table 8.9).
75	Total Human Health Risk Summed over all Pathways (Reasonable Worst-Case) (3, Table 8.10).

LIST OF FIGURES

CONVERSION FACTORS, NON-SI TO SI (METRIC) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
acres	4,046.873	square meters
cubic feet	0.02831685	cubic meters
cubic yards	0.7645549	cubic meters
feet	0.3048	meters
gallons (US liquid)	3.785412	cubic decimeters
miles (US statute)	1.609347	kilometers
square miles	2.589998	square kilometers
tons (2,000 pounds, mass)	907.1847	kilograms

INFORMATION SUMMARY, AREA OF CONCERN:
BUFFALO RIVER, NEW YORK

INTRODUCTION

Background

The Water Quality Act of 1987, Section 118, authorizes the Great Lakes National Program Office (GLNPO) to carry out a 5-year study and demonstration project, Assessment and Remediation of Contaminated Sediments (ARCS), with emphasis on the removal of toxic pollutants from bottom sediments. Information from the ARCS program is to be used to guide the development of Remedial Action Plans (RAPs) for 42 identified Great Lakes Areas of Concern (AOCs) as well as Lake-wide Management Plans (Figure 2).

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Each state has established RAP coordinators to develop a RAP for each AOC. Most RAP coordinators state that there is a need to develop guidance to interpret the information in a manner that will allow decisions to be made about each AOC. The following summarizes the status of the RAP reports for the five priority AOCs:

Area of Concern	Status
Saginaw Bay	Final RAP - September 1988
Grand Calumet River	Draft RAP - January 1988
Sheboygan Harbor	Draft RAP - December 1988
Buffalo River	Final RAP - November 1989
Ashtabula River	Draft RAP - September 1989

Purpose

The purpose of this report is to summarize the information collected during meetings with RAP coordinators and Corps Districts to find out what information was available on contaminant migration at each of the five priority AOCs.

Scope

Information collected during visits with RAP coordinators and Corps Districts is summarized. Sources of additional information have been referenced so that these can be contacted at a later date. Documents that were mentioned during meetings with RAP coordinators, but were not available at the time, are referenced so that they can be obtained, if desired. Retrieval of information by subject in a quick and easy manner was a goal of this report.

Abbreviations

Definitions of abbreviations used in this report are given below for the convenience of the reader.

USEPA V - US Environmental Protection Agency Region V

USEPA II - US Environmental Protection Agency Region II

NYSDEC - New York State Department of Environmental Conservation

NYSDOH - New York State Department of Health

IWD/OR - Inland Waters Directorate, Ontario Region, Environment Canada

MOE - Ontario Ministry of the Environment

USACOE - US Army Corps of Engineers

SUMMARY OF INFORMATION

Boundary of AOC

The location of the Buffalo River AOC is shown in Figure 2. The Buffalo River watershed is approximately 446 square miles* (outlined with dashed lines) and includes the Cayuga Creek, Buffalo Creek, and Cazenovia Creek. The boundary of the Buffalo River, NY, AOC is shown in Figure 3.

Contaminants of concern

At least 15 subprojects have been conducted to monitor water, sediment, or biota in the Buffalo River (Table 2). Data from these initial subprojects plus more recent studies have been collected, and the contaminants of concern have been tabulated according to water, sediment, or biota in Table 3. Contaminants include a mix of metals and organic compounds. The New York State Health Department issued a 1987-1988 fish and wildlife advisory to eat no carp from the Buffalo River due to elevated PCBs and chlordane tissue contents.

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* A table of factors for converting non-SI units of measurements to SI (metric) units is presented on page 11.

Levels of PCBs and DDT (and metabolites) in carp are stated to pose a risk of toxicity to piscivorous wildlife inhabiting the river. Young-of-year spottail shiners have been collected by NYSDEC in 1985 and 1987 with levels of PCBs exceeding NYSDEC criteria.

A summary of impairments and potential sources and causes for the Buffalo River AOC is shown as Table 4.

Levels of contaminants

The highest concentrations of contaminants found in Buffalo River sediments and biota are listed in Tables 5 and 6. Ranges of water quality parameters are shown in Table 7.

Volume of contaminated sediments

Based on average annual peak daily flow of the Buffalo River for a 45-year period of record (1940-1985) of 12,300 cfs, the average annual suspended sediment yield for the drainage basin has been estimated as 94,100 tons. The dredged volume is actually lower than the recorded inflowing suspended sediment data. The volume of sediment in the navigation channel of the Buffalo River has been estimated to be 100,000 to 125,000 cubic yards. Information on the volume of sediment outside the navigation channel was not found. There are limited data to indicate the volumes of sediment contaminated with specific contaminants at specific levels of contamination.

Sediment data

At least five major sediment sampling studies have been conducted on the Buffalo River. The locations of the sampling sites are shown in Figures 4a, 4b, and 4c. More specific locations and sediment data for each study are presented in Figures 5-12 and Tables 8-23g. The USACOE has taken one large composite sediment sample in August 1989 near Buffalo Color to conduct sediment treatability tests. The results of these tests will be available within 12 months. Additional sediment samples were collected in 1989 (Laniak et al. 1990). These data are reported in Table 23h. The Toxicity/Chemistry Work Group of the ARCS Program planned sediment sampling in the Buffalo River during 1990 (USEPA 1990; Figure 4d).

Water quality data

Monitoring of surface water quality is the Buffalo River and tributaries of the Buffalo River watershed is summarized in Table 24 for the locations shown in Figures 13 and 14. Selected data are presented in Table 7 and Tables 25a-28a. Water and suspended sediment samples were collected during dredging (Smith, Glowacky, and Crerar 1984; Tables 28b through 28e).

Monitoring of groundwater has been conducted by the US Geological Survey (USGS) at selected Hazardous Waste and Contaminated Sites (Tables 29 and 30). Low dissolved oxygen during August has been identified as contributing to poor water quality for biota in the Buffalo River.

Point source discharges

Point source discharges have been documented in relation to industrial discharges and waste loadings from flow and USEPA priority and special pollutant concentrations measured at industrial outfalls. The locations of major discharges are shown in Figure 15 (Nos. 3, 4, 5, 6). Selected waste loading data are presented in Tables 31-35.

Nonpoint source discharges

Locations of storm sewer discharges are shown in Figure 14. Selected storm sewers have been monitored to document migration of contaminants through surface runoff (Table 36).

Waterway hydraulics/watershed hydrology

A recent study has estimated the sedimentation and shoaling rates for the Buffalo River (USAE District, Buffalo 1988, R29*). Sediment discharge relationships have been developed (Table 37). Locations of sediment sampling and cross sections for the sedimentation analysis are shown in Figures 16 and 17. A summary of shoaling rates is presented as Table 38.

Air quality

No air quality data were identified.

Potential hazardous waste sites/Superfund sites

Potential migration of contaminants from five contaminated sites has been identified (NYSDEC 1988, R16). The location of these sites is shown in Figure 18 and described in Tables 39-48.

The Times Beach-Site 241 (915080) is located adjacent to Lake Erie near the head of the Niagara River. The Corps of Engineers used this 18.6-hectare (46-acre) site for disposal and containment of dredged material from the Buffalo River, Buffalo Harbor, and the Black Rock Canal from 1971-1976. Approximately 420,500 cubic meters (550,000 cubic yards) of dredged material has been deposited at the site. In the summer of 1981, the Corps of Engineers collected 16 dredged material samples from the site. The samples were analyzed

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* See list of References at conclusion of text.

for a number of organic and inorganic constituents; the results are presented in Table 39.

Three monitoring wells were installed by the USGS in the containment site in 1982. In January 1983, the three monitoring wells installed at the site were sampled, and a surface water sample was collected by the USGS. Each sample was analyzed for priority pollutants. The results of the analyses are presented in Table 40.

Two other dredged material containment sites, the Small Boat Harbor containment site located in the Buffalo Outer Harbor and the Buffalo Harbor containment site located adjacent to the Bethlehem Steel Corporation plant along Lake Erie, were sampled in a similar manner. The results of the subsurface and surface water samples at these sites are presented in Table 41.

The Mobil Oil Corporation-Site 141 (915040) is located in the southern part of the city of Buffalo adjacent to the Buffalo River at mile 4.9. The site was used to dispose of unknown quantities of noncontact cooling water silt, air flotation unit sediments, gravity separator sediments, tetraethyl lead, lube sludges, spent catalysts, and soil contaminated with asphalt and fuel oil. It is expected that there is contaminant migration to the Buffalo River from the disposal site. The material underlying the disposal site is sand, which has a high permeability; thus, the groundwater may move freely toward the river. One soil sample was collected by USGS in 1982 from each of four test borings. Each sample received lead analysis and a GC/MS acid-base natural scan for organic compounds. The results of the analyses indicate elevated levels of lead (920 $\mu g/g$ maximum, 238 $\mu g/g$ mean). No organic priority pollutants were quantified. Analyses of four additional soil samples collected by USGS in May 1983 and analyzed for organic parameters are presented in Table 42.

The McNaughton-Brooks, Incorporated-Site 138 (915034) is located in the city of Buffalo near the Buffalo River at mile 4.7. Solvents such as xytol, toluol, and paint sludges were disposed on a rubble pile at the site until 1966. The clay encountered inhibits vertical migration of contaminants. The concentration of synthetic organic compounds in the soil samples analyzed indicates that horizontal migration off the disposal site may have occurred. One soil sample was collected by USGS in 1982 from each of four boreholes and analyzed for cadmium, chromium, lead; a GC/MS acid-base neutral scan for organic compounds was also performed. Lead was the only inorganic constituent identified at elevated levels. The maximum and mean values for lead and the

organic priority pollutants quantified are presented in Table 43. Organic parameter analyses of four additional soil samples collected by USGS in May 1983 are presented in Table 44.

Allied Chemical-Site 107 (915004) is located in the southern part of the city of Buffalo and is adjacent to the Buffalo River at mile point 4.5. The site had a sludge lagoon in which an unknown quantity of spent vanadium pentoxide catalyst, sulfate sludges, sulfuric acid, nitric acid, salts, slag, and polymerized "sulphan" were deposited. The lagoon operated between 1930 and 1977. Since then, it has been excavated and filled with clean fill. No geologic data were obtained for this site. Three monitoring wells were drilled by the owner between the disposal site and the Buffalo River. No drilling logs were available. Three monitoring wells were sampled by the USGS in July 1982. Each water sample was analyzed for chromium, copper, lead, nickel, and vanadium. The results presented in Table 45 indicate elevated levels of lead and nickel.

Buffalo Color Corporation-Sites 120-122 (915012-a,b,c) are located in the southern part of the city of Buffalo and are adjacent to the Buffalo River at mile point 4.1. Three disposal sites have been identified on the property: two lagoons for iron oxide sludge which were used from 1930-1963; a weathering area which may contain traces of organics in metal sludge; and a 774-foot well used to dispose of 3.5 million gallons of 40 percent ammonium sulfate from 1957-1963. The geology of the site consists of 2.1 to 6.1 meters (7 to 20 feet) of fill. The site is underlain with Onondaga Limestone. The deep well extends to the bottom of the Lockport Dolomite or uppermost portions of the Rochester Shale. A 61-meter (200-foot) steel casing extends from the surface through the Camillus Shale. Two complete soil samples collected and analyzed in December 1982 by the owner showed concentrations presented in Table 46.

Soil samples obtained below the two closed lagoons indicated the presence of similar compounds. A detailed site investigation program is currently under way at this facility. The proximity of these sites to the river and the concentrations of organic and inorganic compounds indicate a significant potential for contaminant movement to the river.

Spills

No information was available concerning spills that have occurred in the Buffalo River.

Adjacent land use contaminant sources

Current adjacent land use is shown in Figure 19. Most of the property near the Buffalo River is currently being used for industrial, manufacturing, and transportation operations, or is vacant. Some facility activities include flour milling, cereal and grain processing, grain transportation and distribution, cement distribution, furniture making and refinishing, metal recycling, dye manufacturing, tire recycling, oil storage and dehydration, and sulfuric acid production.

The watershed of the Buffalo River is roughly triangular in shape, as the basin map (Figure 2) shows, and has a drainage area of about 446 square miles. There are three major streams in the watershed: Cayuga Creek, Buffalo Creek, and Cazenovia Creek.

Cayuga Creek is the northernmost of the three major streams in the Buffalo River Basin. It is 40 miles long and drains 128 square miles of Erie, Genesee, and Wyoming counties. The lower reaches of Cayuga Creek pass through the residential communities of Lancaster and Depew. The upland areas are primarily farmland and wooded areas.

Buffalo Creek drains an area of 150 square miles and joins Cayuga Creek 8 miles above Lake Erie to form the Buffalo River. It is 43 miles long from its source near Java Center in Wyoming County to its confluence with Cayuga Creek. The land adjacent to Buffalo Creek is primarily farmland and woods. Buffalo Creek passes through several small communities.

Cazenovia Creek joins the Buffalo River about 6 miles above Lake Erie. The total watershed area is 138 square miles. Cazenovia Creek is similarly typified by agricultural and wooded sections of land, with several small residential communities and scattered park and recreational areas.

Bioassay data

Limited bioassay data are available for the Buffalo River AOC. Acute toxicity bioassays were conducted with *Daphnia magna* and *Hyalella azteca* (NYSDEC 1988, R16). Chronic toxicity bioassays were conducted with *Ceriodaphnia dubia*. Laboratory variation in test results led to inconclusive test results. Bioaccumulation bioassays were conducted with fathead minnows. None of the contaminants bioaccumulated in test organisms were not found in the sediment tested. These tests were inconclusive.

Biological data

The Buffalo River drainage basin provides a wide variety of fish habitat conditions. Basin conditions range from brook trout habitat in some upper

stream reaches to warmwater species habitat in the lower urban areas. Trout, salmon, black bass, and northern pike are among the many species found within the watershed. The NYSDEC stocks the Little Buffalo Creek (on Cayuga Creek system), the main Buffalo Creek, and the East Branch Cazenovia Creek with trout. Como Park Lake (Cayuga Creek) is stocked with panfish. In addition, the Buffalo Harbor is stocked with trout.

Fish, clams, mussels, and algae have been sampled or exposed to the Buffalo River AOC. Sampling locations for these studies are shown in Figure 20, and data are presented in Tables 49-56. Based on fish tissue concentration of PCBs, DDT and chlordane, a 1987-1988 fish advisory was issued to eat no carp from the Buffalo River AOC. Levels of PCBs and DDT (and metabolites) in carp are stated to pose a risk of toxicity to piscivorous wildlife inhabiting the river.

Benthic macroinvertebrates were sampled in 1982. Data from this sampling are presented in Table 57. The populations of benthic macroinvertebrates have been related to those typically found in organically contaminated sediments.

Risk assessment

No risk assessments have been conducted for the Buffalo River AOC prior to 1989. However, fish advisories were issued for PCB, DDT, and chlordane contamination in 1987-1988. Laniak et al. (1990) prepared a baseline human health risk assessment. Estimates of human exposure to various contaminants are presented in Tables 58-75.

GLNPO SUBJECT-REFERENCE MATRIX

AREA OF CONCERN: Buffalo River, New York

Subject	Reference*,**	Point of Contact†
Sediment	R16, R9, R3, R19, R22, R21, R4, R28	P5
Metals	R16, R9, R22, R21, R4, R28 (1, 2, 3)	P5
PCBs	R16, R9, R22, R21, R4, R28 (1, 3)	P5
PAHs	R16, R9, R15, R22, R21, R4, R28 (1, 3)	P5
Pesticides	R16, R9, R22, R21, R4, R28 (1, 3)	P5
Purgeable Halocarbons	R28	
TOC		
Others (specify)		
CN	R16, R28 (1, 2)	
TVS	R4	
O&G	R28 (1, 2)	
Particle Size	R20, R28 (2, 4)	
Engineering Properties	R20	
Deposition Data	R16, R13, R29, R20	P9, P3
Transport Data	R13, R29, R20	P8, P7
Depth Data	R16, R9	
Horizontal Distribution	R16, R9	P5
Volume To Be Considered	R23	
Elutriate Test	R16, R9 (4)	
Water Quality	R16, R19, R23, R21, R3	P6, P4, P5, P12, P10 P2
Turbidity	R16	
Physical Data	R16, R17	P6
Temperature	R16, R17	P6
DO	R16, R17	P6
Conductivity	R16, R17	P6
Hardness		
Total Suspended Solids	R16 (5)	
Total Solids	R16, R17, R23 (1, 2)	
TVS	R16	

* Numbers refer to sources listed in the References section (page 24).
** Numbers in parentheses refer to sources listed in Literature Cited (Appendix 1).
† Points of contact are listed on page 28.

Subject	Reference	Point of Contact
Chemical Data	R18, R19, R34, R33, R31, R3, R23	
pH	R16, R17 (5)	
TOC	R23	
Metals	R16, R17, R18 (5)	
PCBs	(5)	
PAHs	(5)	P4
Pesticides		
COD	R16, R23 (1, 2)	
BOD	R16, R23	
Others (specify)		
N	R16 (1, 2)	
P	R16 (1, 2)	
Volatile Organics	R16	
Bacteria		
Waterway Hydraulics		
Flow Data	R16, R13	P7
Water Depth	R5	
Flood Data	R5	
Point Discharges	R16, R21, R3	
Concentration Data	R16, R21, R23	
Volume Data	R16, R21	
Waste Load Data	R16, R21, R23	
Storm Sewers	R21	
Nonpoint Discharges	R16, R21	
Hazardous Waste Sites		
Concentration Data		
Volume Data		
Waste Load Data	R23	
Spills		
Watershed Hydrology	R16, R13	
Rainfall Data		
Acid Rain		
Runoff Data	R32, R21	
Loads	R21	
Volume		

Subject	Reference	Point of Contact
Watershed Hydrology (Cont.)		
Runoff Data (Cont.)		
Solids		
Chemical Data (Specify)	R21	
Leachate	R14	
Air		
Air Quality Data		
Atmospheric Deposition		
Superfund Sites	R16, R21	
Adjacent Land Use	R30, R16, R31	
Contaminant Sources	R16, R15	
Geology	R20	
Groundwater	R28, R21, R8	
Flow	R8	
Chemistry	R28, R21, R8	
Bioassay Data		
Acute	R16	
Chronic	R16, R9, R4, R1	
Bioaccumulation	R16, R11	
Biological Data		
Fish	R16, R10, R2 (3)	P9
Diversity	R16, R10	
Quantity	R16, R10	
Quality-Tumors	R2	P1
Tissue Content	R16, R9	
(Zooplankton) Water Column Macroinvertebrates	R16, R35	
Advisory	R16	
Tainting Flesh	R16	
Risk Assessment	(3)	
Historical Data	R23 (3)	
Population Data	R23	
Benthic	R16, R11, R10, R25, R24, R21	
Diversity	R16, R10, R25	
Abundance	R16, R10, R25	
Content	R11, R21	

Subject	Reference	Point of Contact
Birds	R16, R10	
Diversity	R10	
Quantity	R10	
Contents		
Plants	R10	
Diversity	R10	
Abundance	R10	
Contents	R28	
Metals	R28	
Phytoplankton	R16, R35	
Mammals	R16, R10	
Endangered Species		
Other		
Trout Stocking	R16	
Algae (Cladophora)	R27, R21	
Content Metals	R27, R21	
Purgeable Halocarbons	R27	
Pesticides	R27	
PCBs	R27	
Base Neutral	R27	
Acid Fraction	R27	

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POINTS OF CONTACT

Person	Area of Expertise	Location/Telephone
1. John Black	Fish Tumors	N.Y. Dept. of Health, Roswell Park Memorial Institute, Buffalo, NY 716-845-3350
2. G. Jirka	Natural Capping	N.Y. State Water Resource Inst. 468 Hollister Hall Cornell Univ., Ithaca, NY 607-255-7535
3. Edward Kuzia	Water Quality, PAHs	N.Y. State Dept. of Environmental Conservation, Albany, NY
4. Dick Leonard	Water Quality	US Army Engineer District, Buffalo; 1776 Niagara St., Buffalo, NY 14207 716-879-4270
5. Simon Litten	Water Quality, Sediment Dating	N.Y. State Dept. of Environmental Conservation Bureau of Technical Services and Research; 50 Wolf Rd., Albany, NY 518-457-7470
6. John McMahon	RAP Coordinator	N.Y. Dept. of Environmental Conservation; 600 Delaware, Buffalo, NY 716-847-4600
7. David Melfi	Sediment Transport	US Army Engineer District, Buffalo, 1776 Niagara St., Buffalo, NY 14207 716-879-4270
8. Ralph Rumer	Sediment Transport	Dept. of Civil Engineering, State Univ. of New York at Buffalo
9. US Fish & Wildlife Service	Conducting Fish Studies in 1988-1989	
10. Tom Wilkins	Modeling	Cornell University-Geotechnical Ithaca, NY

Person	Area of Expertise	Location/Telephone
11. Steve Yaksich	Water Quality	US Army Engineer District, Buffalo, 1776 Niagara St., Buffalo, NY 14207 716-879-4272
12. USGS	Gen. Info. - Water Resources of an Area	Hydrologic Information Unit 419 National Center, Reston, VA
13. District Chief, WRD, USGS	Local Info. - Water Resources of the Area	PO Box 1669, Albany, NY 12201 518-472-3107
14. USEPA	STORET	Office of Administration and Resources Management, National Data Processing Division, Research Triangle Park, NC 27711

Table 1

Information Required to Evaluate the Potential for Contaminant Mobility

1. SEDIMENT DATA
   - Water Content
   - Hydrous Oxides (Manganese, ferrous)
   - Total PAHs
   - Total PCBs (Aroclors and Congeners)
   - TOC
   - Total Solids
   - OM
   - EP Test
   - CEC (plus calcium, magnesium phosphorus, potassium concentration in extractant)
   - Atterberg Limits
   - Specific Gravity Determination
   - Dispersion Coefficients
   - Sediment Particle Density
   - Bulk Density
   - Permeability
   - Particle Size Distribution (hydrometer method); (include sand, fine sand, silt and clay)
   - Wet Sediment pH (1:2 sediment to distilled water solution)
   - Dry Sediment pH (1:2 sediment to distilled water solution)
   - % Base Saturation
   - % Free Calcium Carbonate
   - Potential pH or Lime Requirement (using titration or similar method)
   - Total Carbon Content
   - Total Soluble Heavy Metal Content
   - Total Heavy Metal Content
   - Surface Runoff Suspended Solids
   - Wet Sediment Extractable Heavy Metal Content (DTPA preferred)
   - Dry Sediment Extractable Heavy Metal Content (DTPA preferred)
   - Depth (thickness) of Mixed Top Sediment Layer
   - Depth (thickness) of Contaminated Sediment Layers
   - Sedimentation Rate (possibly through core dating)
   - Sediment Deposition History
   - Suspended Solids Settling Rates (possibly through sediment traps)
   - Consolidation Characteristics
   - Sediment Porosity (mixed layer and deeper layers)
   - Pesticides
   - Priority Pollutants (40 CFR Part 136)
   - Dioxin
   - Reference Site
   - OG
   - EC
   - Redox
   - Sulfides
   - SOD
   - Volatile Solids
   - Salinity
   - NH3

2. POINT DISCHARGES INTO WATERWAY
   - Contaminant Loads Based on Concentration and Volumetric Flow Rates
   - Surface Runoff During Storm Events
   - Combined Sewer Overflow

(Continued)

Table 1 (Continued)

3. NONPOINT DISCHARGES INTO WATERWAY
   - Ground Water: Information on Geohydrology and Ground Water Characteristics
   - Atmospheric Deposition

4. LAND USE OF ADJACENT PROPERTIES

5. CONTAMINATED SITES
   - Hazardous Waste
   - Superfund
   - Spill

6. WATERSHED HYDROLOGY
   - Wetlands

7. WATERWAY HYDRAULICS & FLOW
   - Hydrology or Flows Through the System
   - Area of Bottom Contamination
   - Water Depth at Area of Contamination
   - Contaminant Waste Loads to System
   - Floods

8. WATER QUALITY DATA

DOC	TOC
DO	Hardness
BOD	PH
Metals	Conductivity
PAHs	Temperature
PCBs	Total Solids

   - Total Suspended Solids (distributed in time and space)
   - Best Estimates of Partition Coefficients for Low (water column) and High (bottom sediments) Sediment Concentrations
   - Sediment-Water Contaminant Distribution Coefficients
   - Bacteriological Quality
   - Priority Pollutants
   - Interstitial Water Contaminant Concentration

9. BIOASSAY TEST DATA
   - Rapid:
     - microtox
     - *Daphnia*
     - *Ceriodaphnia*
     - *Pontoporeia*
     - Ames Test
   - Chronic:
     - *C. tentans*
     - *Daphnia*
     - fathead minnows
     - macroinvertebrate

(Continued)

Table 1 (Concluded)

Plant bioassay data:
- Total PCB Content (aroclor content)
- Specific PCB Congeners
- PAHs
- Heavy Metal Uptake

10. BIOLOGICAL DATA

Fisheries Surveys, including:
- body weight/size
- diet/stomach contents
- feeding type
- lipid content
- phytoplankton
- zooplankton

Benthic Community
- overall benthic "health"
- benthic indicators/low diversity

11. MISCELLANEOUS INFORMATION

Climatological Data
- Air Quality

12. RISK ASSESSMENT
- Human Health
- Ecological

13. WILDLIFE USAGE
- Birds
- Mammals

14. ENDANGERED SPECIES
- Federal
- State

Table 2

Contaminant Analyses Performed on Niagara River Ambient Monitoring

Subproject Samples (Source R-21, Table 4.1)

CHEMICAL CLASS	MEDIA	WATER AND SUSPENDED SEDIMENT											BOTTOM SEDIMENT							BIOTA									
	SUB-PROJECT #	1	7	(9)	(10)	(11)	(20)	22	(23)	24	(25)	26	32	(1)	(8)	12&12a	13-14	(21)	(27) & 27a	2	(3)	4	(5)	(6)	(15)	(18)	(19)	30	31	33
Metals				•	•	•		•	•	•	•	•	•	•	•		•	•	•											
PCBs				•	•	•		•	•	•	•	•	•	•	•		•	•	•				•							
Pesticides			•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•		•	•			•	•	•	•	•
Aliphatic hydrocarbons													•	•			•			•		•	•			•	•	•	•	•
Aromatic hydrocarbons				•									•	•			•													
Polynuclear aromatic Hydrocarbons		•		•	•	•		•					•	•			•	•		•										
Halogenated aliphatics				•									•	•			•													
Halogenated aromatics				•	•	•	•	•	•				•	•			•													
Alcohols, Organic acids, Ethers, Esters				•									•	•			•	•			•					•				
Nitro-and Amine aromatics				•										•			•													
Aldehydes and Ketones													•	•			•													
Organo-sulphides													•																	
Phenol				•							•	•	•				•													
Halogenated phenols				•													•													
Phthalates				•	•	•		•	•					•			•													
Dioxin													•				•		•		•									
Total Number of Analyses: 105,747	see	66	804	1758	649	290	1934	2392	3454	15618	7708	13965	9383	3142	1684	20951	2292	3729	845	90	1429				(*)					
Total Number of Detections: 27,167	biota	66	25	311	98	193	1073	1118	1827	3293	1679	2097	1983	681	265	1668	1118	1548	53	85	488		--	--	7043	5840	1320	8		8

(*) Samples collected but not yet analyzed.

Identification of sub-projects is as follows:

Sub-Project Number	Title	Agency
(1)	Buffalo Harbour & Niagara River Sediment Survey	USEPA V
2	Ambient Feasibility Study	NYSDEC
(3)	Polycyclic Aromatic Hydrocarbon Trackdown	NYSDEC/USEPA V
4	Nearshore Ambient Trackdown	NYSDEC
(5)	Fish Studies	NYSDEC
(6)	Macroinvertebrate Survey	NYSDEC/NYSDOH
7	Lake Erie and Lake Ontario Water Sampling	USEPA/ERL
(8)	Sediment Testing in Buffalo River and Harbour	USACOE
(9)	Water Quality Surveillance Network Sampling	NYSDEC
(10)	Lake Erie Input to Niagara River	NYSDEC
(11)	Buffalo River Toxics Loading	NYSDEC
12	Open Lake (Erie) Dredge Spoil Site Sampling	USEPA II
12a	Niagara River Sediment Sampling	USEPA II
13	Scajaquada Creek Sediment Sampling	NYSDEC
14	Two Mile Creek Sediment Sampling	NYSDEC
(15)	Cayuga Creek Dioxin Trackdown	NYSDEC
(18)	Survey of Contaminants at Niagara-on-the-Lake	IWD-OR
22	Niagara River Suspended Sediments	IWD-OR
(23)	Toxic Contaminants Sources Survey	IWD-OR
24	Niagara-on-the-Lake Daily Water Monitoring	IWD-OR
(25)	Lower Niagara River Water Quality Survey	MOE
26	Upper Niagara River Water Quality Survey	MOE
27a	Niagara River Sediment Survey (1979)	MOE
(27)	Lower Niagara River Sediment Survey (1981)	MOE
(20)	Freshwater Clam Studies	MOE
(21)	Cladophora Surveys	MOE
30	Fish Studies - Toxic Contaminants	MOE
31	Trends in Contaminants in Herring Gulls	CWS
32	Drinking Water Monitoring	MOE
33	Sport Fish Testing - Angler Advisory Program	MOE

○ Encircled numbers are sub-projects with sample sites in Buffalo River AOC.

Table 3

Contaminants of Concern for the Buffalo River AOC

Medium	Contaminant	Location	Reference
Water	-Al, Cu, Hg, Ni, Zn	Downstream of mouth of Buffalo River	Sections C.2.1, C.2.2 (R21)
Suspended Sediments	-No collection sites	--	--
Bottom Sediment	-Cd, Hg, Pb, Zn, α-BHC, γ-BHC, p,p'-DDT, p,p'-DDE, 1,2-DCB, 1,3-DCB, 1,4-DCB, HCB, α-Endosulfan, Endrin, Benzo(a)pyrene, Fluoranthene	Many of the highest levels occurred near Buffalo Color on the Buffalo River	Section C.3.3 (R21)
	-PCBs		Subproject 1 (R22)
	-PAHs		Subproject 3 (R7)
	-PAHs		(R4)
Biota			
Alga (*Cladophora*)	-Al, Cr, Co, Cu, Hg, Mn, Ni, Pb, Se, Zn, PCBs	In Buffalo River downstream of confluence with Buffalo Ship Canal	Section C.4.2, Table C.28 (R21)
Clam (*Elliptio*)	-α, ß-BHC.α, γ-Chlordane, p,p-DDD, o,p-DDT, HCB, PCBs	In Buffalo River downstream of confluence with Buffalo Ship Canal	Section C.4.3, Table C.34 (R21)
Mussels (*E. dilatata*)	-PCB congeners, p,p-DDE, o,p-DDE, HCB	Up and down river	(R11)
Young Fish (*Notropis*)	-No collection sites	--	--
	-PCBs, Chlordane		Table 4.4 (R16)

Table 4

Summary of Impairments, Causes and Sources (R-16)

No.	Impairments and Impairment Indicators	Impairment	Likely Causes	Known Sources	Potential Sources
1.	Restrictions on fish and wildlife consumption	Yes	Polychlorinated biphenyls	Bottom sediments	Inactive hazardous waste sites
			Chlordane		Bottom sediments
2.	Tainting of fish and wildlife flavor	Likely	Polynuclear aromatic hydrocarbons	Bottom sediments	Inactive hazardous waste sites Combined sewer overflows
3.	Degradation of fish and wildlife populations	Likely	Low dissolved oxygen 1/		Bottom sediments Inactive hazardous waste sites Combined sewer overflows Other point sources Other nonpoint sources
4.	Fish tumors and other deformities	Yes	Polynuclear aromatic hydrocarbons	Bottom sediments	Inactive hazardous waste sites Combined sewer overflows
5.	Bird or animal deformities or reproduction	Likely	Polychlorinated biphenyls	Bottom sediments	Inactive hazardous waste sites
			DDT and metabolites		Bottom sediments
6.	Degradation of benthos	Yes	None identified	Not applicable	Not applicable
7.	Restriction on dredging activities	Yes	Metals and cyanides	Bottom sediments	Inactive hazardous waste sites Combined sewer overflows Other point sources Other nonpoint sources

(Continued)

Table 4 (Concluded)

No.	Impairments and Impairment Indicators	Impairment	Likely Causes	Known Sources	Potential Sources
8.	Eutrophication or undesireable algae	No	Not applicable	Not applicable	Not applicable
9.	Restrictions on drinking water consumption or taste and odor problems	No	Not applicable	Not applicable	Not applicable
10.	Beach closings	No	Not applicable	Not applicable	Not applicable
11.	Degradation of aesthetics	No	Not applicable	Not applicable	Not applicable
12.	Added costs to agriculture or industry	No	Not applicable	Not applicable	Not applicable
13.	Degradation of phytoplankton and zooplankton population	No	Not applicable	Not applicable	Not applicable
14.	Loss of fish and wildlife habitat	Yes	Physical disturbance	Bulkheading Dredging Steep bank slopes	Suitable substrate

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1/ River channelization is also a potential factor

Table 5

Highest Concentration (μg/g) of Contaminants

in Buffalo River AOC Sediments

Chemical	Highest Concentration (μg/g)	Sub-Project No.
Lead	3300	1
Zinc	600	1
Mercury	66.6	8
Cadmium	4.5	1
p,p'-DDT	1.84	1
p,p'-DDE	0.125	1
Benzo(a)pyrene	72.5	1
Fluoranthene	35.6	1
Phenanthrene	9.6	3
Anthracene	3.4	3
Pyrene	22.0	3
Benzofluorene	9.2	3
Benzathracene	2.6	3
Chrysene	1.8	3
Benzo(c)pyrene	4.5	3
Perylene	13.7	3
Benzo(b)Fluoranthene	5.5	3
Benzo(k)Fluoranthene	1.2	3
Dibenz(a,h)Anthracene	6.3	3
Benzo(ghi)Perylene	2.6	3
Indeno(123-cd)Pyrene	2.8	3
Heptachlor epoxide	0.300	1
alpha-Endosulfan	0.015	1
alpha-BHC	0.016	23
gamma-BHC	0.298	1
Endrin	0.267	1
1,2-DCB	247.8	1
1,3-DCB	10	1
1,4-DCB	3	1
HCB	58.7	1
PCBs	3.2	1

Table 6

Highest Concentrations of Contaminants in Biota of Buffalo River AOC

Chemical	Highest Concentration µg/g, Fresh Weight
Fish (R16)	
PCBs	14.5
DDT	1.63
Chlordane	0.53
Mercury	0.29
Aldrin/Dieldrin	0.06
Endrin	<0.01
Lindane	0.04
Mirex	0.01
Clams (R21)	
PCBs	1284 ± 277
alpha-BHC	5 ± 4
beta-BHC	3 ± 5
Chlordane	13 ± 7
p,p'-DDD	7 ± 7
DDT	5 ± 10
Heptachlor epoxide	3 ± 3
Herachlorobenzene	2 ± 1
Mussels (R11)	
HCB	1.6
p,p-DDE	4.2
PCB-15	8.5
PCB-28	3.9
PCB-44	9.0
PCB-49	5.4
PCB-52	5.1
PCB-70	9.1
PCB-87	2.6
PCB-101	5.2
PCB-138	9.4
PCB-153	9.6
PCB-180	53.0
Alga (R21)	
PCBs	220 ± 110
As	11.3 ± 0.6
Cd	0.5 ± 0.1
Pb	60.0 ± 1.0
Hg	0.13 ± 0.01
Zn	99 ± 1.2

Table 7

Ranges of Water Quality Parameters Measured in the Buffalo River AOC

Parameter	Range
River Water (R16)	
Temp (Celsius)	6.0-24.0
Per ent Saturation (%)	31-105
DO (mg/l)	2.8-9.5
Sp. Conductance (μmhos/cm)	225-445
Chlorine demand (mg/l)	0.35-3.02
Total Fe (mg/l)	0.417-1.06
COD (mg/l)	8.8-34.6
BOD (mg/l)	<20
TSS (mg/l)	6-38
TDS (mg/l)	175-377
TS (mg/l)	195-412
NH3-N (mg/l)	<0.06
Total Chlorides (mg/l)	19.1-44.8
Groundwater, μg/l (R16)	
Cd	10.2
Cr	223
Cu	85-472
Pb	174-1331
Hg	0.3
Ni	219
Zn	261,000
2-chlorophenol	13
bis (2-ethylhexyl)-phthalate	37
1,2-dichlorobenzene	76.7
Napthalene	33.3
1,2,4-trichlorobenzene	25.7
Benzene	141
Chlorobenzene	1743

Table 8

Attenberg Limits for the Analyzed Samples from October 30, 1987 (R-20, Table 5.3)

Sample	Liquid Limit # of Tests	Liquid Limit Value [%]	Liquid Limit Standard Deviation [%]	Plastic Limit # of Tests	Plastic Limit Value [%]	Plasticity Index [%]
A	2	47.9		1	27.3	20.6
B	5	44.7	0.8	2	27.9	16.8
E	4	61.3	0.7	1	36.5	24.8
G	4	63.9	0.7	1	38.0	25.9
K	3	34.3		1	22.2	12.1
J	4	44.2	0.4	1	31.1	13.1
N	4	54.0	1.2	1	37.2	16.8
N_{bis}	5	66.1	1.3	2	38.3	27.8

Table 9

Water Contents Tests (R-20, Table 5.4)

Sample	w @ GT-CEE	w @ CU-SCL	Moisture (air dry) [%]
A	0.49	0.72	
B	0.85	0.79	41
E	1.31	1.36	51
G	1.55	1.36	56
J	0.99		48
N	0.88		47
K	0.47		

Table 10

Cation Exchange Capacity and Organic Matter Content of Analyzed Samples of October 30, 1987 (R-20, Table 5.5)

Sample	Cation Exchange Capacity [meq/100g]	Organic Matter [%]
B	1.52	3.3
E	1.92	4.7
G	2.02	5.1
J	1.47	4.4
N	1.34	7.8

Table 11

Summary of Laboratory Test Results and Derived Quantities (R-20, Table 5.6)

Sample	w [%]	e	c [kg/l]	CEC [meq/100g]	Org [%]	LL [%]	PL [%]	PI [%]	LI [%]
A	0.5	1.3	1.2			48	27	21	1
B	0.9	2.3	0.8	2	3	45	28	17	3
E	1.3	3.5	0.6	2	5	61	37	25	4
G	1.6	4.1	0.5	2	5	64	38	26	5
J	1.0	2.6	0.7	1	4	44	31	13	5
K	0.5	1.2	1.2			34	22	12	2
N	0.9	2.3	0.8	1	8	54	37	17	3
N_{bis}						66	38	28	2

Table 12

Grain Size Fractions for Samples from October 30, 1987 and August 12, 1981 (R-20, Table 5.7)

Sample	Clay [%]	Silt [%]	Sand [%]	D_{50} [mm]	Textural Class
A	16.5	50.3	33.2	1.5	Silt loam
B	20.2	63.8	16	0.012	Silt loam
E	29.4	62.8	7.8	0.008	Silty clay loam
G	30.6	63.6	5.8	0.011	Silty clay loam
1	5.5	44.1	50.4	0.062	Sandy loam
2	11.9	52.8	35.2	0.027	Loam
3	8.0	73.7	18.3	0.022	Silt loam
4	6.0	55.1	38.9	0.041	Silt loam
5	7.7	70.6	21.7	0.022	Silt loam
6	9.8	60.2	30.0	0.025	Silt loam
7	9.8	71.3	18.6	0.016	Silt loam
8	12.8	42.7	44.5	0.013	Silt loam
9	10.9	72.5	16.6	0.015	Silt loam
10	14.2	72.8	12.9	0.013	Silt loam
11	14.5	76.7	8.8	0.010	Silt loam

Table 13

Historical Bulk Sediment Contaminant Concentrations-Buffalo River and Buffalo Ship Canal (R-22, Table 10)

HISTORICAL BULK SEDIMENT CONTAMINANT CONCENTRATIONS
BUFFALO RIVER AND BUFFALO SHIP CANAL
Data from Rockwell, Claff, and Kuehl, 1983
(mg/kg)

	Sample Sites (see Fig. 9)						
Substances	4	8	12	26	52	53	54
Cd	0.3	0.3	2.8	4.5	4.0	1.1	0.5
Cr	14	15	1000	54	95	37	34
Cu	24	33	1200	140	120	61	76
Pb	89	41	3300	300	190	85	100
Hg	0.1	0.1	24	1.3	3.4	0.6	1.4
Ni	19	24	120	39	39	37	23
Zn	100	110	540	390	470	200	260
Ag	0.3	ND	ND	3.5	ND	ND	ND
Total 2CB	ND	ND	180	ND	ND	ND	ND
Total 3CB	ND	ND	243	ND	ND	ND	ND
Total 4CB	ND	ND	1000	20	ND	ND	ND
5CB	ND	ND	540	ND	ND	ND	ND
6CB	ND	ND	114	ND	ND	ND	ND
Total PAH	16.5	4.2	238	285	51	1.9	16.6
PCB	ND	0.07	3.17	2.12	0.33	0.10	0.14
Total DDT	0.049	0.007	2.318	0.205	0.209	0.099	0.169
Total Chlordane	.021	0.013	0.301	0.012	0.052	0.012	0.018
Mirex*	0.004	ND	0.266	ND	0.01	0.004	0.007

* not confirmed by GC/MS.

