Water-Quality Assessment of the Albemarle-Pamlico Basin, North Carolina and Virginia—Chemical Analyses of Organic Compounds and Inorganic Constituents in Streambed Sediment, 1992-93

By Michael D. Woodside and Benjamin R. Simerl

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FOREWORD

The mission of the U.S. Geological Survey (USGS) is to assess the quantity and quality of the earth resources of the Nation and to provide information that will assist resource managers and policymakers at Federal, State, and local levels in making sound decisions. Assessment of water-quality conditions and trends is an important part of this overall mission.

One of the greatest challenges faced by water-resources scientists is acquiring reliable information that will guide the use and protection of the Nation's water resources. That challenge is being addressed by Federal, State, interstate, and local water-resource agencies and by many academic institutions. These organizations are collecting water-quality data for a host of purposes that include: compliance with permits and water-supply standards; development of remediation plans for specific contamination problems; operational decisions on industrial, wastewater, or water-supply facilities; and research on factors that affect water quality. An additional need for water-quality information is to provide a basis on which regional- and national-level policy decisions can be based. Wise decisions must be based on sound information. As a society we need to know whether certain types of water-quality problems are isolated or ubiquitous, whether there are significant differences in conditions among regions, whether the conditions are changing over time, and why these conditions change from place to place and over time. The information can be used to help determine the efficacy of existing water-quality policies and to help analysts determine the need for and likely consequences of new policies.

To address these needs, the U.S. Congress appropriated funds in 1986 for the USGS to begin a pilot program in seven project areas to develop and refine the National Water-Quality Assessment (NAWQA) Program. In 1991, the USGS began full implementation of the program. The NAWQA Program builds upon an existing base of water-quality studies of the USGS, as well as those of other Federal, State, and local agencies. The objectives of the NAWQA Program are to:

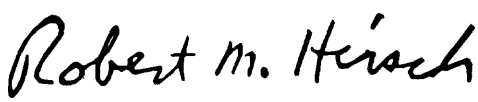
- Describe current water-quality conditions for a large part of the Nation's freshwater streams, rivers, and aquifers.
- Describe how water quality is changing over time.
- Improve understanding of the primary natural and human factors that affect water-quality conditions.

This information will help support the development and evaluation of management, regulatory, and monitoring decisions by other Federal, State, and local agencies to protect, use, and enhance water resources.

The goals of the NAWQA Program are being achieved through ongoing and proposed investigations of 60 of the Nation's most important river basins and aquifer systems, which are referred to as study units. These study units are distributed throughout the Nation and cover a diversity of hydrogeologic settings. More than two-thirds of the Nation's freshwater use occurs within the 60 study units and more than two-thirds of the people served by public water-supply systems live within their boundaries.

National synthesis of data analysis, based on aggregation of comparable information obtained from the study units, is a major component of the program. This effort focuses on selected water-quality topics using nationally consistent information. Comparative studies will explain differences and similarities in observed water-quality conditions among study areas and will identify changes and trends and their causes. The first topics addressed by the national synthesis are pesticides, nutrients, volatile organic compounds, and aquatic biology. Discussions on these and other water-quality topics will be published in periodic summaries of the quality of the Nation's ground and surface water as the information becomes available.

This report is an element of the comprehensive body of information developed as part of the NAWQA Program. The program depends heavily on the advice, cooperation, and information from many Federal, State, interstate, Tribal, and local agencies and the public. The assistance and suggestions of all are greatly appreciated.



Robert M. Hirsch
Chief Hydrologist

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CONVERSION FACTORS, ABBREVIATED WATER-QUALITY UNITS, AND TRADE-NAME DISCLAIMER

Multiply	By	To obtain
centimeter	0.394	inch
meter	3.281	foot
square kilometer	0.3861	square mile
gram	0.03527	ounce, avoirdupois
gram	0.002205	pound, avoirdupois
liter	0.2642	gallon

Temperature expressed in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by the following equation:

$$°F = 1.8\ (°C + 32)$$

Abbreviated water-quality units: Chemical concentration is reported in micrograms per kilogram (µg/kg) or micrograms per gram (µg/g). Micrograms per gram is a unit expressing the concentration of chemical constituents in streambed sediment as weight (micrograms) of constituent per unit weight (gram) of streambed sediment.

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Water-Quality Assessment of the Albemarle-Pamlico Basin, North Carolina and Virginia—Chemical Analyses of Organic Compounds and Inorganic Constituents in Streambed Sediment, 1992-93

By Michael D. Woodside *and* Benjamin R. Simerl

Abstract

In 1991, the U.S. Geological Survey began full-scale implementation of the National Water-Quality Assessment (NAWQA) program. Long-term goals of the NAWQA program are to describe the status and trends in the quality of a large, representative part of the Nation's surface-water and ground-water resources and to describe the primary natural and human factors that affect these resources. One of the first assessment phases of the NAWQA program is to examine the occurrence and distribution of organic and inorganic constituents in streambed sediment.