Table 14

Contaminant Concentrations in Buffalo River Bottom Sediments

for Parameters Quantified-USEPA Region V Sampling 1981

(R-16, Table A.3)

(ug/g)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
1,1,1-trichloroethane	17	0.001	0.000	0.000	0.000	0.000	0.000	1
1,1,2,2-tetrachloroethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1,1,2-trichloroethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1,1,3-trimethylcyclohexane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1,1-dichloroethane	17	0.001	0.000	0.000	0.000	0.000	0.000	2
1,1-dichloroethene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1,2-dichloroethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1,2-dichloroethylene	17	0.002	0.000	0.000	0.000	0.000	0.000	1
1,2-dichloropropane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
1-methyl-2-propylcyclopentane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
2-butanone	17	0.000	0.000	0.000	0.000	0.000	0.000	0
2-chloroethylvinyl ether	17	0.000	0.000	0.000	0.000	0.000	0.000	0
2-hexanone	17	0.000	0.000	0.000	0.000	0.000	0.000	0
2-methylhexane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
2-(2-propenyl)toluene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
3-methylhexane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
4-methyl-2-pentanone	17	0.000	0.000	0.000	0.000	0.000	0.000	0
acetone	17	0.000	0.000	0.000	0.000	0.000	0.000	0
benzene	17	0.122	0.000	0.000	0.000	0.000	0.000	4
bromodichloromethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
bromoform	17	0.000	0.000	0.000	0.000	0.000	0.000	0
bromomethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
carbon disulfide	17	0.000	0.000	0.000	0.000	0.000	0.000	0
carbon tetrachloride	17	0.000	0.000	0.000	0.000	0.000	0.000	0
chlorobenzene	17	2.349	0.000	0.000	0.016	0.000	0.040	4
chloroethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
chloroform	17	0.047	0.000	0.000	0.032	0.000	0.080	1
chloromethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
chlorotoluene	17	0.265	0.000	0.000	0.000	0.000	0.000	1
cis-1,3-dichloropropene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
cyclohexane	17	0.100	0.000	0.000	0.000	0.000	0.000	1
dibromochloromethane	17	0.002	0.000	0.000	0.000	0.000	0.000	3
dibromoethane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
dichlorobenzene	17	0.100	0.000	0.000	0.000	0.000	0.000	1
diethyl ether	17	0.040	0.000	0.000	0.000	0.000	0.000	2
dimethylcyclohexane	17	0.008	0.000	0.000	0.000	0.000	0.000	1
dimethylcyclopentane	17	0.002	0.000	0.000	0.000	0.000	0.000	1
ethylbenzene	17	0.056	0.000	0.000	0.000	0.000	0.000	4

(Continued)

Table 14 (Continued)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
ethylcyclopentane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
ethyltoluene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
hydrocarbons-volatile	17	0.000	0.000	0.000	0.000	0.000	0.000	0
methylcyclodecane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
methylcyclohexane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
methylene chloride	17	0.232	0.020	0.000	0.035	0.000	0.088	3
N-nitrosodimethylamine	17	0.000	0.000	0.000	0.000	0.000	0.000	0
propylbenzene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
styrene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
tetrachloroethene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
tetrachloroethylene	17	0.114	0.000	0.000	0.000	0.000	0.000	2
toluene	17	0.691	0.000	0.000	0.040	0.000	0.100	2
trans-1,2-dichloroethene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
trans-1,3-dichloropropene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
tribromomethane	17	0.001	0.000	0.000	0.000	0.000	0.000	3
trichloroethane	17	0.000	0.000	0.000	0.000	0.000	0.000	1
trichloroethene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
trichloroethylene	17	0.002	0.000	0.000	0.000	0.000	0.000	1
trimethylbenzene	17	0.000	0.000	0.000	0.000	0.000	0.000	0
trimethylcyclohexane	17	0.000	0.000	0.000	0.000	0.000	0.000	0
vinyl acetate	17	0.000	0.000	0.000	0.000	0.000	0.000	0
vinyl chloride	17	0.000	0.000	0.000	0.000	0.000	0.000	0
(hydrocarbons-alcohols)	17	0.000	0.000	0.000	0.000	0.000	0.000	0
(substituded cyclohexanes)	17	0.000	0.000	0.000	0.000	0.000	0.000	0
m-xylene	17	0.126	0.000	0.000	0.020	0.000	0.050	4
o-xylene	17	0.097	0.000	0.000	0.020	0.000	0.050	3
p-xylene	17	0.097	0.000	0.000	0.020	0.000	0.050	3
1,2,4-trichlorobenzene	16	11.794	0.000	0.000	0.000	0.000	0.000	3
1,2-dichlorobenzene	16	11.775	0.000	0.000	1.850	0.000	4.625	3
1,3-dichlorobenzene	16	0.356	0.000	0.000	0.150	0.000	0.375	3
1,4-dichlorobenzene	16	0.431	0.000	0.000	0.550	0.000	1.375	2
1,3&4-dichlorobenzene	16	1.112	0.000	0.000	0.000	0.000	0.000	2
1,4-dimethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1,7-dimethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-chloroanthraquinone	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-chloro-2-nitrobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-chloro-3-nitrobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-methylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-methyl-2-isopropyl-naphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
1-pentylheptylbenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4,5-trichlorophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4,6-trichlorophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4-dichloronitrobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4-dichlorophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4-dimethylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4-dinitrophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0

Table 14 (Continued)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
2,4-dinitrotoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,6-dinitrotoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2,7-dimethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-chloroaniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-chloronaphthalene	16	0.250	0.000	0.000	0.000	0.000	0.000	1
2-chlorophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-methylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-methylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-nitroaniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-nitrophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
2-nitrotoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
3,3'-dichlorobenzidine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
3-ehtyl-o-xylene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
3-nitroaniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4,5-dimethyl-2-cyclohexen-1-one	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4,6-dinirto-2-methylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-bromophenylphenylether	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-chloroaniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-chlorophenylphenylether	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-chloro-3-methylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-ethyltoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-methyldibenzofuran	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-methylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-nitroaniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-nitrophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4-nitrotoluene+4-chloraniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
acenaphthene	16	5.296	0.000	0.000	0.200	0.000	0.500	3
acenaphthylene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
aniline	16	0.000	0.000	0.000	0.000	0.000	0.000	0
anthracene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzeneacetaldehyde	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzidine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzoic acid	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzo(a)anthracene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzo(a)pyrene	16	4.531	0.000	0.000	0.000	0.000	0.000	1
benzo(b)fluoranthene	16	6.056	0.000	0.000	0.000	0.000	0.000	1
benzo(g,h,i)perylene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzo(k)fluoranthene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
benzyl alcohol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
bis(2-chloroethoxy)methane	16	0.000	0.000	0.000	0.000	0.000	0.000	0
bis(2-chloroethyl)ether	16	0.000	0.000	0.000	0.000	0.000	0.000	0
bis(2-chloroisopropyl)ether	16	0.000	0.000	0.000	0.000	0.000	0.000	0
bis(2-ethylhexyl)phthalate	16	2.277	0.000	0.000	1.450	0.000	3.625	2
bis(2-methylphenyl)diazine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
butylbenzylphthalate	16	0.012	0.000	0.000	0.000	0.000	0.000	1
chrysene	16	0.000	0.000	0.000	0.000	0.000	0.000	0

(Continued)

Table 14 (Continued)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
chrysene/benz(a)anthracene	16	7.881	1.050	0.000	10.850	0.000	27.125	1
diacetone alcohol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dibenzofuran	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dibenzo(a,h)anthracene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
diethylbenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
diethylbenzene(2)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
diethylphthalate	16	0.100	0.000	0.000	0.000	0.000	0.000	3
dimethyldibenzofuran	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dimethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dimethylnaphthalene(2)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dimethylphenanthrene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dimethylphthalate	16	0.000	0.000	0.000	0.000	0.000	0.000	0
di-n-butylphthalate	16	0.812	0.000	0.000	0.600	0.000	1.500	2
di-n-octylphthalate	16	0.000	0.000	0.000	0.000	0.000	0.000	0
ethyltoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
fluoranthene	16	5.739	2.350	0.350	5.610	0.000	13.500	2
fluorene	16	0.075	0.000	0.000	0.000	0.000	0.000	3
hexachlorobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
hexachlorobutadiene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
hexachlorocyclopentadiene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
hexachloroethane	16	0.000	0.000	0.000	0.000	0.000	0.000	0
hydrocarbons-semi-volatiles	16	0.000	0.000	0.000	0.000	0.000	0.000	0
indeno(1,2,3-cd)pyrene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
isophorone	16	0.000	0.000	0.000	0.000	0.000	0.000	0
methylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
methylphenanthrene(2)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
methylphenanthrene(3)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
naphthalene	16	11.612	0.250	0.000	0.950	0.000	2.375	2
nitrobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
nonylphenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
N-nitrosodiphenylamine	16	1.331	0.000	0.000	0.100	0.000	0.250	3
N-nitrosodi-n-propylamine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
o-toluidine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
pentachlorobenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
pentachlorophenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
pentachlorotoluene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
pentamethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
phenanthrene	16	3.647	2.050	0.850	3.030	0.000	6.300	3
pyrene	16	4.616	1.950	0.000	4.600	0.000	11.500	2
p-toluidine	16	0.000	0.000	0.000	0.000	0.000	0.000	0
tetramethylbenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
tetramethylbenzene(2)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
tetramethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
trimethylnaphthalene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
trimethylnaphthalene(2)	16	0.000	0.000	0.000	0.000	0.000	0.000	0
trimethylphenanthrene	16	0.000	0.000	0.000	0.000	0.000	0.000	0

(Continued)

Table 14 (Continued)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
t-pentylbenzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
(1,2,3-trimethyl)-4-propenyl nap	16	0.000	0.000	0.000	0.000	0.000	0.000	0
(1-methyldodecyl)benzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
(1-methyltridecy)benzene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
(tetramethylbutyl)phenol	16	0.000	0.000	0.000	0.000	0.000	0.000	0
alpha-BHC	16	0.000	0.000	0.000	0.000	0.000	0.000	0
beta-BHC	16	0.020	0.008	0.000	0.014	0.000	0.035	2
delta-BHC	16	0.000	0.000	0.000	0.000	0.000	0.000	0
gamma-BHC	16	0.019	0.000	0.000	0.000	0.000	0.000	3
heptachlor	16	0.000	0.000	0.000	0.000	0.000	0.000	0
aldrin	16	0.000	0.000	0.000	0.000	0.000	0.000	0
heptachlor epoxide	16	0.051	0.005	0.002	0.054	0.000	0.132	3
endosulfan I	16	0.000	0.000	0.000	0.000	0.000	0.000	0
dieldrin	16	0.005	0.000	0.000	0.000	0.000	0.000	2
4,4'-DDE	16	0.034	0.010	0.003	0.050	0.000	0.121	2
endrin	16	0.017	0.000	0.000	0.000	0.000	0.000	1
endosulfan II	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4,4'-DDD	16	0.034	0.010	0.002	0.017	0.000	0.040	2
endrin aldehyde	16	0.000	0.000	0.000	0.000	0.000	0.000	0
endosulfan sulfate	16	0.000	0.000	0.000	0.000	0.000	0.000	0
4,4'-DDT	16	0.127	0.006	0.004	0.023	0.000	0.051	1
methoxychlor	16	0.102	0.012	0.000	0.083	0.000	0.208	2
endrin ketone	16	0.000	0.000	0.000	0.000	0.000	0.000	0
chlordane	16	0.033	0.010	0.007	0.014	0.000	0.025	2
toxaphene	16	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1016	16	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1221	16	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1232	16	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1242	16	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1248	16	0.368	0.080	0.020	0.550	0.000	1.345	2
PCB-1254	16	0.317	0.056	0.000	0.575	0.000	1.438	1
PCB-1260	16	0.119	0.000	0.000	0.047	0.000	0.118	3
2,4'-DDE	16	0.005	0.000	0.000	0.000	0.000	0.000	3
2,4'-DDD	16	0.005	0.001	0.000	0.004	0.000	0.010	1
2,4'-DDT	16	0.003	0.000	0.000	0.006	0.000	0.015	1
DCPA	16	0.001	0.000	0.000	0.000	0.000	0.000	3
mirex	16	0.026	0.000	0.000	0.006	0.000	0.015	3
alpha-endosulfan	16	0.001	0.000	0.000	0.000	0.000	0.000	3
beta-endosulfan	16	0.018	0.001	0.000	0.011	0.000	0.028	2
zyt on	16	0.065	0.010	0.000	0.036	0.000	0.090	2
trifluralin	16	0.005	0.000	0.000	0.000	0.000	0.000	3
chlorobenzilate	16	0.001	0.000	0.000	0.000	0.000	0.000	1
aluminum	15	11346.667	12000.000	10000.000	12500.000	6250.000	16250.000	1
antimony	15	0.000	0.000	0.000	0.000	0.000	0.000	0

(Continued)

Table 14 (Concluded)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
arsenic	15	0.000	0.000	0.000	0.000	0.000	0.000	0
barium	15	96.067	93.000	88.000	105.000	62.500	130.500	1
beryllium	15	0.273	0.000	0.000	0.000	0.000	0.000	1
cadmium	15	1.388	1.100	0.570	1.650	0.000	3.270	1
calcium	15	25333.333	24000.000	21000.000	27000.000	12000.000	36000.000	1
chromium	15	101.733	36.000	20.500	42.000	0.000	74.250	2
cobalt	15	11.933	12.000	11.000	12.500	8.750	14.750	1
copper	15	142.867	55.000	38.000	65.000	0.000	105.500	3
iron	15	26953.333	27000.000	24000.000	30500.000	14250.000	40250.000	2
lead	15	327.067	90.000	65.000	130.000	0.000	227.500	3
magnesium	15	8420.000	9100.000	7500.000	9700.000	4200.000	13000.000	0
manganese	15	580.000	550.000	505.000	635.000	310.000	830.000	1
mercury	16	2.000	0.500	0.300	0.800	0.000	1.550	1
nickel	15	38.200	32.000	30.500	36.500	21.500	45.500	2
potassium	15	1492.000	1400.000	1200.000	1700.000	450.000	2450.000	0
selenium	15	0.000	0.000	0.000	0.000	0.000	0.000	0
silver	15	0.233	0.000	0.000	0.000	0.000	0.000	1
sodium	15	278.000	140.000	120.000	520.000	0.000	1120.000	0
thallium	15	0.000	0.000	0.000	0.000	0.000	0.000	0
tin	15	5.533	5.000	0.000	6.500	0.000	16.250	1
vanadium	15	20.467	20.000	18.500	22.000	13.250	27.250	0
zinc	15	235.333	180.000	140.000	235.000	0.000	377.500	3
boron	15	4.760	0.000	0.000	9.100	0.000	22.750	0
lithium	15	26.467	28.000	23.000	29.000	14.000	38.000	1
molybdenum	15	3.653	1.600	1.050	2.850	0.000	5.550	3
strontium	15	41.200	41.000	34.000	43.500	19.750	57.750	1
yttrium	15	10.413	10.000	10.000	12.000	7.000	15.000	1
cyanide	16	1.519	1.350	0.000	1.950	0.000	4.875	1
phenols(4AAP)	16	22.187	0.000	0.000	0.550	0.000	1.375	3

Table 15

Contaminant Concentrations in Bottom Sediments of Lake Erie and the Niagara River, Collected by MOE, 1979 (R-21, Table C.16)

PARAMETER	DETECTION LIMIT	RIVER SEGMENT/SUB-AREA														
		Fort Erie		Chippawa		Buffalo River	Bird Is.-Riverside	Tonawanda North Tonawanda					Wheatfield-Upper River			
		M-1	M-2	M-14	M-15	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13
Arsenic	0.3	2.7	4.6	3.3	3.2	8.2	2.4	2.5	14	5.4	7.6	2.4	1.9	2.4	3.4	4.0
Cadmium	0.04	<0.40	<0.40	<0.40	<0.40	0.60	<0.40	<0.40	0.50	<0.40	0.40	0.80	0.50	0.88	<0.40	<0.40
Chromium	3.0	7.8	8.0	8.0	19	34	24	7.0	79	5.8	28	19	11	24	8.2	20
Copper	1.0	5.5	3.8	7.0	15	40	14	9.5	110	10	32	12	8.5	20	7.8	18
Lead	3.0	6.0	4.5	4.0	11	56	12	7.0	200	5.0	48	13	11	31	10	20
Mercury	0.01	0.09	0.08	0.20	0.06	0.23	0.07	0.06	0.67	<0.01	0.65	0.04	0.09	0.60	0.06	0.10
Nickel	3.0	20	8.8	9.0	19	25	8.0	6.0	38	10	10	13	6.0	10	6.5	17
Zinc	1.0	32	26	36	75	170	67	42	460	50	330	120	100	200	210	76
PCBs, Total	0.010	-	0.027	0.048	ND	0.710	0.036	0.050	0.380	0.220	0.340	0.810	0.120	0.960	0.530	-
Aldrin	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	0.001	ND	ND	ND	ND	0.006	ND	ND	0.002	ND	ND	0.003	0.001	0.002	ND	ND
alpha-BHC	0.001	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
beta-BHC	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	0.001	ND	ND	ND	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
gamma-Chlordane	0.001	ND	0.003	0.001	ND	0.002	ND	ND	0.005	ND	0.009	0.003	ND	ND	ND	ND
alpha-Chlordane	0.001	ND	0.003	ND	ND	0.003	ND	ND	0.001	ND	ND	0.001	ND	ND	ND	ND
o,p-DDT	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDT	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDE	0.001	0.006	0.002	0.001	0.001	0.019	0.001	0.003	0.006	0.003	0.005	0.003	0.002	0.009	0.007	0.001
p,p'-DDD (TDE)	0.005	ND	0.005	0.002	ND	0.005	ND	ND	ND	ND	0.009	0.005	ND	ND	ND	ND
Endrin	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
alpha-Endosulfan	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
beta-Endosulfan	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mirex	0.005	Tr	ND	ND	0.008	0.012	ND	ND	0.018	0.008	0.004	0.010	0.005	0.010	0.016	ND
Hexachloro-benzene	0.001	ND	ND	ND	ND	0.022	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

NOTES: Data Source: Sub-project 27 (MOE). Stations correspond to locations in Figure 4.2.
ND = not detected at detection limit indicated; Tr = Trace (contaminant identified but present at level below detection limit).
A dash (-) indicates no data available.
Concentrations are in ppm (ug/g, dry weight).

Table 16

Contaminant Concentrations in Bottom Sediments of the Niagara River

Collected by IWD-OR, 1981 (R-21, Table C.17)

PARAMETER	DETECTION LIMIT	RIVER SEGMENT/SUB-AREA								
		Fort Erie	Chippawa		Buffalo River	Black Rock Canal	Bird Is.-Riverside	Tonawanda-North Tonawanda		
		E-4	E-11	E-12	E-1	E-2	E-3	E-5	E-6	E-7
Arsenic		4	3	8	16	16	12	20	7	5
Cadmium (extr.)	0.10	0.44	0.39	< 0.10	2.0	19.0	2.4	1.1	3.2	0.79
Chromium (extr.)		5	2	3	18	119	44	34	49	14
Cobalt (extr.)		3	2	4	5	4	3	4	2	2
Copper (extr.)		4	5	19	49	169	116	88	58	25
Lead (extr.)		13	11	9	109	767	145	88	105	72
Mercury		0.10	0.06	0.02	0.52	2.45	0.89	1.44	0.29	0.16
Nickel (extr.)		11	13	7	10	32	16	20	11	9
Selenium	0.10	0.25	0.20	0.17	< 0.10	0.19	0.22	0.22	0.27	0.20
Zinc (extr.)		11	33	7	179	1055	16	299	239	197
PCBs, Total	0.010	ND	0.020	ND	0.480	10.280	2.820	0.230	0.530	17.900
Aldrin	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dieldrin	0.001	ND	ND	ND	ND	ND	ND	ND	ND	0.010
alpha-BHC	0.001	ND	ND	ND	0.016	0.032	0.002	ND	0.002	0.015
gamma-BHC (Lindane)	0.001	ND	0.002	ND	ND	ND	0.004	ND	ND	ND
alpha-Chlordane	0.001	ND	ND	ND	ND	0.049	ND	ND	ND	ND
gamma-Chlordane	0.001	ND	ND	ND	ND	0.094	ND	ND	ND	0.020
o,p-DDT	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p'-DDT	0.001	0.024	0.009	ND	0.005	ND	0.073	ND	ND	ND
p,p'-DDE	0.001	0.005	ND	ND	0.008	0.100	0.024	ND	0.011	0.280
p,p'-DDD (TDE)	0.001	ND	ND	ND	0.005	0.007	0.005	0.007	0.054	0.007
Endrin	0.001	ND	ND	ND	0.010	0.181	0.008	ND	0.050	0.015
alpha-Endosulfan	0.001	ND	ND	ND	0.012	0.078	0.016	0.003	ND	0.008
beta-Endosulfan	0.001	ND	ND	ND	ND	ND	ND	0.007	ND	ND
Heptachlor	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor epoxide	0.001	ND	ND	ND	0.008	ND	ND	ND	0.019	ND
Methoxychlor	0.001	ND	0.018	ND	0.001	ND	0.059	0.014	0.103	0.008
Mirex	0.001	ND	0.003	ND	ND	ND	ND	ND	ND	ND
Σ -Dichlorobenzenes	0.001	0.019	ND	0.043	0.050	0.112	0.119	0.068	0.060	0.027
Σ -Trichlorobenzenes	0.001	ND	ND	ND	0.068	0.081	0.023	0.008	0.002	ND
Σ -Tetrachlorobenzenes	0.001	ND	ND	ND	0.001	ND	0.002	ND	ND	ND
Pentachlorobenzene	0.001	ND	ND	ND	0.004	0.003	0.002	0.013	0.002	ND
Hexachlorobenzene	0.001	ND	ND	ND	0.002	0.002	0.002	0.012	0.003	0.088

NOTES: Data source: sub-project 23 (IWD-OR). Stations correspond to locations in Figure 4.2.
Concentrations are in ppm, (ug/g dry weight). All inorganics values are total except those designated "(extr.)" for extractable.
ND = Not detected at detection limit indicated.

Table 17a

Contaminant Concentrations in Bottom Sediments of Buffalo Harbor Collected by USACOE, October 1981

PARAMETER	RIVER SEGMENT/SUB-AREA												
	Lake Erie						Buffalo River				Black Rock Canal		
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
Aluminum	7920	10280	7480	3855±35	4320	7820	10270±170	8520	8930	9050	8890	6780	11030
	8865±474	9920	7760	7820	4300	8270	10040	8680	9980±438	8830	8380	7360	10860±410
	8200	9440	9560	9075±686	3900	7910±156	10400	8380	9190	8850	7960±71	7353±172	11230
Arsenic	8.7	0.9	11.5	12.2±0.5	5.2	13.9	7.9±0.1	13.3	9.9	27.4	7.6	6.7	7.2
	9.5±0.4	7.9	13.1	11.5	6.1	9.8	10.0	15.0	12.3±0.8	11.5	7.9	5.0	5.7±0.8
	10.5	7.6	12.5	12.1±0.2	7.6	11.6±0.8	9.3	11.9	10.3	10.1	8.5±0.8	6.0±1.6	9.8
Cadmium	0.7	11.5	0.2	0.5±0.1	0.2	0.7	0.3±0.0	1.2	1.1	3.3	1.9	0.8	12.2
	0.6±0.0	11.6	0.5	0.5	0.2	0.5	0.7	1.6	1.4±0.1	1.9	1.1	0.9	16.1±0.2
	0.3	11.5	0.8	0.4±0.2	0.2	0.7±0.2	1.1	1.4	1.0	1.0	1.6±0.1	0.7±0.5	16.1
Chromium	48.3	89.3	41.6	44.3±0.0	19.7	43.4	24.7±0.5	29.6	27.5	85.8	30.6	35.0	111.2
	49.4±0.4	91.2	46.1	42.4	19.5	41.9	25.0	34.2	31.1±0.5	41.9	29.8	41.4	125.9±4.1
	49.7	92.5	49.0	44.7±1.7	17.9	43.6±0.2	23.5	38.2	31.3	28.0	29.8±1.1	41.0±1.0	124.8
Copper	50.3	139.3	42.4	42.4±2.2	16.9	42.6	56.3±0.7	65.5	57.1	123.4	49.9	43.9	199.9
	51.2±0.8	142.8	44.8	41.5	18.7	42.3	57.7	78.7	66.7±1.5	73.9	51.4	49.3	206.9±2.1
	50.9	139.0	43.1	44.1±2.4	18.6	45.0±0.3	53.6	83.4	62.2	56.1	49.4±0.1	48.2±0.6	197.5
Iron	25800	25800	31500	35250±212	25700	31300	26150±212	27700	23700	35700	25400	32000	25500
	44000±566	23000	35700	32900	25900	31900	26400	28700	28700±141	28300	25700	33900	27250±778
	33700	23200	36600	35950±778	25700	32800±424	25500	28400	26800	26800	24800±0	34433±115	26500
Lead	117.9	328.5	52.6	75.8±0.9	38.2	86.9	225.5±145.7	164.6	79.7	112.6	94.1	100.3	426.1
	123.7±7.1	343.5	68.9	81.7	21.9	70.6	123.1	204.4	96.7±1.8	223.1	99.3	105.5	465.3±5.1
	114.0	327.9	84.9	77.9±0.7	18.3	67.0	118.9	160.7	92.1	81.7	82.8±0.7	106.7±1.3	464.7
Manganese	394.9	409.1	989.3	944.9±3.7	685.8	884.1	519.1±0.6	479.2	451.6	529.9	48.74	42.3	416.6
	1045.6±43.8	418.8	1038.5	940.0	651.5	859.5	532.9	487.8	438.2±11.6	474.7	491.9	804.3	448.6±6.4
	1083.2	405.4	1065.3	856.5±129.7	635.8	872.6±2.6	501.6	495.6	439.7	468.0	492.7±1.1	800.8±10.8	452.3
Mercury	0.46	1.03	0.25	0.27	0.11	0.54±0.0	0.24	0.52	0.47	66.57	0.42	0.51	0.84
	0.48	1.03	0.31	0.41	0.13	0.48	0.22	0.71	0.56	0.95	0.41	0.45	0.94
	0.43±0.02	1.03	0.31	0.38	0.10	0.50	0.26	0.81	0.57	0.52	12.38	0.51	0.89
Nickel	37.3	51.3	37.3	39.9±0.5	18.7	37.1	36.7±1.6	36.6	33.9	43.4	36.1	32.5	50.1
	40.8±0.8	56.1	38.3	41.4	19.0	40.5	39.5	35.4	40.0±0.4	37.8	35.6	35.2	54.1±1.6
	41.7	53.5	41.7	42.3±1.9	17.1	40.1±0.8	38.0	34.2	36.8	36.1	34.4±0.7	35.3±1.1	53.7
Zinc	776.4	696.0	496.5	598.8±4.9	267.1	590.1	380.2±4.7	463.3	375.3	71.99	423.1	678.5	757.8
	737.2±0.8	702.6	567.2	592.5	286.7	713.4	401.2	489.9	417.5±7.4	529.1	413.4	773.1	779.3±6.2
	725.6	747.9	658.1	601.4±10.5	240.3	565.5±1.9	363.8	496.0	364.8	360.8	433.5±11.8	782.0±2.1	768.7

NOTES: Data Source: Sub-project 8 (USACOE). Stations correspond to locations in Figure 4.2.
Concentrations are in ppm (ug/g, dry weight).

Table 17b

Buffalo Harbor Heavy Metals - Sediment Analysis (2, Table 3)

Sample Code		Aluminum mg/kg (Dry)	Arsenic mg/kg (Dry)	Cadmium mg/kg (Dry)	Chromium mg/kg (Dry)	Copper mg/kg (Dry)	Iron mg/kg (Dry)	Lead mg/kg (Dry)	Manganese mg/kg (Dry)	Mercury mg/kg (Dry)	Nickel mg/kg (Dry)	Zinc mg/kg (Dry)
BH-Reference	-1	4320	5.2	<0.2	19.7	16.9	25700	38.2	685 .8	0.11	18.7	267.1
	-2	4300	6.1	<0.2	19.5	18.7	25900	21.9	.651.5	0.13	19.0	286.7
	-3	3900	7.6	<0.2	17.9	18.6	25700	18.3	635.8	0.10	17.1	240.3
BH-16	-1	7920	8.7	0.7	48.3	50.3	25800	117.9	394.9	0.46	37.3	776.4
	-2	8865±474	9.5±0.4	0.6±0.0	49.4±0.4	51.2±0.8	44000±566	123.7±7.1	1045.6±43.8	0.48	40.8±0.8	737.2±0.8
	-3	8200	10.5	0.3	49.7	50.9	43700	114.0	1083.2	0.43±0.02	41.7	725.6
BH-19	-1	7480	11.5	0.2	41.6	42.4	31500	52.6	989.3	0.25	37.3	496.5
	-2	7760	13.1	0.5	46.1	44.8	35700	68.9	1038.5	0.31	38.3	567.2
	-3	9560	12.5	0.8	49.0	43.1	36600	84.9	1065.3	0.31	41.7	658.1
BH-21	-1	8855±35	12.2±0.5	0.5±0.1	44.3±0.0	42.4±2.2	35250±212	75.8±0.9	944.9±3.7	0.27	39.9±0.5	598.8±4.9
	-2	7820	11.5	0.5	42.4	41.5	32900	81.7	940.0	0.41	41.4	592.5
	-3	9075±686	12.1±0.2	0.4±0.2	44.7±1.7	44.1±2.4	35950±778	77.9±0.7	856.5±129.7	0.38	42.3±1.9	601.4±10.5
BH-24	-1	7820	13.9	0.7	43.4	42.6	31300	86.9	884.1	0.54±0.0	37.1	590.1
	-2	8270	9.8	0.5	41.9	42.3	31900	70.6	859.5	0.48	40.5	713.4
	-3	7910±156	11.6±0.8	0.7±0.2	43.6±0.2	45.0±0.3	32800±424	67.0	872.6±2.6	0.50	40.1±0.8	565.5±1.9
BH-27	-1	9050	27.4	3.3	85.8	123.4	35700	112.6	529.9	66.57	43.4	71.99
	-2	8830	11.5	1.9	41.9	73.9	28300	223.1	474.7	0.95	37.8	529.1
	-3	8850	10.1	1.0	28.0	56.1	26800	81.7	468.0	0.52	36.1	360.8
BH-29	-1	8930	9.9	1.1	27.5	57.1	23700	79.7	451.6	0.47	33.9	375.3
	-2	9980±438	12.3±0.8	1.4±0.1	31.1±0.5	66.7±1.5	28700±141	96.7±1.8	438.2±11.6	0.56	40.0±0.4	417.5±7.4
	-3	9190	10.3	1.0	31.3	62.2	26800	92.1	439.7	0.57	36.8	364.8
BH-31	-1	8520	13.3	1.2	29.6	65.5	27700	164.6	479.2	0.52	36.6	463.3
	-2	8680	15.0	1.6	34.2	78.7	28700	204.4	487.8	0.71	35.4	489.9
	-3	8380	11.9	1.4	38.2	83.4	28400	160.7	495.6	0.81	34.2	496.0
BH-34	-1	10270±170	7.9±0.1	0.3±0.0	24.7±0.5	56.3±0.7	26150±212	225.5±145.7	519.1±0.6	0.24	36.7±1.6	380.2±4.7
	-2	10040	10.0	0.7	25.0	57.7	26400	123.1	532.9	0.22	39.5	401.2
	-3	10400	9.3	1.1	23.5	53.6	25500	118.9	501.6	0.26	38.0	363.8
BH-43	-1	8890	7.6	1.9	30.6	49.9	25400	94.1	48.74	0.42	36.1	423.1
	-2	8380	7.9	1.1	29.8	51.4	25700	99.3	491.9	0.41	35.6	413.4
	-3	7960±71	8.5±0.8	1.6±0.1	29.8±1.1	49.4±0.1	24800±0	82.8±0.7	492.7±1.1	12.38	34.4±0.7	433.5±11.8

(Continued)

Table 17b (Concluded)

Sample Code		Aluminum mg/kg (Dry)	Arsenic mg/kg (Dry)	Cadmium mg/kg (Dry)	Chromium mg/kg (Dry)	Copper mg/kg (Dry)	Iron mg/kg (Dry)	Lead mg/kg (Dry)	Manganese mg/kg (Dry)	Mercury mg/kg (Dry)	Nickel mg/kg (Dry)	Zinc mg/kg (Dry)
BH-44	-1	10280	0.9	11.5	89.3	139.3	25800	328.5	409.1	1.03	51.3	696.0
	-2	9920	7.9	11.6	91.2	142.8	23000	343.5	418.8	1.03	56.1	702.6
	-3	9440	7.6	11.5	92.5	139.0	23200	327.9	405.4	1.03	53.5	147.9
BH-46	-1	11030	7.2	12.2	111.2	199.9	25500	426.1	416.6	0.84	50.1	757.8
	-2	10860±410	5.7 0.8	16.1±0.2	125.9±4.1	206.9±2.1	27250±778	465.3±5.1	448.6±6.4	0.94	54.1±1.6	779.3±6.2
	-3	11230	9.8	16.1	124.8	197.5	26500	464.7	452.3	0.89	53.7	768.7
BH-47	-1	6780	6.7	0.8	35.0	43.9	32000	100.3	42.3	0.51	32.5	678.5
	-2	7360	5.0	0.9	41.4	49.3	33900	105.5	804.3	0.45	35.2	773.1
	-3	7353±172	6.0±1.6	0.7±0.5	41.0±1.0	48.2±0.6	34433±115	106.7±1.3	800.8±10.8	0.51	35.3±1.1	782.0±2.1

Table 17c

Buffalo Harbor (BH) Grain Size Data (2, Table 2)

Sample Code	% Very Coarse Sand	% Coarse Sand	% Medium Sand	% Fine Sand	% Very Fine Sand	% Silt + Clay
BH Reference-1	0.00	0.03	0.16	4.69	19.40	75.72
-2	0.00	0.01	0.16	3.52	21.36	74.95
-3	0.01	0.02	0.17	4.58	23.03	72.19
BH-16 -1	0.01	0.07	0.76	3.29	6.28	89.66
-2	0.00	0.03	0.26	1.68	4.19	93.84
-3	0.06	0.10	0.42	2.20	4.42	92.80
BH-19 -1	0.09	1.90	3.54	4.69	4.14	84.83
-2	0.14	0.27	0.86	2.20	3.68	92.85
-3	0.18	0.35	0.75	1.58	2.94	94.20
BH-21 -1	0.01	0.05	0.29	0.78	2.23	96.64
Replicate-1	0.01	0.06	0.28	1.02	2.12	96.51
-2	0.00	0.06	0.30	1.91	1.59	97.14
-3	0.03	0.10	0.58	1.07	1.60	96.62
BH-24 -1	0.08	0.37	1.60	4.68	7.66	85.61
-2	0.01	0.23	0.79	2.87	5.71	90.39
-3	0.00	0.01	0.28	2.63	5.88	91.20
BH-27 -1	0.04	0.10	0.22	0.72	2.78	96.14
-2	0.21	0.24	0.66	2.18	4.45	92.26
-3	0.00	0.04	0.13	0.52	1.78	97.53
BH-29 -1	0.34	0.63	0.93	1.31	2.52	94.27
-2	0.01	0.08	0.20	0.56	2.13	97.02
-3	0.03	0.06	0.12	0.55	3.13	96.11
Replicate-3	0.00	0.03	0.13	0.64	3.01	96.19

(Continued)

Table 17c (Concluded)

Sample Code		% Very Coarse Sand	% Coarse Sand	% Medium Sand	% Fine Sand	% Very Fine Sand	% Silt + Clay
BH-31	-1	0.05	0.19	0.60	2.22	5.03	91.91
	-2	0.26	0.60	1.64	4.31	7.14	86.05
	-3	0.01	0.11	0.72	2.76	5.95	90.40
BH-34	-1	0.06	0.17	0.49	3.29	4.56	91.43
	-2	0.00	0.02	0.26	3.16	4.26	92.30
	-3	0.00	0.07	0.72	4.97	4.94	89.30
BH-43	-1	0.01	0.05	0.23	3.95	5.81	89.95
	-2	0.00	0.01	0.15	3.31	6.00	90.53
	-3	0.00	0.03	0.15	2.79	5.40	91.63
BH-44	-1	0.01	0.04	0.18	0.62	1.15	98.00
	-2	0.00	0.04	0.18	0.58	1.16	98.04
	-3	0.00	0.05	0.32	1.02	1.40	97.21
BH-46	-1	0.17	0.13	0.35	0.82	0.82	97.71
	-2	0.02	0.09	0.27	0.81	1.00	97.81
Replicate	-2	0.02	0.07	0.26	0.84	1.00	97.81
	-3	0.03	0.08	0.32	0.77	1.01	97.79
BH-47	-1	0.03	0.10	0.56	3.02	7.95	88.34
	-2	0.10	0.17	0.51	2.15	5.82	91.25
	-3	0.01	0.05	0.32	1.69	5.73	92.20

Table 18

Contaminant Concentrations in Buffalo River Bottom Sediments

for Parameters Quantified USACOE-Buffalo District

Sampling - 1981 (R-16, Table A.3)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
di-2-ethylhexyl phthalate	12	0.000	0.000	0.000	0.000	0.000	0.000	0
di-n-butyl phthalate	12	0.234	0.160	0.000	0.400	0.000	1.000	0
2,4-D isopropyl ester	12	0.000	0.000	0.000	0.000	0.000	0.000	0
hexachlorobenzene	12	0.007	0.000	0.000	0.000	0.000	0.000	1
beta-BHC	12	0.008	0.000	0.000	0.000	0.000	0.000	2
gamma-BHC	12	0.002	0.000	0.000	0.000	0.000	0.000	1
heptachlor	12	0.011	0.010	0.000	0.020	0.000	0.050	0
aldrin	12	0.002	0.000	0.000	0.000	0.000	0.000	1
heptachlor epoxide	12	0.000	0.000	0.000	0.000	0.000	0.000	0
dieldrin	12	0.000	0.000	0.000	0.000	0.000	0.000	0
4,4'-DDE	12	0.002	0.000	0.000	0.000	0.000	0.000	1
endrin	12	0.000	0.000	0.000	0.000	0.000	0.000	0
4,4'-DDD	12	0.000	0.000	0.000	0.000	0.000	0.000	0
4,4'-DDT	12	0.019	0.000	0.000	0.025	0.000	0.062	2
methoxychlor	12	0.010	0.000	0.000	0.000	0.000	0.000	2
PCB-1242	12	0.000	0.000	0.000	0.000	0.000	0.000	0
PCB-1248	12	0.122	0.000	0.000	0.225	0.000	0.562	0
PCB-1254	12	0.438	0.450	0.290	0.555	0.000	0.953	0
PCB-1260	12	0.000	0.000	0.000	0.000	0.000	0.000	0
gamma-chlordane	12	0.012	0.000	0.000	0.030	0.000	0.075	0
DCPA	12	0.096	0.080	0.055	0.110	0.000	0.193	1
2,4'-DDD	12	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4'-DDE	12	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4'-DDT	12	0.017	0.000	0.000	0.030	0.000	0.075	1
alpha-endosulfan	12	0.039	0.000	0.000	0.065	0.000	0.163	1
beta-endosulfan	12	0.000	0.000	0.000	0.000	0.000	0.000	0
isodrin	12	0.003	0.000	0.000	0.000	0.000	0.000	2
mirex	12	0.012	0.000	0.000	0.020	0.000	0.050	0
tetradifon	12	0.000	0.000	0.000	0.000	0.000	0.000	0
trifluralin	12	0.047	0.030	0.000	0.080	0.000	0.200	0
zytron	12	0.000	0.000	0.000	0.000	0.000	0.000	0
aluminum	12	9260.000	8990.000	8755.000	10010.000	6872.500	11892.500	0
arsenic	12	12.408	10.900	9.950	12.800	5.675	17.075	1
cadmium	12	1.333	1.150	1.000	1.500	0.250	2.250	1
chromium	12	35.067	30.350	26.250	36.200	11.325	51.125	1
copper	12	69.550	63.850	56.700	76.300	27.300	105.700	1
iron	12	27737.500	27250.000	26275.000	28550.000	22862.500	31962.500	1

(Continued)

* Commonly referred to as bis-2-ethylexyl phthalate.

Table 18 (Concluded)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
lead	12	140.258	121.000	94.400	184.500	0.000	319.650	0
manganese	12	484.858	483.500	459.800	510.350	383.975	586.175	0
mercury	12	6.033	0.540	0.365	0.760	0.000	1.353	1
nickel	12	37.367	36.750	35.750	38.750	31.250	43.250	1
zinc	12	392.824	390.700	364.300	476.600	195.850	645.050	1
cyanide	12	0.404	0.331	0.294	0.417	0.109	0.601	3
phenols (4AAP)	12	0.479	0.381	0.244	0.663	0.000	1.292	1

Table 19

Sediment PAH Concentrations (ug/kg) Collected by NYSDEC

in Sub-Project 3, 1981 (R-7)

PARAMETER	Chippawa	RIVER SEGMENT/SUB-AREA													
		Buffalo River										Ton.-N. Ton.			
	N-30	N-15	N-16	N-17	N-18	N-19	N-20	N-21	N-22	N-23	N-24	N-25	N-26	N-27	N-28
Fluorene	21.0	0.0	171.0	129.0	0.0	645.0	631.0	235.0	131.0	261.0	167.0	2161.0	355.0	0.0	141.0
Phenanthrene	60.1	764.0	841.0	669.0	2255.0	9603.0	3577.0	2484.0	1413.0	1665.0	1707.0	10707.0	2436.0	539.0	3433.0
Anthracene	29.5	197.0	172.0	210.0	564.0	3401.0	1351.0	799.0	702.0	560.0	595.0	2768.0	632.0	0.0	635.0
Fluoranthene	175.0	3369.0	3329.0	2454.0	4009.0	10070.0	3228.0	6388.0	4059.0	4418.0	5285.0	43485.0	6934.0	6510.0	10988.0
MePhenanthrene	29.4	297.0	352.0	347.0	517.0	1432.0	898.0	1013.0	990.0	555.0	611.0	5651.0	6934.0	766.0	695.0
Pyrene	10.7	1999.0	1744.0	1395.0	5480.0	21946.0	7121.0	5327.0	3649.0	2746.0	3405.0	126783.0	0.0	1082.0	6716.0
MeAnthracene	9.1	0.0	236.0	235.0	402.0	1013.0	543.0	671.0	762.0	398.0	219.0	7426.0	1094.0	168.0	357.0
Benzofluorene	59.7	797.0	1222.0	1267.0	3502.0	9227.0	5886.0	6562.0	6445.0	4103.0	3973.0	33409.0	1098.0	3052.0	2534.0
Benzathracene	16.4	600.0	637.0	456.0	789.0	2073.0	2595.0	2308.0	1627.0	1030.0	1248.0	3544.0	695.0	4861.0	2254.0
Chrysene	0.0	504.0	359.0	242.0	344.0	385.0	1759.0	1772.0	1276.0	653.0	702.0	88.0	1323.0	5086.0	2400.0
Benzo(e)Pyrene	0.0	1870.0	847.0	2783.0	4451.0	0.0	4177.0	3914.0	4509.0	3538.0	3962.0	7563.0	910.0	5096.0	1756.0
Perylene	17.3	2510.0	2097.0	5090.0	4787.0	13727.0	7909.0	5641.0	6359.0	4513.0	4898.0	0.0	1869.0	12201.0	6263.0
Benzo(b)Fluoranthene	10.9	942.0	862.0	662.0	5503.0	0.0	1992.0	2514.0	1599.0	1383.0	1632.0	1103.0	593.0	6012.0	3740.0
Benzo(k)Fluoranthene	4.6	396.0	403.0	322.0	656.0	896.0	1150.0	1111.0	638.0	536.0	727.0	436.0	298.0	2995.0	1660.0
Benzo(a)Pyrene	16.6	629.0	674.0	466.0	215.0	1917.0	2539.0	2228.0	1296.0	1031.0	1296.0	583.0	585.0	6012.0	2526.0
Dibenz(a,h)Anthracene	6.0	167.0	147.0	121.0	140.0	6313.0	453.0	506.0	274.0	292.0	282.0	202.0	153.0	2995.0	385.0
Benzo(g,h,i)Perylene	16.7	747.0	636.0	717.0	212.0	2138.0	2353.0	2615.0	1339.0	1439.0	1352.0	847.0	793.0	5168.0	2060.0
Indeno(1,2,3-c,d)-Pyrene	0.0	806.0	619.0	891.0	2023.0	795.0	1658.0	1655.0	2801.0	2049.0	2093.0	714.0	429.0	5556.0	2176.0
TOTAL:	483.0	16594.0	15349.0	18488.0	35850.0	85581.0	49821.0	4774.0	39869.0	31170.0	34153.0	247480.0	27131.0	67497.0	50719.0

Table 20

Contaminant Concentrations in Buffalo River Bottom Sediments

for Parameters Quantified NYSDEC Sampling-1983

(R-16, Table A.5)

(ug/g)

PARAMETER	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
fluorene	10	0.237	0.169	0.129	0.261	0.000	0.459	2
phenanthrene	10	2.498	1.686	0.841	2.484	0.000	4.949	1
anthracene	10	0.855	0.579	0.210	0.799	0.000	1.683	1
fluoranthene	10	4.661	4.034	3.329	5.285	0.395	8.219	1
pyrene	10	5.481	3.527	1.999	5.480	0.000	10.702	1
chrysene	10	0.800	0.578	0.359	1.276	0.000	2.652	0
benzo(b)fluoranthene	10	1.709	1.491	0.862	1.992	0.000	3.687	1
benzo(k)fluoranthene	10	0.683	0.647	0.403	0.896	0.000	1.635	0
benzo(a)pyrene	10	1.229	1.163	0.629	1.917	0.000	3.849	0
indeno(1,2,3-cd)pyrene	10	1.539	1.656	0.806	2.049	0.000	3.913	0
dibenzo(a,h)anthracene	10	0.869	0.278	0.147	0.453	0.000	0.912	1
benzo(g,h,i)perylene	10	1.355	1.345	0.717	2.138	0.000	4.269	0
mephenanthrene	10	0.701	0.583	0.352	0.990	0.000	1.947	0
meanthracene	10	0.448	0.400	0.235	0.671	0.000	1.325	0
benzofluorene	10	4.298	4.038	1.267	6.445	0.000	14.212	0
benzathracene	10	1.336	1.139	0.637	2.073	0.000	4.227	0
benzo(e)pyrene	10	3.005	3.726	1.870	4.177	0.000	7.637	0
perylene	10	5.753	4.994	4.513	6.359	1.744	9.128	1

Table 21

Depths in Feet to Surface of River Bed in Buffalo River

Sediment Survey Study (R-4)

DEPTHS IN FEET TO SURFACE OF RIVER BED
Referred to low water datum elevation of 568.6 ft

USAE Transect	Position[1]				
	1	2	3	4	5
735	13.5	17.8	21.8	-	-
736	10.3	17.8	21.8	-	-
737	10.0	17.5	21.0	-	-
738	-	18.5	21.5	18.5	-
740	10.0	15.5	20.0	18.5	10.0
741	10.7	18.2	22.2	16.6	10.1
742	10.5	16.5	22.2	18.7	6.6
743	10.8	15.1	23.2	-	-
744	10.6	18.1	22.1	-	-
745	10.0	17.5	24.1	-	10.1
746	10.0	17.5	22.1	18.1	-
747	10.4	18.1	25.1	17.2	11.0
748	-	18.1	24.6	-	-
749	9.6	19.1	25.1	17.1	-
750	-	17.8	20.8	18.6	-
751	-	17.8	20.8	16.4	-

[1]Position 1 is nearest the west bank, position 2 is next, and so forth across the width of the channel.

Table 22

Core Length Collected in Buffalo River Sediment Survey

Study (R-4, Table 12)

Transect	CORE LENGTH (cm) Position				
	1	2	3	4	5
735	p	54	36	-	-
736	66	114	72	-	-
737	p	84	54	-	-
738	-	30	84	56	-
740	42	66	90	98	70
741	72	140	78	78	114
742	36	21	78	16	54
743	60	66	72	-	-
744	30	45	p	-	-
745	93	93	48	-	76
746	78	42	60	p	-
747	128	94	54	p	30
748	-	100	98	-	-
749	p	109	109	p	-
750	-	41	35	100	-
751	-	42	114	p	-

p - Sample taken with Mini-Ponar and assumed to be 8 cm deep.

Table 23a

USACOE 1983 Grain Size Data (4)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BUFFALO HARBOR STUDY **DATE:** Jan 84 **SHEET** OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83 (E)1		1A	0.0 2.0	Sandy SILT (ML), black, fine sand, non-plastic, with organics intermixed						40	60
		1B	2.0 3.0	CLAY (CL), brown-gray, fine sand, medium high plasticity, with organics intermixed		49	23			2	98
D83 (E)2		1A	0.0 1.0	Silty SAND (SM), dark gray, medium to fine sand, non-plastic, with organics intermixed						60	40
		1B	1.0 3.0	CLAY (CH), gray-brown, fine sand, high plasticity		51	23			3	97
D83 (E)3		1A	0.0 1.0	Sandy SILT (ML), gray-green, fine sand, non-plastic, with organics intermixed						15	85
		1B	1.0 2.0	CLAY (CL), gray, fine sand, medium plasticity		39	20			10	90
D83 (E)4		1A	0.0 1.5	Sandy Organic CLAY (OL), green, fine sand, medium plasticity						20	80

ORD Form 867
1 Mar 75

(Previous edition obsolete)

ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BUFFALO HARBOR STUDY DATE: Jan 84 SHEET OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83 (E)4		1B	1.5 2.0	CLAY (CL), gray, fine sand, medium plasticity		34	18			3	97
D83 (E)5		1A	0.0 1.5	Sandy CLAY (CL), gray, fine sand, medium high plasticity						20	80
				traces of organic							
		1B	1.5 2.0	CLAY (CL), brown, fine sand, medium plasticity						3	97
		2	2.0 4.0	Same as Sample #1B		38	19			3	97
		3		No jar or sample							
D83 (E)6		1A	0.0 1.5	Sandy CLAY (CL), gray-green, medium to fine sand, medium						25	75
				high plasticity, traces of organic							
		1B	1.5 2.0	CLAY (CL), brown, fine sand, medium plasticity, with		36	18			2	98
				silt seam							
D83 (E)7		1A	0.0 1.5	No material in jar							

ORD Form 867
1 Mar 75 (Previous edition obsolete) ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BUFFALO HARBOR STUDY — DATE: Jan 84 — SHEET OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83 (E)7		1B	1.5 2.0	Sandy SILT (ML), brown, fine sand, non-plastic		non-p	lastic			25	75
D83 (E)8		1	0.0 2.0	Sandy Organic CLAY (OL), gray-green, fine sand, medium high plasticity						20	80
		2A	2.0 3.5	CLAY (CL), gray-green, fine sand, medium high plasticity traces of organic		49	23			5	95
		2B	3.5 4.0	Sandy Organic CLAY (OL), gray-green, fine sand, medium high plasticity						25	75
D83 (E)9		1	0.0 2.0	Silty SAND (SM), dark gray, medium to fine sand, non-plastic, with organic intermixed						75	25
		2A	2.0 4.0	Same as Sample #1		non-p	lastic			70	30
		2B	4.0 5.0	CLAY (CH), gray, fine sand, high plasticity						3	97

ORD Form 867
1 Mar 75

(Previous edition obsolete)

ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BUFFALO HARBOR STUDY **DATE:** Jan 84 **SHEET** **OF**

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
083 (E)19		1	0.0 2.0	Sandy SILT (ML), green, fine sand, non-plastic, with organics intermixed						25	75
		2A	2.0 2.5	SILT (ML), brown, fine sand, non-plastic						10	90
		2B	2.5 3.5	CLAY (CL), gray, fine sand, medium plasticity		36	17			2	98
		2C	3.5 4.0	Clayey Sandy GRAVEL (GC), gray, coarse to fine angular gravel, coarse to fine sand, very low plasticity				2"	65	20	15

ORD Form 867
1 Mar 75

(Previous edition obsolete)

ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BIRD ISLAND DATE: Jan 84 SHEET OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83-26		1	0.0 2.0	Gravelly Sandy Organic CLAY (OL), gray, fine sub-rounded gravel, coarse to fine sand, medium plasticity				3/4"	15	25	60
		2A	2.0 3.1	Same as Sample #1				3/4"	20	25	55
		2B	3.1 4.0	Sandy CLAY (CL-ML), brown-gray, fine sub-rounded gravel, coarse to fine sand, very low plasticity, with organic odor		22	16	½"	5	35	60
		3	4.0 6.0	Sandy Clayey GRAVEL (GC), gray-brown, coarse to fine angular to sub-rounded gravel, coarse to fine sand, low plasticity				1"	50	20	30
		4	6.0 7.0	Sandy Clayey GRAVEL (GC), brown-gray, coarse to fine angular to sub-rounded gravel, coarse to fine sand, low plasticity				1"	50	20	30

ORD Form 867
1 Mar 75

(Previous edition obsolete) ED-FL

(Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BIRD ISLAND **DATE:** Jan 84 **SHEET** **OF**

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83-26		5	7.0 7.2	Gravelly Silty SAND (SM), brown-gray, fine angular to sub-rounded gravel, coarse to fine sand, non-plastic				3/4"	25	50	25
D83-27		1	0.0 2.0	Sandy Organic CLAY (OL), red-gray, fine with some coarse and medium sand, medium high plasticity						25	75
		2A	2.0 3.0	Sandy Organic Clay (OL), brown-gray, fine sub-rounded gravel, coarse to fine sand, medium high plasticity				½"	2	25	73
		2B	3.0 4.0	Silty Sandy GRAVEL (GM), gray, coarse to fine sub-rounded gravel, coarse to fine sand, non-plastic, with organic odor				1"	50	35	15
		3	4.0 6.0	Sandy GRAVEL (GP-GM), gray, coarse to fine angular to sub-rounded gravel, coarse to fine sand, non-plastic, with organic odor				3"	60	30	10
		4	6.5 8.5	SAND (SP-SM), gray, fine sub-rounded gravel, coarse to fine sand, non-plastic, with organic odor		non-plastic		½"	5	85	10

ORD Form 867
1 Mar 75

(Previous edition obsolete)

ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BIRD ISLAND DATE: Jan 84 SHEET OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83-27		5	8.5 10.5	Gravelly Sandy Organic CLAY (OL), brown-gray, fine sub-rounded gravel, coarse to fine sand, medium plasticity				3/4"	15	25	60
		6	10.5 12.5	Sandy Organic CLAY (OL), gray-green, medium to fine sand medium high plasticity						25	75
		7	12.5 12.8	Sandy Organic CLAY (OL), gray-green, fine angular gravel coarse to fine sand, medium high plasticity				3/4"	1	25	74
D83-29		1	0.0 2.0	Sandy CLAY (CH), dark gray, fine sand, high plasticity, traces of organic						20	80
		2A	2.0 3.2	Same as Sample #1		53	28			20	80
		2B	3.2 4.0	GRAVEL (GP-GC), gray, coarse to fine sub-rounded gravel, coarse to fine sand, low plasticity				3"	80	10	10

ORD Form 867
1 Mar 75 (Previous edition obsolete) ED-FL

(Continued)

Table 23a (Continued)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BIRD ISLAND **DATE:** Jan 84 **SHEET** OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83-29		3	4.0 5.0	Sandy GRAVEL (GP-GM), gray, coarse to fine angular to sub-rounded gravel, coarse to fine sand, non-plastic				3"	65	25	10
		4	5.0 5.5	Sandy GRAVEL (GP-GM), gray-brown, coarse to fine angular to sub-rounded gravel, coarse to fine sand, non-plastic				2½"	65	25	10
D83-30		1A	0.0 1.4	Sandy Organic CLAY (OH), brown-gray, fine sand, high plasticity						20	80
		1B	1.4 2.0	Gravelly Sandy CLAY (CL), brown-gray, coarse to fine angular to sub-rounded gravel, coarse to fine sand, medium plasticity, traces of organic				2"	20	20	60
		2A	2.0 2.8	Same as Sample #1B		32	16	1"	20	20	60
		2B	2.8 4.0	Clayey GRAVEL (GC), brown, coarse to fine sub-rounded gravel, coarse to fine sand, very low plasticity				2½"	75	10	15

ORD Form 867
1 Mar 75

(Previous edition obsolete) ED-FL

(Continued)

Table 23a (Concluded)

OHIO RIVER DIVISION LABORATORIES — SOILS LABORATORY *ACTUAL %

SITE: BIRD ISLAND DATE: Jan 84 SHEET OF

HOLE NO.	ELEV. TOP	SAMPLE NO.	DEPTH FT.	VISUAL SOIL CLASSIFICATION	W.C. %	L.L.	P.L.	ESTIMATE max size	ESTIMATE grav	ESTIMATE sand	ESTIMATE fine
D83-30		3	4.0 6.0	Silty Sandy GRAVEL (GM), brown, coarse to fine sub-rounded gravel, coarse to fine sand, non-plastic				3½"	60	28	12
		4	6.0 6.2	Sandy GRAVEL (GP-GM), brown, coarse to fine sub-rounded gravel, coarse to fine sand, non-plastic				2"	60	30	10

ORD Form 867
1 Mar 75

(Previous edition obsolete)

ED-FL

(Sheet 9 of 9)

Table 23b

Total Solids Contents of Samples (1, Table I)

Army Sample Identification	% Total Solids*
D-83-1 0-3'	58.8
D-83-2 0-1'	61.8
D-83-2 1-3'	71.3
D-83-3 0-1'	48.3
D-83-4 0-1.5'	53.3
D-83-5 0-2'	57.8
D-83-5 2-4'	74.0
D-83-6 0-2'	55.5
D-83-7 0-1.5'	53.8
D-83-8 2-4'	57.7
D-83-9 0-2'	63.9
D-83-15 0-2'	52.4

* % total solids were calculated after drying the samples to a constant weight in an oven at 103°C.

Table 23c

Metals (1, Table II)

Sample Identification	Nickel	Arsenic	Cadmium	Chromium	Copper	Mercury	Lead	Zinc
D-83-1 0-3'	50.0	13.6	2.0	59.0	48.4	LT 0.70	95.0	328
D-83-2 0-1'	49.9	10.7	2.0	50.3	39.1	LT 0.71	81.8	283
D-83-2 1-3'	51.9	5.5	1.2	16.4	36.1	LT 0.63	35.9	83.8
D-83-3 0-1'	52.0	10.8	1.8	45.0	41.2	LT 0.93	96.0	372
D-83-4 0-1.5'	56.0	11.1	2.0	48.6	43.0	LT 0.79	94.0	368
D-83-5 0-2'	62.0	9.3	2.0	62.6	46.0	LT 0.69	110	550
D-83-5 2-4'	44.0	1.8	1.2	13.4	22.8	LT 0.66	34.0	86.0
D-83-6 0-2'	51.9	9.4	1.8	43.9	42.1	LT 0.85	104	375
D-83-7 0-1.5'	50.0	9.5	2.0	36.4	40.8	LT 0.89	114	440
D-83-8 2-4'	52.0	8.8	2.0	44.8	46.0	LT 0.75	116	550
D-83-9 0-2'	43.9	12.4	1.6	56.5	37.5	LT 0.72	81.9	258
D-83-15 0-2'	56.0	8.4	2.0	44.2	44.6	LT 0.80	102	480

Source: Mr. Richard Leonard, US Army Corps of Engineers, 5 Dec 1983.
Data reported in micrograms per gram on a dry weight basis.
LT = less than.

Table 23d

Non-Metals (1, Table III)

Sample Identification	Volatile Solids	Chemical Oxygen Demand	Total Kjedahl Nitrogen	Oil and Grease	Ammonia Nitrogen	Total Phosphorus	Cyanide
D-83-1 0-3'	7.3%	39,200	160	0.59%	33.0	218	0.51
D-83-2 0-1'	6.5%	37,200	283	0.18%	126	143	LT 0.40
D-83-2 1-3' RED LAC. CLAY	5.3%	11,200	241	0.04%	167	251	LT 0.35
D-83-3 0-1'	7.3%	47,500	373	0.19%	109	156	0.62
D-83-4 0-1.5'	7.0%	43,100	490	0.19%	261	161	0.56
D-83-5 0-2'	6.4%	90,800	187	0.12%	173	241	0.79
D-83-5 2-4' RED LAC. CLAY	6.1%	10,600	101	0.007%	67.4	216	LT 0.34
D-83-6 0-2'	6.6%	49,200	403	0.18%	141	202	0.68
D-83-7 0-1.5'	6.5%	41,100	211	0.17%	134	210	0.80
D-83-8 2-4'	6.3%	46,000	288	0.17%	149	243	LT 0.43
D-83-9 0-2'	7.0%	14,400	213	0.13%	73.7	241	0.47
D-83-15 0-2'	5.6%	52,700	307	0.13%	159	403	LT 0.48

Data reported in micrograms per gram except for oil and grease and volatile solids (%). All data reported on a dry weight basis.

LT = Less Than

Table 23e

PCBS, Pesticides, and Phthalates (1, Table IV)

Sample Identification	DCPA	DDT	DDE	HCB	DBP	Mirex	Trifluralin	Endosulfan	Chlordane	PCBs	Heptachlor
D-83-1 0-3'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 0.080	LT 0.020	0.36	LT 0.020	0.042	LT 2.0	LT 0.020
D-83-2 0-1'	LT 0.040	LT 0.020	LT 0.020	LT 0.020	LT 0.080	LT 0.020	0.06	LT 0.020	0.029	LT 2.0	7.07
D-83-2 1-3'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 0.080	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-3 0-1'	LT 0.020	LT 0.020	LT 0.020	0.024	0.53	LT 0.020	0.044	LT 0.020	LT 0.020	LT 2.0	0.053
D-83-4 0-1.5'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	0.11	LT 0.020	0.031	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-5 0-2'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	0.63	LT 0.020	0.049	0.047	LT 0.020	LT 2.0	LT 0.020
D-83-5 2-4'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	0.21	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-6 0-2'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	0.26	LT 0.020	0.034	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-7 0-1.5'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 0.080	LT 0.020	0.027	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-8 2-4'	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 0.080	LT 0.020	0.046	LT 0.020	LT 0.020	LT 2.0	LT 0.020
D-83-9 0-2'	0.12	LT 0.020	LT 0.020	0.026	2.61	LT 0.020	0.17	LT 0.020	LT 0.020	LT 2.0	LT 0.060
D-83-15 0-2'	LT 0.020	LT 0.020	LT 0.020	LT 0.040	0.96	LT 0.020	LT 0.020	LT 0.020	LT 0.020	LT 2.0	LT 0.020

Data reported in micrograms per gram on a dry weight basis.

LT = Less Than

Table 23f

Aromatic Hydrocarbons (1, Table V)

Sample Identification	Aniline	1-Amino Naphthalene	N-Benzyl N-Ethyl Aniline	P,P'-Benzylidine bis(N,N-dimethyl Aniline)	Benzo(a)Pyrene
D-83-1 0-3'	0.30	1.36	LT 0.090	LT 0.17	1.61
D-83-2 0-1'	0.28	1.41	LT 0.080	0.21	1.67
D-83-2 1-3'	0.048	LT 0.014	LT 0.090	LT 0.17	LT 0.040
D-83-3 0-1'	LT 0.028	LT 0.010	LT 0.064	0.12	1.60
D-83-4 0-1.5'	0.046	LT 0.010	LT 0.068	LT 0.12	LT 0.028
D-83-5 0-2'	0.23	0.28	LT 0.060	LT 0.11	LT 0.026
D-83-5 2-4'	0.18	LT 0.014	LT 0.092	LT 0.17	LT 0.040
D-83-6 0-2'	0.17	LT 0.010	LT 0.066	LT 0.12	LT 0.028
D-83-7 0-1.5'	0.081	LT 0.010	LT 0.068	LT 0.12	LT 0.028
D-83-8 2-4'	0.18	LT 0.010	0.072	LT 0.14	LT 0.032
D-83-9 0-2'	LT 0.038	LT 0.012	LT 0.086	LT 0.16	LT 0.038
D-83-15 0-2'	LT 0.030	LT 0.010	LT 0.070	LT 0.13	LT 0.030

Data reported in micrograms per gram on a dry weight basis.

LT = Less Than

Table 23g

Contaminant Concentrations in Buffalo River Bottom Sediments for Parameters Quantified Erie County Sampling-1985 (R-16, Table A.6)

PARAMETER	NO. OF SAMPLES [1]	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
acenapthene	58	1.165	0.000	0.000	0.520	0.000	1.300	11
acenapthylene	58	1.332	0.000	0.000	0.538	0.000	1.345	12
anthracene	58	4.091	0.000	0.000	1.793	0.000	4.482	12
benzo(a)anthracene	58	2.184	0.000	0.000	3.290	0.000	8.225	4
benzo(a)pyrene	58	2.056	0.815	0.173	2.777	0.000	6.683	8
benzo(b)fluoranthene	58	1.161	0.266	0.000	1.240	0.000	3.100	10
benzo(g,h,i)perylene	58	1.730	0.295	0.000	2.380	0.000	5.950	6
benzo(k)fluoranthene	58	1.641	0.116	0.000	1.360	0.000	3.400	11
chrysene	58	1.639	0.000	0.000	1.307	0.000	3.268	9
dibenzo(a,h)anthracene	58	1.539	0.122	0.000	1.375	0.000	3.438	8
fluoranthene	58	3.919	0.000	0.000	3.153	0.000	7.883	8
fluorene	58	2.097	0.000	0.000	0.827	0.000	2.067	12
indeno(1,2,3-cd)pyrene	58	2.073	0.583	0.000	3.240	0.000	8.100	2
napthalene	58	4.435	0.000	0.000	0.787	0.000	1.968	9
phenanthrene	58	4.079	0.000	0.000	2.845	0.000	7.113	9
pyrene	58	3.167	0.475	0.000	3.313	0.000	8.283	8
aldrin	58	0.045	0.000	0.000	0.000	0.000	0.000	4
alpha-BHC	58	0.066	0.000	0.000	0.039	0.000	0.098	11
beta-BHC	58	0.119	0.013	0.003	0.067	0.000	0.162	9
gamma-BHC	58	0.000	0.000	0.000	0.000	0.000	0.000	1
2,4'-DDD	58	0.017	0.000	0.000	0.000	0.000	0.000	9
2,4'-DDE	58	0.000	0.000	0.000	0.000	0.000	0.000	0
2,4'-DDT	58	0.015	0.000	0.000	0.000	0.000	0.000	13
4,4'-DDD	58	0.006	0.000	0.000	0.002	0.000	0.004	6
4,4'-DDE	28	0.025	0.008	0.000	0.029	0.000	0.073	4
4,4'-DDT	58	0.003	0.000	0.000	0.004	0.000	0.011	6
dieldrin	58	0.000	0.000	0.000	0.000	0.000	0.000	0
endrin	58	0.007	0.000	0.000	0.000	0.000	0.000	14
heptachlor	58	0.000	0.000	0.000	0.000	0.000	0.000	0
heptachlor epoxide	58	0.059	0.000	0.000	0.031	0.000	0.077	9

* PCBs Reported as 15 packed column chlorobiphenyl peaks identified under conditions described by Webb and McCall (1973) (R36).

Table 23g (Concluded)

PARAMETER	NO. OF SAMPLES [1]	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS
PCB-1	58	0.449	0.112	0.000	0.401	0.000	1.003	8
PCB-2	58	0.177	0.000	0.000	0.233	0.000	0.583	5
PCB-3	58	0.199	0.062	0.004	0.192	0.000	0.474	7
PCB-4	58	0.421	0.127	0.025	0.296	0.000	0.702	9
PCB-5	58	0.446	0.189	0.068	0.359	0.000	0.797	6
PCB-6	58	0.241	0.078	0.019	0.295	0.000	0.709	4
PCB-7	58	0.343	0.171	0.066	0.318	0.000	0.697	5
PCB-8	58	0.084	0.000	0.000	0.048	0.000	0.119	7
PCB-9	58	0.013	0.006	0.001	0.014	0.000	0.035	5
PCB-10	58	0.105	0.079	0.001	0.157	0.000	0.392	1
PCB-11	58	0.088	0.034	0.000	0.131	0.000	0.327	5
PCB-12	58	0.022	0.011	0.001	0.027	0.000	0.067	5
PCB-13	58	0.010	0.000	0.000	0.014	0.000	0.036	4
PCB-14	58	0.094	0.002	0.000	0.014	0.000	0.035	8
PCB-15	58	0.017	0.000	0.000	0.017	0.000	0.043	6
cadmium	58	2.768	1.691	1.203	3.067	0.000	5.863	4
chromium	58	79.434	28.915	14.700	62.700	0.000	134.700	11
copper	58	128.111	65.533	35.967	124.000	0.000	256.049	8
iron	58	40673.543	32183.333	23333.333	46100.000	0.000	80250.000	5
lead	58	205.644	97.350	47.800	207.433	0.000	446.882	8
manganese	58	719.688	612.666	525.333	743.667	197.832	1071.168	8
mercury	58	1.551	0.475	0.280	1.327	0.000	2.897	7
nickel	58	43.670	38.533	31.700	46.500	9.500	68.700	4
silver	58	0.459	0.308	0.183	0.487	0.000	0.943	6
zinc	58	488.317	288.633	155.000	693.000	0.000	1500.000	3

[1] Number of cores (represent 162 samples)

Table 23h

Buffalo River Sediments - 1989 Data (3)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
Metals in mg/kg dry weight

Site No.	Cd - Bulk	Cr - Bulk	Cu - Bulk	Fe - Bulk	Pb - Bulk	Mn - Bulk
27	0.5	21	45	27400	64	505
56	1	16	50	32800	71	480
29	0.5	18	49	30300	82	490
54	1	13	46	29200	66	490
52	1	13	48	28400	62	460
53	1	12	46	31900	70	490
50	0.6	9	40	30800	55	480
51	0.9	14	48	30700	71	500
31	0.5 LT	18	49	30300	82	490
49	0.5	9	38	29400	50	560
48	1	2	35	24300	60	520
34	0.6 LT	4	35	20500	25	530
Arith. Mean	0.8	12	44	28833	63	500
Std. Dev.	0.2	5	5	3285	15	25
No. of samples	12	12	12	12	12	12
Min. Value	0.5	2	35	20500	25	460
Max. Value	1	21	50	32800	82	560

(Continued)

Table 23h (Continued)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
Metals in mg/kg dry weight

Site No.	Hg - Bulk	Ni - Bulk	Ag - Bulk	Zn - Bulk
27	0.5	27	0.5 LT	190
56	0.5	34	0.5	220
29	0.4	31	0.5 LT	210
54	0.37	30	0.5 LT	210
52	0.34	29	0.6 LT	180
53	0.3	31	0.5	200
50	0.28	32	0.6 LT	170
51	0.41	31	0.5 LT	190
31	0.4	31	0.5 LT	210
49	0.18	32	0.5 LT	150
48	0.24	25	0.6 LT	120
34	0.06	22	0.6 LT	940
Arith. Mean	0.33	30	0.5	249
Std. Dev.	0.12	3	0.05	210
No. of samples	12	12	12	12
Min. Value	0.06	22	0.5	120
Max. Value	0.5	34	0.6	940

(Continued)

Table 23h (Continued)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
PAHs in mg/kg

Sample	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)Anthracene	Benzo(a)Pyrene	Benzo(b)Flouranthe
27	0.2 LT	0.2 LT	0.22	0.83	1.09	1.91
56	0.2 LT	0.2 LT	0.16	0.67	1.03	1.95
29	0.2 LT	0.2 LT	0.13	0.58	0.79	1.58
54	0.2 LT	0.2 LT	0.34	0.93	1.37	2.38
52	0.2 LT	0.2 LT	0.16	0.51	0.81	1.45
53	0.2 LT	0.2 LT	0.1 LT	0.5	0.82	1.33
50	0.2 LT	0.2 LT	0.13	0.45	0.86	1.49
51	0.2 LT	0.2 LT	0.23	0.67	1.1	1.83
31	0.2 LT	0.2 LT	0.32	0.9	1.39	2.28
49	0.2 LT	0.2 LT	0.16	0.37	0.77	1.31
48	0.2 LT	0.2 LT	0.14	0.46	0.74	1.21
34	0.2 LT	0.2 LT	0.12	0.39	0.68	1.11
Arith. Mean	0.2	0.2	0.18	0.61	0.95	1.65
Std. Dev.	ERR	ERR	0.07	0.19	0.23	0.40
No. of samples	12	12	12	12	12	12
Min. Value	0.2	0.2	0.1	0.37	0.68	1.11
Max. Value	0.2	0.2	0.34	0.93	1.39	2.38

(Continued)

Table 23h (Continued)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
PAHs in mg/kg

Sample	Benzo(ghi)Perylene	Benzo(k)Flouranthene	Chrysene	Dibenzo(a,h)Anthracene	Flouranthene	Flourene
27	0.48	0.2 LT	0.94	0.4 LT	1.86	0.3 LT
56	0.55	0.2 LT	0.82	0.4 LT	1.83	0.3 LT
29	0.4 LT	0.2 LT	0.73	0.4 LT	1.36	0.3 LT
54	0.49	0.2 LT	0.98	0.4 LT	2.33	0.3 LT
52	0.4 LT	0.2 LT	0.57	0.4 LT	1.3	0.3 LT
53	0.4	0.2 LT	0.64	0.4 LT	1.26	0.3 LT
50	0.4 LT	0 2 LT	0.63	0.4 LT	1.21	0.3 LT
51	0.4 LT	0.2 LT	0.58	0.4 LT	1.78	0.37
31	0.66	0.2 LT	0.99	0.4 LT	2.54	0.55
49	0.4 LT	0.2 LT	0.49	0.4 LT	1.15	0.3 LT
48	0.4 LT	0.2 LT	0.52	0.4 LT	1.05	0.3 LT
34	0.4 LT	0.2 LT	0.43	0.4 LT	1.21	0.3 LT
Arith. Mean	0.45	0.2	0.69	0.4	1.57	0.33
Std. Dev.	0.08	ERR	0.19	ERR	0.47	0.07
No. of samples	12	12	12	12	12	12
Min. Value	0.4	0.2	0.43	0.4	1.05	0.3

Table 23h (Continued)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
PAHs in mg/kg

Sample	Indeno(1,2,3-cd)Pyrene	Naphthalene	Phenanthrene	Pyrene
27	0.58	0.3 LT	0.74	0.98
56	0.59	0.3 LT	0.71	0.99
29	0.44	0.3 LT	0.58	0.83
54	0.61	0.3 LT	1.34	1.38
52	0.41	0.3 LT	0.59	0.72
53	0.42	0.3 LT	0.54	0.66
50	0.3 LT	0.3 LT	0.59	0.76
51	0.45	0.3 LT	0.81	1.18
31	0.75	0.36	1.35	1.38
49	0.3 LT	0.3 LT	0.64	0.72
48	0.3 LT	0.3 LT	0.6	0.83
34	0.3 LT	0.3 LT	0.78	0.72
Arith. Mean	0.45	0.31	0.77	0.93
Std. Dev.	0.14	0.02	0.27	0.25
No. of samples	12	12	12	12
Min. Value	0.3	0.3	0.54	0.66

Table 23h (Continued)

Buffalo River Sediments - 1989 Data - Aqua Tech Environmental Consultants Report
Pesticides in mg/kg dry weight

Sample	Alpha-BHC	Beta-BHC	Lindane	Heptachlor	Heptachlor-epoxide	Aldrin
27	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.09	0.02 LT
56	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
29	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
54	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
52	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
53	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
50	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
51	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
31	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
49	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
48	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.03 LT	0.02 LT
34	0.02 LT	0.02 LT	0.02 LT	0.03 LT	0.05	0.02 LT
Arith. Mean	0.02	0.02	0.02	0.03	0.04	0.02
Std. Dev.	0.00	0.00	0.00	ERR	0.02	0.00
No. of samples	12	12	12	12	12	12
Min. Value	0.02	0.02	0.02	0.03	0.03	0.02
Max. Value	0.02	0.02	0.02	0.03	0.09	0.02

Table 23h (Concluded)

Buffalo River Sediments - 1989 Data - Aqua.Tech Environmental Consultants Report
Pesticides in mg/kg dry weight

Sample	Dieldrin	Endrin	p,p-DDT	p,p-DDD	p,p-DDE
27	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
56	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
29	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
54	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
52	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
53	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
50	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
51	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03
31	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
49	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
48	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT.
34	0.02 LT	0.05 LT	0.03 LT	0.02 LT	0.03 LT
Arith. Mean	0.02	0.05	0.03	0.02	0.03
Std. Dev.	0.00	ERR	ERR	0.00	ERR
No. of samples	12	12	12	12	12
Min. Value	0.02	0.05	0.03	0.02	0.03
Max. Value	0.02	0.05	0.03	0.02	0.03

Table 24

Summary of Water Quality Monitoring Activities in the Buffalo River

Agency	Site	Period	Frequency	Sample Type	Depth	Parameters
			Surface Water			
NYSDEC	MP 1.8	1982-86	Monthly	Grab	0.5-1.0 m to bottom	Flow and Priority Pollutants
NYSDEC	MP 1.1 3.7 5.8	1982	Twice	Grab	1 m below surface	Temp, % Sat, DO, Conductance, Demand, Fe, COD, BOD, TSS, TDS, TS, NH3-N, Total chlorides
NYSDEC	3	1982-86	Monthly	Grab	1 m below surface	Flow and Priority Pollutants
USGS	3	1940-85	Daily	Grab		Flow, Conventional Parameters and Metals
			Groundwater			
USGS	Allied Chemical	1982-	Monthly	Grab		Metals
USACOE	Times Beach	1983-	Once	Grab		Priority Pollutants

Table 25a

Dissolved Oxygen and Associated Parameter Sampling Data,

Buffalo River (R-16, Table 4.7)

DISSOLVED OXYGEN AND ASSOCIATED PARAMETER SAMPLING DATA [1]
BUFFALO RIVER
JUNE 2, 1982

	Confluence With Cazenovia Creek [2] Mile Point 5.8				Conrail Bridge [2] Mile Point 3.7				Michigan Avenue Bridge [2] Mile Point 1.1			
Depth [3] (m)	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)
0.5	23.0	98	8.5	357	22.0	99	8.7	287	21.0	105	9.5	237
1.5	23.0	82	7.1	347	22.0	64	5.5	287	21.0	98	8.8	237
2.5	23.0	74	6.4	317	22.0	56	5.0	287	21.0	98	8.8	237
3.5	23.0	71	6.2	307	20.0	54	5.1	287	19.0	95	8.8	237
4.5	24.0	62	5.4	307	19.0	54	5.1	297	18.0	76	7.3	237
5.5			-----		19.0	54	5.1	307	18.0	76	7.3	237
6.5			6.7 [4]		19.0	54	5.1	287	18.0	76	7.3	237
7.5	SECCHI DEPTH, 0.5 M				19.0	54	5.1	287	18.0	75	7.2	237
8.5					18.0	66	6.3	292	18.0	75	7.2	237
9.5					18.0	66	6.3	292	18.0	76	7.3	257
							-----				-----	
							5.7 [4]				8.0 [4]	
					SECCHI DEPTH, 1.5 M				SECCHI DEPTH, 3.0 M			

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[1] Data collected and analyzed by Ecology & Environment.

[2] Sampling stations located 50 meters downstream of Buffalo River confluence with Cazenovia Creek, 20 meters downstream of Conrail Bridge and Michigan Avenue Bridge.

[3] Samples collected to river bottom at each station.

[4] Mean station value.

(Continued)

Table 25a (Continued)

DISSOLVED OXYGEN AND ASSOCIATED PARAMETER SAMPLING DATA [1]
BUFFALO RIVER
JUNE 9, 1982

Depth [3] (m)	Confluence With Cazenovia Creek [2] Mile Point 5.8 Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Conrail Bridge [2] Mile Point 3.7 Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Michigan Avenue Bridge [2] Mile Point 1.1 Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)
0.5	21.0	76	6.9	397	18.0	68	6.6	367	14.5	70	7.3	267
1.5	18.0	69	6.8	387	17.0	62	6.1	362	13.5	67	7.1	269
2.5	16.0	64	6.4	382	16.0	62	6.2	357	12.5	62	6.8	272
3.5	15.0	58	6.0	377	16.0	56	5.6	342	11.3	59	6.6	262
4.5	15.0	57	5.8	387	15.5	54	5.4	342	8.2	60	7.2	237
5.5			---		14.0	52	5.4	337	7.0	62	7.6	231
6.5			6.4 [4]		14.0	56	5.8	302	6.0	68	8.6	229
7.5	SECCHI DEPTH, 0.5 M				13.0	50	5.3	307	6.0	68	8.6	229
8.5					13.0	50	5.3	307	6.0	68	8.6	229
9.5					13.0	50	5.3	307	6.0	53	9.0	225
							---				---	
					SECCHI DEPTH, 0.75 M		5.7 [4]		SECCHI DEPTH, 0.5 M		7.7 [4]	

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[1] Data collected and analyzed by Ecology & Environment.

[2] Sampling stations located 50 meters downstream of Buffalo River confluence with Cazenovia Creek, 20 meters downstream of Conrail Bridge and Michigan Avenue Bridge.

[3] Samples collected to river bottom at each station.

[4] Mean station value.

(Continued)

Table 25a (Concluded)

DISSOLVED OXYGEN AND ASSOCIATED PARAMETER SAMPLING DATA [1]
BUFFALO RIVER
AUGUST 12, 1982

Depth [3] (m)	Confluence With Cazenovia Creek [2] Mile Point 5.8				Conrail Bridge [2] Mile Point 3.7				Michigan Avenue Bridge [2] Mile Point 1.1			
	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)	Temperature (C)	Percent Saturation (%)	Dissolved Oxygen (mg/l)	Specific Conductance (umhos/cm)
0.5	20.0	73	6.7	435	22.0	48	4.2	390	22.0	52	4.6	365
1.5	20.0	68	6.3	435	22.0	39	3.5	395	22.0	49	4.3	360
2.5	20.0	68	6.3	435	22.0	36	3.2	405	22.5	41	3.6	360
3.5	21.0	67	6.0	445	22.0	31	2.8	405	22.5	41	3.6	360
4.5	21.0	67	6.0	445	22.0	31	2.8	405	22.5	41	3.6	360
5.5			---		22.0	36	3.2	405	22.5	41	3.6	360
6.5			6.3 [4]		22.0	36	3.2	405	22.5	43	3.8	350
7.5	SECCHI DEPTH, 0.5 M				22.0	36	3.2	405	22.0	49	4.3	345
8.5					22.0	36	3.2	405	22.0	42	3.7	345
9.5							---		22.0	42	3.7	355
							3.3 [4]				---	
					SECCHI DEPTH, 1.0 M						3.9 [4]	
									SECCHI DEPTH, 1.0 M			

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[1] Data collected and analyzed by Ecology & Environment.

[2] Sampling stations located 50 meters downstream of Buffalo River confluence with Cazenovia Creek, 20 meters downstream of Conrail Bridge and Michigan Avenue Bridge.

[3] Samples collected to river bottom at each station.

[4] Mean station value.

Table 25b

Chemical Sampling Data, Buffalo River, 1982 (R-16, Table 4.8)

Parameters (mg/l)	June 2, 1982			June 9, 1982			August 12, 1982		
	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)
Chlorine Demand	3.02	2.08	1.65	1.90	3.37	1.79	0.35	1.37	0.56
Total Iron	0.953	0.961	0.753	0.814	1.06	0.853	0.556	0.417	0.448
Chemical Oxygen Demand	24.6	24.6	8.8	16.3	16.3	25.6	52.3	31.1	34.6
5-Day Biochemical Oxygen Demand	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Suspended Solids	35	35	38	14	19	20	8	6	10
Total Dissolved Solids	377	341	290	226	186	175	202	232	204
Total Solids	412	376	318	240	205	195	210	238	214
Ammonia Nitrogen (as N)	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Total Chlorides	23.4	33.5	32.1	27.2	21.0	19.1	44.8	33.3	28.7

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[1] Data collected and analyzed by Ecology & Environment.

[2] Sampling stations located 50 meters downstream of Buffalo River confluence with Cazenovia Creek, 20 meters downstream of Conrail Bridge and Michigan Avenue Bridge.

MP Mile point.

Table 26

Buffalo Harbor Nutrient/Quality Indicators - Sediment Analysis

(2, Table 4)

Sample Code		Ammonia mg/kg	Chemical Oxygen Demand mg/kg	Cyanide mg/kg	Oil & Grease mg/kg	Phenol mg/kg	Phosphorus (Total) mg/kg	% Solids (Total)	% Solids (Volatile)	Total Kjeldahl Nitrogen mg/kg
BH-Reference	-1	17.4	40100	0.416	1.02	<0.001	740	77.09	1.06	389
	-2	21.3	18700	0.305	1.15	0,031	819	76.64	1.10	403
	-3	19.5	75400±83600	0.450±0.040	0.093	0.506	796±6	77.05	1.10	385±35
BH-16	-1	100.6	61200	0.144	4.47±4.04	1.902±0.048	798	58.66	5.76	1698
	-2	220.2	55200	5.036	5.37	1.123	772	55.11	5.75	1734
	-3	125.0	28600	1.560	16.84	2.000	861	51.66±0.31	5.49±0.39	1880
BH-19	-1	80.8	35500	0.177	8.28	0.783	757	58.90	3.71	1454
	-2	98.6	35700	0.527	15.67±1.79	0.619	838	53.66	3.94	1627
	-3	111.2±1.1	30100	0.695	11.30±10.57	0.620	773±22	51.48	5.41	1892±172
BH-21	-1	99.4	44400	0.090	12.74	1.203±0.223	846	52.82	4.03	1812
	-2	105.9	34500	0.404	8.07	0.033	1016	50.78	4.48	2292
	-3	92.4	50700	0.103	2.67	1.069	630	53.63	4.38	1333
BH-24	-1	90.4	40600	0.620	12.11	0.124	712	56.55	4.96	1640
	-2	95.0	58600	<0.001	4.26	0.987	769	57.53	4.76	1618
	-3	95.1	67300	0.128	1.17±4.58	1.418	757	56.39	4.56	1511
BH-27	-1	110.9	54700	0.556	4.88	<0.001	1307	57.02	4.75	1872
	-2	143.5	55800	0.349	2.90	0.328	1018	58.97±0.40	4.25±0.22	1568
	-3	227.4	77800±65100	1.44	1.70	0.953	810	57.76	4.20	1532
BH-29	-1	237.9	64000	0.393	2.22±1.98	0.246±0.043	1075	58.49	4.21	1878
	-2	158.6	60600	0.442±0.023	3.50	0.314±0.055	960	53.99	4.47	1773
	-3	150.3	52400	<0.001	2.21	<0.001	1021	56.07	4.32	1686
BH-31	-1	116.9	49800	0.301	3.73	0.492	1038	55.74	5.46	1919
	-2	140.8	48800	0.304	2.96	0.434	911	57.51	5.03	1660
	-3	186.8	66000	0.374	2.44	0.660	1019	56.55	5.75	1865
BH-34	-1	184.4	67700	0.314	1.98	0.242	1044	48.94	6.36	2498
	-2	177.2±2.3	60300±36800	0.287	2.43	1.408	975	47.25	6.01	2334
	-3	352.6	49500	0.087	2.91	0.667±0.117	1153±16	45.39	6.40	2624±177

(Continued)

Table 26 (Concluded)

Sample Code		Ammonia mg/kg	Chemical Oxygen Demand mg/kg	Cyanide mg/kg	Oil & Grease mg/kg	Phenol mg/kg	Phosphorus (Total) mg/kg	% Solids (Total)	% Solids (Volatile)	Total Kjeldahl Nitrogen mg/kg
BH-43	-1	89.1	54100	<0.001	0.40	1.588	853	57.07	3.91	1464
	-2	96.6	50000	0.140	0.42	0.595	856	59.47	8.46	1460
	-3	84.3	65000	0.181	0.36	1.170	1021	60.26	3.73	1390
BH-44	-1	139.9	23800	0.148	9.32	1.161	1844	48.05	7.42	2705
	-2	296.0	62400	0.181	9.27	0.199	1939	47.05	7.21	2674
	-3	263.2	56700	0.037±0.52	9.77	1.190	1788	50.03	7.73	2271
BH-46	-1	586.6	43500	0.750	12.25	0.208	2128	37.22	9.65	3335
	-2	383.6	37400±53000	0.010	12.83	0.239	1834	40.92	7.29	2765
	-3	553.9	31700	0.691	13.82	1.585±0.057	1822	38.94	7.29	2784
BH-47	-1	39.7	54600	<0.001	4.32	0.979	814	56.73	4.12	1397
	-2	49.2	56900	0.096	4.62	<0.001	851	56.55	3.79	1481
	-3	40.1±0.0	126800±159900	0.492	4.54	<0.001	829	55.26	4.78	1453

Table 27

Contaminant Concentrations in Buffalo River Water Samples, Ohio Street Bridge, April 1982-March 1986 (R-16, Table A.1)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS	WATER QUALITY STANDARDS AND CRITERIA CLASS D	CLASS C/B	CLASS A
flow	cfs		30	328.4	186.5	98.0	344.0	0.0	713.0	2			
chloromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
bromomethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
vinyl chloride	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.3 *
dichlorodifluoromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
chloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
trichlorofluoromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
dichloromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
1,1-dichloroethene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.07 *
1,1-dichloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
trans-1,2,dichloroethene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
chloroform	ug/l	1	29	0.1	0.0	0.0	0.0	0.0	0.0	1	N.S.	N.S.	0.2
1,2-dichloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.8
1,1,1-trichloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
carbon tetrachloride	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.4 *
bromodichloromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
1,2-dichloropropane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 * [1]
trans-1,3-dichloropropene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
trichloroethene	ug/l	1	29	0.3	0.0	0.0	0.0	0.0	0.0	3	11 *	11 *	3 *
dibromochloromethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
cis-1,3-dichloropropene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
1,1,2-trichloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.6
2-chloroethylvinyl ether	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
bromoform	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
1,1,2,2-tetrachloroethane	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.2 *
tetrachloroethene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	1 *	1 *	0.7 *
chlorobenzene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	50	5	5
1,3-dichlorobenzene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	50 [1]	5 [1]	5 [1]
1,2-dichlorobenzene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	50 [1]	5 [1]	5 [1]
1,4-dichlorobenzene	ug/l	1	29	0.0	0.0	0.0	0.0	0.0	0.0	0	50 [1]	5 [1]	5 [1]
benzene	ug/l	1	19	0.2	0.0	0.0	0.0	0.0	0.0	2	6 [1]	6 [1]	1.0 [1]
toluene	ug/l	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
ethylbenzene	ug/l	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
para xylene	ug/l	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 * [1]
meta xylene	ug/l	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 * [1]
ortho xylene	ug/l	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 * [1]
phenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	5	5	1.0
2-chlorophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.

(Continued)

Table 27 (Continued)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS	WATER QUALITY STANDARDS AND CRITERIA CLASS D	CLASS C/B	CLASS A
2-nitrophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,4-dimethylphenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,4-dichlorophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
4-chloro-3-methylphenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,4,6-trichlorophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,4,5-trichlorophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,4-dinitrophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
4-nitrophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2-methyl-4,6-dinitrophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
pentachlorophenol	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	1	0.4	0.4
benzoic acid	ug/l	10	4	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
bis(2-chloroisopropyl)ether	ug/l	10	6	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
bis(2-chloroethyl)ether	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.03 *
N-nitrosodimethylamine	ug/l	10	16	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
N-nitrosodi-n-propylamine	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
hexachloroethane	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
nitrobenzene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	30
isophorone	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
bis(2-chloroethoxy)methane	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
1,2,4-trichlorobenzene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	50 [1]	5 [1]	5 [1]
naphthalene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	10
hexachlorobutadiene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	10	1	0.5
hexachlorocyclopentadiene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	4.5	0.45	0.45
2-chloronaphthalene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	10
2,6-dinitrotoluene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.07 *
acenaphthylene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
dimethylphthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
acenaphthene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	20
2,4-dinitrotoluene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
diethylphthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
fluorene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
4-chlorophenylphenylether	ug/l	10	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
N-nitrosodiphenylamine	ug/l	10	14	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
1,2-diphenylhydrazine	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.05 *
4-bromophenylphenylether	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
hexachlorobenzene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.02 *
phenanthrene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
anthracene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
di-n-butylphthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
fluoranthane	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
pyrene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
benzidine	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.1	0.1	0.1
butylbenzylphthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 *
benzo(a)anthracene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.002 *
3,3'-dichlorobenzidine	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.

(Continued)

Table 27 (Continued)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS	WATER QUALITY STANDARDS AND CRITERIA CLASS D	CLASS C/B	CLASS A
bis(2-ethylhexyl)phthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	0.6	0.6
chrysene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.002 *
dioctylphthalate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
benzo(b)fluoranthene	ug/l	30	10	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.002 *
benzo(k)fluoranthene	ug/l	30	10	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.002 *
benzo(a)pyrene	ug/l	30	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0012 *	0.0012 *	0.0012 *
indeno(1,2,3-cd)pyrene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	0.002 *
dibenzo(a,h)anthracene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
benzo(g,h,i)perylene	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
alpha-BHC	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	2 [1]	0.01 [1]	0.01 [1]
beta-BHC	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	2 [1]	0.01 [1]	0.01 [1]
gamma-BHC	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	2 [1]	0.01 [1]	0.01 [1]
delta-BHC	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	2 [1]	0.01 [1]	0.01 [1]
heptachlor	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001
aldrin	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001 [6]
heptachlor epoxide	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001
endosulfan I	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.22	0.009	0.009
4,4'-DDE	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001
dieldrin	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001 [6]
endrin	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.002	0.002	0.002
4,4'-DDD	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001
endosulfan II	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.22	0.009	0.009
endrin aldehyde	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
endosulfan sulfate	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
4,4'-DDT	ug/l	10	19	0.0	0.0	0.0	0.0	0.0	0.0	0	0.001	0.001	0.001
zinc	ug/l	20 [15]	30	12.3	0.0	0.0	30.0	0.0	75.0	0	435 [2,5]	30 [2]	30 [2]
lead	ug/l	10	30	9.1	0.0	0.0	0.0	0.0	0.0	2	131 [2,5]	5 [2,5]	5 [2,5]
beryllium	ug/l	2 [16]	30	0.0	0.0	0.0	0.0	0.0	0.0	1	N.S.	1100 [5]	1100 [5]
copper	ug/l	10 [17]	30	0.0	0.0	0.0	0.0	0.0	0.0	0	25 [2,5]	16 [2,5]	16 [2,5]
nickel	ug/l	1 [18]	30	1.2	0.0	0.0	1.6	0.0	4.0	4	2433 [2,5]	126 [2,5]	126 [2,5]
silver	ug/l	1 [19]	30	0.0	0.0	0.0	0.0	0.0	0.0	0	8 [3,5]	0.1 [3]	0.1 [3]
mercury	ug/l	0.2 [20]	30	0.0	0.0	0.0	0.0	0.0	0.0	2	0.2 *	0.2 *	0.2 * [7]
arsenic	ug/l	10	30	0.0	0.0	0.0	0.0	0.0	0.0	0	360 [4]	190 [4]	50
cadmium	ug/l	1 [21]	30	0.1	0.0	0.0	0.0	0.0	0.0	2	6 [2,5]	2 [2,5]	2 [2,5]
antimony	ug/l	5 [22]	30	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	3 *
thallium	ug/l	10 [23]	30	0.0	0.0	0.0	0.0	0.0	0.0	0	20 [2]	8 [2]	8 [2]
chromium	ug/l	10	30	1.0	0.0	0.0	0.0	0.0	0.0	2	2341 [2,5]	12 [2,5]	12 [2,5]
selenium	ug/l	5 [24]	30	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	1 [2]	1.0 [2]
1-chlorocyclohexene-1	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
cumene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
styrene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
p-bromofluorobenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
n-propylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
tert-butylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
o/p-chlorotoluene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.

(Continued)

Table 27 (Concluded)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	MEAN	MEDIAN	LOWER FOURTH	UPPER FOURTH	LOWER CUTOFF	UPPER CUTOFF	OUT-LIERS	WATER QUALITY STANDARDS AND CRITERIA CLASS D	CLASS C/B	CLASS A
bromobenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
metachlorotoluene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
1,3,5-trimethylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 [1]
1,2,4-trimethylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	50 [1]
p-cymene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
cyclopropylbenzene	ug/l	1	14	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
sec-butylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
n-butylbenzene	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
2,3-benzofuran	ug/l	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0	N.S.	N.S.	N.S.
1,2,3-trichlorobenzene	ug/l	5	8	0.0	0.0	0.0	0.0	0.0	0.0	0	50 [1]	5 [1]	5 [1]
ammonia	mg/l		18	0.3	0.2	0.1	0.3	0.0	0.6	0	6.8 [8]	1.8 [8]	1.8 [8]
nitrogen (NO2)	ug/l		18	27.6	33.0	15.0	38.0	0.0	72.5	0	N.S.	100	100
nitrogen (NO2,NO3)	mg/l		18	0.3	0.3	0.2	0.5	0.0	0.9	0	N.S.	N.S.	N.S.
phenols (4AAP)	ug/l	1	24	1.2	1.0	0.0	2.0	0.0	5.0	0	5 [9]	5 [9]	1.0
pH	SU		24	7.7	7.6	7.5	7.8	7.0	8.2	3	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5
TSS	mg/l		18	18.0	13.0	11.0	22.0	0.0	38.5	1	N.S.	N.S.	N.S.
BOD7	mg/l		23	2.8	2.6	2.0	3.2	0.2	5.0	0	N.S.	N.S.	N.S.
coliform, total	/100ml		23	10428.7	5000.0	2050.0	15500.0	0.0	35675.0	2	N.S. [10]	N.S. [10]	5000 [11]
coliform, fecal	/100ml		23	562.3	140.0	70.0	485.0	0.0	1107.5	4	N.S. [12]	N.S. [12]	200 [13]
turbidity			18	12.4	6.8	4.8	17.0	0.0	35.3	2	N.S.	N.S.	N.S.
alkalinity	mg/l		24	104.8	106.5	98.5	111.5	79.0	131.0	1	N.S.	N.S.	N.S.
temperature	deg C		24	18.1	18.5	15.5	23.0	4.2	34.2	0	32	32	32
conductivity			18	354.4	357.5	325.0	385.0	235.0	475.0	1	N.S.	N.S.	N.S.
dissolved oxygen	mg/l		23	6.9	6.5	5.1	8.6	0.0	13.7	0	3	4 [14]	4 [14]
TKN	mg/l		12	0.5	0.5	0.1	0.9	0.0	1.9	0	N.S.	N.S.	N.S.
phosphate, total	mg/l		16	0.1	0.1	0.0	0.1	0.0	0.1	1	N.S.	N.S.	N.S.
COD	mg/l		18	20.9	20.0	16.0	24.0	4.0	36.0	1	N.S.	N.S.	N.S.
hardness	mg/l		5	144.0	150.0	120.0	160.0	60.0	220.0	0	N.S.	N.S.	N.S.