Streambed sediment was collected at 22 stations in the Albemarle-Pamlico drainage basin that drains into the Albemarle and Pamlico Sounds, the second largest estuarine system in the United States. Streambed-sediment samples were analyzed for 35 organochlorine and 63 semivolatile compounds; 44 major, minor, and trace elements; and forms of organic carbon.

INTRODUCTION

In 1991, the U.S. Geological Survey (USGS) began full-scale implementation of the National Water-Quality Assessment (NAWQA) program. Long-term goals of the NAWQA program are to describe the status and trends in the quality of a large, representative part of the Nation's surface-water and ground-water resources and to describe the primary natural and human factors that affect these resources. In order to meet these goals, the program will collect data on surface-water and ground-water quality and ecological information that will be useful to water-resource managers at the National, State, and local levels (Leahy and others, 1990).

When fully implemented, the NAWQA program will total 60 study units incorporating about 60 to 70 percent of the Nation's water use and population served by public water supply. The Albemarle-Pamlico drainage basin was among the first 20 NAWQA study units selected for study. The initial phase of the Albemarle-Pamlico NAWQA study began in 1991 and is expected to continue through 1996.

The surface-water component of the NAWQA program combines organic and inorganic analyses of water, sediment, and biota to describe the sources, transport, and fate of these constituents. The chemistry of streambed sediment is important because many inorganic and organic constituents can be sorbed to streambed sediments, thereby serving as a reservoir or sink. Concentrations of many inorganic and organic constituents can be several orders of magnitude higher in streambed sediment than in the overlying streamwater (Horowitz, 1985). Inorganic and organic constituents sorbed to streambed sediment also can be transported downstream during high streamflows.

Purpose and Scope

This report includes descriptions of the sampling design, sample collection and preparation, chemical analysis, and analytical data for streambed sediment collected in the Albemarle-Pamlico study unit at 15 stations from October through December 1992 and at

7 stations in August 1993. The purpose of this report is to present the analyses for 35 organochlorine and 63 semivolatile compounds; 44 major, minor, and trace elements; and forms of organic carbon in streambed sediment collected at these stations (fig. 1).

Description of Study Unit

The Albemarle-Pamlico drainage basin is located in North Carolina and Virginia and encompasses about 72,500 square kilometers that drains into the Albemarle and Pamlico Sounds, the second largest estuarine system in the United States. The Tar, Neuse, Roanoke, and Chowan are the major river basins in the Albemarle-Pamlico drainage basin. About 1 percent of the study unit is in the Valley and Ridge Physiographic Province, 3 percent in the Blue Ridge Physiographic Province, 44 percent in the Piedmont Physiographic Province, and 52 percent in the Coastal Plain Physiographic Province. About 5 percent of the land in the study unit is developed for urban and industrial use, about 15 percent is wetlands, about 30 percent is cropland (tobacco, soybean, corn, wheat, cotton, and peanut) and livestock (hogs, poultry, and cattle), and about 50 percent is forested (McMahon and Lloyd, 1995). In 1990, the population of the counties and cities that are entirely, or partially, drained by streams in the study unit was about 3 million (McMahon and Lloyd, 1995).

METHODS

The sampling design, sample collection and preparation procedures, and chemical analysis methods are described in this section.