WATER QUALITY STANDARD AND GUIDANCE VALUE FOOTNOTES

N.S. - No standard or guidance value
* - Guidance value
[1] - Applies to sum of isomers
[2] - Applies to acid soluable form
[3] - Applies to ionic form
[4] - Applies to dissolved form
[5] - Calculated based on 144 mg/l hardness
[6] - Applies to sum of aldrin and dieldrin
[7] - Standard not greater than 2 ug/l
[8] - Calculated based on pH = 7.67 and temperature = 18.125 C
[9] - Total unchlorinated
[10] - Monthly median not greater than 2400/100ml from a minimum of five examinations when disinfection is practiced.
[11] - Monthly median not greater than 5000/100ml from a minimum of five examinations.
[12] - Monthly geometric mean not greater than 200/100ml from a minimum of five examinations when disinfection is practiced.
[13] - Monthly geometric mean not greater than 200/100ml from a minimum of five examinations.
[14] - Minimum daily average not less than 5 mg/l

Table 28a

New York State Water Quality Standards and Criteria Exceedances of Buffalo River Water Samples Ohio Street Bridge, April 1982-March 1986 (R-16, Table A.2)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	CLASS D	EXCEEDANCES	CLASS C/B	EXCEEDANCES	CLASS A	EXCEEDANCES
chloromethane	ug/l	1	29	N.S.		N.S.		N.S.	
bromomethane	ug/l	1	29	N.S.		N.S.		N.S.	
vinyl chloride	ug/l	1	29	N.S.		N.S.		0.3 *	+ 0
dichlorodifluoromethane	ug/l	1	29	N.S.		N.S.		N.S.	
chloroethane	ug/l	1	29	N.S.		N.S.		N.S.	
trichlorofluoromethane	ug/l	1	29	N.S.		N.S.		50 *	0
dichloromethane	ug/l	1	29	N.S.		N.S.		N.S.	
1,1-dichloroethene	ug/l	1	29	N.S.		N.S.		0.07 *	+ 0
1,1-dichloroethane	ug/l	1	29	N.S.		N.S.		50 *	0
trans-1,2,dichloroethene	ug/l	1	29	N.S.		N.S.		50 *	0
chloroform	ug/l	1	29	N.S.		N.S.		0.2	+ 1
1,2-dichloroethane	ug/l	1	29	N.S.		N.S.		0.8	+ 0
1,1,1-trichloroethane	ug/l	1	29	N.S.		N.S.		50 *	0
carbon tetrachloride	ug/l	1	29	N.S.		N.S.		0.4 *	+ 0
bromodichloromethane	ug/l	1	29	N.S.		N.S.		50 *	0
1,2-dichloropropane	ug/l	1	29	N.S.		N.S.		50 * [1]	0
trans-1,3-dichloropropene	ug/l	1	29	N.S.		N.S.		N.S.	
trichloroethene	ug/l	1	29	11 *	0	11 *	0	3 *	1
dibromochloromethane	ug/l	1	29	N.S.		N.S.		50 *	0
cis-1,3-dichloropropene	ug/l	1	29	N.S.		N.S.		N.S.	
1,1,2-trichloroethane	ug/l	1	29	N.S.		N.S.		0.6	+ 0
2-chloroethylvinyl ether	ug/l	1	29	N.S.		N.S.		N.S.	
bromoform	ug/l	1	29	N.S.		N.S.		50 *	0
1,1,2,2-tetrachloroethane	ug/l	1	29	N.S.		N.S.		0.2 *	+ 0
tetrachloroethene	ug/l	1	29	1 *	0	1 *	0	0.7 *	+ 0
chlorobenzene	ug/l	1	29	50	0	5	0	5	0
1,3-dichlorobenzene	ug/l	1	29	50 [1]	0	5 [1]	0	5 [1]	0
1,2-dichlorobenzene	ug/l	1	29	50 [1]	0	5 [1]	0	5 [1]	0
1,4-dichlorobenzene	ug/l	1	29	50 [1]	0	5 [1]	0	5 [1]	0
benzene	ug/l	1	19	6 *	0	6 *	0	1.0 *	1
toluene	ug/l	1	19	N.S.		N.S.		50 *	0
ethylbenzene	ug/l	1	19	N.S.		N.S.		50 *	0
para xylene	ug/l	1	19	N.S.		N.S.		50 * [1]	0
meta xylene	ug/l	1	19	N.S.		N.S.		50 * [1]	0
ortho xylene	ug/l	* 1	19	N.S.		N.S.		50 * [1]	0
phenol	ug/l	10	19	5	+ 0	5	+ 0	1.0	+ 0
2-chlorophenol	ug/l	10	19	N.S.		N.S.		N.S.	

(Continued)

Table 28a (Continued)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	CLASS D	EXCEEDANCES	CLASS C/B	EXCEEDANCES	CLASS A	EXCEEDANCES
2-nitrophenol	ug/l	10	19	N.S.		N.S.		N.S.	
2,4-dimethylphenol	ug/l	10	19	N.S.		N.S.		N.S.	
2,4-dichlorophenol	ug/l	10	19	N.S.		N.S.		N.S.	
4-chloro-3-methylphenol	ug/l	10	19	N.S.		N.S.		N.S.	
2,4,6-trichlorophenol	ug/l	10	19	N.S.		N.S.		N.S.	
2,4,5-trichlorophenol	ug/l	10	19	N.S.		N.S.		N.S.	
2,4-dinitrophenol	ug/l	10	19	N.S.		N.S.		N.S.	
4-nitrophenol	ug/l	10	19	N.S.		N.S.		N.S.	
2-methyl-4,6-dinitrophenol	ug/l	10	19	N.S.		N.S.		N.S.	
pentachlorophenol	ug/l	10	19	1	+ 0	0.4	+ 0	0.4	+ 0
benzoic acid	ug/l	10	4	N.S.		N.S.		N.S.	
bis(2-chloroisopropyl)ether	ug/l	10	6	N.S.		N.S.		N.S.	
bis(2-chloroethyl)ether	ug/l	10	19	N.S.		N.S.		0.03 *	+ 0
N-nitrosodimethylamine	ug/l	10	16	N.S.		N.S.		N.S.	
N-nitrosodi-n-propylamine	ug/l	10	19	N.S.		N.S.		N.S.	
hexachloroethane	ug/l	10	19	N.S.		N.S.		N.S.	
nitrobenzene	ug/l	10	19	N.S.		N.S.		30	0
isophorone	ug/l	10	19	N.S.		N.S.		50 *	0
bis(2-chloroethoxy)methane	ug/l	10	19	N.S.		N.S.		N.S.	
1,2,4-trichlorobenzene	ug/l	10	19	50 [1]	0	5 [1]	+ 0	5 [1]	+ 0
naphthalene	ug/l	30	19	N.S.		N.S.		10	+ 0
hexachlorobutadiene	ug/l	10	19	10	0	1	+ 0	0.5	+ 0
hexachlorocyclopentadiene	ug/l	10	19	4.5	+ 0	0.45	+ 0	0.45	+ 0
2-chloronaphthalene	ug/l	10	19	N.S.		N.S.		10	0
2,6-dinitrotoluene	ug/l	10	19	N.S.		N.S.		0.07 *	+ 0
acenaphthylene	ug/l	30	19	N.S.		N.S.		N.S.	
dimethylphthalate	ug/l	10	19	N.S.		N.S.		50 *	0
acenaphthene	ug/l	30	19	N.S.		N.S.		20	+ 0
2,4-dinitrotoluene	ug/l	10	19	N.S.		N.S.		N.S.	
diethylphthalate	ug/l	10	19	N.S.		N.S.		50 *	0
fluorene	ug/l	30	19	N.S.		N.S.		50 *	0
4-chlorophenylphenylether	ug/l	10	8	N.S.		N.S.		N.S.	
N-nitrosodiphenylamine	ug/l	10	14	N.S.		N.S.		50 *	0
1,2-diphenylhydrazine	ug/l	10	19	N.S.		N.S.		0.05 *	+ 0
4-bromophenylphenylether	ug/l	10	19	N.S.		N.S.		N.S.	
hexachlorobenzene	ug/l	10	19	N.S.		N.S.		0.02 *	+ 0
phenanthrene	ug/l	30	19	N.S.		N.S.		50 *	0
anthracene	ug/l	30	19	N.S.		N.S.		50 *	0
di-n-butylphthalate	ug/l	10	19	N.S.		N.S.		50 *	0
fluoranthane	ug/l	30	19	N.S.		N.S.		50 *	0
pyrene	ug/l	30	19	N.S.		N.S.		50 *	0
benzidine	ug/l	10	19	0.1	+ 0	0.1	+ 0	0.1	+ 0
butylbenzylphthalate	ug/l	10	19	N.S.		N.S.		50 *	0
benzo(a)anthracene	ug/l	30	19	N.S.		N.S.		0.002 *	+ 0
3,3'-dichlorobenzidine	ug/l	10	19	N.S.		N.S.		N.S.	

(Continued)

Table 28a (Continued)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	CLASS D	EXCEEDANCES	CLASS C/B	EXCEEDANCES	CLASS A	EXCEEDANCES
bis(2-ethylhexyl)phthalate	ug/l	10	19	N.S.		0.6	+ 0	0.6	+ 0
chrysene	ug/l	30	19	N.S.		N.S.		0.002 *	+ 0
dioctylphthalate	ug/l	10	19	N.S.		N.S.		N.S.	
benzo(b)fluoranthene	ug/l	30	10	N.S.		N.S.		0.002 *	+ 0
benzo(k)fluoranthene	ug/l	30	10	N.S.		N.S.		0.002 *	+ 0
benzo(a)pyrene	ug/l	30	19	0.0012 *	+ 0	0.0012 *	+ 0	0.0012 *	+ 0
indeno(1,2,3-cd)pyrene	ug/l	10	19	N.S.		N.S.		0.002 *	+ 0
dibenzo(a,h)anthracene	ug/l	10	19	N.S.		N.S.		N.S.	
benzo(g,h,i)perylene	ug/l	10	19	N.S.		N.S.		N.S.	
alpha-BHC	ug/l	10	19	2 [1]	+ 0	0.01 [1]	+ 0	0.01 [1]	+ 0
beta-BHC	ug/l	10	19	2 [1]	+ 0	0.01 [1]	+ 0	0.01 [1]	+ 0
gamma-BHC	ug/l	10	19	2 [1]	+ 0	0.01 [1]	+ 0	0.01 [1]	+ 0
delta-BHC	ug/l	10	19	2 [1]	+ 0	0.01 [1]	+ 0	0.01 [1]	+ 0
heptachlor	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001	+ 0
aldrin	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001 [6]	+ 0
heptachlor epoxide	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001	+ 0
endosulfan I	ug/l	10	19	0.22	+ 0	0.009	+ 0	0.009	+ 0
4,4'-DDE	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001	+ 0
dieldrin	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001 [6]	+ 0
endrin	ug/l	10	19	0.002	+ 0	0.002	+ 0	0.002	+ 0
4,4'-DDD	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001	+ 0
endosulfan II	ug/l	10	19	0.22	+ 0	0.009	+ 0	0.009	+ 0
endrin aldehyde	ug/l	10	19	N.S.		N.S.		N.S.	
endosulfan sulfate	ug/l	10	19	N.S.		N.S.		N.S.	
4,4'-DDT	ug/l	10	19	0.001	+ 0	0.001	+ 0	0.001	0
zinc	ug/l	20 [15]	30	435 [2,5]	0	30 [2]	5	30 [2]	5
lead	ug/l	10	30	131 [2,5]	1	5 [2,5]	+ 2	5 [2,5]	+ 2
beryllium	ug/l	2 [16]	30	N.S.		1100 [5]	0	1100 [5]	0
copper	ug/l	10 [17]	30	25 [2,5]	0	16 [2,5]	0	16 [2,5]	0
nickel	ug/l	1 [18]	30	2433 [2,5]	0	126 [2,5]	0	126 [2,5]	0
silver	ug/l	1 [19]	30	8 [3,5]	0	0.1 [3]	+ 0	0.1 [3]	+ 0
mercury	ug/l	0.2 [20]	30	0.2 *	1	0.2 *	1	0.2 * [7]	1
arsenic	ug/l	10	30	360 [4]	0	190 [4]	0	50	0
cadmium	ug/l	1 [21]	30	6 [2,5]	0	2 [2,5]	0	2 [2,5]	0
antimony	ug/l	5 [22]	30	N.S.		N.S.		3 *	+ 0
thallium	ug/l	10 [23]	30	20 [2]	0	8 [2]	+ 0	8 [2]	+ 0
chromium	ug/l	10	30	2341 [2,5]	0	12 [2,5]	2	12 [2,5]	2
selenium	ug/l	5 [24]	30	N.S.		1 [2]	+ 0	1.0 [2]	+ 0
1-chlorocyclohexene-1	ug/l	1	8	N.S.		N.S.		N.S.	
cumene	ug/l	1	8	N.S.		N.S.		N.S.	
styrene	ug/l	1	8	N.S.		N.S.		N.S.	
p-bromofluorobenzene	ug/l	1	8	N.S.		N.S.		N.S.	
n-propylbenzene	ug/l	1	8	N.S.		N.S.		N.S.	
tert-butylbenzene	ug/l	1	8	N.S.		N.S.		N.S.	
o/p-chlorotoluene	ug/l	1	8	N.S.		N.S.		N.S.	

(Continued)

Table 28a (Concluded)

PARAMETER	UNITS	DETECT. LIMIT	NO. OF SAMPLES	CLASS D	EXCEEDANCES	CLASS C/B	EXCEEDANCES	CLASS A	EXCEEDANCES
bromobenzene	ug/l	1	8	N.S.		N.S.		N.S.	
metachlorotoluene	ug/l	1	8	N.S.		N.S.		N.S.	
1,3,5-trimethylbenzene	ug/l	1	8	N.S.		N.S.		50 [1]	0
1,2,4-trimethylbenzene	ug/l	1	8	N.S.		N.S.		50 [1]	0
p-cymene	ug/l	1	8	N.S.		N.S.		N.S.	
cyclopropylbenzene	ug/l	1	14	N.S.		N.S.		N.S.	
sec-butylbenzene	ug/l	1	8	N.S.		N.S.		N.S.	
n-butylbenzene	ug/l	1	8	N.S.		N.S.		N.S.	
2,3-benzofuran	ug/l	1	8	N.S.		N.S.		N.S.	
1,2,3-trichlorobenzene	ug/l	5	8	50 [1]	0	5 [1]	0	5 [1]	0
ammonia	mg/l		18	6.8 [8]	0	1.8 [8]	0	1.8 [8]	0
nitrogen (NO2)	ug/l		18	N.S.		100	0	100	0
nitrogen (NO2,NO3)	mg/l		18	N.S.		N.S.		N.S.	
phenols (4AAP)	ug/l	1	24	5 [9]	0	5 [9]	0	1.0	11
pH	SU		24	6.5 - 8.5	1	6.5 - 8.5	1	6.5 - 8.5	1
TSS	mg/l		18	N.S.		N.S.		N.S.	
BOD7	mg/l		23	N.S.		N.S.		N.S.	
coliform, total	/100ml		23	N.S. [10]		N.S. [10]		5000 [11]	10
coliform, fecal	/100ml		23	N.S. [12]		N.S. [12]		200 [13]	10
turbidity			18	N.S.		N.S.		N.S.	
alkalinity	mg/l		24	N.S.		N.S.		N.S.	
temperature	deg C		24	32	0	32	0	32	0
conductivity			18	N.S.		N.S.		N.S.	
dissolved oxygen	mg/l		23	3	0	4 [14]	4	4 [14]	4
TKN	mg/l		12	N.S.		N.S.		N.S.	
phosphate, total	mg/l		16	N.S.		N.S.		N.S.	
COD	mg/l		18	N.S.		N.S.		N.S.	
hardness	mg/l		5	N.S.		N.S.		N.S.	

WATER QUALITY STANDARD AND GUIDANCE VALUE FOOTNOTES

Class A - Best usage drinking water supply
Class B - Best usage primary contact recreation
Class C - Best usage fishing and fish propagation
Class D - Best usage fishing
N.S. - No standard or guidance value
* - Guidance value
\+ - Detection limit greater than standard or guidance value
[1] - Applies to sum of isomers
[2] - Applies to acid soluable form
[3] - Applies to ionic form
[4] - Applies to dissolved form
[5] - Calculated based on 144 mg/l hardness
[6] - Applies to sum of aldrin and dieldrin
[7] - Standard not greater than 2 ug/l
[8] - Calculated based on pH = 7.67 and temperature = 18.125 C
[9] - Total unchlorinated
[10] - Monthly median not greater than 2400/100ml from a minimum of five examinations when disinfection is practiced.
[11] - Monthly median not greater than 5000/100ml from a minimum of five examinations.
[12] - Monthly geometric mean not greater than 200/100ml from a minimum of five examinations when disinfection is practiced.
[13] - Monthly geometric mean not greater than 200/100ml from a minimum of five examinations.
[14] - Minimum daily average not less than 5 mg/l
[15] - Detection limit was 50 ug/l in 1982-85
[16] - Detection limit was 20 ug/l in 1982-84
[17] - Detection limit was 50 ug/l in 1982-84
[18] - Detection limit was 50 ug/l in 1982-84
[19] - Detection limit was 20 ug/l in 1982-84
[20] - Detection limit was 0.4 ug/l in 1982-83
[21] - Detection limit was 2 ug/l in 1982-84
[22] - Detection limit was 1000 ug/l in 1982-84
[23] - Detection limit was 1000 ug/l in 1982-84
[24] - Detection limit was 10 ug/l in 1982-83

Table 28b

Inventory of Samples (5, Table I)

ATEC Lab Nos. Inorganic	Organic	Sample Description	Time Collected
		Water Samples	
1744-84	11592	25 minutes before dredge	10:25
1745-84	11593	10 minutes before dredge	10:40
1746-84	11594	Wake #1	10:50
1747-84	11595	15 minutes after dredge	11:05
1748-84	11596	30 minutes after dredge	11:20
1749-84	11597	60 minutes after dredge	11:50
1750-84	11598	120 minutes after dredge	12:50
1751-84	11599	Wake #2	13:25
1752-84	11600	15 minutes after dredge	13:40
1753-84	11601	30 minutes after dredge	13:55
1754-84	11602	60 minutes after dredge	14:25
1755-84	11603	Wake #3	16:05
1756-84	11604	15 minutes after dredge	16:20
		Suspended Sediment Samples	
1809-84		Wake	13:25 - 14:25
1910-84		120 minutes after dredge	17:21 - 18:21

Table 28c

Analyses Conducted on Water Samples Collected at Buffalo River, Buffalo, NY (5, Table II)

ATEC Lab No.	1744-84	1745-84	1786-84	1747-84
Identification (Field No.)	1025 25 min. before	1040 10 min. before	1050 Wake #1	1105 15 min. after
Arsenic, µg/l	< 4	< 4	6	< 4
Cadmium, µg/l	4	< 4	< 4	< 4
Chromium, µg/l	< 10	12	24	20
Copper, µg/l	< 4	< 4	< 4	< 4
Lead, µg/l	50	64	110	84
Mercury, µg/l	< 0.3	< 0.3	1.6	< 0.3
Nickel, µg/l	< 10	12	32	24
Zinc, µg/l	31	24	170	60
pH, S.U.	7.3	7.3	7.6	7.4
Suspended Solids, mg/l	54	51	273	131
Dissolved Solids, mg/l	154	148	139	147
Oil/Grease, mg/l	1.4	1.2	0.8	4.1
T. Non-Volatile Chlorinated Hydrocarbons, µg/l	< 0.01	< 0.01	< 0.01	< 0.01
T. Volatile Chlorinated Hydrocarbons, µg/l	< 1.0	< 1.0	< 1.0	< 1.0

* Concentrations estimated on the basis of a bromochloropropane internal standard.

** Concentrations estimated on the basis of an aldrin internal standard.

(Continued)

Table 28c (Continued)

ATEC Lab No.	1748-84	1749-84	1750-84	1751-84
Identification (Field No.)	1120 30 min. after	1150 1 hr. before	1250 2 hr. after	1325 Wake #2
Arsenic, µg/l	< 4	< 4	< 4	4
Cadmium, µg/l	< 4	< 4	< 4	< 4
Chromium, µg/l	20	12	< 10	20
Copper, µg/l	< 4	< 4	< 4	< 4
Lead, µg/l	84	84	32	68
Mercury, µg/l	0.3	0.3	< 0.3	0.5
Nickel, µg/l	24	16	22	28
Zinc, µg/l	68	48	56	140
pH, S.U.	7.4	7.5	7.4	7.5
Suspended Solids, mg/l	142	118	125	301
Dissolved Solids, mg/l	140	146	153	133
Oil/Grease, mg/l	1.2	3.9	0.6	< 0.5
T. Non-Volatile Chlorinated Hydrocarbons, µg/l	< 0.01	< 0.01	< 0.01	< 0.01
T. Volatile Chlorinated Hydrocarbons, µg/l	< 1.0	< 1.0	< 1.0	< 1.0

* Concentrations estimated on the basis of a bromochloropropane internal standard.

** Concentrations estimated on the basis of an aldrin internal standard.

Table 28c (Concluded)

ATEC Lab No.	1752-84	1753-84	1754-84	1755-84	1756-84
Identification (Field No.)	1340 15 min. after	1355 30 min. after	1425 1 hr. after	1605 Wake #3	1620 15 min. after
Arsenic, µg/l	< 4	< 4	< 4	5	< 4
Cadmium, µg/l	< 4	< 4	< 4	< 4	< 4
Chromium, µg/l	< 10	< 10	< 10	16	< 10
Copper, µg/l	< 4	< 4	< 4	< 4	< 4
Lead, µg/l	32	32	40	88	36
Mercury, µg/l	< 0.3	0.3	< 0.3	0.5	< 0.3
Nickel, µg/l	16	12	12	32	< 10
Zinc, µg/l	48	40	52	180	48
pH, S.U.	7.4	7.4	7.6	7.6	7.2
Suspended Solids, mg/l	135	112	115	498	125
Dissolved Solids, mg/l	153	154	153	130	171
Oil/Grease, mg/l	1.0	< 0.5	< 0.5	< 0.5	< 0.5
T. Non-Volatile Chlorinated Hydrocarbons, µg/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
T. Volatile Chlorinated Hydrocarbons, µg/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

* Concentrations estimated on the basis of a bromochloropropane internal standard.

** Concentrations estimted on the basis of a aldrin internal standard.

Table 28d

Analyses Conducted on Suspended Sediment Samples Collected at Buffalo River, Buffalo, NY. Inorganic Parameters (5, Table III)

ATEC Lab No. / Identification	1809-84 Wake		1810-84 2nd Hour	
Total Dry Sediment Weight, g	12.8		4.3	
	mg/kg	µg/l in water	mg/kg	µg/l in water
Arsenic	8	3	8	1.0
Cadmium	< 2	< 0.7	< 2	< 0.2
Chromium	25	9.1	26	3.2
Copper	69	25	64	7.9
Lead	96	35	76	9.3
Mercury	0.5	0.2	< 0.1	< 0.01
Nickel	36	13	40	4.9
Zinc	157	57	176	21.4
Iron	22,300	8,160	25,000	3,070
Manganese	690	252	826	101

Note: Metals were determined on dry sediments concentrated from water samples. The equivalent concentrations in the water are based upon the assumption that the sediments represent the solids contained in 35 liters of water.

Table 28e

Analyses Conducted on Suspended Sediment Samples Collected at Buffalo River, Buffalo, NY. Organic Parameters (5, Table IV)

ATEC Lab No. / Identification	1809-84 Wake		1810-84 2nd Hour	
Total Dry Sediment weight, g	12.8		4.3	
PCB's:	mg/kg	µg/l in water	mg/kg	µg/l in water
Aroclor 1016	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1221	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1232	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1242	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1248	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1254	< 1.0	< 0.4	< 1.0	< 0.1
Aroclor 1260	< 1.0	< 0.4	< 1.0	< 0.1
Polynuclear Aromatic Hydrocarbons:				
Phenanthrene	< 1.4	< 0.5	< 1.4	< 0.2
Anthracene	< 1.3	< 0.5	< 1.3	< 0.2
Fluoranthene	< 1.4	< 0.5	< 1.4	< 0.2
Pyrene	< 1.3	< 0.5	< 1.3	< 0.2
Benzo(a)Anthracene	< 1.3	< 0.5	< 1.3	< 0.2
Chrysene	< 1.3	< 0.5	< 1.3	< 0.2
Benzo(b)Fluoranthene	< 2.9	< 1	< 2.9	< 0.4
Benzo(k)Fluoranthene	< 1.8	< 0.7	< 1.8	< 0.2
Benzo(a)Pyrene	< 2.4	< 0.9	< 2.4	< 0.3
Dibenzo(a,h)Anthracene	<14.8	< 5.5	<14.8	< 1.8
Indeno(1,2,3-cd)Pyrene	< 7.5	< 2.8	< 7.5	< 0.9
Benzo(ghi)Perylene	< 8.7	< 3.2	< 8.7	< 1.1
Other Base Neutral Organics:				
Hexachloroethane	< 4.7	< 1.7	< 4.7	< 0.6
Hexachlorobutadiene	< 6.8	< 2.5	< 6.8	< 0.8
Hexachlorobenzene	< 4.8	< 1.8	< 4.8	< 0.6
1,2,4-Trichlorobenzene	< 3.5	< 1.3	< 3.5	< 0.4
2-Chloronaphthalene	< 1.9	< 0.7	< 1.9	< 0.2
1,2-Diphenylhydrazine	< 1.8	< 0.7	< 1.8	< 0.2
Hexachlorocyclopentadiene	< 9.0	< 3.3	< 9.0	< 1.1

Table 29

Groundwater Sampling at Hazardous Waste Sites (R-16, Table B-62)

SITE NAME AND NUMBER	FIRST SAMPLING DATE	TEST HOLES DRILLED	EXISTING WELLS	NUMBER OF WATER SAMPLES: Ground water	NUMBER OF WATER SAMPLES: Surface water	NUMBER OF SEDIMENT SAMPLES	GC/MS EXTRACTABLES	NUMBER OF SAMPLES FOR EACH PARAMETER: Volatiles	As	Cd	Cr	Cu	Fe	Pb	Mg	Ni	V	Zn	Ca	S
DiBacco (Old Creek bed)	07-09-82	-	-	-	4	-	4*	-	-	-	-	3	3	3	4	-	-	-	-	-
Dunlop Tire and Rubber(125,6,7)	07-09-82	4	-	-	-	4	4*	-	-	-	-	-	-	-	-	-	-	-	-	-
forebay of PASNY	07-10-82	2	-	-	-	2	2*	-	1	1	1	1	1	1	1	1	1	1	1	-
City of Tonawanda Dump	07-10-82	8	-	2	2	6	10 (3*)	-	-	-	7	-	7	-	-	-	-	-	-	-
Griffon Park	07-12-82	4	-	1	-	4	5*	-	-	-	-	5	5	-	5	-	-	-	-	-
Allied Chemical(108)	07-13-82	3	-	1	1	2	4*	-	-	-	-	-	-	-	-	-	-	-	-	-
Allied Chemical(110)	07-13-82	3	-	-	-	3	3*	-	-	-	-	-	-	-	-	-	-	-	-	-
Allied Chemical(109)	07-14-82	1	-	1	1	1	3*	1	1	1	1	1	1	1	1	-	-	1	-	-
Airco Speer	07-14-82	4	-	-	-	4	4*	-	-	-	-	-	-	-	-	-	-	-	-	-
Huntley Power Station	07-15-82	18	-	-	2	18	19*	-	19	19	19	-	19	19	19	19	-	-	-	-
Leigh Valley Railroad	07-19-82	20	-	-	-	20	-	-	-	-	20	20	20	20	-	20	-	-	-	-
Allied Chemical(107)	07-19-82	-	3	3	-	-	-	-	-	-	3	3	3	3	-	3	3	-	-	3
Chemical Leaman		-	3	3	-	-	3*	-	-	-	-	-	-	-	-	-	-	-	-	-
Allied Chemical(105)	07-20-82	4	-	-	-	4	4*	-	4	4	4	-	4	4	4	4	-	-	-	-
Aluminum Match Plate	07-20-82	4	-	-	-	4	-	-	-	-	-	-	4	-	4	-	-	-	-	-
Spauling Fibre	07-21-82	4	-	-	-	4	-	-	-	-	-	-	3	-	-	-	-	3	-	-
Remco Steel	07-22-82	3	-	-	2	3	-	-	-	-	6	6	6	6	-	-	-	-	-	-
Republic Steel	07-22-82	-	7	6	1	-	7*	-	-	-	6	6	-	6	-	-	-	-	-	-
NFTA(092)	07-27-82	2	-	-		2	2*	-	-	-	-	-	-	-	-	-	-	-	-	
Adams Generating Plant	07-27-82	4	-	-		4	4*	-	-	-	4	4	4	-	4	-	-	-	-	
Anaconda	07-28-82	4	-	-		4	4*	-	4	4	4	4	4	4	4	-	-	4	-	
J.H. Williams	07-29-82	4	-	-		4	4 (3*)	-	-	-	-	-	4	4	-	-	-	-	-	

NOTE: Dash (-) means not analyzed for.

* Analyses performed by Mead Compu Chem, Inc., Research Triangle Park, N.C. total (number by Mead*). All other analyses performed by U.S.G.S. (United States Geological Survey).

Table 30

Mean Priority Pollutant Concentrations in Groundwater Samples at Significant Hazardous Sites

(R-16, Table B.2)

Sub-Area	BUFFALO - LACKAWANNA						
Segment	Lake Erie			Buffalo River			
Facility	Site 118 Bethlehem Steel ug/l	Site 162 Altlift ug/l	Site 241 Times Beach Dredge Spoil ug/l	Site 141 Mobil Oil ug/l	Site 138 McNaughton Brooks ug/l	Site 107 Allied Chemical ug/l	Site 18-20 Buffalo Color ug/l
Categories/Parameters				1/	1/		1/
ACID/PHENOLICS							
2-Chlorophenol			13				
2,4-Dichlorophenol							
Pentachlorophenol							
Phenol							
2,4,5-Trichlorophenol							
2,4 Dimethyl phenol							
BASE NEUTRALS							
Acenaphthene							
Acenaphthylene							
Benzo(a)anthracene							
Benzo(a)pyrene							
Benzo(b)fluoranthene							
Benzo(g,h,i)perylene							
Benzo(k)fluoranthene							
Bis(2-ethylhexyl)phthalate			37				
Butylbenzylphthalate							
2-Chloronaphthalene							
Chrysene							
1,2-Dichlorobenzene			76.7				
1,3-Dichlorobenzene			7.3				
1,4-Dichlorobenzene			56.3				
Diethylphthalate							
Di-n-butylphthalate							
Di-n-octylphthalate							
Fluoranthene							
Fluorene							
Hexachlorobenzene							
Hexachlorobutadiene							
Hexachlorocyclopentadiene							
Hexachloroethane							
Naphthalene	100		33.3				
Phenanthrene							
Pyrene							
1,2,4-Trichlorobenzene			25.7				
PURGEABLES							
Benzene	6		141				
Carbon tetrachloride							
Chlorobenzene			1743				
Chloroethane							
Chloroform							
1,1-Dichloroethane							
1,2-Dichloroethane							
1,1-Dichloroethylene							
Trans-1,2-dichloroethylene							
1,2-Dichloropropane							
Trans-1,3-dichloropropene							
Ethylbenzene			29.7				
Methylene chloride							
1,1,2,2-Tetrachloroethane							
Tetrachloroethylene							
Toluene	1		7.6				
1,1,1-Trichloroethane							
1,1,2-Trichloroethane							
Trichloroethylene							
Trichlorofluoromethane							
Vinyl chloride							
PESTICIDES							
Alpha BHC							
Beta BHC							
Gamma BHC							
Delta BHC							
Endrin aldehyde							
Heptachlor							
PCBs							
METALS, TOTAL							
Antimony			8				
Arsenic	30	10.7	67.3				
Beryllium							
Cadmium			10.2				
Chromium		10	223				
Copper		43	472			84.6	
Lead	120		1331			173.6	
Mercury		3.2	0.3				
Nickel			219			373	
Selenium							
Silver		2					
Thallium							
Zinc	155		261,000				
CYANIDES, TOTAL	160						
OTHER	2/	2/	2/			2/	

Notes: 1/ No water data available. 2/ See text for other parameters.

Table 31

EPA Priority Pollutant and Special Category Loadings for Parameters Quantified from December 1981-82 Sampling (R-21, Table 2.4)

kg/d(lb/d)

Sub-Area	Buffalo - Lackawanna			Tona.-N. Tona.	Niagara Falls, N.Y.		
Segment	Lake Erie	Buffalo R.	Bird Island - Riverside		Wheatfield-Upper River	Lower River	Totals
POLLUTANTS/CATEGORIES							
EPA PRIORITY POLLUTANTS							
Acid Extractables	13.4(29.5)	-	-	5.6(12.4)	1.7(3.8)	25.0(55.2)	45.8(100.9)
Base/Neutral Extractables							
PAHs	1.2(2.6)	14.9(32.8)	0.7(1.5)	0.4(0.9)	-	-	17.1(37.7)
PCBs	0.1(0.2)	-	-	-	-	-	0.1(0.2)
Pesticides	0.1(0.3)	0.1(0.2)	0(0.1)	0.1(0.2)	0(0.1)	1.1(2.4)	1.4(3.3)
Other B/Ns	4.9(10.8)	-	4.1(9.0)	1.5(3.3)	1.8(3.9)	8.7(19.2)	21.0(46.3)
Total B/Ns	6.3(13.9)	15.0(33.0)	4.8(10.6)	2.0(4.4)	1.8(4.0)	9.8(21.6)	39.7(87.5)
Purgeables	0.7(1.5)	1.6(3.5)	18.5(40.7)	8.3(18.2)	1.6(3.6)	102.5(226.1)	133.2(293.6)
Metals, Total	158.4(349.2)	14.4(31.7)	401.6(885.5)	250.7(552.7)	41.4(91.3)	125.7(277.2)	992.2(2187)
Cyanides, Total	2.0(4.5)	7.6(16.7)	12.7(27.9)	19.1(42.1)	0.1(0.2)	1.3(2.9)	42.6(93.9)
SPECIAL ORGANIC POLLUTANT CATEGORIES							
Phenols (4AAP)	3.9(8.7)	4.8(10.6)	4.7(10.3)	36.1(79.6)	1.2(2.6)	107.2(236.3)	157.9(348.1)
Chlorobenzenes	-*	-*	0.4(0.8)*	4.7(10.3)**	1.6(3.5)**	8.3(18.2)**	15.0(32.8)
Chlorotoluenes	-***	-***	-***	-**	3.0(6.6)**	47.7(105.2)**	50.7(111.8)

Notes: Loadings include significant and other discharges monitored. Dash (-) indicates none detected. * Values indicated are EPA-priority pollutant chlorobenzenes only. ** Special scan conducted including 4 non-priority pollutant chlorobenzenes and 20 chlorotoluenes for the following facilities only: Occidental Durez Div. (Tona.-N. Tona. Sub-area); Occidental Niagara Plant (Wheatfield-Upper River Segment); Niagara Falls (C) WWTP, Occidental Niagara Plant (Lower River Segment). Values include both non-priority and priority pollutant chlorobenzenes, quantified parameters only. *** No special scan conducted.

Table 32

Significant Discharges of EPA Priority and Special Category Pollutants to the Niagara River Based on Quantitative Data (R-21, Table 2.9)

MAP #	FACILITY	FLOW		EPA PRIORITY POLLUTANT CATEGORY LOADINGS(kg/d)[1]												
		m^3/d	DS MGD	Acid Extract-ables	PAHs	Other B/Ns	Pesti-cides	PCBs	Purge-ables	Total Priority Organics	Cyanides	Metals	Total Priority Pollutants	4-AAP Phenols [2]	Chlorinated Benzenes [2]	Chlorinated Toluenes [2]
	Buffalo-Lackawanna Sub-Area															
1.	City of Lackawanna WWTP	8,700	2.3	-	-	-	-	-	-	-	0.1	2.1	2.2	0	-*	N.A.
2.	Bethleham Steel Corp. [3]	259,000	68.4	13.4	1.1	4.9	0.1	0.1	0.7	20.3	1.9	156.2	178.4	3.9	-*	N.A.
3.	PVS Chemical Corp.	31,000	8.3	-	-	-	-	-	-	0	0.1	1.4	1.5	-	-*	N.A.
4.	Buffalo Color Corp.	42,000	11.3	-	-	-	0	-	0.4	0.4	0.4	3.6	4.4	0	-*	N.A.
5.	Donner-Hanna Coke [4] Joint Venture	28,000	7.4	-	14.9	-	0	-	1.2	16.1	7.0	2.1	25.2	4.2	-*	N.A.
6.	Republic Steel Corp.[4]	53,700	14.2	-	-	-	-	-	0.2	0.2	-	7.4	7.6	0.6	-*	N.A.
7.	Buffalo Sewer Authority	645,000	17.0	-	0.7	4.1	0	-	18.4	23.2	12.7	401.6	437.5	4.7	0.4*	N.A.
	Fort Erie Sub-Area															
A.	Fort Erie WPCP	11,400	3.0	0	0.1	2.1	0	-	2.8	5.0	0.1	2.0	7.1	0.3	0*	N.A.
B.	Fleet Manufacturing	900	0.2	-	0	0.02	0	-	0.1	0.12	-	1.2	1.3	-	-*	N.A
	Tonawanda-North Tonawanda Sub-Area															
8.	Town of Tonawanda WWTP	81,800	21.6	-	-	-	0	-	-	0	12.1	14.7	26.8	2.9	-*	N.A.
9.	Town of Amherst WWTP	74,900	19.8	-	-	-	-	-	-	0	0.1	25.5	25.6	-	-*	N.A.
10.	City of North Tonawanda WWTP	17,000	4.4	-	-	-	-	-	0.3	0.3	0.7	3.9	4.9	0.4	-*	N.A.
11.	General Motors Corp.	93,500	24.7	-	-	-	-	-	-	0	0.6	14.0	14.6	1.5	-*	N.A.
12.	Niagara Mohawk Power Corp.	2,777,000	733.8	-	-	-	-	-	1.1	1.1	5.4	148.0	154.5	9.0	-*	N.A.
13.	Dunlop Tire & Rubber Corp.	9,500	2.5	-	-	-	-	-	-	0	0.1	4.6	4.7	-	-*	N.A.
14.	FMC Corp.	23,000	6.1	-	-	-	-	-	-	0	0	2.4	2.4	-	-*	N.A.
15.	Ashland Oil Inc. [4]	74,900	19.8	-	-	-	-	-	-	0	0.1	-	0.1	1.0	-*	N.A.

Notes: Dash (-) indicates none detected at or above quantification limit. N.A. indicates not analyzed. Zero (0) indicates parameter identified and quantified at less than 0.1 kg/day.

[1] Multiply by 2.205 to arrive at lb/d.

[2] Special organic pollutant category, not a priority pollutant.

[3] Facility's steel-making terminated in 1983.

[4] Facility now closed.

* Values indicated are EPA priority pollutant chlorobenzenes only.

** Special scan conducted, including 4 non-priority pollutant chlorobenzenes and 20 chlorotoluenes for the following facilities only: Occidental Durez Div.; Occidental Niagara Plant; Niagara Falls (C) WWTP. Values include both non-priority and priority pollutant chlorobenzenes.

Table 33

EPA Priority Pollutants and Special Category Loadings from Significant Sources by Categories/Parameters from December 1981-82 Sampling (Quantified Parameters Only) (R-21, Table 2.14)

kg/day (lb/day)

Sub-Area	BUFFALO - LACKAWANNA							
Segment	Lake Erie		Buffalo River				Bird Island-Riverside	Black Rock Canal
Facility	City of Lackawanna WWTP	Bethlehem Steel Corp.	PVS Chemical Corp.	Buffalo Color Corp.	Donner-Hanna Coke	Republic Steel Corp.	BSA WWTP	None
CATEGORIES/PARAMETERS								
ACID EXTRACTABLES								
2,4-Dimethylphenol	-	0.3(0.7)	-	-	-	-	-	
2,4-Dinitrophenol	-	-	-	-	-	-	-	
2-Nitrophenol	-	0.3(0.6)	-	-	-	-	-	
4-Nitrophenol	-	0.8(1.8)	-	-	-	-	-	
Phenol	-	12.0(26.4)	-	-	-	-		
2,4,6-Trichlorophenol	-	-	-	-	-	-	-	
BASE/NEUTRAL EXTRACTABLES								
Anthracene	-	-	-	-	4.5(9.9)	-	-	
Benzo(a)anthracene	-	0(0.1)	-	-	2.8(6.2)	-	0.7(1.5)	
Bis(2-ethylhexyl)phthalate	-	4.9(10.8)	-	-	-	-	3.3(7.3)	
1,2-Dichlorobenzene	-	-	-	-	-	-	-	
1,4-Dichlorobenzene	-	-	-	-	-	-	0.4(0.8)	
Di-n-butylphthalate	-	-	-	-	-	-	0.4(0.9)	
Fluoranthene	-	0.6(1.4)	-	-	2.8(6.2)	-	-	
Pyrene	-	0.5(1.1)	-	-	4.8(10.5)	-	-	
1,2,4-Trichlorobenzene	-	-	-	-	-	-	-	
Hexachlorobutadiene	-	-	-	-	-	-	-	
PURGEABLES								
Bromodichloromethane	-	-	-	-	-	-	0.3(0.7)	
Benzene	-	0.6(1.3)	-	-	-	-	-	
Carbon tetrachloride	-	-	-	-	-	-	-	
Chlorobenzene	-	-	-	-	-	-	-	
Chloroform	-	-	-	-	-	0.2(0.4)	3.2(7.1)	
Ethylbenzene	-	-	-	-	-	-	-	
Methylene chloride	-	-	-	0.4(0.8)	1.2(2.7)	-	12.9(28.4)	
1,1,2,2-Tetrachloroethene	-	-	-	-	-	-	-	
Tetrachloroethylene	-	-	-	-	-	-	-	
Toluene	-	0.1(0.2)	-	-	-	-	2.0(4.5)	
Trans-1,2-dichloroethylene	-	-	-	-	-	-	-	
1,1,1-Trichloroethane	-	-	-	-	-	-	-	
Trichloroethylene	-	-	-	-	-	-	-	
Trans-1,3-dichloropropene	-	-	-	-	-	-	-	
PESTICIDES, TOTAL	-	0.1(0.3)	-	0(0.1)	0(0.1)	-	0(0.1)	
PCB #1248	-	0.1(0.2)	-	-	-	-	-	
METALS, TOTAL								
Arsenic	-	0.2(0.4)	-	-	-	-	-	
Beryllium	0.2(0.4)	0.1(0.3)	-	-	-	-	5.6(12.4)	
Cadmium	-	-	-	-	-	-	6.0(13.2)	
Chromium	-	-	-	1.5(3.2)	-	-	96.7(213.3)	
Copper	0.4(1.0)	0.8(1.8)	-	-	-	1.5(3.2)	45.7(100.7)	
Lead	0.9(1.9)	31.8(70.2)	-	-	-	3.2(7.0)	47.8(105.3)	
Mercury	-	0(0)	-	-	-	-	0(0.1)	
Nickel	-	0.9(2.0)	-	1.4(3.1)	-	-	55.1(121.4)	
Selenium	-	2.3(5.1)	-	-	0.7(1.5)	-	-	
Silver	-	0.4(1.0)	0.6(1.4)	-	-	-	8.2(18.0)	
Thallium	-	-	-	-	-	-	-	
Zinc	0.6(1.4)	119.6(263.7)	0.8(1.7)	0.7(1.6)	1.4(3.1)	2.7(5.9)	136.6(301.1)	
CYANIDES, TOTAL	0.1(0.2)	1.9(4.3)	0.1(0.3)	0.4(1.0)	7.0(15.4)	-	12.7(27.9)	
PHENOLS (4AAP)	0(0.1)	3.9(8.7)	-	0(0)	4.2(9.3)	0.6(1.3)	4.7(10.3)	
CHLORINATED BENZENES	-*	-*	-*	-*	-*	-*	0.4(0.8)*	
CHLORINATED TOLUENES	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	

NOTES: Dash (-) indicates parameter analysed but not quantified. N.A. indicates parameter not analysed. Zero (0) indicates parameter identified and quantified at less than 0.1 kg/day. *EPA-priority pollutant chlorobenzenes. ** Special scan conducted for four non-priority pollutant chlorobenzenes and twenty chlorotoluenes.

Table 34

PAH Concentrations in Water from Allied Chemical Outfalls to Buffalo River (R-7, Table 4)

COMPOUND	Concentration (ng/L) Outfall 001	Outfall 003	Outfall 004
FLUORENE	ND*	ND	ND
PHENANTHRENE	ND	ND	ND
ANTHRACENE	ND	ND	ND
FLUORANTHENE	ND	1.2	5.4
McPHENANTHRENE	ND	ND	ND
PYRENE	2.1	1.1	2.0
MeANTHRACENE	ND	ND	ND
BENZOFLUORENE	ND	ND	ND
BENZANTHRACENE	0.2	0.1	0.1
CHRYSENE	0.3	ND	0.6
BENZO(e)PYRENE	ND	ND	ND
PERYLENE	ND	ND	ND
BENZO(b)FLUORANTHENE	0.2	0.6	0.1
BENZO(k)FLUORANTHENE	0.1	ND	0.1
BENZO(a)PYRENE	0.5	0.5	0.7
DIBENZ(a,h)ANTHRACENE	0.1	ND	0.7
BENZO(g,h,i)PERYLENE	0.2	0.1	7.5
INDENO(1,2,3-c,d)PYRENE	ND	ND	ND
TOTAL	3.7	3.6	17

*ND - Not Detected.