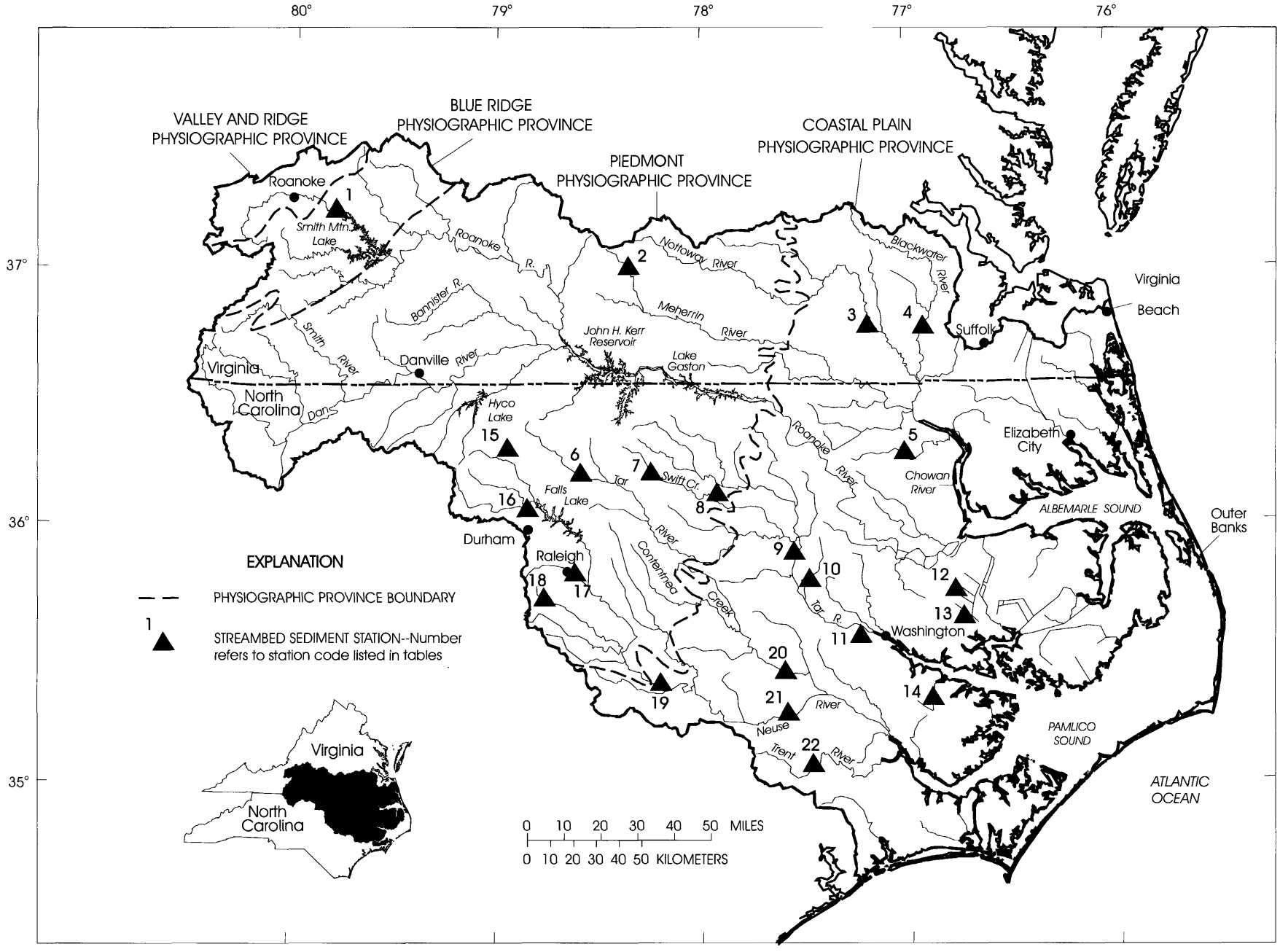
Sampling Design

Streambed sediment was collected at 22 stations in the Albemarle-Pamlico drainage basin (fig. 1 and table 1). These 22 stations include a network of 11 fixed stations where water-quality samples are collected monthly. Ecological information and biological

Table 1. Stations in the Albemarle-Pamlico Basin where streambed sediment was collected, 1992-93
[--, not a fixed station]

Station code	Station number	Station type	Station name	Latitude	Longitude
1	02056670	--	Roanoke River at State route 634 near Hardy, Va.	371310	794756
2	02051000	--	North Meherrin River near Lunenburg, Va.	365953	782103
3	02047000	Integrator	Nottoway River near Sebrell, Va.[1]	364613	770959
4	02049500	Integrator	Blackwater River near Franklin, Va.[1]	364545	765355
5	02053490	--	Ahoskie Creek near Poortown, N.C.	361718	770132
6	02081500	--	Tar River near Tar River, N.C.[2]	361141	783500
7	02082731	Indicator	Devils Cradle Creek near Alert, N.C. at State route 1412[2]	361203	781419
8	02082770	--	Swift Creek at Hilliardston, N.C.[2]	360642	775516
9	02083500	Integrator	Tar River at Tarboro, N.C.[2]	355338	773200
10	02083833	Indicator	Pete Mitchell Swamp at State route 1409 near Penny Hill, N.C.[2]	354600	772926
11	02084160	Indicator	Chicod Creek at State route 1760 near Simpson, N.C.[2]	353347	771343
12	02084557	Indicator	Van Swamp near Hoke, N.C.[2]	354349	764449
13	02084558	Indicator	Albemarle Canal near Swindell, N.C.[2]	353818	764319
14	02084540	Indicator	Durham Creek at Edward, N.C.[2]	351925	765226
15	02085390	--	North Flat River at Timberlake, N.C.	361724	785643
16	02086849	--	Ellerbe Creek near Gorman, N.C.[2]	360333	784958
17	02087324	--	Crabtree Creek at U.S. 1 near Raleigh, N.C.[2]	354840	783643
18	02087580	--	Swift Creek near Apex, N.C.[2]	354307	784509
19	02088119	--	Neuse River near Cox Mill, N.C.	352227	781147
20	02091500	Integrator	Contentnea Creek at Hookerton, N.C.[2]	352544	773459
21	02089500	Integrator	Neuse River at Kinston, N.C.[2]	351529	773509
22	02092500	--	Trent River near Trenton, N.C.[2]	350354	772724