Table 35

PAH Concentrations in Water from Buffalo Color Water Outfalls and Intake (R-7, Table A.2)

COMPOUND	Concentration (ng/L) Intake	Outfall 006	Outfall 011
FLUORENE	ND*	ND	ND
PHENANTHRENE	ND	ND	ND
ANTHRACENE	ND	ND	ND
FLUORANTHENE	1.3	5.4	6.0
MePHENANTHRENE	ND	ND	ND
PYRENE	4.2	5.2	43
MeANTHRACENE	ND	ND	ND
BENZOFLUORENE	ND	ND	ND
BENZANTHRACENE	0.2	0.3	0.6
CHRYSENE	0.4	0.4	1.1
BENZO(e)PYRENE	ND	ND	ND
PERYLENE	ND	ND	ND
BENZO(b)FLUORANTHENE	0.3	0.3	0.6
BENZO(k)FLUORANTHENE	0.2	0.2	0.3
BENZO(a)PYRENE	0.8	0.7	0.9
DIBENZO(g,h,i)PERYLENE	0.2	0.1	0.1
BENZO(g,h,i)PERYLENE	0.3	13	0.4
INDENO(1,2,3-c,d)PYRENE	ND	ND	ND
TOTAL	7.9	25	53

*ND - Not Detected

Table 36

Storm Sewer Sediment Analyses for Priority and Selected Category Pollutants (R-21, Table A.2)

(ug/g)

Sub-Area	BUFFALO - LACKAWANNA					
Segment	Lake Erie		Buffalo River			
Site	26° SSO 1/ to Smokes Cr. @ Kirby Ave. Lackawanna (C) 3/	42° SSO 1/ to Smokes Cr. near Rt. 5 Lackawanna (C) 3/	42° SSO 1/ to Cayuga Cr. @ French Rd. Cheektowaga (T) 3/	73° SSO 1/ to Cayuga Cr. @ Seton Dr. Ext. Cheektowaga (T) 3/	96° CSO 2/ to Buffalo R. from Sloan Drain Buffalo (C) 3/	94° & 98° SS 4/ to Cheektowaga Cr. near Orchard Park Rd. West Seneca (T) 3/
Categories/Parameters						
ACID EXTRACTABLES						
Phenol	-	- -	-	-	-	-
BASE/NEUTRAL EXTRACTABLES						
Acenaphthene	LT	LT	LT	-	-	-
Anthracene	LT	LT	LT	-	-	LT
Benzo(a)anthracene	LT	LT	-	LT	-	LT
Benzo(a)pyrene	LT	LT	-	LT	-	LT
Benzo(b)fluoranthene	LT	LT	LT	LT	-	LT
Benzo(g,h,i)perylene	LT	-	-	-	-	-
Benzo(k)fluoranthene	-	-	-	-	-	-
Bis(2-ethylhexyl)phthalate	-	35	-	-	-	-
Chrysene	LT	LT	-	LT	-	LT
Dibenzo(a,h)anthracene	-	-	-	-	-	-
1,2-Dichlorbenzene	-	-	-	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-	-
1,4-Dichlorobenzene	-	-	-	-	-	-
3,3-Dichlorobenzidine	-	-	-	-	-	-
Di-n-butylphthalate	-	-	-	-	-	-
Di-n-octylphthalate	-	-	-	-	-	-
Fluoranthene	LT	LT	LT	LT	-	LT
Fluorene	-	LT	-	-	-	-
Hexachlorobenzene	-	-	-	-	-	-
Hexachlorobutadiene	-	-	-	-	LT	-
Indeno(1,2,3-cd)pyrene	LT	-	-	-	-	-
Naphthalene	-	LT	-	-	-	-
Phenanthrene	LT	LT	-	LT	-	LT
Pyrene	-	LT	LT	LT	-	LT
PURGEABLES						
Benzene	-	-	-	-	LT	-
Bromomethane	-	LT	-	-	-	-
Chlorobenzene	-	-	-	-	-	-
Chloroethane	-	-	-	-	-	-
Chloroform	-	-	-	-	LT	-
Chloromethane	-	-	-	-	-	-
1,1-Dichloroethane	-	-	-	-	-	-
1,1-Dichloroethylene	-	-	-	-	-	-
Trans-1,2-dichloroethylene	-	-	-	-	-	-
Ethylbenzene	-	LT	-	-	-	-
Methylene chloride	-	-	-	-	LT	-
Tetrachloroethylene	-	LT	-	LT	LT	-
Toluene	-	LT	-	LT	-	LT
1,1,1-Trichloroethane	-	-	-	-	-	-
Trichloroethylene	-	-	-	LT	LT	-
Trichlorofluoromethane	-	-	-	-	-	-
Vinyl chloride	-	-	-	-	-	-
PESTICIDES						
Aldrin	-	-	-	-	-	-
α-BHC	-	-	-	-	-	-
β-BHC	-	-	-	-	-	-
δ-BHC	-	-	-	-	-	-
γ-BHC	-	-	-	-	-	-
4,4'-DDD	-	-	-	-	-	-
4,4'-DDE	-	-	-	-	0.05	-
4,4'-DDT	-	-	-	-	-	-
β-Endosulfan	-	-	-	-	-	-
Endosulfan sulfate	-	-	-	-	-	-
Endrin	-	-	-	-	-	-
Heptachlor	-	-	-	-	-	-
Heptachlor epoxide	-	-	-	-	-	-
PCBs						
PCB-1242	-	-	-	-	2.6	-
PCB-1254	-	-	-	2.1	-	-
PCB-1260	-	-	-	-	-	-
METALS, TOTAL						
Antimony	-	-	15	19	-	-
Arsenic	1.3	14	1.1	2.5	10	9.2
Beryllium	0.4	3.9	-	-	0.9	1.1
Cadmium	48	3.6	0.7	0.6	9.3	-
Chromium	29	42	40	36	18	18
Copper	24	78	96	60	49	28
Lead	360	470	330	210	690	55
Mercury	0.06	-	-	0.01	0.07	-
Nickel	7.9	-	60	39	60	17
Selenium	-	-	-	-	-	-
Silver	2.8	-	1.5	-	4.7	1.1
Thallium	-	-	-	-	-	-
Zinc	250	520	320	210	710	160
CYANIDES, TOTAL	4.6	29	-	1.6	-	-
PHENOLS (4AAP)	0.3	3.4	-	0.9	0.5	0.6

1/ LT - Parameter identified but not quantified
2/ SSO - Storm sewer outfall
3/ CSO - Combined sewer overflow
4/ SS - Storm sewer system sample
5/ (C)=City, (T)=Town, (V)=Village

Table 37

Sediment Discharge Relationship for the Buffalo River (R-29)

Sediment Discharge (Tons/day)	Flow 46 (cfs)	9,400 (cfs)	21,800 (cfs)
Clay	.37	4,420	13,800
VF Silt	.32	3,870	12,800
F Silt	.32	3,870	12,800
M Silt	.32	3,870	12,800
C Silt	.32	3,870	12,800
VF Sand	.09	1,100	3,450
F Sand	.09	1,100	3,450

Table 38

Summary of Shoaling Rates (R-29)

Station	$\bar{X}$	5 YRS	$\bar{X}$	10 YRS	$\bar{X}$	15 YRS	$\bar{X}$	20 YRS	$\bar{X}$	25 YRS
0	.85	1.50	2.55	2.60	4.20	4.50	5.59	6.20	7.70	9.5
418	.75	1.50	2.25	2.50	3.80	3.90	5.30	5.70	6.80	8.7
1022	.65	1.50	1.95	2.50	3.25	3.10	4.60	5.00	5.90	7.5
1729	.60	1.10	2.15	2.50	3.60	3.60	5.05	6.30	6.50	8.0
2817	.60	0.50	2.60	2.50	3.90	4.40	5.40	8.00	7.00	9.0
3458	.55	0.50	1.75	2.00	3.00	3.30	4.20	6.00	5.45	7.0
4003	.35	0.50	1.05	1.50	1.75	2.00	2.50	2.50	3.20	4.0
5725	.35	0.50	1.05	1.50	1.75	2.00	2.50	2.60	3.20	3.7
7581	.35	0.50	1.05	1.60	1.75	2.10	2.50	2.80	3.20	3.5
9148	.55	1.30	1.55	2.80	2.65	2.90	3.65	4.50	4.70	5.1
9671	.80	1.60	2.30	3.20	3.85	4.60	4.80	5.00	5.25	5.6
10215	.75	1.40	2.15	2.90	3.60	4.20	4.45	4.70	5.15	5.6
10635	.65	1.20	1.95	2.60	3.60	4.00	4.30	4.60	5.15	5.6
11067	.60	1.00	1.80	2.30	3.00	3.80	4.10	4.50	5.00	5.5
11610	.55	0.70	1.65	2.00	2.15	3.50	3.85	4.20	4.95	5.7
12188	.45	0.50	1.50	1.70	2.50	3.20	3.55	4.00	4.60	5.5
12602	.55	0.60	1.65	2.00	2.75	3.50	3.90	4.40	5.05	6.0
14036	.75	1.10	2.15	3.00	3.60	4.50	5.00	5.60	6.45	7.3
14361	.75	1.20	2.15	3.10	3.65	4.60	5.10	5.80	6.60	7.5
14980	.80	1.40	2.35	3.40	3.90	5.00	5.45	6.10	7.05	8.0
15823	.90	1.70	2.70	4.10	4.50	5.60	6.30	7.00	8.15	9.0
16233	1.0	2.00	3.00	4.30	5.10	5.80	6.75	7.30	8.35	9.2
17695	1.25	2.90	3.90	5.00	5.80	6.70	7.60	8.50	9.25	10
18295	1.15	3.20	3.45	5.20	5.75	7.10	8.00	8.80	10.3	10
19557	1.65	3.30	4.25	5.50	6.40	7.10	7.55	8.22	8.65	9.5
20057	1.65	3.30	4.25	5.60	6.40	7.10	7.55	8.10	8.65	9.0
20855	1.60	3.40	5.00	5.70	6.35	7.00	7.30	7.70	8.30	8.7
21350	1.60	3.40	5.00	5.80	6.35	7.00	7.30	7.50	8.30	8.8
22680	1.40	3.30	4.50	5.60	5.90	6.50	6.65	6.70	7.30	7.6
23828	1.70	3.30	5.00	5.30	5.50	5.90	6.00	6.10	6.50	6.7
24915	1.70	3.20	4.90	5.20	5.30	5.40	5.45	5.50	5.75	6.0
25775	1.35	3.10	4.10	5.00	5.00	5.00	5.00	5.00	5.30	5.5
26545	1.50	3.30	4.50	4.70	4.80	4.90	4.95	5.00	5.10	5.3
26985	1.50	3.30	4.50	4.70	4.80	4.90	4.95	5.00	5.10	5.2
28863	.10	0.00	0.35	0.50	0.55	0.70	0.75	1.00	0.95	1.0

Table 39

Concentration of Selected Inorganic and Organic Compounds in Dredged Material Samples at Times Beach Confined Disposal Facility, 241 (915080) (R-21)

Parameter	Concentration (ug/g) [2]/ Maximum	Mean
Arsenic[1]/	58.9	22.7
Cadmium[1]/	13.3	11.9
Chromium[1]/	393	332
Copper[1]/	269	251
Lead[1]/	1,037	497
Mercury[1]/	9.4	4.8
Nickel[1]/	63	55
Zinc[1]/	1,854	1,283
Bis(2-ethylhexyl) phthalate[1]/	5.5	3.0
PCB (Aroclor 1242)[1]/	1.0	0.7
PCB (Aroclor 1254)[1]/	2.5	1.5
Aniline	2.8	2.3
1-Aminonaphthalene	4.1	2.7
N-Benzyl-ethylaniline	7.0	4.5
4,4'-Methylene-bis(N,N'-dimethylaniline)	1.4	0.9
p,p'-Benzylidene bis(N,N'-dimethylaniline)	4.7	3.3
Benzo(a)pyrene[1]/	96	39
1,2-Dichlorobenzene[1]/	9.8	3.5
1,3-Dichlorobenzene[1]/	9.5	3.9
1,4-Dichlorobenzene[1]/	22	12
Naphthalene[1]/	20	14
Phenahthrene[1]/	15	13
Anthracene[1]/	13	9.7
Fluoranthene[1]/	24	17
Pyrene[1]/	27	17
Benzo(a)anthracene[1]/	23	12
Chrysene[1]/	26	14

1/ EPA priority pollutant
2/ HNO_3 extracted

Compounds identified but not quantified include 4-(dimethyl-amino) benzophenone, N,N,N',N'-tetramethylbenzidine, chlordane, toxaphene, dimethyl phthalate, diethyl phthalate, dibutyl phthalate, benzylbutyl phthalate, lindane, heptachlor, aldrin, p,p'-DDE, dieldrin, endrin, p,p'-DDD, p,p'-DDT, methoxyclor, mirex, and phenol.

Table 40

Concentration of Parameters in Subsurface and Surface Water

Samples at Times Beach Confined Disposal Facility (R-21)

Parameter	Concentration (ug/L) Sub-surface Water Maximum	Sub-surface Water Mean	Surface Water (Single Sample)
Aluminum	95,800	33,810	30,000
Antimony 1/	24	8	31
Arsenic 1/	106	67.3	115
Barium	2,320	929	331
Cadmium 1/	17	10.2	39
Chromium 1/	496	223	758
Cobalt	220	73.3	ND
Copper	1,250	472	912
Lead 1/	3,560	1,331	2,020
Manganese	19,200	7,752	2,930
Mercury 1/	0.96	0.32	ND
Nickel 1/	659	219	129
Thallium 1/	ND	ND	66
Zinc 1/	761,000	261,000	3,340
Benzene 1/	370	149	ND
Chlorobenzene 1/	4,600	1,743	ND
Ethylbenzene 1/	46	29.7	ND
Toluene 1/	15	7.6	ND
2-Chlorophenol 1/	39	13	ND
1,2-Dichlorobenzene 1/	230	76.7	ND
1,3-Dichlorobenzene 1/	22	7.3	ND
1,4-Dichlorobenzene 1/	120	56.3	ND
1,2,4-Trichlorobenzene 1/	77	25.7	ND
N-nitrosodiphenylamine 1/	48	24	38
Bis(2-ethylhexyl) phthalate 1/	81	37	ND
Aniline	35	11.7	ND
4-Chloroaniline	430	143	ND
Naphthalene 1/	100	33.3	ND
o-Xylene	32	10.7	ND
Fluoranthene	ND	ND	9.2
Hexane	2,500	1,533	ND

1/ EPA Priority pollutant
ND Not detected

Other organic parameters tentatively identified and semi-quantified include: methylcyclopentane, 4-ethyl-2-methylhexane, 4-methylbenzeneamine, 2-chlorobenzeneamine, 3-ethyl-5-methylpyridine, 2,4-dimethylheptane, 1,3-dimethylbenzene, 3-hexanone, 2-hexanone, 3-hexanol, 2-hexanol, and 1-hexanol.

Table 41

Concentrations of Parameters in Subsurface and Surface Water Samples at Small Boat Harbor Site and Buffalo Outer Harbor Site

Parameter	Subsurface Water Mean Concentration (ug/L)		Surface Water Single Sample Concentration (ug/L)	
	Small Boat Harbor Site	Buffalo Outer Harbor Site	Small Boat Harbor Site	Buffalo Outer Harbor Site
Aluminum	3,690	5,030	234	1,680
Antimony 1/	7	ND	ND	ND
Arsenic 1/	44	17	ND	ND
Barium 1/	186	233	ND	ND
Cadmium 1/	9.8	6.2	ND	ND
Chromium 1/	122.3	102	ND	19
Copper 1/	94.3	20.7	ND	ND
Lead 1/	357	124	ND	72
Manganese	3,426	5,110	39	311
Mercury 1/	0.3	ND	ND	ND
Nickel 1/	47.7	ND	ND	ND
Tin	16	25.3	ND	ND
Zinc 1/	11,136	14,600	14	124
Benzene 1/	21.7	255	ND	ND
Chlorobenzene 1/	834	109	ND	ND
Toluene 1/	ND	2.8	ND	ND
Ethylbenzene 1/	3.7	ND	ND	ND
1,3-Dichlorobenzene 1/	20.7	ND	ND	ND
N-nitrosodiphenylamine 1/	23.7	ND	ND	ND
1,4-Dichlorobenzene 1/	8.7	ND	ND	ND
Bis(2-ethylhexyl) phthalate 1/	ND	20	ND	ND
Acenaphthylene	ND	7	ND	ND
Phenanthrene 1/	ND	1.9	ND	ND
Naphthalane 1/	ND	36.7	ND	ND
o-Xylene	6	1.9	ND	ND
Fluoranthene 1/	ND	8	ND	ND

1/ EPA priority pollutant
ND Not detected

Additional parameters similar to those at the Times Beach site were tentatively identified at these containment sites.

Table 42

Concentrations of Parameters in Soil Samples from Mobil Oil Corporation-Site 141 (915040) (R-21)

Parameter	Concentration (ug/g) Maximum	Mean
Methylene chloride 1/	0.7	0.2
Ethylbenzene 1/	0.09	0.02
Fluorotrichloromethane	0.04	0.01
Toluene 1/	0.01	0.01
Fluoranthene 1/	38	10
Benzo(a)anthracene 1/	15	4.1
Benzo(a)pyrene 1/	15	4.1
Benzo(k)fluoranthene 1/	15	3.7
Phenanthrene 1/	46	11.9
Pyrene 1/	31	7.9
Chrysene 1/	15	4.1
Acenaphthalene 1/	15	3.7
Anthracene 1/	11	2.7
Fluorene 1/	11	2.7
Benzo(k)fluoranthene 1/	600	150

1/ EPA priority pollutant

Organic compounds tentatively identified and semiquantified include: 2-methylbutane, cyclohexane, methylcyclohexane, 1,2-dimethyl-cis-cyclohexane, 3-hepten-2-one, 1-methylpyrene, and hydrocarbons.

Table 43

Concentrations of Parameters in Four Soil Sample from McNaughton-Brooks, Inc.-Site 138 (915034) R-21)

Parameter	Concentration (ug/g) Maximum	Mean
Lead 1/	520	175
Naphthalene 1/	6	2
Acenaphthylene 1/	7	2
Acenaphthene 1/	20	8
Fluorene 1/	18	8
Phenanthrene 1/	59	23
Anthracene 1/	23	6
Fluoranthene 1/	104	35
Pyrene 1/	104	33
Chrysene 1/	84	21
Benzo(a)anthracene 1/	89	23
Benzo(b)fluoranthene 1/	5	1
Benzo(k)fluoranthene 1/	167	48
Benzo(a)pyrene 1/	85	22
Undecane	2	0.4

Organic compounds tentatively identified include: 1,4-dimethylbenzene, 1,2-dimethylbenzene, 2-methylnaphthalene, 1-methylnaphthalene, 1,1-biphenyl, 1,5-dimethylnaphthalene, 2,3-dimethylnaphthalene, 4-methyldibenzofuran, and (1,1'-biphenyl)-4-carboxaldehyde.

Table 44

Concentrations of Parameters in Additional Soil Samples

from McNaughton-Brooks, Inc.-Site 138 (915034)

Parameter	Concentration (ug/g) Maximum	Mean
Benzene 1/	0.03	0.02
Ethylbenzene 1/	0.1	0.6
Methylene chloride 1/	0.2	0.07
Toluene 1/	0.09	0.02
Fluoranthene 1/	34.2	11.8
Naphthalene 1/	11.2	2.8
Bis(2-ethylhexyl) phthalate 1/	0.1	0.03
Benzo(a)anthracene 1/	25.2	6.3
Benzo(a)pyrene 1/	0.02	.005
Benzo(b)fluoranthene and benzo(k)fluoranthene 1/	32.4	8.1
Chrysene 1/	25.7	6.4
Pyrene 1/	60.5	17.8
Acetone	0.5	0.1
2-Butanone	0.09	0.02
Carbon disulfide	0.007	0.002
4-Methyl-2-pentanone	0.2	0.05
Styrene	0.01	0.003
o-Xylene	0.6	0.3

1/ EPA priority pollutant

Additional parameters tentatively identified and semi-quantified are: 1,7,7-trimethyl-tricyclo (2.2.1.02,6) heptane, 1-ethyl-2-methyl-benzene, tetrahydrofuran, 3-methyl-2-butanone, 1-pentanol, 2,6,6-trimethyl-bicyclo (3.1.1) hepten-2-one, 1,3- and 1,4-dimethylbenzene, benzofuran, cis-1,2-dimethylcyclohexane, 5-methyl-1-phenyl-hexane, 2-propyloxylbenzene, 1,3,5-trimethylbenzene, 1,2,3-trimethylbenzene, and hydrocarbons. The presence of these volatile hydrocarbons suggests a significant potential for contaminant migration.

Table 45

Concentrations of Metals in Groundwater Samples from Allied Chemical-Site 107 (915004) (R-21)

Parameter	Concentration (ug/L) Maximum	Mean
Copper 1/	190	84
Lead 1/	370	173
Nickel 1/	900	373
Vanadium	30	13

1/ EPA priority pollutant

Analyses indicate low values for pH (3.9 maximum, 3.6 mean). These pH values would enhance mobilization and seepage of inorganic contaminants to the river.

Table 46

Concentrations of Parameters in Soil Samples from Buffalo Color Corporation-Site 120-122 (915012-a,b,c) (R-21)

Parameter	Concentration (ug/g) Maximum	Mean
Arsenic[1/]	1,870	989
Chromium, total[1/]	1,050	904
Chromium, hexavalent	3.2	1.9
Copper[1/]	6,200	5,905
Lead[1/]	57,600	41,900
Mercury[1/]	138	89
Nickel[1/]	103	82
Zinc[1/]	2,130	1,462
1-Naphthylamine	0.2	0.2
Benzidine[1/]	1.0	1.0
Acenaphthene[1/]	1.0	1.0
Naphthalene[1/]	2.0	1.5
Fluorene[1/]	1.9	1.5
Anthracene[1/]/ Phenanthrene[1/]	9.6	5.2
Fluoranthene[1/]	10	6
Pyrene[1/]	6.7	3.8
Chrysene[1/]/ Benzo(a)anthracene[1/]	4.6	2.8
Benzo(b)fluroanthene,[1/]/ benzo(k) fluoranthene,[1/]/ benzo(a)pyrene[1/]	7.9	4.8
Dinitrotoluene[1/]	1,000	500

1/ EPA priority pollutant

Table 47

Significant Hazardous Waste Sites Buffalo- Lackawanna

Sub-Area (R-21)

Site No.	Site Name	Operational Dates	Area (Acres)	Contents
118	Bethlehem Steel	1920's-1984	750 (Fill Area)	Spent pickle liquor, tar sludge, ammonia still lime sludge and metal sludge
162	Alltift	1950's-1070's	25	Dye, oil sludge, phenolic compounds, chrome sludge, copper sulfate, nitrobenzene, monochlorobenzene, naphthalene, auto demolition waste, core sands, fly ash and foundry sand
241	Times Beach	1971-1876	46	Dredge spoils from Buffalo River, Buffalo Harbor and Black Rock Canal
141	Mobil Oil	1950's-1076	3	Cooling waste silt, separator floats and sediments, tetraethyl lead, lube sludges, spent catalysts, soil contaminated with asphalt and fuel oil
138	McNaughton-Brooks	1960-1066	1	Xytol, toluol, and paint sludge
107	Allied Chemical	1930-1977	1	Vanadium pentoxide catalyst, sulfate sludges, sulfuric and nitric acids, salts, slag and polymerized sulphan
120-122	Buffalo Color	1930-1933	3	Iron oxide sludge, metal sludge which may contain trace organics, ammonium sulfate (well injection)
203	Squaw Island	1954-1970	60	Foundry sand, incinerator residue, trace oils, resins and municipal waste

Table 48

Sites Having Significant Potential for Contaminant Migration

Along the Niagara River (New York and Ontario) (R-21)

SITE NO.	SITE NAME	CONTAMINANT MIGRATION CONCERNS	REMEDIATION STATUS
	NEW YORK		
	Buffalo-Lackawanna Sub Area		
118	Bethlehem Steel	Elevated levels of organics and inorganics in wells along Lake Erie shore. Contaminant migration to Lake Erie is indicated.	Investigation Underway
162	Alltift	Elevated levels of indicator parameters above clay. Potential for horizontal migration.	Preliminary Investigation Complete
241	Times Beach	Barrier in place does not prevent water from entering and leaving site. Any leachate produced at site could enter Lake Erie and Niagara River.	Investigation Underway
141	Mobil Oil Corporation	Material underlying site is sand; contaminant migration to Buffalo River is expected.	No Action to Date
138	McNaughton-Brooks, Incorporated	Soil samples indicate significant potential for horizontal migration off the site.	No Action to Date
107	Allied Chemical	Low pH values found in monitoring wells could enhance mobilization and seepage of heavy metal contaminants to Buffalo River.	Preliminary Investigation Complete
120-122	Buffalo Color (3 sites)	Proximity of sites to Buffalo River and concentrations of organic and inorganic compounds indicate significant potential for contaminant movement to river.	Investigation Underway
203	Squaw Island	Location of site between the Niagara River and Black Rock Canal would allow any leachate to percolate to these water bodies.	No Action to Date
	Tonawanda-North Tonawanda Sub-Area		
105	Allied Chemical	Organic and inorganic compounds found in soil samples. Additional information needed to confirm contaminant migration from site to Niagara River.	No Action to Date
108	Tonawanda Coke	Organic contaminants identified in soil samples. Additional information needed to confirm contaminant migration from this site to Niagara River.	No Action to Date
136	INS Equipment Corporation	Proximity of site to river and former presence of wetlands suggest that contaminant migration is occurring.	No Action to Date

Table 49

Buffalo River Fish Contaminant Data, December Sampling

1977-1984 (R-16, Table 4.4)

	1977	1980		1983		1984	FDA Action Levels
		Sample 1	Sample 2	Sample 1	Sample 2		
Carp							
No. analyzed	10	6	7	9	1	3	
Collection date	July 1	June 2	June 2	May 17	May 17	June 8	
Avg. length (mm)	420	546	468	541	666	741	
Min. length (mm)	356	500	432	505	---	688	
Max. length (mm)	483	602	518	569	---	815	
Avg. weight (g)	1002	2714	1846	2470	4780	7219	
Min. weight (g)	408	2359	1451	2000	---	6647	
Max. weight (g)	2087	3266	2177	2900	---	7990	
% lipid	8.27	10.16	8.24	11.38	12.52	25.66	
Total PCB (ppm)	4.26	0.82	0.69	3.63	14.5	6.67	2.0
Total DDT (ppm)	0.14	0.29	0.30	0.46	0.88	1.63	5.0
Aldrin/dieldrin (ppm)	0.06	<0.01	<0.01	0.01	0.02	0.04	0.3
Endrin (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.3
Heptachlor and its epoxide (ppm)	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.3
Lindane group (ppm)	<0.01	<0.01	<0.01	0.01	0.01	0.04	NAL 1/
Mirex (ppm)	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.1
Mercury (ppm)	0.12	0.14	0.16	0.10	0.12	NA	1.0 2/
Total chlordane (ppm)	NA	0.06	0.05	0.11	0.22	0.53	0.3
Hexachlorobenzene (ppm)	NA	NA	NA	0.01	0.07	<0.01	NAL 1/

1/ NAL - No action level

2/ Methyl mercury

< - less than

NA - Not analyzed

(Continued)

Table 49 (Concluded)

Species	1977 White Sucker	1980 NA	1983 Pumpkinseed Sample 1	1983 Pumpkinseed Sample 2	1984 Brown Bullhd.	FDA Action Levels
No. analyzed	10		10	13	7	
Collection date	June 13		May 17	May 17	June 4	
Avg. length (mm)	283		137	146	322	
Min. length (mm)	231		130	142	313	
Max. length (mm)	318		140	154	345	
Avg. weight (g)	192		62	83	514	
Min. weight (g)	95		50	70	500	
Max. weight (g)	296		70	100	700	
% lipid	1.22		1.16	1.39	4.73	
Total PCB (ppm)	0.71		0.38	0.41	0.87	2.0
Total DDT (ppm)	0.34		0.03	0.04	0.30	5.0
Aldrin/dieldrin (ppm)	0.01		<0.01	<0.01	0.01	0.3
Endrin (ppm)	<0.01		<0.01	<0.01	<0.01	0.3
Heptachlor and its epoxide (ppm)	<0.01		<0.01	<0.01	<0.01	0.3
Lindane group (ppm)	<0.01		<0.01	<0.01	<0.01	NAL 1/
Mirex (ppm)	<0.01		<0.01	<0.01	<0.01	0.1
Mercury (ppm)	0.29		0.14	0.17	NA	1.0 2/
Total chlordane (ppm)	NA		0.01	0.01	0.10	0.3
Hexachlorobenzene (ppm)	NA		<0.01	<0.01	<0.01	NAL 1/

1/ NAL - No action level

2/ Methyl mercury

< - less than

NA - Not analyzed

Table 50

Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), 1980 (R-21, Table C.29)

PARAMETER	RIVER SEGMENT/SUB-AREA														
	Fort Erie		Chippawa			Buffalo R.		Bird Is. Riverside	Ton.-N. Ton	Wheatfield-Upper River				
	M-2	M-3	M-20	M-21	M-19	M-3	M-4	M-7	M-9	M-11	M-16	M-14	M-15	M-13
Inorganics (ug/g)														
Aluminum	1300	-	7800	-	-	7300	1900	-	-	-	-	-	-	2400
Arsenic	10.0	-	11.0	-	-	35.0	15.0	-	-	-	-	-	-	10.0
Cadmium	0.4	-	1.3	-	-	0.98	0.53	-	-	-	-	-	-	1.5
Chromium	6.5	-	14.0	-	-	15.5	7.0	-	-	-	-	-	-	15.8
Cobalt	0.7	-	3.2	-	-	4.0	0.8	-	-	-	-	-	-	1.2
Copper	6.5	-	14.8	-	-	20.2	8.0	-	-	-	-	-	-	12.2
Lead	2.0	-	5.8	-	-	41.0	9.3	-	-	-	-	-	-	8.3
Manganese	265	-	433	-	-	274	358	-	-	-	-	-	-	480
Mercury	0.01	-	ND	-	-	0.04	ND	-	-	-	-	-	-	0.03
Nickel	7.8	-	22.0	-	-	14.2	6.0	-	-	-	-	-	-	11.2
Selenium	1.5	-	1.25	-	-	1.8	1.0	-	-	-	-	-	-	1.0
Zinc	32	-	46	-	-	110	65	-	-	-	-	-	-	130
Organics (ng/g)														
PCBs	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES: Data Source: Sub-project 29 (MOE). Stations correspond to locations in Fig. 4.5. (Chapter IV)
Concentrations are averages of duplicate analyses of a composite sample in ppm (ug/g) or ppb (ug/g), dry weight basis.
Tr = Trace (calculated average concentration below detection limit).
Dash (-) indicates no data available.
ND = Not detected.

Table 51

Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), June 1981 (R-21, Table C.30)

CHEMICAL CLASS/ PARAMETER	RIVER SEGMENT/SUB-AREA													
	Fort Erie			Chippawa		Buffalo		Bird Is. Riverside	Tonawanda N. Tonawanda	Wheatfield-Upper River				
	M-2	M-6	M-20	M-21	M-19	M-3	M-4	M-7	M-9	M-11	M-16	M-14	M-15	M-13
Inorganics (ug/g)														
Aluminum	846±20	1823±21	2473±55	-	-	1740±71	-	4190±71	4063±47	4640±47	1305±35	-	-	-
Arsenic	3.1±0.8	6.3±0.6	5.0±0.7	-	-	9.2±0.3	-	11.3±0.6	10.6±0.7	6.2±0.4	6.5±0.4	-	-	-
Cadmium	1.1±0.1	1.1±0.1	1.1±0.1	-	-	0.6±0.2	-	1.6±0.1	1.6±0.1	1.1±0.1	1.4±0.1	-	-	-
Chromium	6.3±0.2	16±0	8.8±0.2	-	-	7.4±0.4	-	44.0±1.0	38.0±0	43.0±0	6.6±0.2	-	-	-
Cobalt	1.0±0.1	2.3±0.17	2.8±0	-	-	2.5±0	-	5.0±0	4.6±0.2	7.8±0	1.5±0	-	-	-
Copper	6.4±0	10.7±0.6	4.4±0.1	-	-	11.0±0	-	24±-	24.0±0	28.0±1.4	3.7±0.7	-	-	-
Lead	5.6±-	7.9±0.7	7.2±-	-	-	24.0±0	-	35.0±1.0	32.3±1.1	39.0±1.4	7.2±-	-	-	-
Manganese	116±5	403±21	227±6	-	-	510±14	-	470±36	493±6	560±28	160±0	-	-	-
Mercury	0.02±0.01	0.03±0.01	0.03±0	-	-	0.06±0.01	-	0.12±0.01	0.12±0.01	1.6±0.4	0.09±0.01	-	-	-
Nickel	5.9±0.2	10.7±0.6	9.2±0.1	-	-	6.4±0.2	-	16.0±0	15.0±0	20.0±0	6.3±0.3	-	-	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	43±3	95±27	55±2	-	-	83±3	-	193±6	207±6	230±0	67±3	-	-	-
Organics (ng/g)														
PCBs	53±10	62±8	27±8	-	-	93±19	-	166±21	160±0	58±19	463±152	-	-	-

NOTES: Data Source: Sub-project 29 (MOE). Station correspond to locations in Fig. 4.5.(Chapter IV)

Concentrations are means and standard deviations in ppm (ug/g) or ppb (ng/g) (dry weight) of 3 replicates.

Some replicates were below the detection limit; values are means of the detection limit and values above the detection limit, preceeded by (less than).

A dash (-) indicates no data available.

Table 52

Contaminant Concentrations in Lake Erie and Niagara River Filamentous Algae (*Cladophora glomerata*), July 1981 (R-21, Table C.31)

PARAMETER	RIVER SEGMENT/SUB-AREA														
	Fort Erie		Chippawa			Buffalo		Bird Is. Riverside	Tonawanda N.Tonawanda	Wheatfield-Upper River					
	M-2	M-6	M-20	M-21	M-19	M-3	M-4	M-7	M-9	M-11	M-16	M-14	M-15	M-13
Inorganics (ug/g)															
Aluminum	1973±147	1527±42	2227±31	-	-	2973±100	-	1643±50	1546±60	1657±15	-	-	1697±139	-
Arsenic	2.8±0	3.1±0.1	3.2±0.4	-	-	11.3±0.6	-	3.3±0.3	5.3±0.4	2±0	-	-	4.1±0	-
Cadmium	0.4± -	0.5±0.1	0.5±0.1	-	-	0.5±0.1	-	1.3±0.1	1.3±0.1	0.53±0.06	-	-	1.2±0.1	-
Chromium	7.1±0.2	21.0±0	6.8±0.1	-	-	13.7±0.6	-	21.7±0.6	16.3±0.5	23.6±1.5	-	-	12.3±0.6	-
Cobalt	2.0±0	2.0±0.2	3.0±0.2	-	-	5.6±0.2	-	2.0±0.1	3.0±0.1	4.3±0.1	-	-	2.7±0.2	-
Copper	10.7±0.6	8.0±0.3	9.7±0.3	-	-	21.7±3.5	-	18.0±1.7	8.0±2.9	10.3±3.2	-	-	30.7±3.5	-
Lead	6.4±0	6.1±0.7	6.4±1.4	-	-	60.0±1.0	-	21.7±0.6	21.3±0.5	25.3±1.1	-	-	20.0± -	-
Manganese	270±10	583±6	407±12	-	-	1620±44	-	470±17	400±17	1243±211	-	-	523±21	-
Mercury	0.02±0.01	0.02±0.01	0.04±0.01	-	-	0.13±0.01	-	0.06±0	0.06±0.01	0.70±0.10	-	-	0.62±0.02	-
Nickel	7.9±0.2	6.2±0.2	12.0±0	-	-	12.7±0.6	-	9.6±0.1	8.6±0.4	1016±0.5	-	-	16.3±0.6	-
Selenium	0.9±0.06	0.5±0.1	0.7±0.2	-	-	0.9±0.8	-	0.6±0	0.4±0	0.4± -	-	-	2.8±0.2	-
Zinc	25±2	34±1	38±5	-	-	99±1.2	-	97±3	127±6	102±8	-	-	95±4	-
Organics (ng/g)															
PCBs	35±18	28±8	25±5	-	-	220±110	-	70±56	105±22	157±15	-	-	-	-

NOTES: Data Source: Sub-project 29 (MOE). Stations correspond to locations in Fig. 4.5.(Chapter IV)
Concentrations are means and standard deviations in ppm (ug/g) or ppb (ng/g) (dry weight) of 3 replicates.
Some replicates were below the detection limit; values are means of the detection limit and values above the detection limit, preceeded by (less than).
A dash (-) indicates no data available.

Table 53

Key to Polychlorinated Biphenyl (PCB) Nomenclature Designated by International Union of Pure and Applied Chemists (IUPAC) Numbers (R-11)

PCB (IUPAC)*	PCB Congener
15	4,4' Dichlorobiphenyl
28	2,4,4' Trichlorobiphenyl
44	2,2',3,5' Tetrachlorobiphenyl
49	2,2',4,5' Tetrachlorobiphenyl
52	2.2',5.5' Tetrachlorobiphenyl
70	2,3',4',5 Tetrachlorobiphenyl
87	2,2'3,4,5' Pentachlorobiphenyl
101	2,2',4,5,5' Pentachlorobiphenyl
138	2,2',3,4,4',5' Hexachlorobiphenyl
153	2,2',4,4',5,5' Hexachlorobiphenyl
180	2,2',3,4,4',5.5' Heptachlorobiphenyl

* IUPAC = International Union of Pure and Applied Chemists.

Table 54

Concentrations of PCBs and Pesticides in the Soft Tissue

of *Elliptio Dilatata* (ug/kg wet weight) (R-11)

STATION* LOCATION	PCB (IUPAC) # 15	28	52	49	44	70	101	87
BUFFALO RIVER								
1 Coast Guard Station	5.7	3.9	5.1	3.2	7.7	9.1	5.2	2.6
3 Pilings across Tines Beach	4.9	0.4	2.7	2.0	<0.1	3.5	<0.1	<0.1
4 Pilings under skyway	5.5	1.5	3.8	2.8	<0.1	5.0	<0.1	1.0
5 Pilings grain elevator	6.0	1.6	3.6	2.7	<0.1	4.5	<0.1	<0.1
6 Across from Allied Chemical	8.1	2.4	4.2	5.4	9.0	7.2	4.9	1.6
7 Cazenovia Creek	4.7	<0.1	0.7	<0.1	<0.1	<0.1	<0.1	0.5
8 Bridge upstream from C. Creek	5.7	<0.1	1.5	1.1	<0.1	4.2	<0.1	<0.1
9 Past Grassy Island	6.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
10 Channel across from bridge	8.5	<0.1	0.5	<0.1	<0.1	<0.1	<0.1	<0.1
12 Under highway bridge	5.2	0.7	1.3	2.2	7.6	2.4	1.3	<0.1
13 School Road	6.5	0.6	1.4	0.9	7.4	1.4	0.4	<0.1
LAKE ERIE OUTSIDE TIMES BEACH								
14	7.6	2.0	4.5	1.3	15.0	5.7	2.6	<0.1
19	6.1	1.1	2.8	2.9	9.4	3.1	0.7	<0.1
20	11.0	0.5	1.4	1.8	8.5	1.8	0.4	<0.1
22	7.9	<0.1	0.8	<0.1	<0.1	<0.1	<0.1	<0.1
INSIDE TIMES BEACH								
24	4.1	5.1	14.0	10.0	4.7	14.0	3.4	2.8
25	6.4	13.0	21.0	15.0	10.0	19.0	5.8	4.2
Transect Locations								
D6	9.3	25.0	37.0	27.0	23.0	32.0	7.8	5.7
D7	5.1	16.0	27.0	17.0	13.0	21.0	3.4	3.6
D8	6.8	14.0	24.0	18.0	12.0	25.0	7.8	5.3
D8 (float)	3.6	15.0	29.0	22.0	45.0	30.0	11.0	6.5
E7	7.2	21.0	31.0	24.0	19.0	30.0	8.4	5.6
E8	6.8	18.0	29.0	22.0	16.0	31.0	9.3	6.2
E9	5.0	18.0	31.0	23.0	16.0	32.0	11.0	6.3

IUPAC = International Union of Pure and Applied Chemists.

* Numbers refer to sites in Figures 4 and 5.

(Continued)

Table 54 (Concluded)

STATION* LOCATION	PESTICIDES 153	138	180	op-DDE	pp-DDE	HCB
BUFFALO RIVER						
1 Coast Guard station	7.3	7.3	4.3	1.4	4.2	1.4
3 Pilings across Times Beach	<0.1	<0.1	53.0	0.9	2.3	<0.1
4 Pilings under skyway	<0.1	<0.1	1.3	1.1	1.7	<0.1
5 Pilings grain elevator	<0.1	<0.1	1.3	0.9	1.0	0.2
6 Across from Allied Chemical	9.6	9.4	7.3	1.2	2.5	1.6
7 Cazenovia Creek	<0.1	<0.1	0.2	<0.1	0.4	0.8
8 Bridge upstream from C. Creek	<0.1	<0.1	3.6	<0.1	0.9	1.2
9 Past Grassy Island	<0.1	<0.1	3.2	<0.1	0.7	<0.1
10 Channel across from bridge	<0.1	<0.1	<0.1	<0.1	0.3	0.6
12 Under highway bridge	1.8	2.7	1.1	0.5	1.5	0.4
13 School Road	1.0	2.1	0.6	0.3	1.0	0.3
LAKE ERIE OUTSIDE TIMES BEACH						
14	4.1	5.6	2.4	0.8	3.2	0.8
19	2.8	3.7	1.5	0.5	1.9	0.8
20	1.7	2.3	0.9	0.3	1.1	0.5
22	<0.1	<0.1	<0.1	<0.1	<0.1	0.6
INSIDE TIMES BEACH						
24	<0.1	<0.1	<0.1	1.8	6.8	2.4
25	<0.1	<0.1	0.8	5.8	5.5	1.7
Transect Locations						
D6	<0.1	<0.1	<0.1	8.2	7.6	2.4
D7	<0.1	<0.1	<0.1	5.9	4.9	1.6
D8	<0.1	<0.1	0.7	2.5	6.6	2.2
D8 (float)	<0.1	<0.1	0.6	3.5	8.2	2.6
E7	<0.1	<0.1	0.3	2.4	6.8	2.4
E8	<0.1	<0.1	0.5	4.6	7.8	2.5
E9	<0.1	<0.1	0.9	2.1	7.9	2.7

Table 55

Organochlorine Contaminants Accumulated by Clams (*Elliptio dilatata*)

Exposed to Lake Erie and Niagara River Waters in 1981

(ng/g)

PARAMETER	DETECTION LIMIT	RIVER SEGMENT/SUB-AREA													
		Fort Erie	Buffalo	Chippawa	Tonawanda-N.Tonawanda	Wheatfield			Upper-River	Lower River					
		(M1)	(M3)	(M20)	(M8)	(M10)	(M11)	(M13)	(M15)	(M25)	(M30)	(M28)	(M31)	(M33)	(M36)	(M37)
PCBs, Total	20	Tr.	1284±277	ND	58±21	481±175	212±49	161±37	722±164	ND	63±18	52±11	48±5	44±7	74±26	57±15
alpha-BHC	1	Tr.	5±4	3±3	2±1	Tr.	1±0	3±1	9±1	Tr.	ND	ND	2±1	2±1	Tr.±-	Tr.
beta-BHC	1	Tr.	3±5	5±3	4±1	ND	ND	3±1	3±4	ND	ND	1±2	ND	ND	ND	ND
gamma-BHC	1	Tr.	ND	3±1	5±2	Tr.	Tr.	1±2	ND	ND	ND	ND	Tr.	Tr.	3±2	Tr.
alpha-Chlordane	2	Tr.	13±4	ND	9±1	11±7	10±7	2±2	Tr.	ND	4±4	5±2	4±1	3±1	Tr.	2±1
gamma-Chlordane	2	ND	13±7	Tr.	6±3	6±5	9±3	Tr.	Tr.	Tr.	3±3	4±2	Tr.	Tr.	Tr.	Tr.
Dieldrin	2	ND	ND	ND	--	ND	ND	--	ND	ND	2±1	2±2	Tr.	Tr.	ND	Tr.
p,p'-DDD	5	ND	7±7	Tr.	Tr.	7±9	Tr.	ND	ND	33±5	ND	ND	ND	ND	ND	ND
p,p'DDE	1	ND	ND	4±3	3±2	ND	ND	2±1	ND	14±7	2±3	1±3	5±4	3±1	Tr.	4±1
o,p-DDT	5	ND	5±10	ND	Tr.	ND	ND	ND	ND	Tr.	ND	ND	ND	ND	ND	ND
p,p'-DDT	5	Tr.	Tr.	ND	Tr.	ND	5±3	ND	ND	5±5	ND	ND	ND	ND	ND	ND
Endosulphan Sulphate	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	1	2±2	3±3	--	--	5±2	4±0.5	--	3±2	4±0.5	3±3	3±2	3±1	3±2	ND	2±2
Hexachloro-Benzene	1	Tr.	2±1	2±3	14±5	5±1	3±2	3±1	10±6	ND	1±0	2±0.5	2±1	1±0.4	2±2	1±1
Mirex	5	ND	ND	ND	ND	ND	ND	ND	Tr.	ND	Tr.	ND	ND	ND	ND	ND
Octachloro-styrene	1	ND	ND	ND	ND	ND	ND	ND	3±1	ND	Tr.	Tr.	1±0.4	1±0	Tr.	1±0
% Fat	--	0.9±0.2	1.0±0.3	--	--	0.9±0.2	1.0±0.3	--	0.9±0.2	1.3±0.4	1.8±0.6	1.3±0.2	1.3±0.3	1.4±0.1	--	1.1±0.3
Number of Replicates	--	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5

NOTES: Data Source: Sub-project 28 (MOE). Stations correspond to locations in Fig. 4.5.(Chapter IV)
ND = Not detected at detection limit indicated (ND taken as zero for calculations of mean and standard deviation). Concentrations are in ppb (ng/g, wet weight).
Tr. - Trace (Mean is less than detection limit).
Aldrin, Heptachlor, alpha-Endosulphan, beta-Endosulphan, Methoxychlor and Oxychlordane were not detected at detection limits of 1,1,2,4,4 and 2 ng/g, respectively. Endrin values were not quantitative.
Exposure time was 21 days (Aug. 15 - Sept. 8). Clams were kept on bottom.
"--" indicates no data available.

Table 56

Organochlorine Contaminants Accumulated by Clams (*Elliptio dilatata*) Exposed to Lake Erie and Niagara River Waters in 1980

(ng/g)

PARAMETER	DETECTION LIMIT	RIVER SEGMENT/SUB-AREA						
		Fort Erie (M1)	Buffalo River (M4)	Chippawa (M20)	Wheatfield-Upper River (M13)	(M22)	Lower River (M31)	(M36)
PCBs, Total	20	ND	Tr.	23±4	76±8	ND	ND	81±31
alpha-BHC	1	5±1	3±1	5±1	11±3	4±1	Tr.	2±3
beta-BHC	1	ND	ND	ND	ND	ND	ND	ND
gamma-BHC	1	2±0	3±1	2±0	3±2	ND	ND	ND
alpha-Chlordane	1	Tr.	2±3	ND	4±1	ND	Tr.	2±3
gamma-Chlordane	1	ND	2±2	Tr.	3±1	Tr.	ND	ND
Dieldrin	1	ND	ND	ND	5±8	ND	ND	ND
p,p'-DDD	5	ND	ND	Tr.	ND	ND	ND	ND
p,p'-DDE	1	1±0	2±1	5±4	1±0	1±0	3±3	4±5
o,p-DDT	5	ND	ND	ND	ND	ND	ND	6±8
p,p'-DDT	5	ND	ND	ND	ND	ND	ND	ND
Endrin	1	ND	ND	ND	16±14	ND	ND	ND
Heptachlor Epoxide	1	ND	ND	ND	8±7	Tr.	1±2	1±1
Hexachlorobenzene	1	Tr.	ND	ND	4±1	ND	Tr.	Tr.
Mirex	5	ND	ND	ND	ND	ND	ND	ND
%Fat	--	1.3±0.2	1.0±0.3	1.3±0.4	1.5±0.3	0.4±0.1	0.2±0.1	0.4±0.06
Number of Replicates	--	3	3		3	3	3	5

NOTES: Data Source: Sub-project 28 (MOE). Stations correspond to locations in Fig. 4.5.(Chapter IV)

ND = Not detected at detection limit indicated (ND taken as zero for calculations of mean and standard deviation). Concentrations are in ppb (ng/g, wet weight)

TR. = Trace (Mean is less than detection limit).

Aldrin, Dieldrin, Heptachlor, α-Endosulphan, and β-Endosulphan, not detected in clams at detection limits of 1,2,1,2 and 4 ng/g, respectively.

Clams were kept on bottom (approx. 2 m depth).

A dash (--) indicates no data available.

Table 57

Benthic Macroinvertebrate Data, Buffalo River, 1982

(R-16, Table 4.10)

(Organisms per square meter)

TAXA	June 2, 1982			June 9, 1982			August 12, 1982		
	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)	Confluence with Cazenovia Creek [2] (MP 5.8)	Conrail Bridge [2] (MP 3.7)	Michigan Avenue Bridge [2] (MP 1.1)
Oligochaeta (sludge worms)	711	44,977	115,555	444	40,000	127,778	792	18,468	801
Gastropoda (snails)	0	0	1,777	0	0	1,977	0	267	89
Pelecypoda (clams)	0	0	177	0	0	89	0	178	401
Turbellaria (flatworms)	NR	NR	NR	NR	NR	NR	0	0	45
Hirudinea (leeches)	NR	NR	NR	NR	NR	NR	0	45	134
Diptera (flies)	NR	NR	NR	NR	NR	NR	579	89	45

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[1] Data collected and analyzed by Ecology & Environment.

[2] Sampling stations located 50 meters downstream of Buffalo River confluence with Cazenovia Creek, 20 meters downstream of Conrail Bridge and Michigan Avenue Bridge.

MP Mile point.

NR Not reported. Believed to be of insufficient size to be retained on a U.S. Standard No. 30 sieve (0.595-mm opening).

Table 58

Typical Exposures for Incidental Ingestion of Water While Swimming (3, Table 6.13)

	Mean 1989 Conc. in Water (mg/l)	Ages 0-6 years Intake (MG/KG-DAY)	Ages 7-18 years Intake (MG/KG-DAY)	Ages 19-70 years Intake (MG/KG-DAY)	Lifetime Intake (MG/KG-DA
Cadmium	2.00E-03	0	2.75E-11	1.26E-12	5.67E-12
Chromium	2.00E-02	0	2.75E-10	1.26E-11	5.67E-11
Copper	9.00E-03	0	1.24E-10	5.77E-12	2.55E-11
Iron	1.90E+00	0	2.61E-08	1.22E-09	5.39E-09
Lead	1.60E-02	0	2.20E-10	1.03E-11	4.54E-11
Manganese	1.89E-01	0	2.60E-09	1.21E-10	5.36E-10
Mercury	1.70E-04	0	2.34E-12	1.09E-13	4.82E-13
Nickel	5.00E-03	0	6.88E-11	3.21E-12	1.42E-11
Silver	2.00E-05	0	2.75E-13	1.28E-14	5.67E-14
Zinc	2.90E-02	0	3.99E-10	1.86E-11	8.22E-11
Acenaphthene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Anthracene	8.05E-03	0	1.11E-10	5.16E-12	2.28E-11
Benzo(a)anthracene	1.94E-03	0	2.67E-11	1.24E-12	5.50E-12
Benzo(a)pyrene	1.06E-03	0	1.46E-11	6.79E-13	3.00E-12
Benzo(b)fluoranthene	1 84E-03	0	2.53E-11	1.18E-12	5.22E-12
Benzo(ghi)perylene	1.83E-04	0	2.52E-12	1.18E-13	5.20E-13
Benzo(k)fluoranthene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chrysene	2.15E-03	0	2.95E-11	1.38E-12	6.09E-12
Dibenzo(a,h)anthracene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	2.49E-02	0	3.43E-10	1.60E-11	7.07E-11
Fluorene	2.62E-02	0	3.61E-10	1.68E-11	7.44E-11
Indeno(1,2,3-cd)pyrene	1.87E-04	0	2.58E-12	1.20E-13	5.31E-13
Napthalene	2.00E-01	0	2.76E-09	1.28E-10	5.68E-10
Phenanthrene	3.36E-02	0	4.63E-10	2.16E-11	9.54E-11
Pyrene	1.55E-02	0	2.13E-10	9.91E-12	4.36E-11
alph-BHC	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
beta-BHC	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	1.01E-01	0	1.38E-09	6.45E-11	2.85E-10
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDE	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDT	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
PCBs	4.43E-03	0	0.00E+00	0.00E+00	0.00E+00

Table 59

Reasonable Worst Case Exposures for Incidental Ingestion of Water While Swimming (3, Table 6.14)

	Worse case 1985 Conc. in Water (mg/l)	Ages 0-6 years Intake (MG/KG-DAY)	Ages 7-18 years Intake (MG/KG-DAY)	Ages 19-70 years Intake (MG/KG-DAY)	Lifetime Intake (MG/KG-DA
Cadmium	4.00E-03	0	5.50E-11	2.56E-12	1.13E-11
Chromium	2.00E-02	0	2.75E-10	1.28E-11	5.67E-11
Copper	1.30E-02	0	1.79E-10	8.33E-12	3.69E-11
Iron	3.76E+00	0	5.17E-08	2.41E-09	1.07E-08
Lead	2.90E-02	0	3.99E-10	1.86E-11	8.22E-11
Manganese	4.22E-01	0	5.81E-09	2.71E-10	1.20E-09
Mercury	2.60E-04	0	3.58E-12	1.67E-13	7.37E-13
Nickel	8.00E-03	0	1.10E-10	5.13E-12	2.27E-11
Silver	2.00E-05	0	2.75E-13	1.28E-14	5.67E-14
Zinc	4.40E-02	0	6.06E-10	2.82E-11	1.25E-10
Acenaphthene	1.26E-01	0	1.73E-09	8.08E-11	3.57E-10
Acenaphthylene	2.51E-01	0	3.46E-09	1.61E-10	7.13E-10
Anthracene	6.71E-02	0	9.23E-10	4.30E-11	1.90E-10
Benzo(a)anthracene	1.53E-02	0	2.10E-10	9.79E-12	4.33E-11
Benzo(a)pyrene	4.46E-03	0	6.14E-11	2.86E-12	1.26E-11
Benzo(b)fluoranthene	3.23E-03	0	4.45E-11	2.07E-12	9.17E-12
Benzo(ghi)perylene	2.24E-03	0	3.08E-11	1.44E-12	6.35E-12
Benzo(k)fluoranthene	2.45E-03	0	3.38E-11	1.57E-12	6.96E-12
Chrysene	4.67E-03	0	6.42E-11	2.99E-12	1.32E-11
Dibenzo(a,h)anthracene	1.35E-03	0	1.86E-11	8.65E-13	3.83E-12
Fluoranthene	5.87E-02	0	8.08E-10	3.77E-11	1.67E-10
Fluorene	7.95E-02	0	1.09E-09	5.10E-11	2.25E-10
Indeno(1,2,3-cd)pyrene	2.37E-03	0	3.27E-11	1.52E-12	6.73E-12
Napthalene	5.81E-01	0	8.00E-09	3.73E-10	1.65E-09
Phenanthrene	1.35E-01	0	1.86E-09	8.68E-11	3.84E-10
Pyrene	5.98E-02	0	8.24E-10	3.84E-11	1.70E-10
alph-BHC	7.30E-03	0	1.00E-10	4.68E-12	2.07E-11
beta-BHC	4.60E-03	0	6.33E-11	2.95E-12	1.30E-11
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	5.80E-05	0	7.99E-13	3.72E-14	1.65E-13
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	1.81E-01	0	2.49E-09	1.16E-10	5.13E-10
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	4.06E-06	0	5.59E-14	2.61E-15	1.15E-14
p,p DDE	2.74E-06	0	3.76E-14	1.75E-15	7.76E-15
p,p DDT	1.08E-05	0	1.49E-13	6.93E-15	3.06E-14
PCBs	4.43E-03	0	6.10E-11	2.84E-12	1.26E-11

Table 60

Typical Exposures for Dermal Contact with Surface Water While Swimming (3, Table 6.15)

		Age specific exposure levels			
	Mean 1989 Conc. in Water (mg/l)	Ages 0-6 years Absorbed Dose (MG/KG-DAY)	Ages 7-18 years Absorbed Dose (MG/KG-DAY)	Ages 19-70 years Absorbed Dose (MG/KG-DAY)	Lifetime Absorbed Dose (MG/KG-DA
Cadmium	4.00E-03	0	5.50E-11	2.58E-12	1.13E-11
Chromium	2.00E-02	0	2.75E-10	1.28E-11	5.67E-11
Copper	1.30E-02	0	1.79E-10	8.33E-12	3.69E-11
Iron	3.76E+00	0	5.17E-08	2.41E-09	1.07E-08
Lead	2.90E-02	0	3.99E-10	1.86E-11	8.22E-11
Manganese	4.22E-01	0	5.81E-09	2.71E-10	1.20E-09
Mercury	2.60E-04	0	3.58E-12	1.67E-13	7.37E-13
Nickel	8.00E-03	0	1.10E-10	5.13E-12	2.27E-11
Silver	2.00E-05	0	2.75E-13	1.28E-14	5.67E-14
Zinc	4.40E-02	0	6.06E-10	2.82E-11	1.25E-10
Acenaphthene	1.26E-01	0	1.73E-09	8.08E-11	3.57E-10
Acenaphthylene	2.51E-01	0	3.46E-09	1.61E-10	7.13E-10
Anthracene	6.71E-02	0	9.23E-10	4.30E-11	1.90E-10
Benzo(a)anthracene	1.53E-02	0	2.10E-10	9.79E-12	4.33E-11
Benzo(a)pyrene	4.46E-03	0	6.14E-11	2.86E-12	1.26E-11
Benzo(b)fluoranthene	3.23E-03	0	4.45E-11	2.07E-12	9.17E-12
Benzo(ghi)perylene	2.24E-03	0	3.08E-11	1.44E-12	6.35E-12
Benzo(k)fluoranthene	2.45E-03	0	3.38E-11	1.57E-12	6.96E-12
Chrysene	4.67E-03	0	6.42E-11	2.99E-12	1.32E-11
Dibenzo(a,h)anthracene	1.35E-03	0	1.86E-11	8.65E-13	3.83E-12
Fluoranthene	5.87E-02	0	8.08E-10	3.77E-11	1.67E-10
Fluorene	7.95E-02	0	1.09E-09	5.10E-11	2.25E-10
Indeno(1,2,3-cd)pyrene	2.37E-03	0	3.27E-11	1.52E-12	6.73E-12
Napthalene	5.81E-01	0	8.00E-09	3.73E-10	1.65E-09
Phenanthrene	1.35E-01	0	1.86E-09	8.68E-11	3.84E-10
Pyrene	5.98E-02	0	8.24E-10	3.84E-11	1.70E-10
alph-BHC	7.30E-03	0	1.00E-10	4.68E-12	2.07E-11
beta-BHC	4.60E-03	0	6.33E-11	2.95E-12	1.30E-11
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	5.80E-05	0	7.99E-13	3.72E-14	1.65E-13
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	1.81E-01	0	2.49E-09	1.16E-10	5.13E-10
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	4.06E-06	0	5.59E-14	2.61E-15	1.15E-14
p,p DDE	2.74E-06	0	3.76E-14	1.75E-15	7.76E-15
p,p DDT	1.08E-05	0	1.49E-13	6.93E-15	3.08E-14
PCBs	4.43E-03	0	6.10E-11	2.84E-12	1.26E-11

Table 61

Reasonable Worst Case Exposures for Dermal Contact with Surface Water While Swimming (3, Table 6.16)

		Age specific exposure levels			
	Worse case 1985 Conc. in Water (mg/l)	Ages 0-6 years	Ages 7-18 years	Ages 19-70 years	Lifetime
		Absorbed Dose (MG/KG-DAY)	Absorbed Dose (MG/KG-DAY)	Absorbed Dose (MG/KG-DAY)	Absorbed Dose (MG/KG-DA
Cadmium	4.00E-03	0	6.83E-07	4.64E-08	1.52E-07
Chromium	2.00E-02	0	3.42E-06	2.32E-07	7.58E-07
Copper	1.30E-02	0	2.22E-06	1.51E-07	4.93E-07
Iron	3.76E+00	0	6.42E-04	4.36E-05	1.43E-04
Lead	2.90E-02	0	4.95E-06	3.37E-07	1.10E-06
Manganese	4.22E-01	0	7.21E-05	4.90E-06	1.60E-05
Mercury	2.60E-04	0	4.44E-08	3.02E-09	9.86E-09
Nickel	8.00E-03	0	1.37E-06	9.29E-08	3.03E-07
Silver	2.00E-05	0	3.42E-09	2.32E-10	7.58E-10
Zinc	4.40E-02	0	7.52E-06	5.11E-07	1.67E-06
Acenaphthene	1.26E-01	0	2.15E-05	1.46E-06	4.78E-06
Acenaphthylene	2.51E-01	0	4.29E-05	2.92E-06	9.53E-06
Anthracene	6.71E-02	0	1.15E-05	7.79E-07	2.54E-06
Benzo(a)anthracene	1.53E-02	0	2.61E-06	1.77E-07	5.79E-07
Benzo(a)pyrene	4.46E-03	0	7.62E-07	5.18E-08	1.69E-07
Benzo(b)fluoranthene	3.23E-03	0	5.53E-07	3.75E-08	1.23E-07
Benzo(ghi)perylene	2.24E-03	0	3.83E-07	2.60E-08	8.49E-08
Benzo(k)fluoranthene	2.45E-03	0	4.19E-07	2.85E-08	9.30E-08
Chrysene	4.67E-03	0	7.97E-07	5.42E-08	1.77E-07
Dibenzo(a,h)anthracene	1.35E-03	0	2.31E-07	1.57E-08	5.12E-08
Fluoranthene	5.87E-02	0	1.00E-05	6.82E-07	2.23E-06
Fluorene	7.95E-02	0	1.36E-05	9.23E-07	3.01E-06
Indeno(1,2,3-cd)pyrene	2.37E-03	0	4.05E-07	2.75E-08	9.00E-08
Napthalene	5.81E-01	0	9.93E-05	6.75E-06	2.20E-05
Phenanthrene	1.35E-01	0	2.31E-05	1.57E-06	5.14E-06
Pyrene	5.98E-02	0	1.02E-05	6.95E-07	2.27E-06
alph-BHC	7.30E-03	0	1.25E-06	8.47E-08	2.77E-07
beta-BHC	4.60E-03	0	7.86E-07	5.34E-08	1.74E-07
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	5.80E-05	0	9.91E-09	6.74E-10	2.20E-09
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	1.81E-01	0	3.09E-05	2.10E-06	6.86E-06
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	4.06E-06	0	6.94E-10	4.72E-11	1.54E-10
p,p DDE	2.74E-06	0	4.67E-10	3.18E-11	1.04E-10
p,p DDT	1.08E-05	0	1.85E-09	1.25E-10	4.10E-10
PCBs	4.43E-03	0	7.58E-07	5.15E-08	1.68E-07

Table 62

Typical Exposures for Dermal Contact with Suspended Sediments While Swimming (3, Table 6.17)

	Mean 1989 Conc. in Sediments (mg/kg)	Ages 0-6 years Absorbed Dose (MG/KG-DAY)	Ages 7-18 years Absorbed Dose (MG/KG-DAY)	Ages 19-70 years Absorbed Dose (MG/KG-DAY)	Lifetime Absorbed Dose (MG/KG-DAY)
Cadmium	8.00E-01	0	2.54E-05	1.94E-06	5.80E-06
Chromium	1.20E+01	0	3.81E-04	2.91E-05	8.69E-05
Copper	4.40E+01	0	1.40E-03	1.07E-04	3.19E-04
Iron	2.88E+04	0	9.16E-01	6.98E-02	2.09E-01
Lead	6.30E+01	0	2.00E-03	1.53E-04	4.56E-04
Manganese	5.00E+02	0	1.59E-02	1.21E-03	3.62E-03
Mercury	3.30E-01	0	1.05E-05	7.99E-07	2.39E-06
Nickel	3.00E+01	0	9.53E-04	7.26E-05	2.17E-04
Silver	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Zinc	2.49E+02	0	7.91E-03	6.03E-04	1.80E-03
Acenaphthene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Anthracene	1.80E-01	0	5.72E-06	4.36E-07	1.30E-06
Benzo(a)anthracene	6.10E-01	0	1.94E-05	1.48E-06	4.42E-06
Benzo(a)pyrene	9.50E-01	0	3.02E-05	2.30E-06	6.88E-06
Benzo(b)fluoranthene	1.65E+00	0	5.24E-05	3.99E-06	1.20E-05
Benzo(ghi)perylene	4.50E-01	0	1.43E-05	1.09E-06	3.26E-06
Benzo(k)fluoranthene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chrysene	6.90E-01	0	2.19E-05	1.67E-06	5.00E-06
Dibenzo(a,h)anthracene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Fluoranthene	1.57E+00	0	4.98E-05	3.80E-06	1.14E-05
Fluorene	3.30E-01	0	1.05E-05	7.99E-07	2.39E-06
Indeno(1,2,3-cd)pyrene	4.50E-01	0	1.43E-05	1.09E-06	3.26E-06
Napthalene	3.10E-01	0	9.85E-06	7.50E-07	2.25E-06
Phenanthrene	7.70E-01	0	2.45E-05	1.86E-06	5.58E-06
Pyrene	9.30E-01	0	2.95E-05	2.25E-06	6.74E-06
alph-BHC	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
beta-BHC	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	4.00E-02	0	1.27E-06	9.68E-08	2.90E-07
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDE	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDT	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
PCBs		0	0.00E+00	0.00E+00	0.00E+00

Table 63

Reasonable Worst Case Exposures for Dermal Contact with Suspended Sediments While Swimming (3, Table 6.18)

		Human Exposure Values			
	Worse case 1985 Conc. in Sediments (mg/kg)	Ages 0-6 years Absorbed Dose (MG/KG-DAY)	Ages 7-18 years Absorbed Dose (MG/KG-DAY)	Ages 19-70 years Absorbed Dose (MG/KG-DAY)	Lifetime Absorbed Dose (MG/KG-DAY)
Cadmium	4.30E+00	0	1.37E-04	1.04E-05	3.12E-05
Chromium	9.97E+01	0	3.17E-03	2.41E-04	7.22E-04
Copper	1.57E+02	0	4.99E-03	3.80E-04	1.14E-03
Iron	5.55E+04	0	1.76E+00	1.34E-01	4.02E-01
Lead	2.94E+02	0	9.34E-03	7.12E-04	2.13E-03
Manganese	7.33E+02	0	2.33E-02	1.77E-03	5.31E-03
Mercury	1.71E+00	0	5.43E-05	4.14E-06	1.24E-05
Nickel	4.82E+01	0	1.53E-03	1.17E-04	3.49E-04
Silver	8.50E-01	0	2.70E-05	2.06E-06	6.16E-06
Zinc	1.20E+03	0	3.82E-02	2.91E-03	8.72E-03
Acenaphthene	1.00E+00	0	3.18E-05	2.42E-06	7.24E-06
Acenaphthylene	1.00E+00	0	3.18E-05	2.42E-06	7.24E-06
Anthracene	1.50E+00	0	4.77E-05	3.63E-06	1.09E-05
Benzo(a)anthracene	4.80E+00	0	1.52E-04	1.16E-05	3.48E-05
Benzo(a)pyrene	4.00E+00	0	1.27E-04	9.68E-06	2.90E-05
Benzo(b)fluoranthene	2.90E+00	0	9.21E-05	7.02E-06	2.10E-05
Benzo(ghi)perylene	5.50E+00	0	1.75E-04	1.33E-05	3.98E-05
Benzo(k)fluoranthene	2.20E+00	0	6.99E-05	5.33E-06	1.59E-05
Chrysene	1.50E+00	0	4.77E-05	3.63E-06	1.09E-05
Dibenzo(a,h)anthracene	6.20E+00	0	1.97E-04	1.50E-05	4.49E-05
Fluoranthene	3.70E+00	0	1.18E-04	8.96E-06	2.68E-05
Fluorene	1.00E+00	0	3.18E-05	2.42E-06	7.24E-06
Indeno(1,2,3-cd)pyrene	5.70E+00	0	1.81E-04	1.38E-05	4.13E-05
Napthalene	9.00E-01	0	2.86E-05	2.18E-06	6.52E-06
Phenanthrene	3.10E+00	0	9.85E-05	7.50E-06	2.25E-05
Pyrene	3.60E+00	0	1.14E-04	8.72E-06	2.61E-05
alph-BHC	4.60E-02	0	1.46E-06	1.11E-07	3.33E-07
beta-BHC	2.90E-02	0	9.21E-07	7.02E-08	2.10E-07
Lindane (gamma-BHC)	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Endrin	1.00E-02	0	3.18E-07	2.42E-08	7.24E-08
Heptachlor	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	7.20E-02	0	2.29E-06	1.74E-07	5.22E-07
Hexachlorobenzene	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00
p,p DDD	5.00E-03	0	1.59E-07	1.21E-08	3.62E-08
p,p DDE	1.90E-02	0	6.04E-07	4.60E-08	1.38E-07
p,p DDT	1.30E-02	0	4.13E-07	3.15E-08	9.42E-08
PCBs	3 8	0	1.21E-04	9.20E-06	2.75E-05

Table 64

Typical Exposures for Ingestion of Contaminated Fish

(3, Table 6.19)

	Lifetime Exposure Intake (MG/KG-DAY)
Cadmium	0.00E+00
Chromium	0.00E+00
Copper	0.00E+00
Iron	0.00E+00
Lead	0.00E+00
Manganese	0.00E+00
Mercury	1.21E-05
Nickel	0.00E+00
Silver	0.00E+00
Zinc	0.00E+00
Acenaphthene	0.00E+00
Acenaphthylene	0.00E+00
Anthracene	0.00E+00
Benzo(a)anthracene	0.00E+00
Benzo(a)pyrene	0.00E+00
Benzo(b)fluoranthene	0.00E+00
Benzo(ghi)perylene	0.00E+00
Benzo(k)fluoranthene	0.00E+00
Chrysene	0.00E+00
Dibenzo(a,h)anthracene	0.00E+00
Fluoranthene	0.00E+00
Fluorene	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00
Napthalene	0.00E+00
Phenanthrene	0.00E+00
Pyrene	0.00E+00
alph-BHC	0.00E+00
beta-BHC	0.00E+00
Lindane (gamma-BHC)	1.86E-06
Aldrin	1.86E-06
Chlordane	1.76E-05
Dieldrin	0.00E+00
Endrin	0.00E+00
Heptachlor	0.00E+00
Heptachlor epoxide	0.00E+00
Hexachlorobenzene	2.79E-06
Mirex	9.29E-07
p,p DDD	0.00E+00
p,p DDE	0.00E+00
p,p DDT	5.76E-05
PCBs	4.74E-04

Table 65

Reasonable Worst Case Exposures for Ingestion of Contaminated Fish (3, Table 6.20)

	Lifetime Exposure
	Intake (MG/KG-DAY)
Cadmium	0.00E+00
Chromium	0.00E+00
Copper	0.00E+00
Iron	0.00E+00
Lead	0.00E+00
Manganese	0.00E+00
Mercury	2.45E-04
Nickel	0.00E+00
Silver	0.00E+00
Zinc	0.00E+00
Acenaphthene	0.00E+00
Acenaphthylene	0.00E+00
Anthracene	0.00E+00
Benzo(a)anthracene	0.00E+00
Benzo(a)pyrene	0.00E+00
Benzo(b)fluoranthene	0.00E+00
Benzo(ghi)perylene	0.00E+00
Benzo(k)fluoranthene	0.00E+00
Chrysene	0.00E+00
Dibenzo(a,h)anthracene	0.00E+00
Fluoranthene	0.00E+00
Fluorene	0.00E+00
Indeno(1,2,3-cd)pyrene	0.00E+00
Napthalene	0.00E+00
Phenanthrene	0.00E+00
Pyrene	0.00E+00
alph-BHC	0.00E+00
beta-BHC	0.00E+00
Lindane (gamma-BHC)	3.77E-05
Aldrin	3.77E-05
Chlordane	3.58E-04
Dieldrin	0.00E+00
Endrin	0.00E+00
Heptachlor	0.00E+00
Heptachlor epoxide	0.00E+00
Hexachlorobenzene	5.66E-05
Mirex	1.89E-05
p,p DDD	0.00E+00
p,p DDE	0.00E+00
p,p DDT	1.17E-03
PCBs	9.62E-03

Table 66

Human Health Risk Resulting from Dermal Contact with Sediments: Typical Case (3, Table 8.1)

	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	5.08E-02	3.87E-03	1.16E-02	
Chromium	0.00E+00	7.19E-02	5.48E-03	1.64E-02	
Copper	0.00E+00	2.64E-01	2.01E-02	6.01E-02	
Iron	NA	NA	NA	NA	
Lead	NA	NA	NA	NA	
Manganese	0.00E+00	7.94E-02	6.05E-03	1.81E-02	
Mercury	0.00E+00	3.49E-02	2.66E-03	7.97E-03	
Nickel	0.00E+00	4.77E-02	3.63E-03	1.09E-02	
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Zinc	0.00E+00	3.96E-02	3.01E-03	9.02E-03	
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Acenaphthylene	NA	NA	NA	NA	
Anthracene	0.00E+00	1.91E-05	1.45E-06	4.35E-06	
Benzo(a)anthracene	NA	NA	NA	NA	
Benzo(a)pyrene	NA	NA	NA	NA	
Benzo(b)fluoranthene	NA	NA	NA	NA	
Benzo(ghi)perylene	NA	NA	NA	NA	
Benzo(k)fluoranthene	NA	NA	NA	NA	
Chrysene	NA	NA	NA	NA	
Dibenzo(a,h)anthracene	NA	NA	NA	NA	
Fluoranthene	0.00E+00	1.25E-03	9.50E-05	2.84E-04	
Fluorene	0.00E+00	2.62E-04	2.00E-05	5.98E-05	
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	
Napthalene	0.00E+00	2.46E-03	1.88E-04	5.61E-04	
Phenanthrene	NA	NA	NA	NA	
Pyrene	0.00E+00	9.85E-04	7.50E-05	2.25E-04	
alph-BHC	NA	NA	NA	NA	
beta-BHC	NA	NA	NA	NA	
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Endrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor epoxide	0.00E+00	9.77E-02	7.45E-03	2.23E-02	2.64E-06
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
p,p DDD	NA	NA	NA	NA	
p,p DDE	NA	NA	NA	NA	
p,p DDT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
PCBs	NA	NA	NA	NA	

NA : denotes lack of RfD with which to compute health risk ratio

Table 67

Human Health Risk Resulting from Dermal Contact with Water: Typical Case (3, Table 8.2)

	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	6.83E-04	4.64E-05	1.52E-04	0.00E+00
Chromium	0.00E+00	6.45E-04	4.38E-05	1.43E-04	0.00E+00
Copper	0.00E+00	2.90E-04	1.97E-05	6.44E-05	0.00E+00
Iron	NA	NA	NA	NA	0.00E+00
Lead	NA	NA	NA	NA	0.00E+00
Manganese	0.00E+00	1.61E-04	1.10E-05	3.58E-05	0.00E+00
Mercury	0.00E+00	9.68E-05	6.58E-06	2.15E-05	0.00E+00
Nickel	0.00E+00	4.27E-05	2.90E-06	9.48E-06	0.00E+00
Silver	0.00E+00	1.14E-06	7.74E-08	2.53E-07	0.00E+00
Zinc	0.00E+00	2.48E-05	1.68E-06	5.50E-06	0.00E+00
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	NA	NA	NA	NA	0.00E+00
Anthracene	0.00E+00	4.58E-06	3.11E-07	1.02E-06	0.00E+00
Benzo(a)anthracene	NA	NA	NA	NA	0.00E+00
Benzo(a)pyrene	NA	NA	NA	NA	0.00E+00
Benzo(b)fluoranthene	NA	NA	NA	NA	0.00E+00
Benzo(ghi)perylene	NA	NA	NA	NA	0.00E+00
Benzo(k)fluoranthene	NA	NA	NA	NA	0.00E+00
Chrysene	NA	NA	NA	NA	0.00E+00
Dibenzo(a,h)anthracene	NA	NA	NA	NA	0.00E+00
Fluoranthene	0.00E+00	1.06E-04	7.23E-06	2.36E-05	0.00E+00
Fluorene	0.00E+00	1.12E-04	7.61E-06	2.48E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.00E+00
Napthalene	0.00E+00	8.55E-03	5.81E-04	1.90E-03	0.00E+00
Phenanthrene	NA	NA	NA	NA	0.00E+00
Pyrene	0.00E+00	8.80E-05	5.98E-06	1.95E-05	0.00E+00
alph-BHC	NA	NA	NA	NA	0.00E+00
beta-BHC	NA	NA	NA	NA	0.00E+00
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Endrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	0.00E+00	1.32E+00	8.98E-02	2.93E-01	3.47E-05
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
p,p DDD	NA	NA	NA	NA	0.00E+00
p,p DDE	NA	NA	NA	NA	0.00E+00
p,p DDT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PCBs	NA	NA	NA	NA	0.00E+00

NA : denotes lack of RfD with which to compute health risk ratio

Table 68

Human Health Risk Resulting from Incidental Ingestion of Water: Typical Case (3, Table 8.3)

	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	5.50E-08	2.56E-09	1.13E-08	
Chromium	0.00E+00	5.19E-08	2.42E-09	1.07E-08	
Copper	0.00E+00	2.34E-08	1.09E-09	4.82E-09	
Iron	NA	NA	NA	NA	
Lead	NA	NA	NA	NA	
Manganese	0.00E+00	1.30E-08	6.06E-10	2.68E-09	
Mercury	0.00E+00	7.80E-09	3.63E-10	1.61E-09	
Nickel	0.00E+00	3.44E-09	1.60E-10	7.09E-10	
Silver	0.00E+00	9.17E-11	4.27E-12	1.89E-11	
Zinc	0.00E+00	2.00E-09	9.30E-11	4.11E-10	
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Acenaphthylene	NA	NA	NA	NA	
Anthracene	0.00E+00	3.69E-10	1.72E-11	7.61E-11	
Benzo(a)anthracene	NA	NA	NA	NA	
Benzo(a)pyrene	NA	NA	NA	NA	
Benzo(b)fluoranthene	NA	NA	NA	NA	
Benzo(ghi)perylene	NA	NA	NA	NA	
Benzo(k)fluoranthene	NA	NA	NA	NA	
Chrysene	NA	NA	NA	NA	
Dibenzo(a,h)anthracene	NA	NA	NA	NA	
Fluoranthene	0.00E+00	8.58E-09	4.00E-10	1.77E-09	
Fluorene	0.00E+00	9.03E-09	4.20E-10	1.86E-09	
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	
Napthalene	0.00E+00	6.89E-07	3.21E-08	1.42E-07	
Phenanthrene	NA	NA	NA	NA	
Pyrene	0.00E+00	7.09E-09	3.30E-10	1.46E-09	
alph-BHC	NA	NA	NA	NA	
beta-BHC	NA	NA	NA	NA	
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Endrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor epoxide	0.00E+00	1.06E-04	4.96E-06	2.19E-05	2.59E-09
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
p,p DDD	NA	NA	NA	NA	
p,p DDE	NA	NA	NA	NA	
p,p DDT	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
PCBs	NA	NA	NA	NA	

NA : denotes lack of RfD with which to compute health risk ratio

Table 69

Human Health Risk Resulting from Ingestion of Fish: Typical Case (3, Table 8.4)

	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	
Chromium	0.00E+00	
Copper	0.00E+00	
Iron	NA	
Lead	NA	
Manganese	0.00E+00	
Mercury	4.02E-02	
Nickel	0.00E+00	
Silver	0.00E+00	
Zinc	0.00E+00	
Acenaphthene	0.00E+00	
Acenaphthylene	NA	
Anthracene	0.00E+00	
Benzo(a)anthracene	NA	
Benzo(a)pyrene	NA	
Benzo(b)fluoranthene	NA	
Benzo(ghi)perylene	NA	
Benzo(k)fluoranthene	NA	
Chrysene	NA	
Dibenzo(a,h)anthracene	NA	
Fluoranthene	0.00E+00	
Fluorene	0.00E+00	
Indeno(1,2,3-cd)pyrene	NA	
Napthalene	0.00E+00	
Phenanthrene	NA	
Pyrene	0.00E+00	
alph-BHC	NA	
beta-BHC	NA	
Lindane (gamma-BHC)	6.19E-03	
Aldrin	6.19E-02	2.41E-06
Chlordane	2.94E-01	3.16E-05
Dieldrin	0.00E+00	2.29E-05
Endrin	0.00E+00	
Heptachlor	0.00E+00	
Heptachlor epoxide	0.00E+00	
Hexachlorobenzene	3.48E-03	
Mirex	4.84E-01	4.74E-06
p,p DDD	NA	
p,p DDE	NA	
p,p DDT	1.15E-01	
PCBs	NA	1.96E-05

NA : denotes lack of RfD with which to compute health risk ratio

Table 70

Total Human Health Risk Summed over all Pathways

(Typical Case) (3, Table 8.5)

Chemical	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	5.15E-02	3.92E-03	1.17E-02	0.00E+00
Chromium	0.00E+00	7.26E-02	5.53E-03	1.65E-02	0.00E+00
Copper	0.00E+00	2.64E-01	2.01E-02	6.02E-02	0.00E+00
Iron	NA	NA	NA	NA	0.00E+00
Lead	NA	NA	NA	NA	0.00E+00
Manganese	0.00E+00	7.96E-02	6.06E-03	1.81E-02	0.00E+00
Mercury	0.00E+00	7.53E-02	4.29E-02	4.82E-02	0.00E+00
Nickel	0.00E+00	4.77E-02	3.63E-03	1.09E-02	0.00E+00
Silver	0.00E+00	1.14E-06	7.74E-08	2.53E-07	0.00E+00
Zinc	0.00E+00	3.96E-02	3.02E-03	9.02E-03	0.00E+00
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Acenaphthylene	NA	NA	NA	NA	0.00E+00
Anthracene	0.00E+00	2.36E-05	1.76E-06	5.36E-06	0.00E+00
Benzo(a)anthracene	NA	NA	NA	NA	0.00E+00
Benzo(a)pyrene	NA	NA	NA	NA	0.00E+00
Benzo(b)fluoranthene	NA	NA	NA	NA	0.00E+00
Benzo(ghi)perylene	NA	NA	NA	NA	0.00E+00
Benzo(k)fluoranthene	NA	NA	NA	NA	0.00E+00
Chrysene	NA	NA	NA	NA	0.00E+00
Dibenzo(a,h)anthracene	NA	NA	NA	NA	0.00E+00
Fluoranthene	0.00E+00	1.35E-03	1.02E-04	3.08E-04	0.00E+00
Fluorene	0.00E+00	3.74E-04	2.76E-05	8.46E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.00E+00
Napthalene	0.00E+00	1.10E-02	7.69E-04	2.46E-03	0.00E+00
Phenanthrene	NA	NA	NA	NA	0.00E+00
Pyrene	0.00E+00	1.07E-03	8.10E-05	2.44E-04	0.00E+00
alph-BHC	NA	NA	NA	NA	0.00E+00
beta-BHC	NA	NA	NA	NA	0.00E+00
Lindane (gamma-BHC)	0.00E+00	6.19E-03	6.19E-03	6.19E-03	0.00E+00
Aldrin	0.00E+00	6.19E-02	6.19E-02	6.19E-02	2.41E-06
Chlordane	0.00E+00	2.94E-01	2.94E-01	2.94E-01	3.16E-05
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-05
Endrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	0.00E+00	1.42E+00	9.72E-02	3.16E-01	3.73E-05
Hexachlorobenzene	0.00E+00	3.48E-03	3.48E-03	3.48E-03	0.00E+00
Mirex	0.00E+00	4.64E-01	4.64E-01	4.64E-01	4.74E-06
p,p DDD	NA	NA	NA	NA	0.00E+00
p,p DDE	NA	NA	NA	NA	0.00E+00
p,p DDT	0.00E+00	1.15E-01	1.15E-01	1.15E-01	0.00E+00
PCBs	NA	NA	NA	NA	1.96E-05

NA : denotes lack of RfD with which to compute health risk ratio

Table 71

Human Health Risk Resulting from Dermal Contact with Sediments: Reasonable Worst-Case (3, Table 8.6)

	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 18-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	2.73E-01	2.08E-02	6.23E-02	
Chromium	0.00E+00	5.98E-01	4.55E-02	1.36E-01	
Copper	0.00E+00	9.41E-01	7.17E-02	2.15E-01	
Iron	NA	NA	NA	NA	
Lead	NA	NA	NA	NA	
Manganese	0.00E+00	1.16E-01	8.87E-03	2.66E-02	
Mercury	0.00E+00	1.81E-01	1.38E-02	4.13E-02	
Nickel	0.00E+00	7.66E-02	5.83E-03	1.75E-02	
Silver	0.00E+00	9.00E-03	6.86E-04	2.05E-03	
Zinc	0.00E+00	1.91E-01	1.46E-02	4.36E-02	
Acenaphthene	0.00E+00	5.29E-04	4.03E-05	1.21E-04	
Acenaphthylene	NA	NA	NA	NA	
Anthracene	0.00E+00	1.59E-04	1.21E-05	3.62E-05	
Benzo(a)anthracene	NA	NA	NA	NA	
Benzo(a)pyrene	NA	NA	NA	NA	
Benzo(b)fluoranthene	NA	NA	NA	NA	
Benzo(ghi)perylene	NA	NA	NA	NA	
Benzo(k)fluoranthene	NA	NA	NA	NA	
Chrysene	NA	NA	NA	NA	
Dibenzo(a,h)anthracene	NA	NA	NA	NA	
Fluoranthene	0.00E+00	2.94E-03	2.24E-04	6.70E-04	
Fluorene	0.00E+00	7.94E-04	6.05E-05	1.81E-04	
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	
Napthalene	0.00E+00	7.15E-03	5.45E-04	1.63E-03	
Phenanthrene	NA	NA	NA	NA	
Pyrene	0.00E+00	3.81E-03	2.91E-04	8.69E-04	
alph-BHC	NA	NA 2.10E-06	NA	NA	
beta-BHC	NA	NA 3.78E-07	NA	NA	
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Endrin	0.00E+00	1.06E-03	8.07E-05	2.41E-04	
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor epoxide	0.00E+00	1.76E-01	1.34E-02	4.01E-02	4.75E-06
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
p,p DDD	NA	NA 8.69E-09	NA	NA	
p,p DDE	NA	NA 4.68E-08	NA	NA	
p,p DDT	0.00E+00	8.26E-04	6.29E-05	1.88E-04	3.20E-08
PCBs	NA	NA 2.12E-04	NA	NA	

NA : denotes lack of RfD with which to compute health risk ratio

Table 72

Human Health Risk Resulting from Dermal Contact with Water: Reasonable Worst-Case (3, Table 8.7)

	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	1.37E-03	9.29E-05	3.03E-04	0.00E+00
Chromium	0.00E+00	6.45E-04	4.38E-05	1.43E-04	0.00E+00
Copper	0.00E+00	4.19E-04	2.85E-05	9.30E-05	0.00E+00
Iron	NA	NA	NA	NA	0.00E+00
Lead	NA	NA	NA	NA	0.00E+00
Manganese	0.00E+00	3.60E-04	2.45E-05	8.00E-05	0.00E+00
Mercury	0.00E+00	1.48E-04	1.01E-05	3.29E-05	0.00E+00
Nickel	0.00E+00	6.83E-05	4.64E-06	1.52E-05	0.00E+00
Silver	0.00E+00	1.14E-06	7.74E-08	2.53E-07	0.00E+00
Zinc	0.00E+00	3.76E-05	2.55E-06	8.34E-06	0.00E+00
Acenaphthene	0.00E+00	3.59E-04	2.44E-05	7.98E-05	0.00E+00
Acenaphthylene	NA	NA	NA	NA	0.00E+00
Anthracene	0.00E+00	3.82E-05	2.60E-06	8.48E-06	0.00E+00
Benzo(a)anthracene	NA	NA	NA	NA	0.00E+00
Benzo(a)pyrene	NA	NA	NA	NA	0.00E+00
Benzo(b)fluoranthene	NA	NA	NA	NA	0.00E+00
Benzo(ghi)perylene	NA	NA	NA	NA	0.00E+00
Benzo(k)fluoranthene	NA	NA	NA	NA	0.00E+00
Chrysene	NA	NA	NA	NA	0.00E+00
Dibenzo(a,h)anthracene	NA	NA	NA	NA	0.00E+00
Fluoranthene	0.00E+00	2.51E-04	1.70E-05	5.57E-05	0.00E+00
Fluorene	0.00E+00	3.40E-04	2.31E-05	7.53E-05	0.00E+00
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.00E+00
Napthalene	0.00E+00	2.48E-02	1.69E-03	5.51E-03	0.00E+00
Phenanthrene	NA	NA	NA	NA	0.00E+00
Pyrene	0.00E+00	3.41E-04	2.32E-05	7.56E-05	0.00E+00
alph-BHC	NA	NA	NA	NA	1.74E-06
beta-BHC	NA	NA	NA	NA	3.14E-07
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Endrin	0.00E+00	3.30E-05	2.25E-06	7.33E-06	0.00E+00
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	0.00E+00	2.38E+00	1.62E-01	5.28E-01	6.24E-05
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
p,p DDD	NA	NA	NA	NA	3.70E-11
p,p DDE	NA	NA	NA	NA	3.53E-11
p,p DDT	0.00E+00	3.69E-06	2.51E-07	8.19E-07	1.39E-10
PCBs	NA	NA	NA	NA	1.29E-06

NA : denotes lack of RfD with which to compute health risk ratio

Table 73

Human Health Risk Resulting from Incidental Ingestion

Water: Reasonable Worst-Case (3, Table 8.8)

	Ages 0-6 years	Ages 7-18 years	Ages 19-70 years	Lifetime	Lifetime
	Intake/RfD	Intake/RfD	Intake/RfD	Intake/RfD	Cancer Risk
Cadmium	0.00E+00	1.10E-07	5.13E-09	2.27E-08	
Chromium	0.00E+00	5.19E-08	2.42E-09	1.07E-08	
Copper	0.00E+00	3.38E-08	1.57E-09	6.96E-09	
Iron	NA	NA	NA	NA	
Lead	NA	NA	NA	NA	
Manganese	0.00E+00	2.90E-08	1.35E-09	5.98E-09	
Mercury	0.00E+00	1.19E-08	5.56E-10	2.46E-09	
Nickel	0.00E+00	5.50E-09	2.56E-10	1.13E-09	
Silver	0.00E+00	9.17E-11	4.27E-12	1.89E-11	
Zinc	0.00E+00	3.03E-09	1.41E-10	6.24E-10	
Acenaphthene	0.00E+00	2.89E-08	1.35E-09	5.95E-09	
Acenaphthylene	NA	NA	NA	NA	
Anthracene	0.00E+00	3.08E-09	1.43E-10	6.34E-10	
Benzo(a)anthracene	NA	NA	NA	NA	
Benzo(a)pyrene	NA	NA	NA	NA	
Benzo(b)fluoranthene	NA	NA	NA	NA	
Benzo(ghi)perylene	NA	NA	NA	NA	
Benzo(k)fluoranthene	NA	NA	NA	NA	
Chrysene	NA	NA	NA	NA	
Dibenzo(a,h)anthracene	NA	NA	NA	NA	
Fluoranthene	0.00E+00	2.02E-08	9.42E-10	4.16E-09	
Fluorene	0.00E+00	2.74E-08	1.27E-09	5.64E-09	
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	
Napthalene	0.00E+00	2.00E-06	9.32E-08	4.12E-07	
Phenanthrene	NA	NA	NA	NA	
Pyrene	0.00E+00	2.75E-08	1.28E-09	5.66E-09	
alph-BHC	NA	NA	NA	NA	1.30E-10
beta-BHC	NA	NA	NA	NA	2.35E-11
Lindane (gamma-BHC)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Aldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Chlordane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Endrin	0.00E+00	2.66E-09	1.24E-10	5.48E-10	
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Heptachlor epoxide	0.00E+00	1.92E-04	8.92E-06	3.95E-05	4.67E-09
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Mirex	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
p,p DDD	NA	NA	NA	NA	2.77E-15
p,p DDE	NA	NA	NA	NA	2.64E-15
p,p DDT	0.00E+00	2.97E-10	1.39E-11	6.13E-11	1.04E-14
PCBs	NA	NA	NA	NA	9.68E-11

NA : denotes lack of RfD with which to compute health risk ratio

Table 74

Human Health Risk Resulting from Ingestion of Fish

Reasonable Worst-Case (3, Table 8.9)

	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	
Chromium	0.00E+00	
Copper	0.00E+00	
Iron	NA	
Lead	NA	
Manganese	0.00E+00	
Mercury	8.17E-01	
Nickel	0.00E+00	
Silver	0.00E+00	
Zinc	0.00E+00	
Acenaphthene	0.00E+00	
Acenaphthylene	NA	
Anthracene	0.00E+00	
Benzo(a)anthracene	NA	
Benzo(a)pyrene	NA	
Benzo(b)fluoranthene	NA	
Benzo(ghi)perylene	NA	
Benzo(k)fluoranthene	NA	
Chrysene	NA	
Dibenzo(a,h)anthracene	NA	
Fluoranthene	0.00E+00	
Fluorene	0.00E+00	
Indeno(1,2,3-cd)pyrene	NA	
Napthalene	0.00E+00	
Phenanthrene	NA	
Pyrene	0.00E+00	
alph-BHC	NA	
beta-BHC	NA	
Lindane (gamma-BHC)	1.26E-01	
Aldrin	1.26E+00	4.90E-05
Chlordane	5.97E+00	6.41E-04
Dieldrin	0.00E+00	4.66E-04
Endrin	0.00E+00	
Heptachlor	0.00E+00	
Heptachlor epoxide	0.00E+00	
Hexachlorobenzene	7.07E-02	
Mirex	9.43E+00	9.62E-05
p,p DDD	NA	
p,p DDE	NA	
p,p DDT	2.34E+00	
PCBs	NA	3.98E-04

NA : denotes lack of RfD with which to compute health risk ratio

Table 75

Total Human Health Risk Summed over all Pathways

(Reasonable Worst-Case) (3, Table 8.10)

Chemical	Ages 0-6 years Intake/RfD	Ages 7-18 years Intake/RfD	Ages 19-70 years Intake/RfD	Lifetime Intake/RfD	Lifetime Cancer Risk
Cadmium	0.00E+00	2.75E-01	2.09E-02	6.26E-02	0.00E+00
Chromium	0.00E+00	5.98E-01	4.56E-02	1.36E-01	0.00E+00
Copper	0.00E+00	9.41E-01	7.17E-02	2.15E-01	0.00E+00
Iron	NA	NA	NA	NA	0.00E+00
Lead	NA	NA	NA	NA	0.00E+00
Manganese	0.00E+00	1.17E-01	8.90E-03	2.66E-02	0.00E+00
Mercury	0.00E+00	9.98E-01	8.31E-01	8.58E-01	0.00E+00
Nickel	0.00E+00	7.66E-02	5.84E-03	1.75E-02	0.00E+00
Silver	0.00E+00	9.00E-03	6.86E-04	2.05E-03	0.00E+00
Zinc	0.00E+00	1.91E-01	1.46E-02	4.36E-02	0.00E+00
Acenaphthene	0.00E+00	8.88E-04	6.47E-05	2.00E-04	0.00E+00
Acenaphthylene	NA	NA	NA	NA	0.00E+00
Anthracene	0.00E+00	1.97E-04	1.47E-05	4.47E-05	0.00E+00
Benzo(a)anthracene	NA	NA	NA	NA	0.00E+00
Benzo(a)pyrene	NA	NA	NA	NA	0.00E+00
Benzo(b)fluoranthene	NA	NA	NA	NA	0.00E+00
Benzo(ghi)perylene	NA	NA	NA	NA	0.00E+00
Benzo(k)fluoranthene	NA	NA	NA	NA	0.00E+00
Chrysene	NA	NA	NA	NA	0.00E+00
Dibenzo(a,h)anthracene	NA	NA	NA	NA	0.00E+00
Fluoranthene	0.00E+00	3.19E-03	2.41E-04	7.26E-04	0.00E+00
Fluorene	0.00E+00	1.13E-03	8.36E-05	2.56E-04	0.00E+00
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.00E+00
Napthalene	0.00E+00	3.20E-02	2.23E-03	7.14E-03	0.00E+00
Phenanthrene	NA	NA	NA	NA	0.00E+00
Pyrene	0.00E+00	4.15E-03	3.14E-04	9.45E-04	0.00E+00
alph-BHC	NA	NA	NA	NA	3.84E-06
beta-BHC	NA	NA	NA	NA	6.92E-07
Lindane (gamma-BHC)	0.00E+00	1.26E-01	1.26E-01	1.26E-01	0.00E+00
Aldrin	0.00E+00	1.26E+00	1.26E+00	1.26E+00	4.90E-05
Chlordane	0.00E+00	5.97E+00	5.97E+00	5.97E+00	6.41E-04
Dieldrin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04
Endrin	0.00E+00	1.09E-03	8.29E-05	2.49E-04	0.00E+00
Heptachlor	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heptachlor epoxide	0.00E+00	2.55E+00	1.75E-01	5.68E-01	6.72E-05
Hexachlorobenzene	0.00E+00	7.07E-02	7.07E-02	7.07E-02	0.00E+00
Mirex	0.00E+00	9.43E+00	9.43E+00	9.43E+00	9.62E-05
p,p DDD	NA	NA	NA	NA	8.73E-09
p,p DDE	NA	NA	NA	NA	4.68E-08
p,p DDT	0.00E+00	2.34E+00	2.34E+00	2.34E+00	3.22E-08
PCBs	NA	NA	NA	NA	6.11E-04

NA : denotes lack of RfD with which to compute health risk ratio

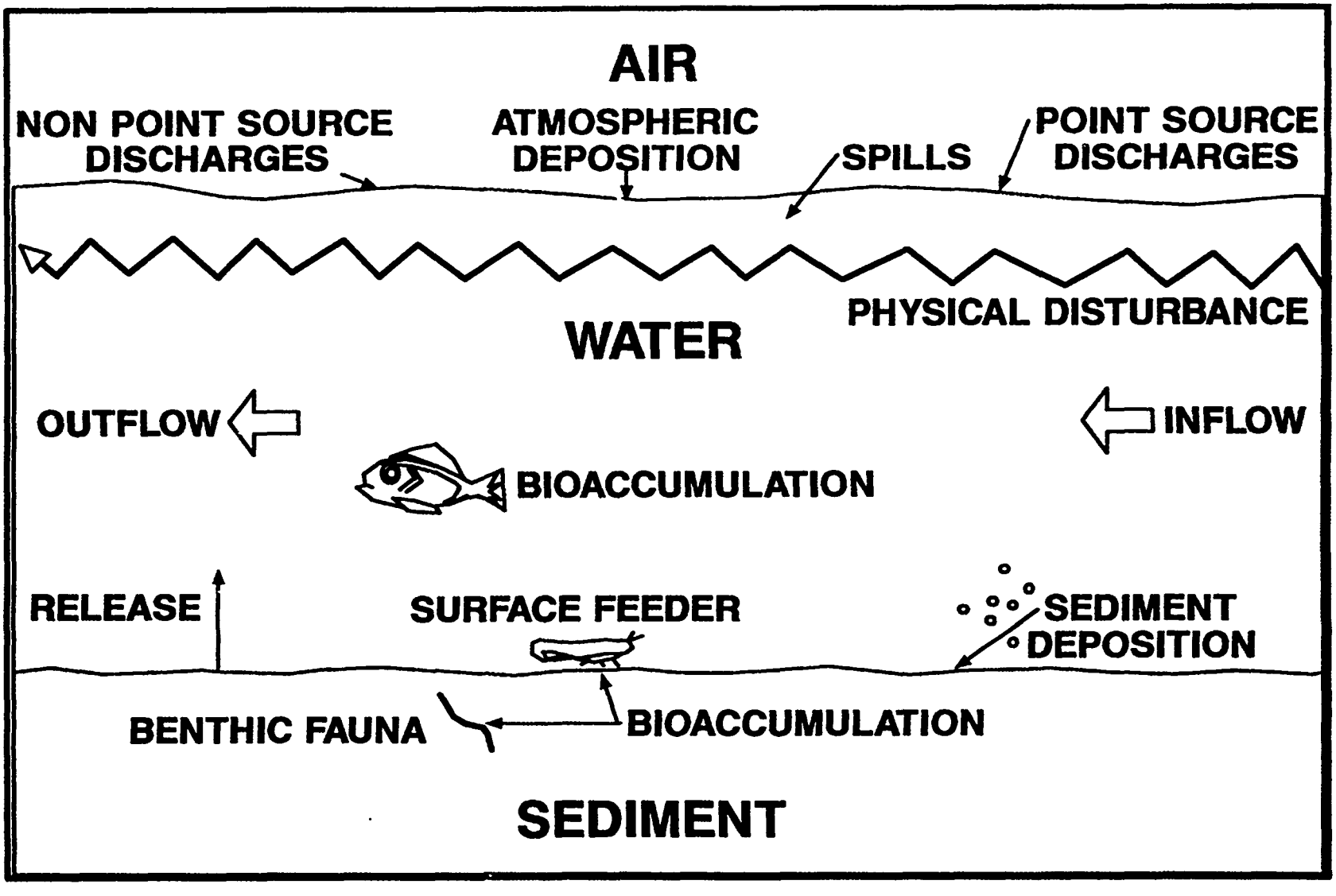

Figure 1. Comtaminant migration pathways for evaluation of in-place contaminated sediments

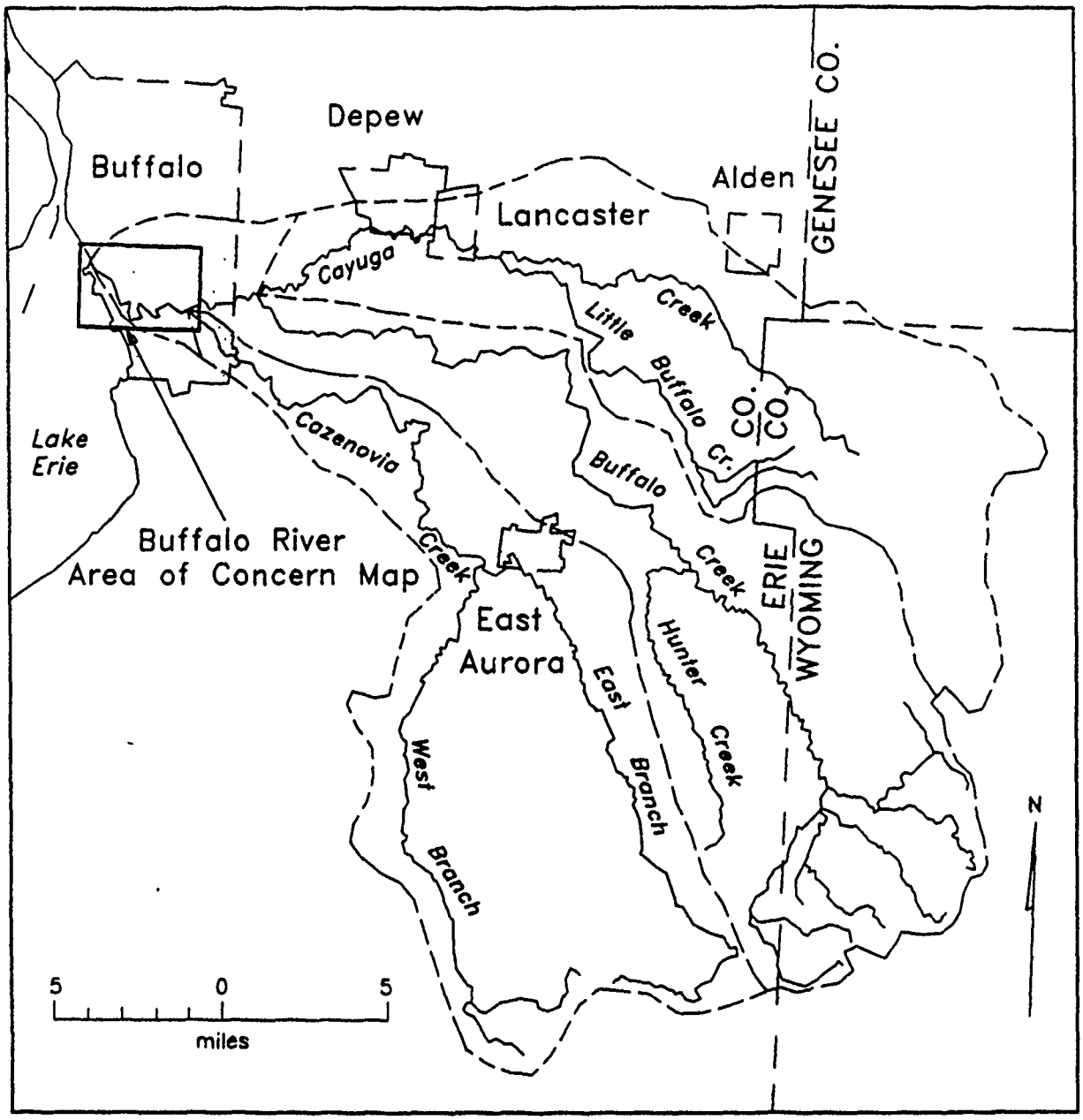

Figure 2. Location of the Buffalo River AOC

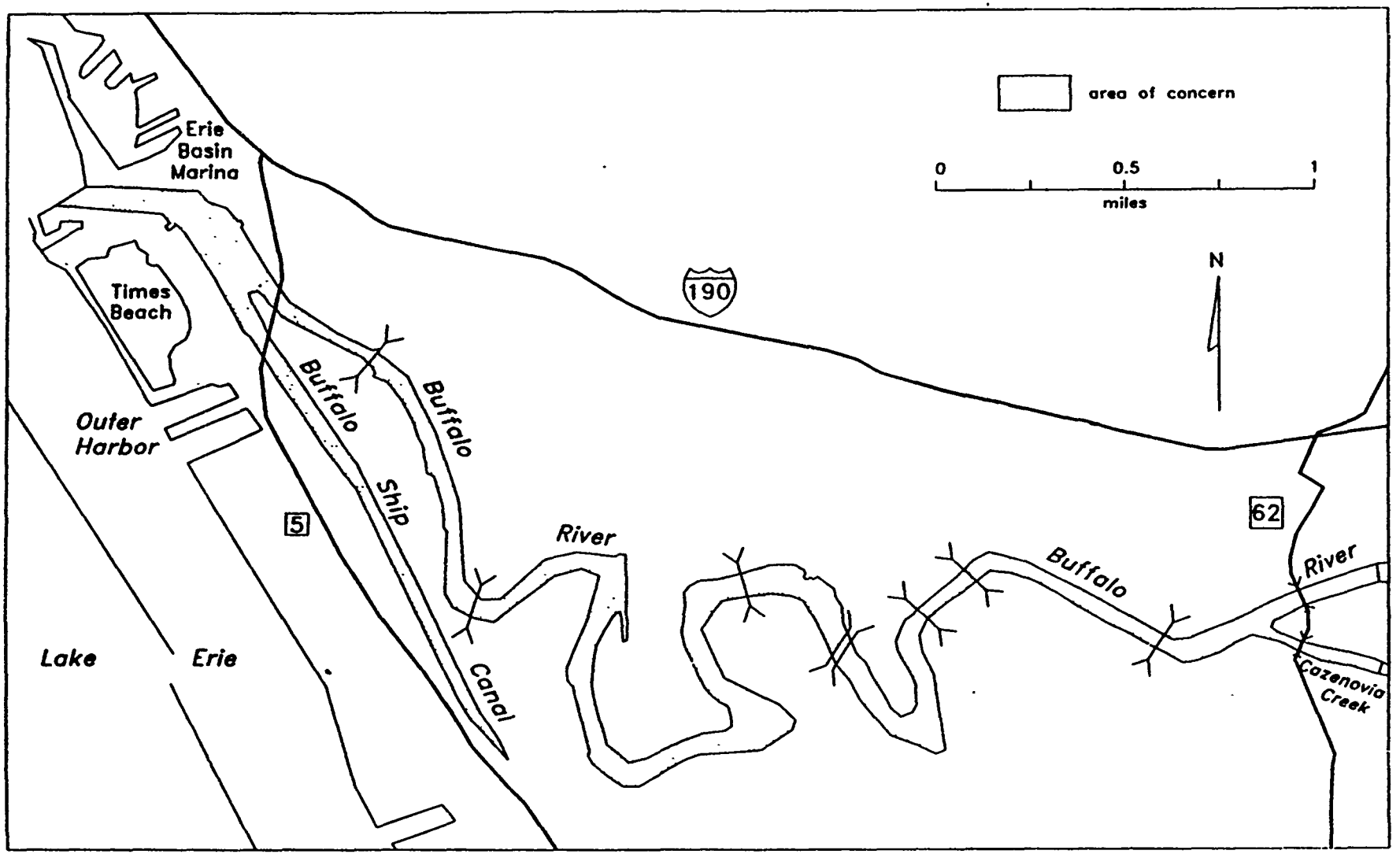

Figure 3. Boundary of the Buffalo River AOC

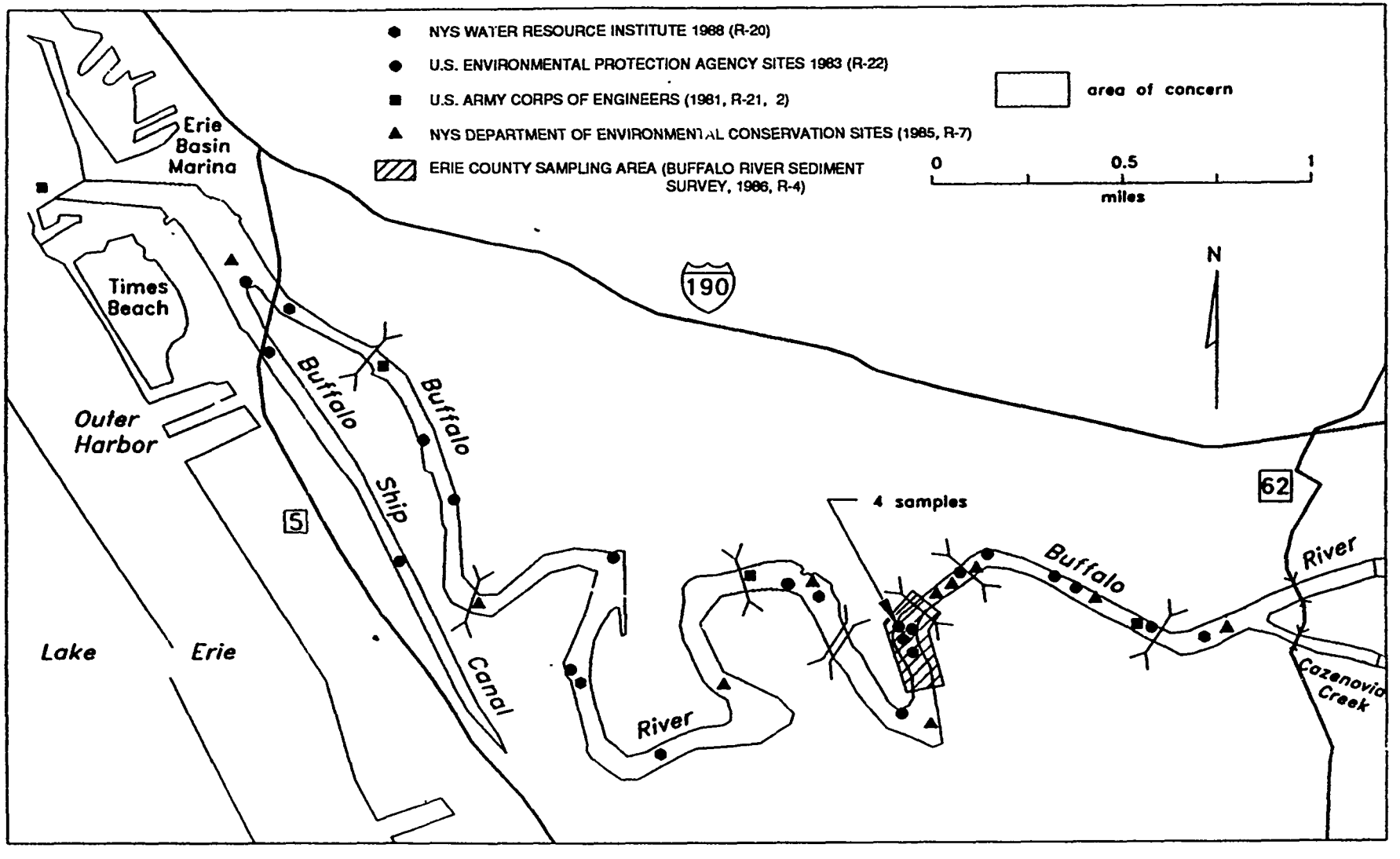

Figure 4a. Sediment sampling sites in the Buffalo River AOC

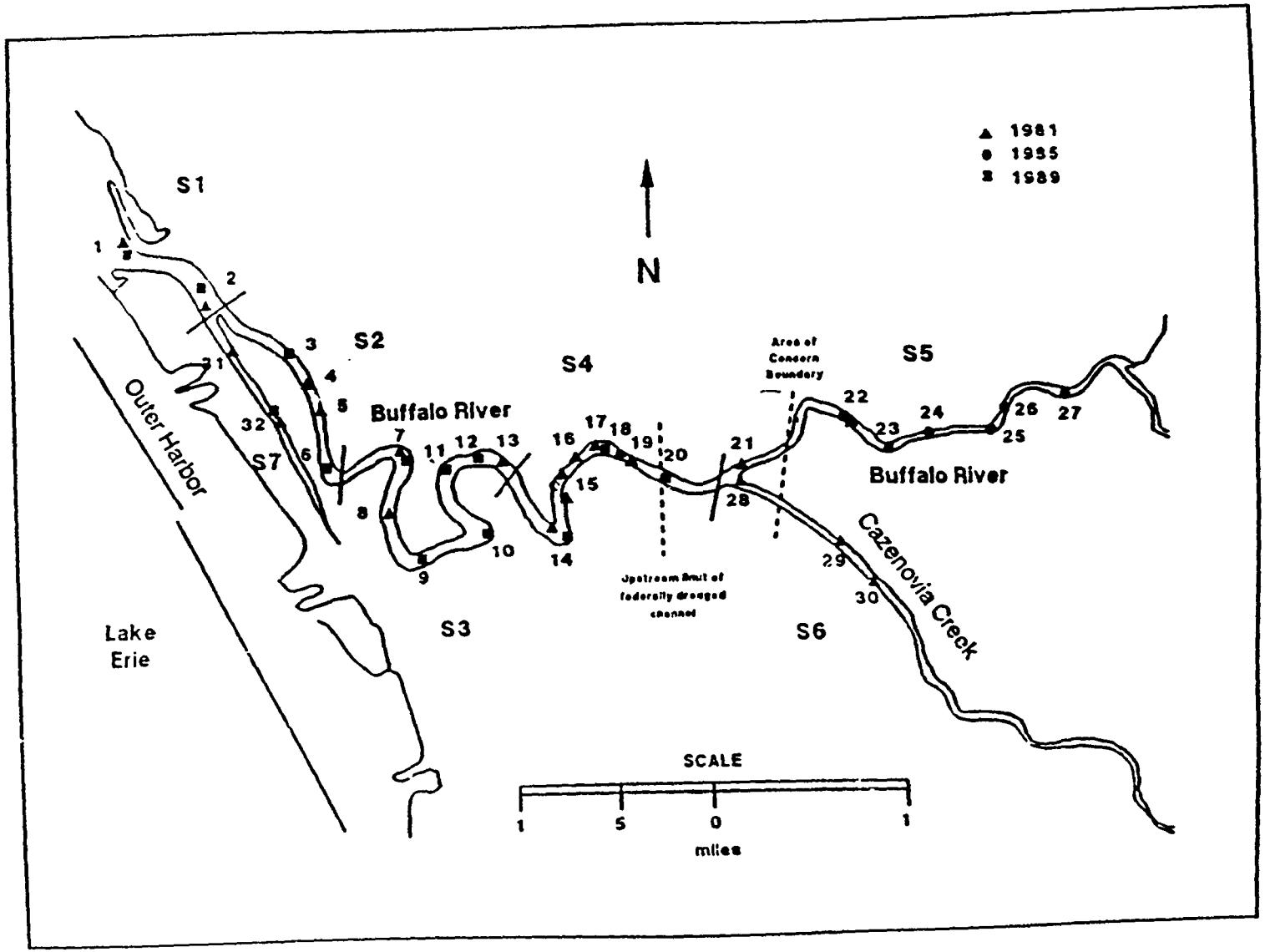

Figure 4b. Location of sediment sampling stations (3, Figure 5.1)

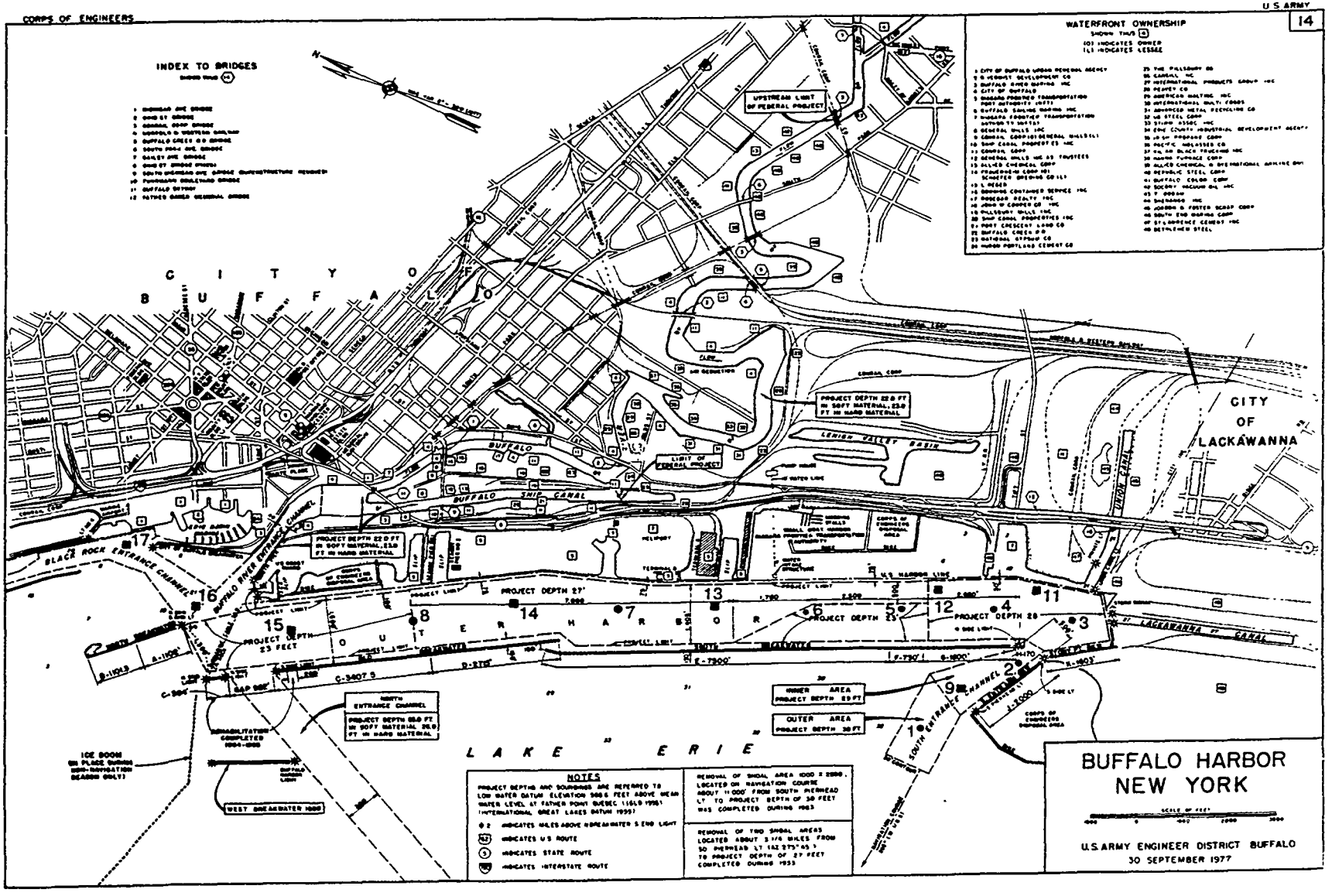

Figure 4c. USACOE 1983 sediment sampling locations (1)

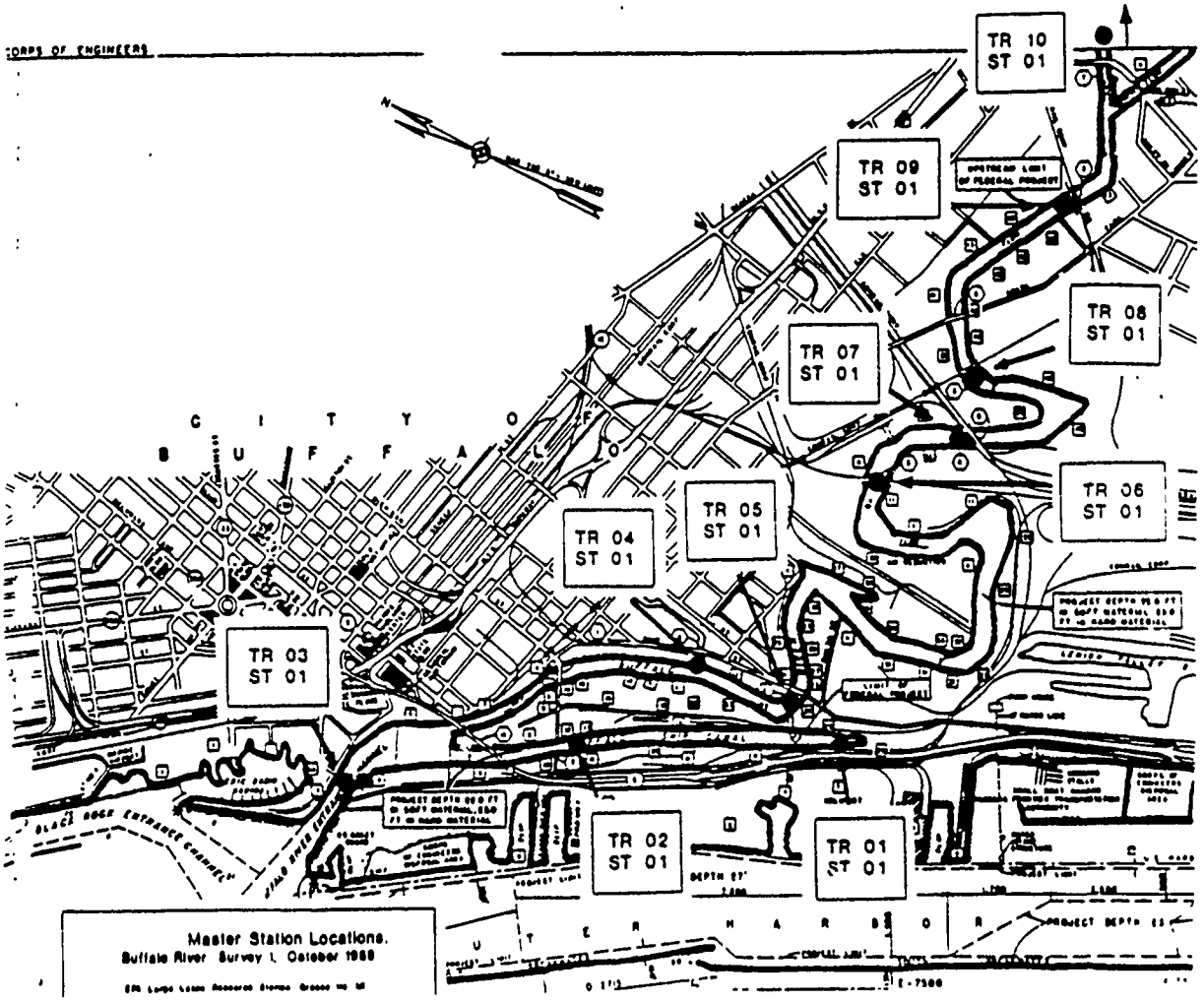

Figure 4d. Buffalo River location map (6, Figure 6)

Figure 5. Locations of the samples taken on October 30, 1987 by NYSDEC (R-20, Figure 4.1)

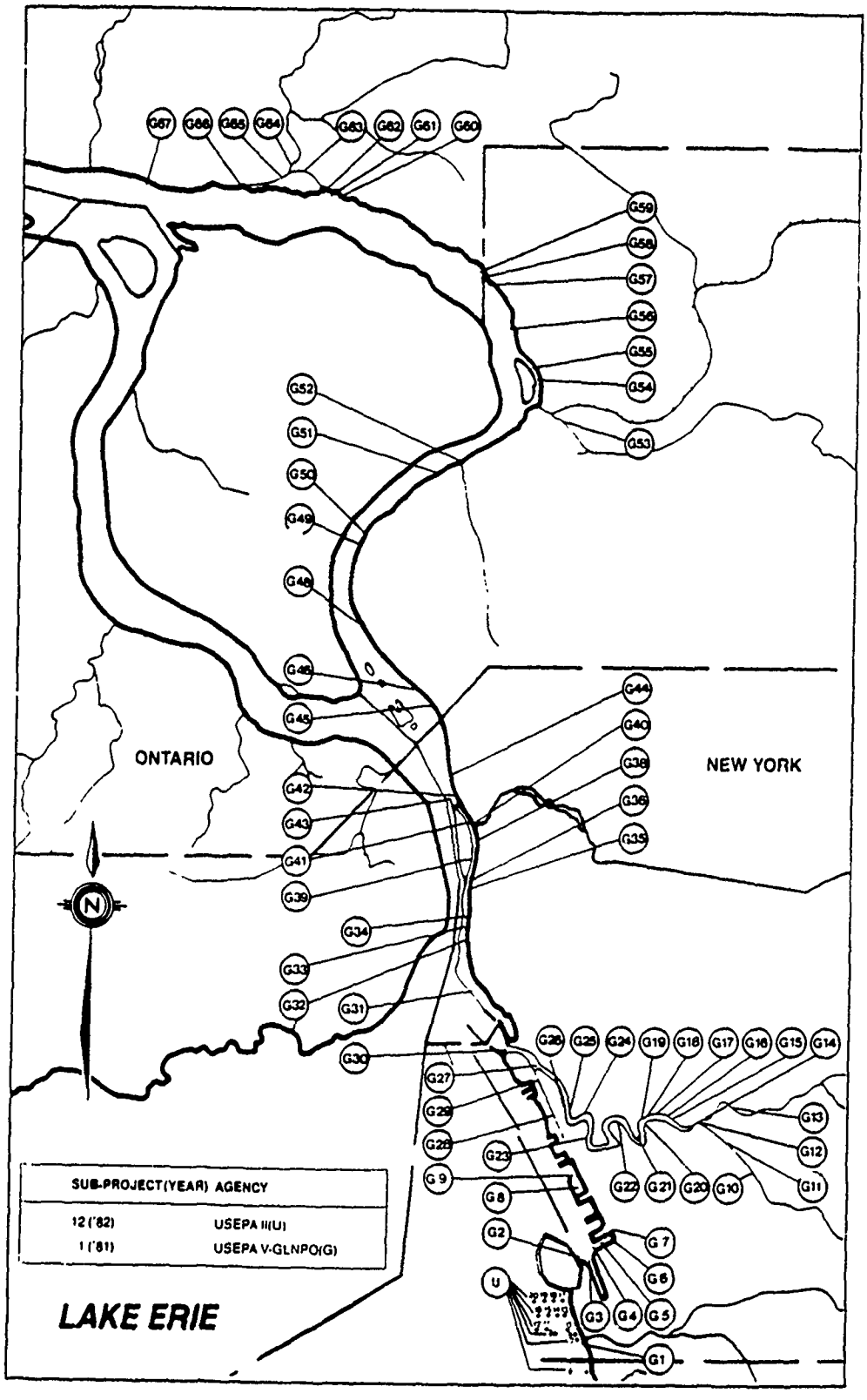

Figure 6. Sediment sampling stations for USEPA V-GLNPO sub-project 1, 1981 (R-21, Figure 4.3)

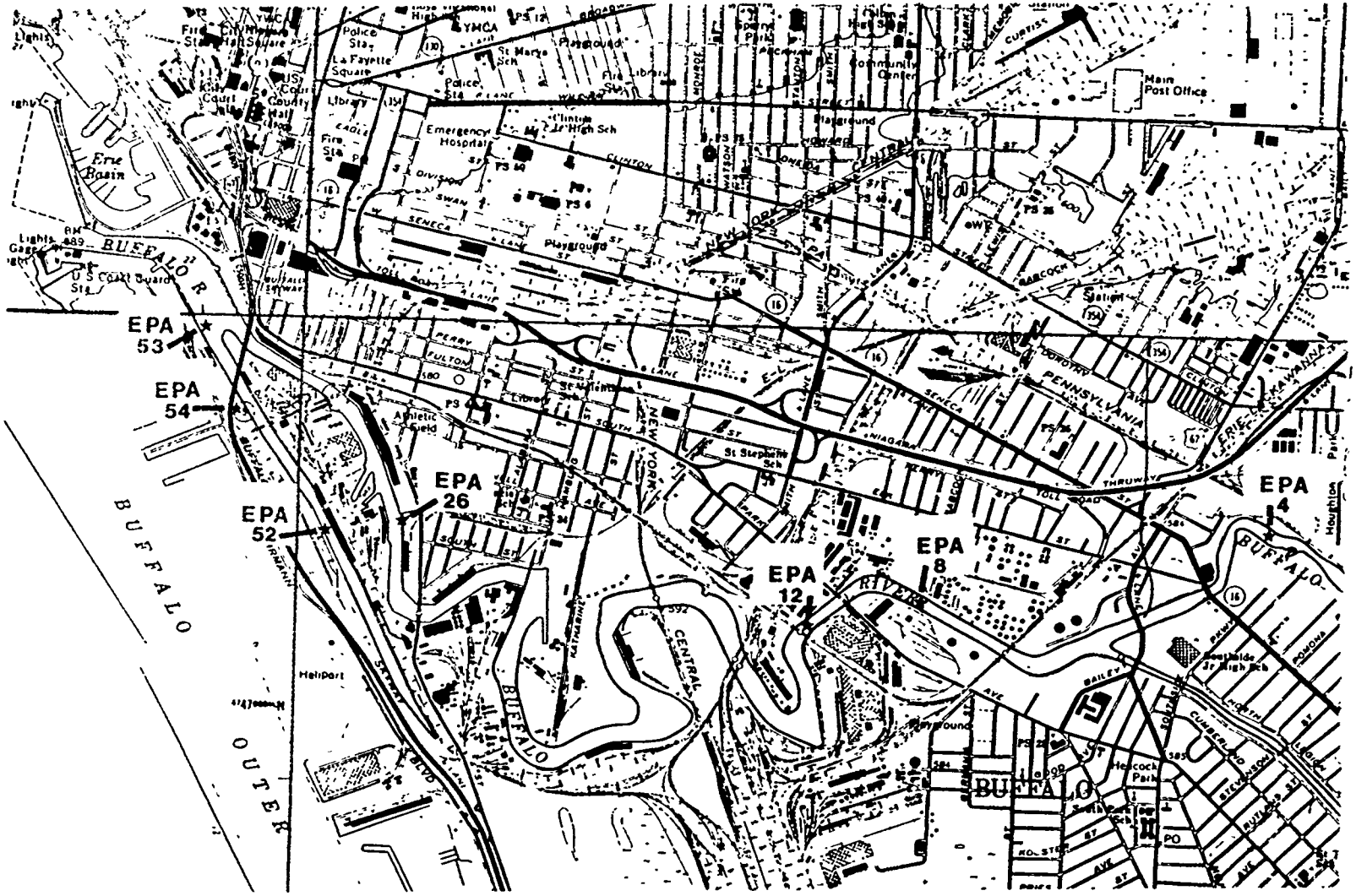

Figure 7. Buffalo River and Buffalo Ship Canal EPA sampling stations (R22)

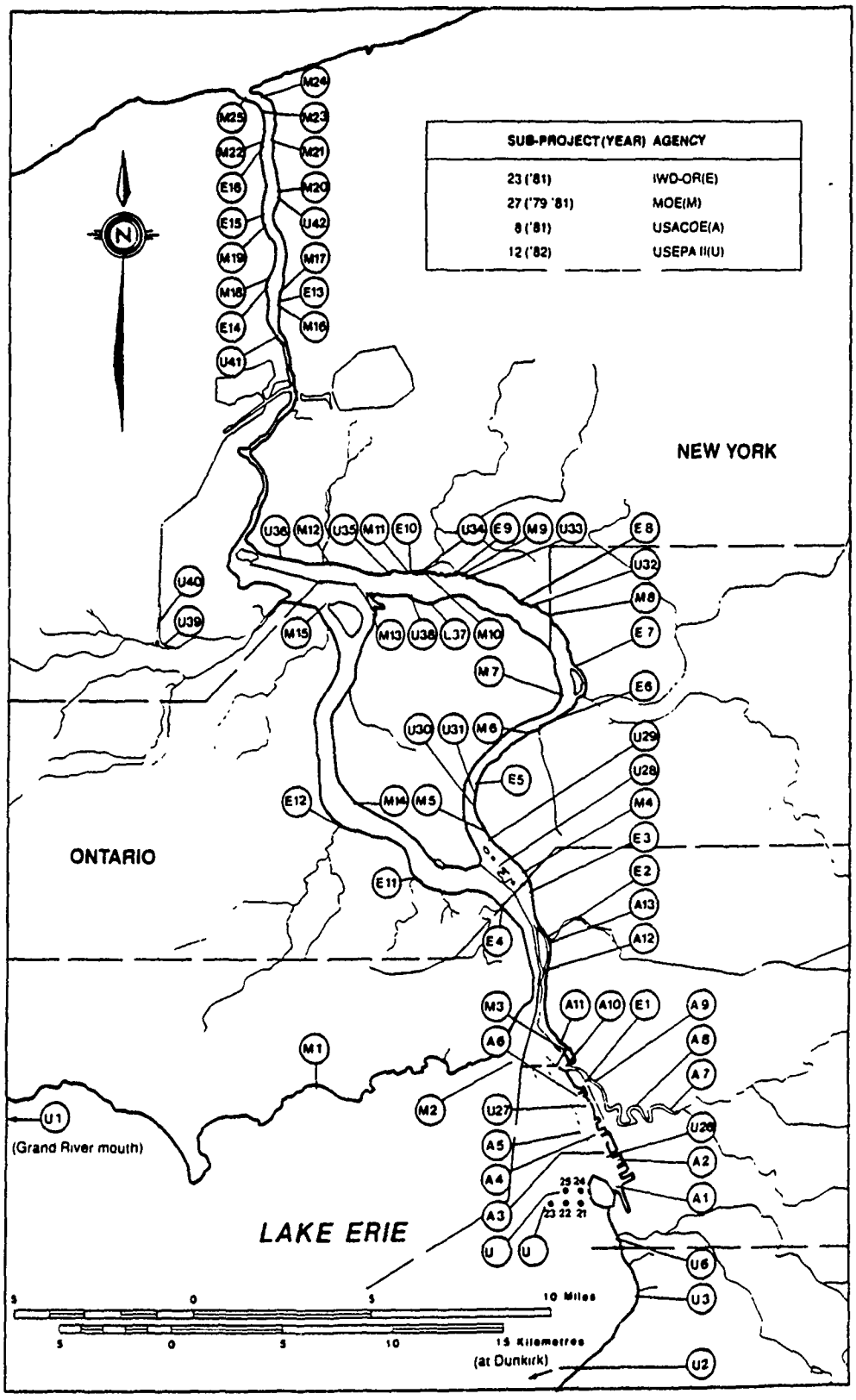

Figure 8a. Sediment sampling sites for sub-project 8, 23 and 27 (R-21, Figure 4.2)

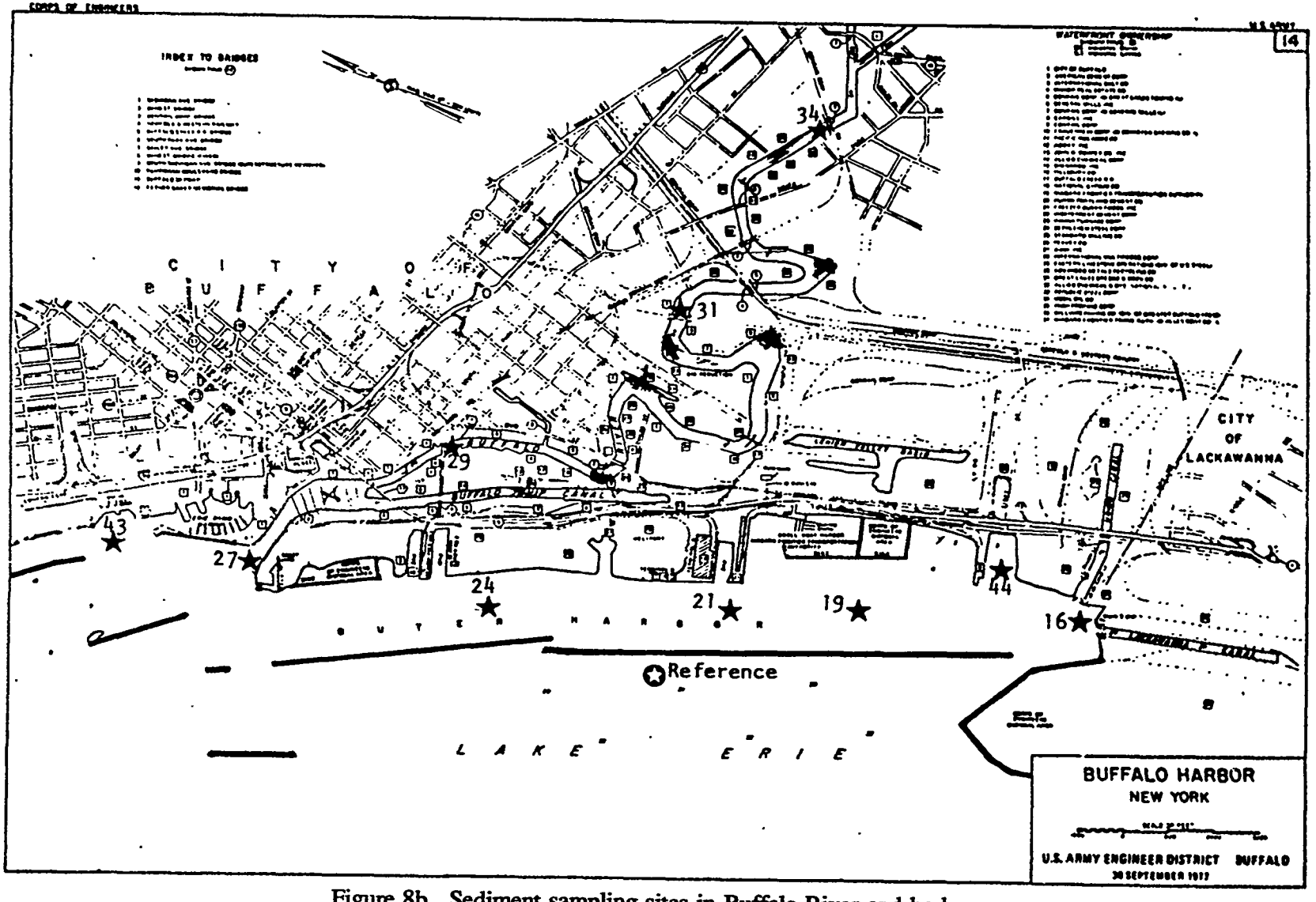

Figure 8b. Sediment sampling sites in Buffalo River and harbor (2, Figure 1)

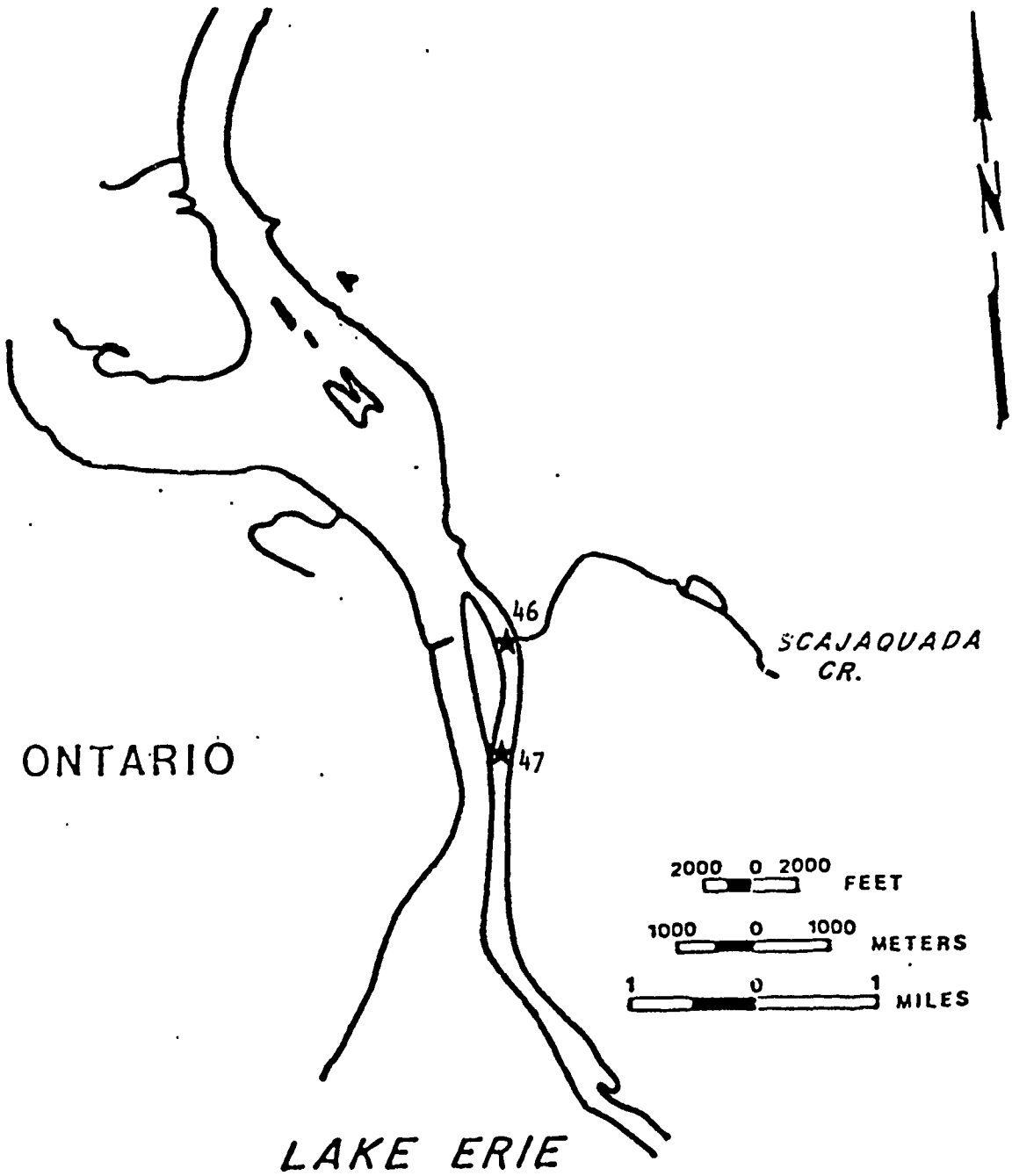

Figure 8c. Sediment sampling sites in Black Rock Channel (2, Figure 2)

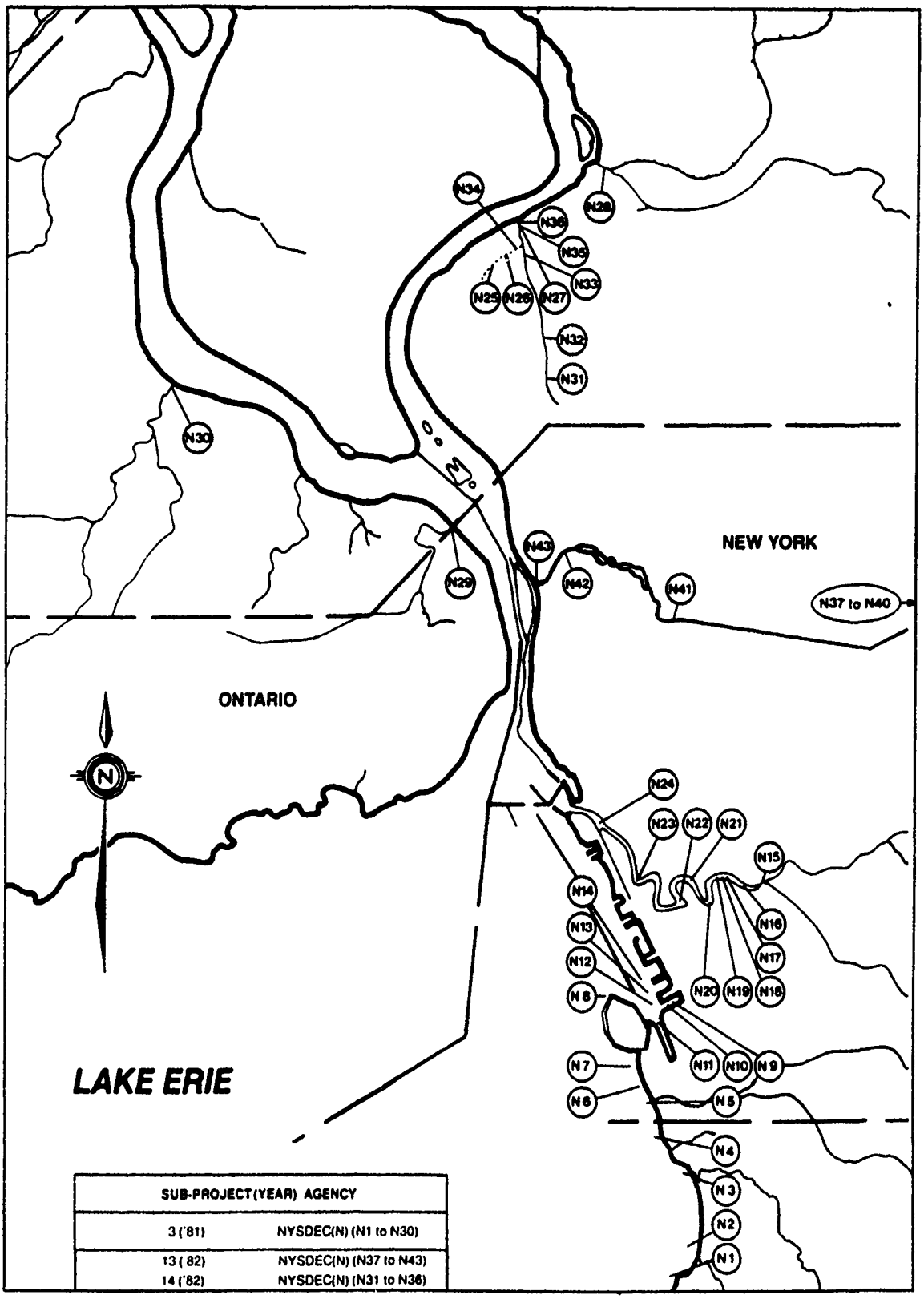

Figure 9. Sediment sampling sites for sub-project 3 (R-21, Figure 4.4)

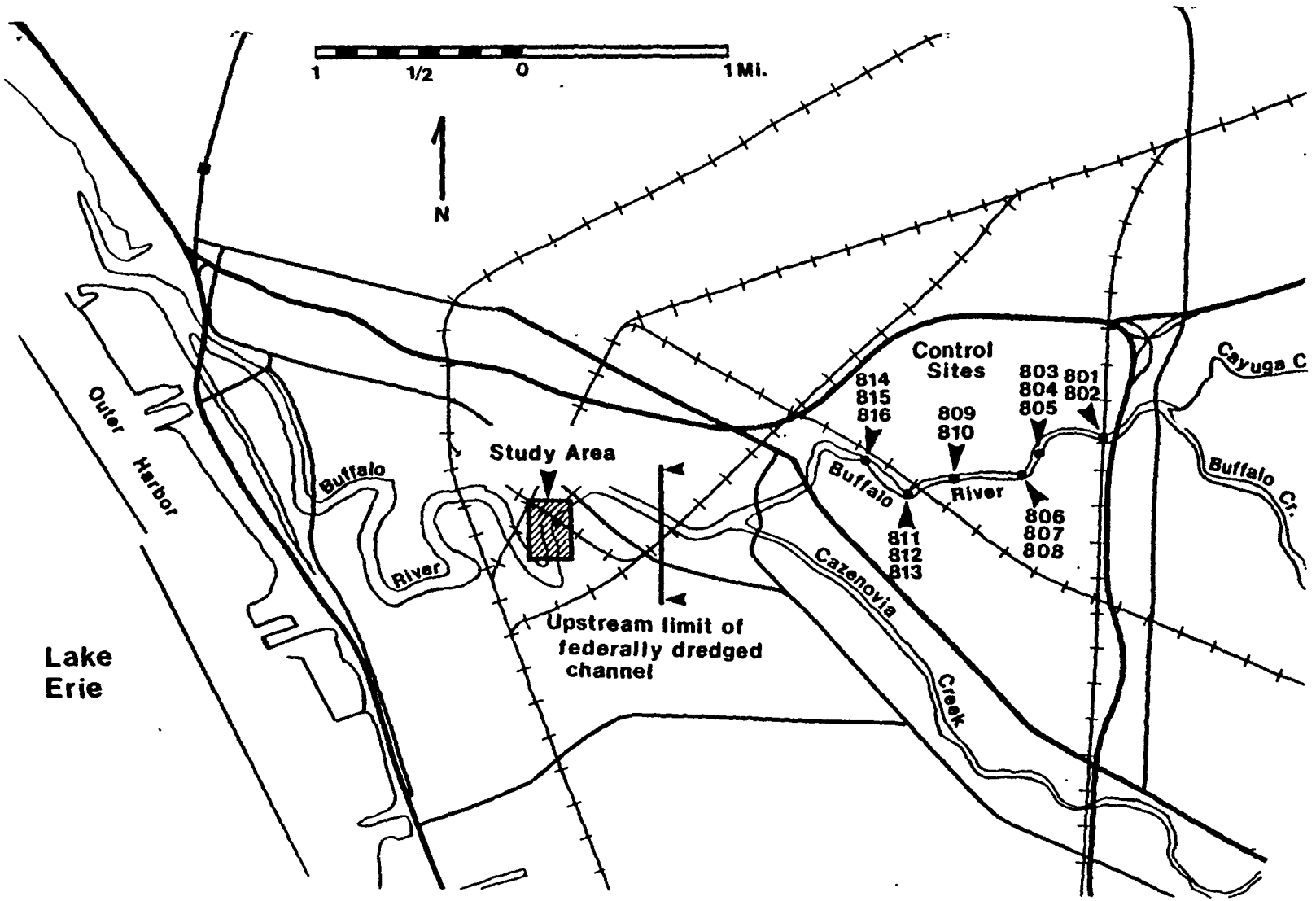

Figure 10. Location of Buffalo River sediment survey study area and control sites (R-4, Figure 10)

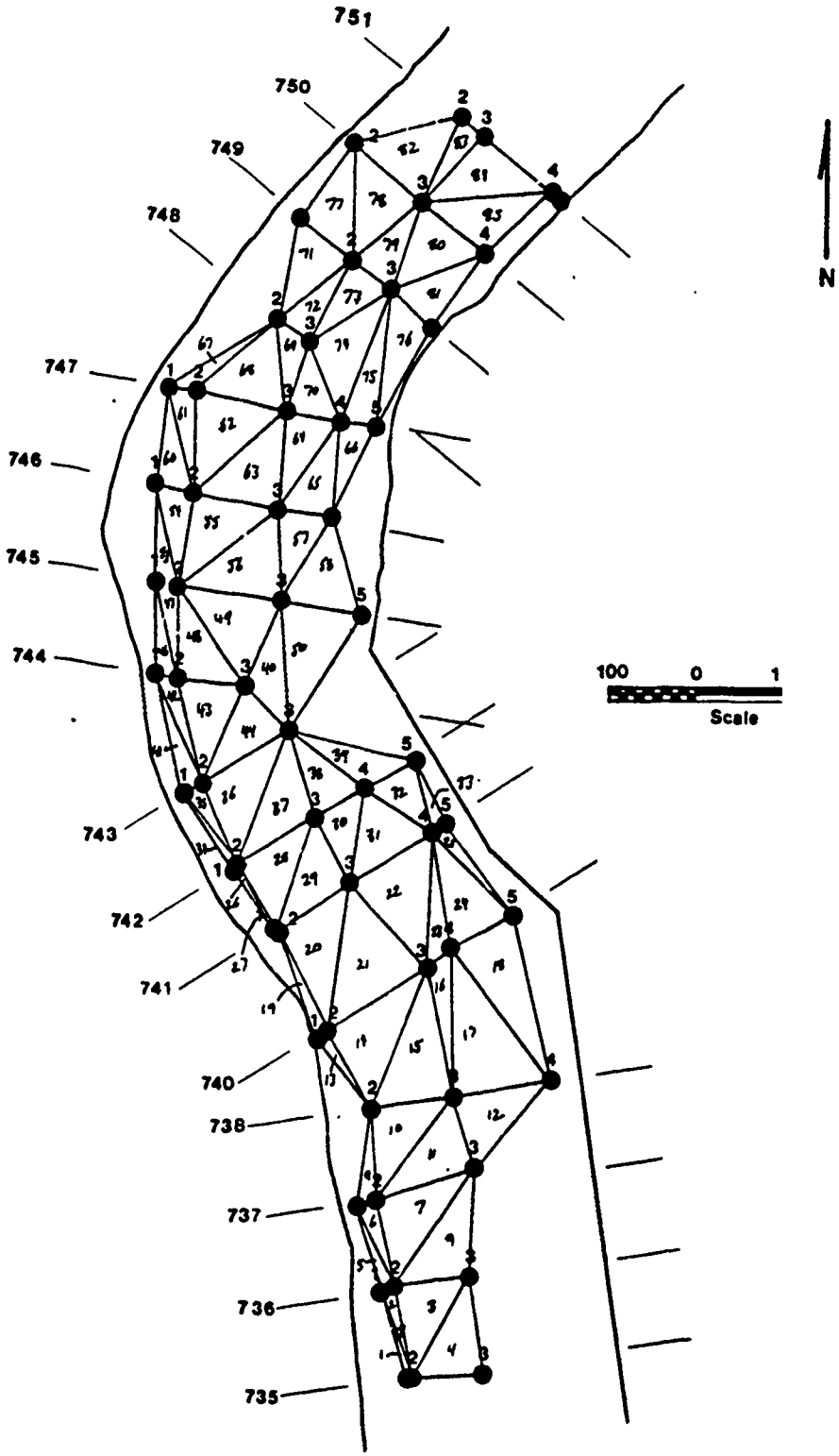

Figure 11. Sampling sites in study area of Buffalo River sediment survey study by Erie County (R-4). (Transects (735-751), cross-sectional positions (1-5), and segment numbers are also shown)

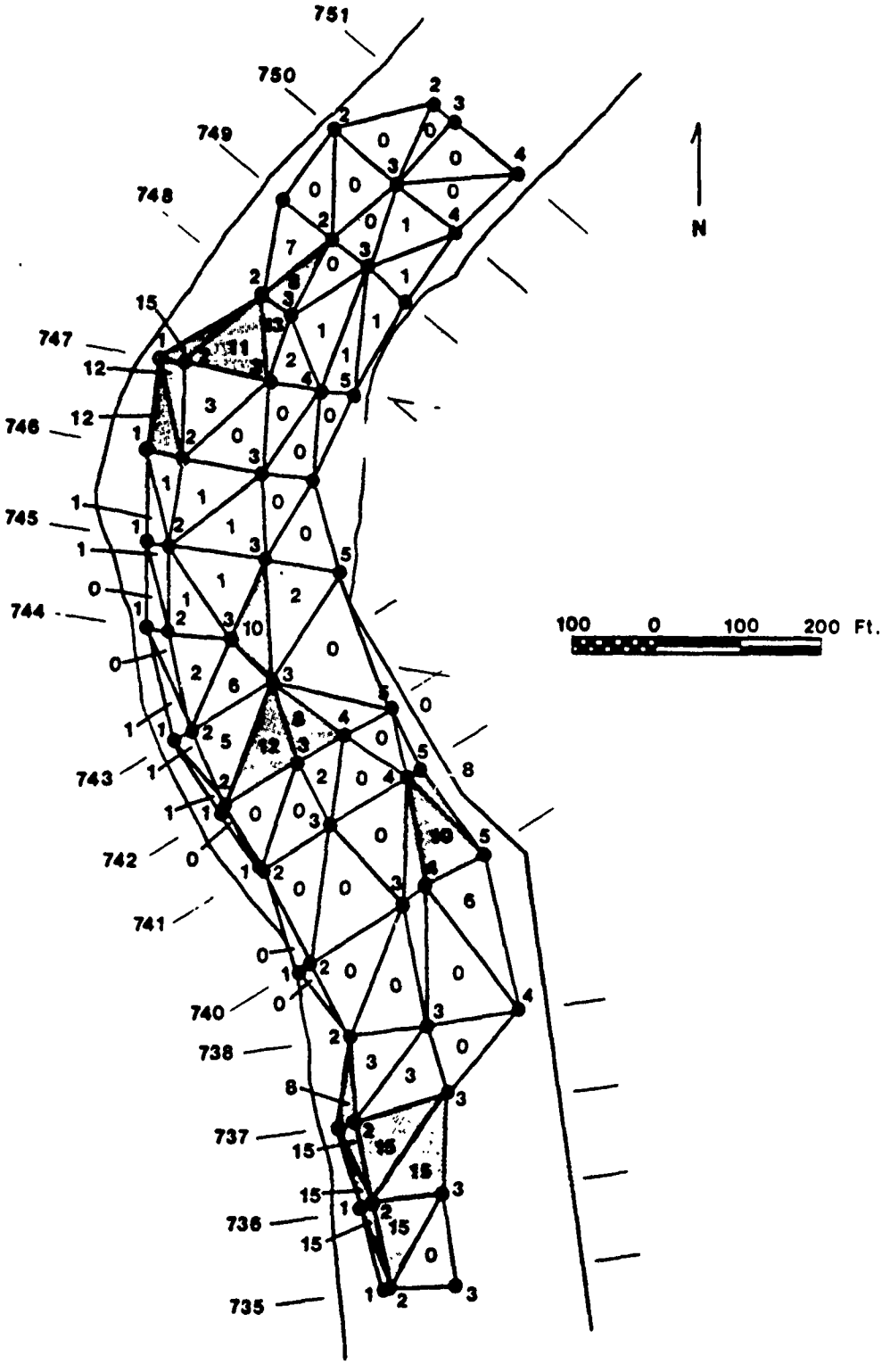

Figure 12. Area distribution of PAHs in Buffalo River sediment survey study (R-4, Figure 12). Numbers within segments denote number of individual PAHs of high concentration. Shaded segments have eight or more individual PAHs of high Concentration

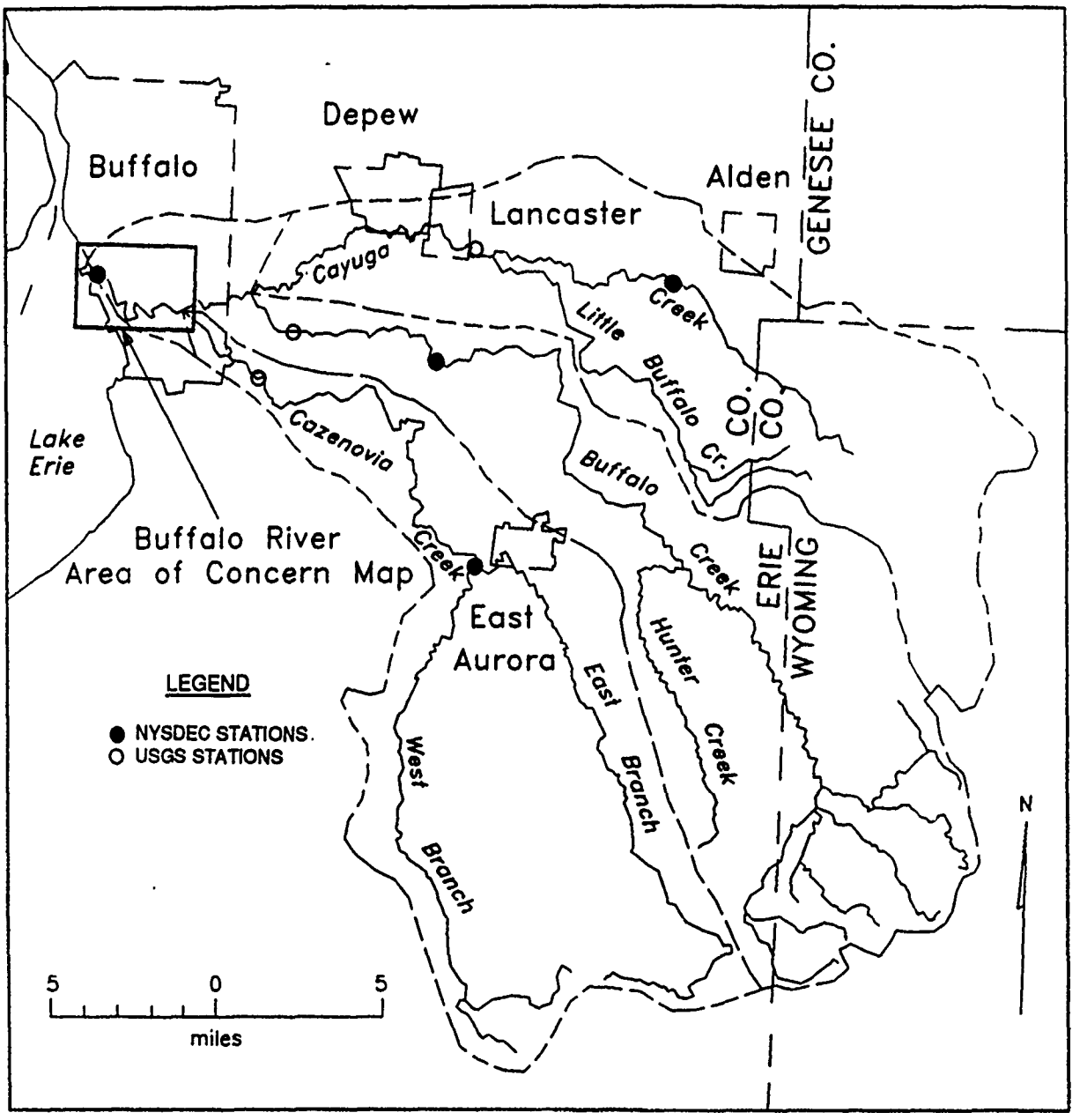

Figure 13. Location of water quality monitoring stations in the Buffalo River watershed (modified from R-16, Figure 2.6)

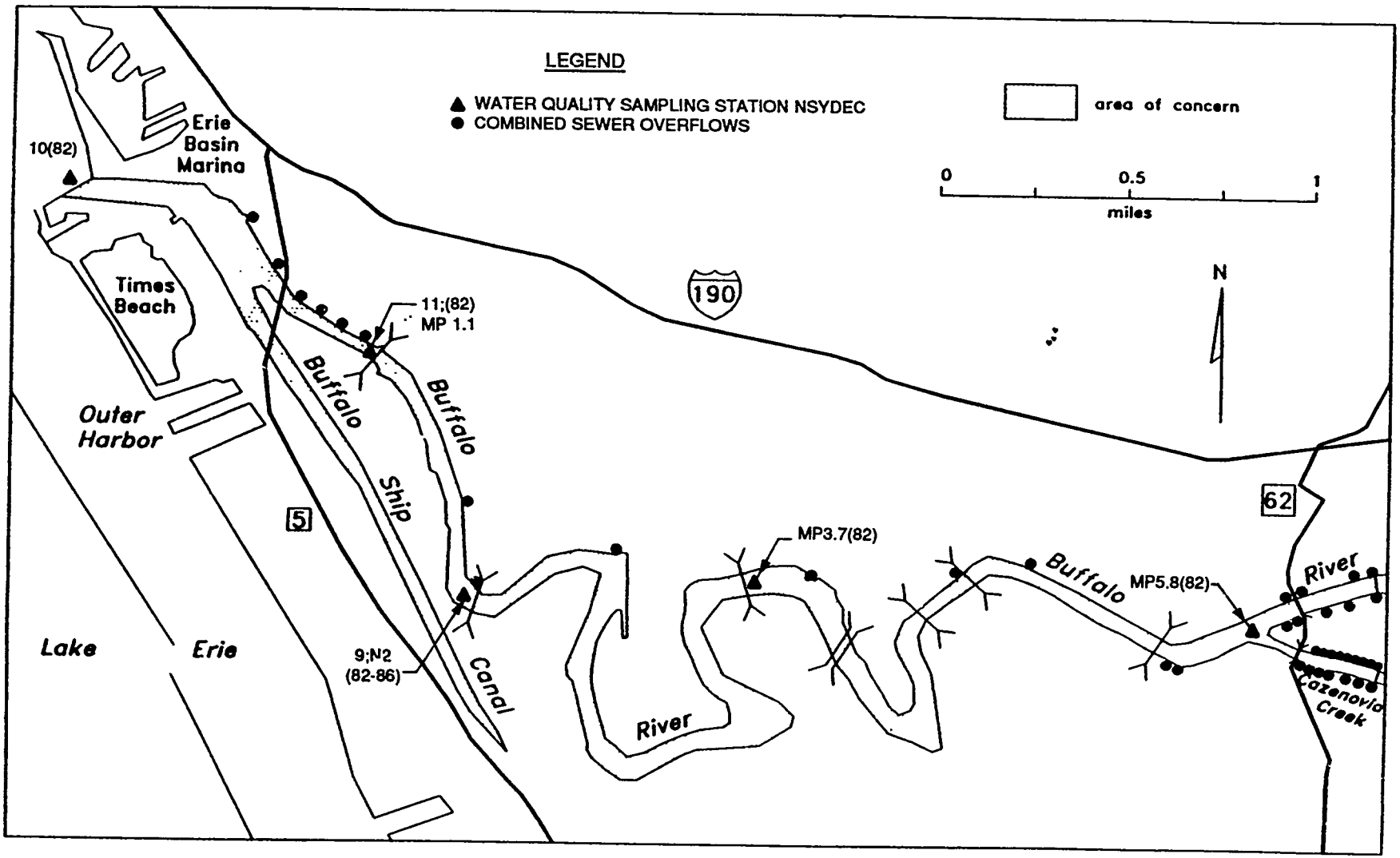

Figure 14. Location of water quality sampling stations and combined sewers overflows in the Buffalo River AOC (modified from R-16, Figure 5.5)

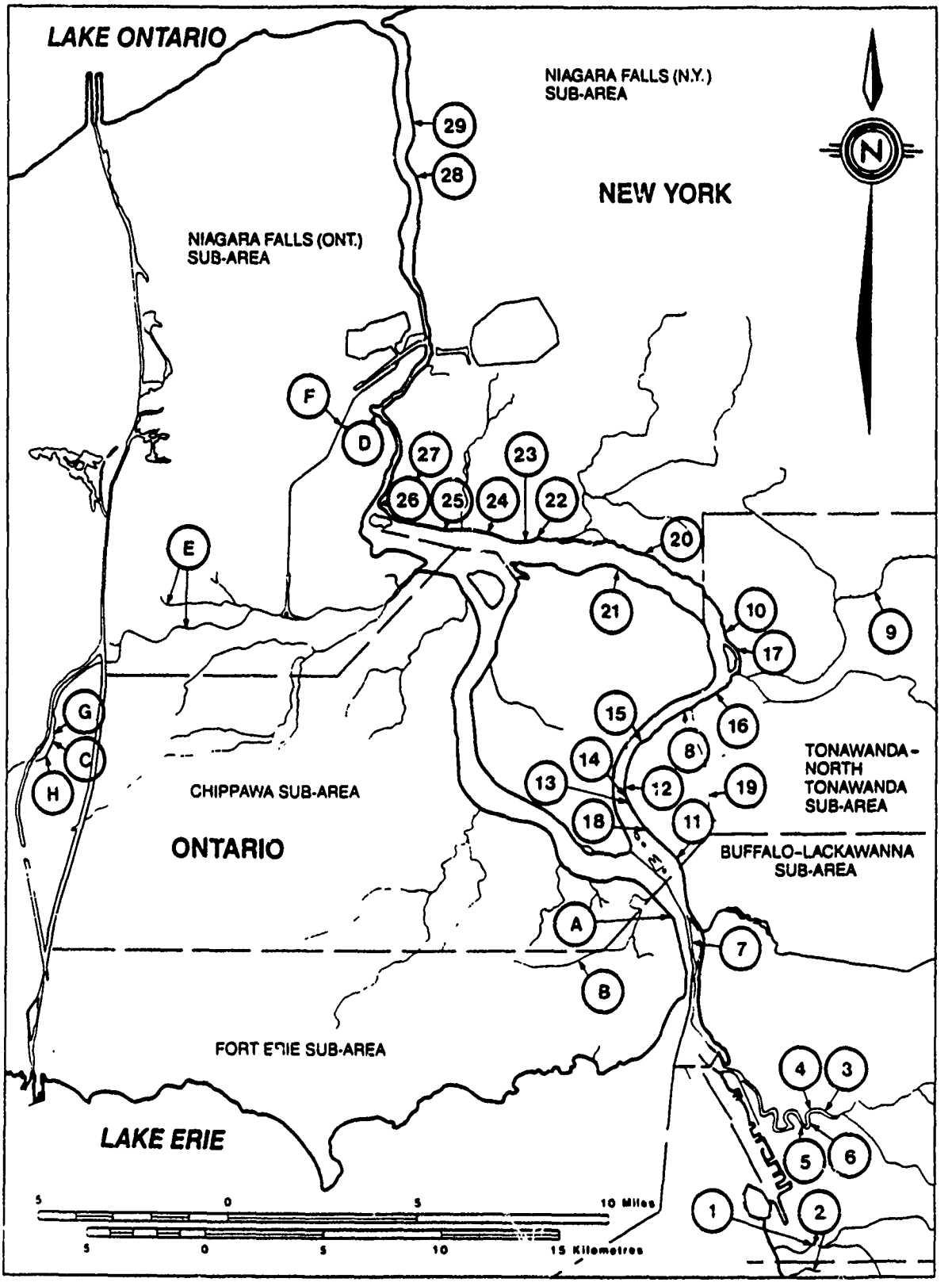

Figure 15. Discharges with significant loadings to the Niagara River (R21, Figure 2.1)

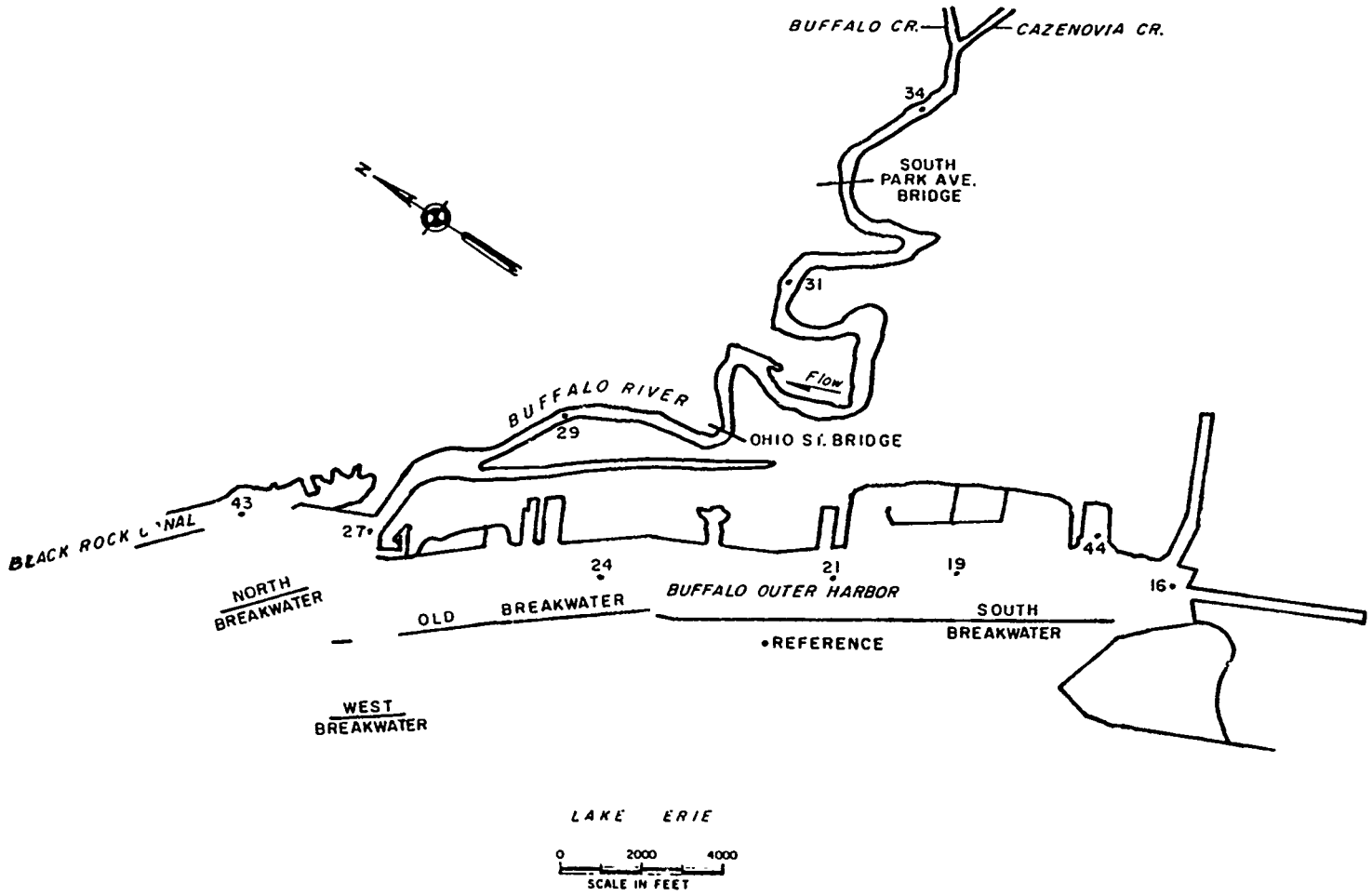

Figure 16. Sediment sampling sites in Buffalo River and harbor for the USACOE sedimentation study (R-29, Figure 1)

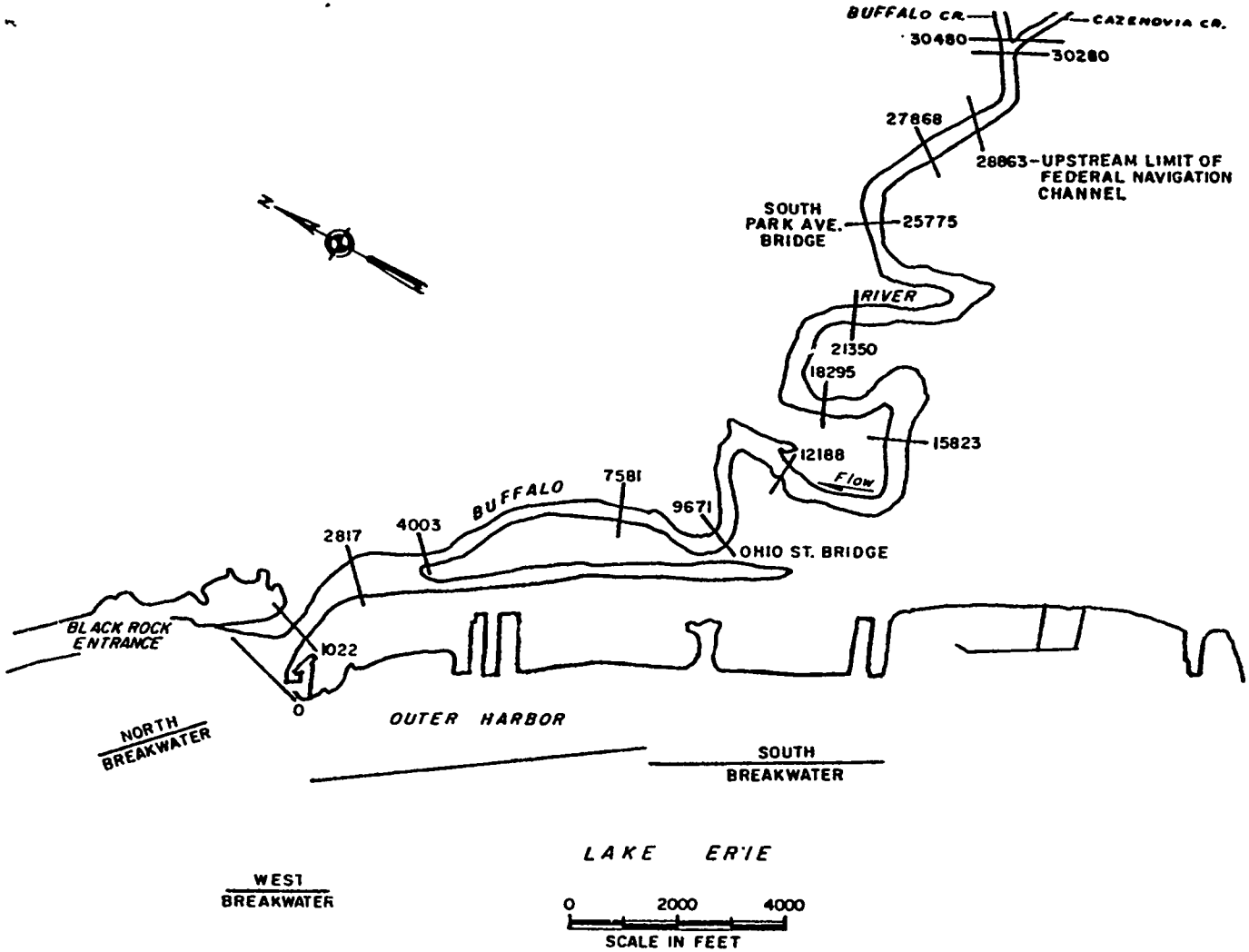

Figure 17. Location of cross sections for sedimentation analysis
(R-29, Figure 2)

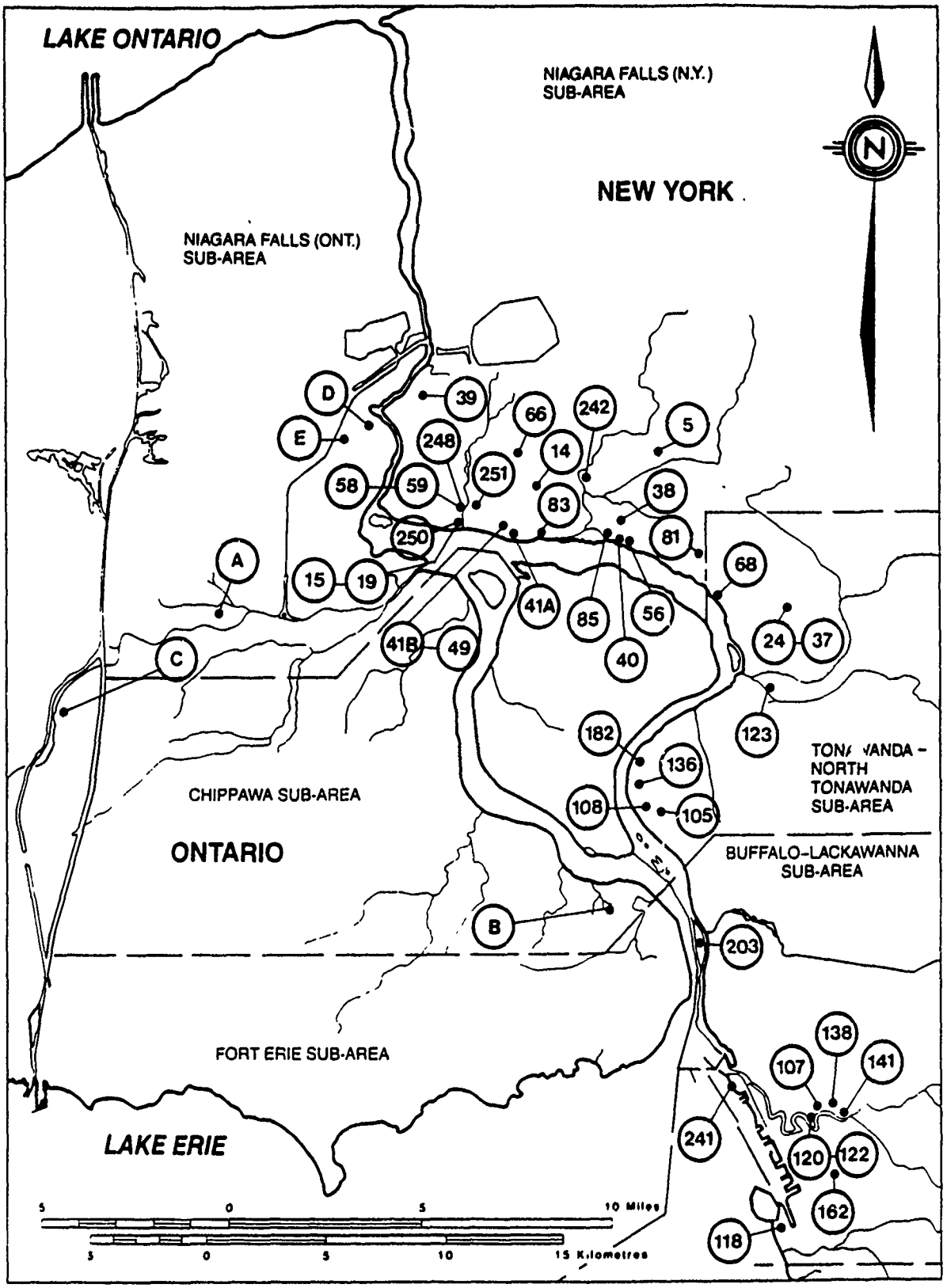

Figure 18. Sites having a significant potential for contaminated migration (R-21, Figure 3.1)

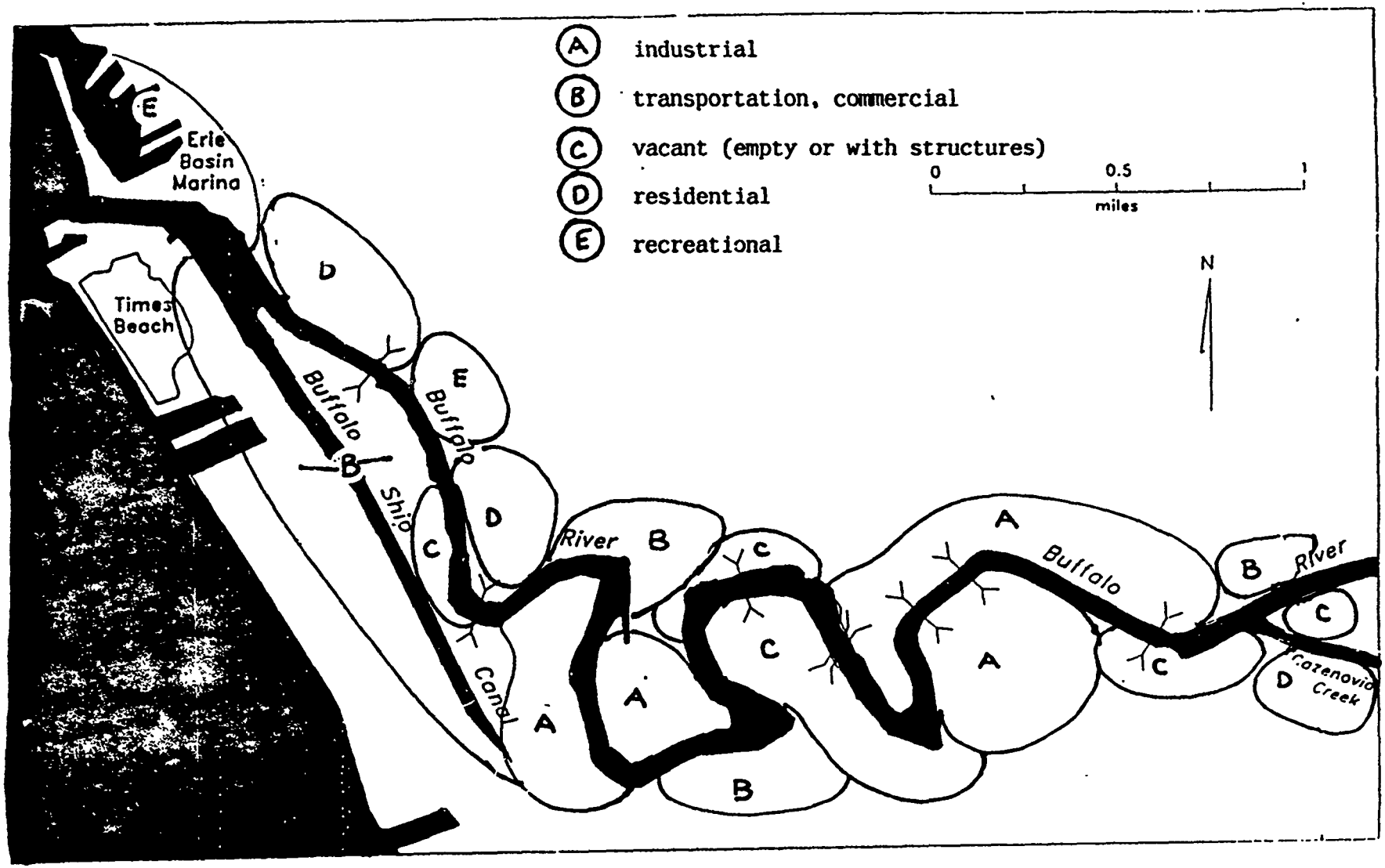

Figure 19. General distribution of current land use along the Buffalo River (R-16, Figure 11.1)

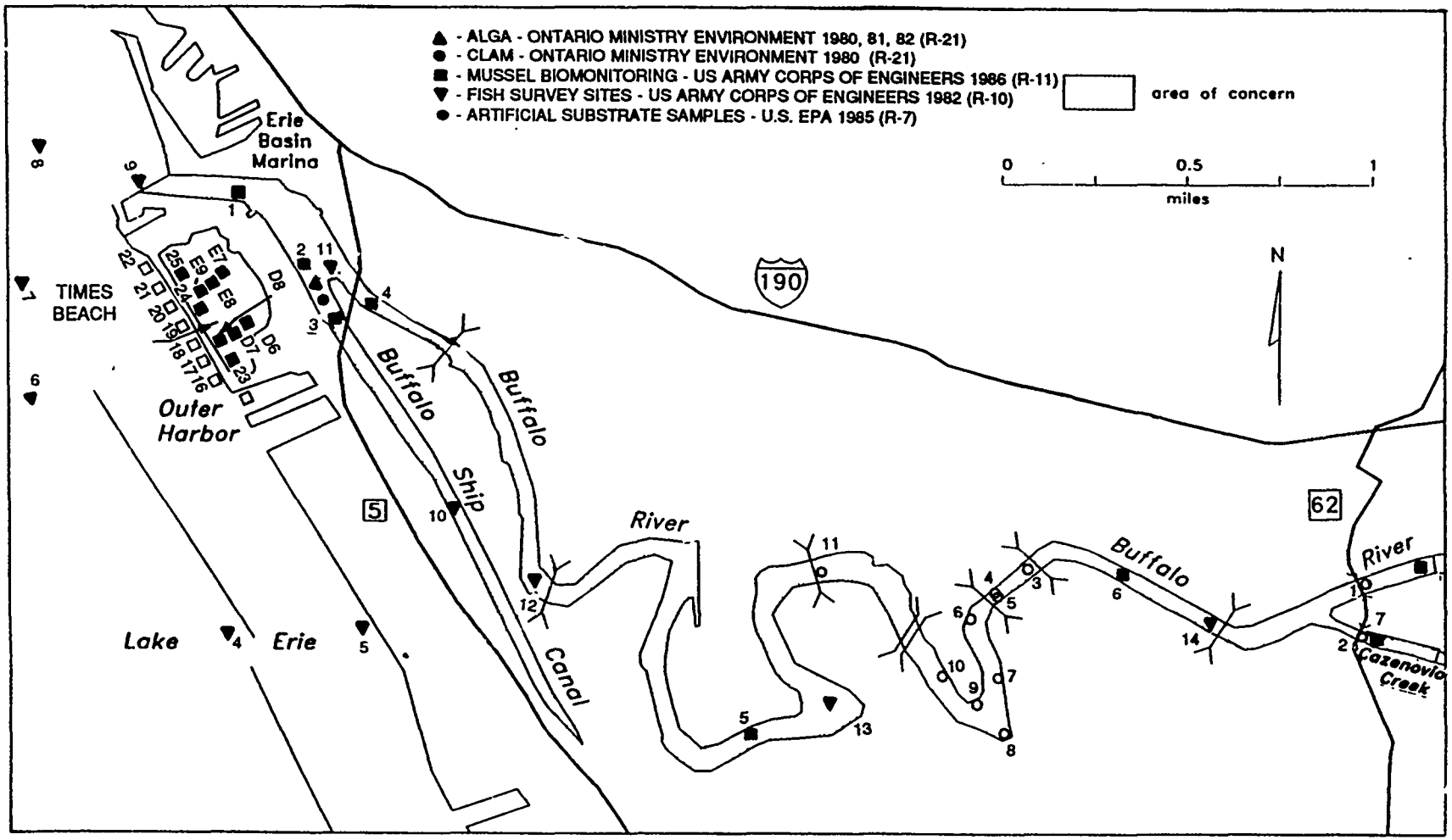

Figure 20. Location of sampling sites for fish, alga, clams, mussels biomonitoring and artificial substrates in the Buffalo River AOC

APPENDIX 1: LITERATURE CITED

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2. Great Lakes Laboratory. 1981. Analysis of Sediment, Water and Elutriate Water Collected and Processed from Buffalo Harbor, New York Sampling Sites. State University College at Buffalo, Open-End Engineer Services Contract Number DACW49-80-C-0053. Buffalo, NY.

3. Laniak, G. F., J. L. Martin, W. W. Sutton, K. P. Brown, C. McConnell, and S. C. McCutcheon. 1990. DRAFT Baseline Human Health Risk Assessment: Buffalo River, New York. EPA/600/***/***. Great Lakes National Program Office, Chicago, IL. and Environmental Research Laboratory, Athens, GA.

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5. Smith, J. A., R. S. Glowacky, and P. J. Crerar. 1984. Analysis of Suspended Sediment and Water Samples from Buffalo River - Buffalo, New York. Technical Report Number G0130-07. Aqua Tech Environmental Consultants, Inc. Melmore, OH.

6. USEPA. 1990. REVIEW DRAFT Assessment and Remediation of Contaminated Sediments (ARCS) Work Plan. Great Lakes Program Office, Chicago, IL.