[1]Refers to station description in Water Resources Data, Virginia, Water Year 1993 (Prugh and others, 1994).
[2]Refers to station description in Water Resources Data, North Carolina, Water Year 1993 (Barker and others, 1994).



Base from U.S. Geological Survey 1:2,000,000

Figure 1. Locations of the Albemarle-Pamlico drainage basin and the streambed-sediment sampling stations.

data also are collected at most of these fixed stations. Fixed stations were selected to represent a range of spatial and temporal scales and environmental settings in selected areas of the Albemarle-Pamlico study unit. The fixed station network is divided into 5 integrator and 6 indicator stations. Integrator stations represent the quality of water in large river basins by integrating or combining the affects of numerous point and nonpoint sources, land uses, and environmental settings. Indicator stations are located in small basins having a large percentage of one or two land uses and environmental settings. The other 11 stations were selected to represent examples of mixed land uses and environmental settings not represented by the indicator stations.

Streambed sediment was collected within a 100-meter stream reach upstream from the road crossing at indicator stations. The 100-meter stream reach was expanded at a few stations to encompass enough depositional zones to collect sufficient amounts of streambed sediment. The stream reach was expanded to 300 meters at integrator stations.

Because metals and selected hydrophobic organic chemicals tend to be concentrated in the fine-grained sediments, the streambed-sediment sampling design focused on depositional zones having fine-grained, surficial sediments. Five to 10 wadable, depositional zones were identified in a stream reach. A depositional zone is an area where stream velocities have decreased and fine-grained sediments settle to the streambed. Depositional zones are often located on the inside of meander bends, behind large rocks or trees in the channel, and along the edge of the streambank. The number of streambed-sediment samples collected from each of the depositional zones was proportional to the size of the depositional zone. Wadable depositional zones were selected because of the ease of sampling and the decreased potential of sample contamination.

Sampling Procedures

Collection and processing guidelines for streambed sediment are discussed in detail by Shelton and Capel (1994). All sample collection and processing equipment was washed with phosphate-free detergent, rinsed with tap water and then rinsed again with deionized water. Equipment used for processing samples for trace element analyses was then rinsed with 5-percent nitric acid, rinsed with deionized water, air dried, and placed in plastic bags. After the initial detergent wash and subsequent rinses, equipment used for processing samples for organic analyses was then rinsed with methanol, air dried, and wrapped in aluminum foil. Collection equipment was washed with detergent, rinsed with nitric acid, and then rinsed with methanol.

Wadable depositional zones were sampled at all stations except at station 02056670, which is located in the backwater of Smith Mountain Lake. An Ekman dredge was used to collect streambed sediment at this station.

Streambed sediment was usually collected by wading into a depositional zone from the downstream end to minimize the disturbance of the fine-grained sediment. A Teflon cylinder (1.5 centimeters diameter) was inserted 2 to 3 centimeters into the streambed sediment. A Teflon spatula was inserted under the cylinder to prevent water in the cylinder from draining out of the bottom while removing the streambed-sediment core. The core was inspected for fine-grained sediment and the water above the core decanted. The cores were composited in a glass bowl. The composited sample was thoroughly mixed using a Teflon spatula.

A subsample of the composited streambed-sediment sample was dry sieved through a 2-millimeter stainless-steel sieve into a 1-liter wide-mouth glass bottle (pre-baked at 450°Celsius) for organic analyses. A Teflon stirrer was used to push the streambed sediment through the sieve. About 500 grams of wet sediment was collected in the bottle.

Another subsample of the composited streambed sediment was wet sieved through a 63-micrometer nylon-cloth sieve with a plastic frame into a 400-milliliter plastic jar for inorganic analyses. Less than 1 liter of native streamwater was used for wet sieving. The native streamwater was reused by allowing the sieved streambed sediment and native streamwater mixture to settle for several minutes and decanting the native streamwater back into a wash bottle for wet sieving. This process was repeated until there was approximately 5 centimeters of fine-grained sediment in the plastic jar.

The inorganic and organic samples were placed on ice immediately after sieving. The organic samples were sent to the laboratory within 3 days of collection. The inorganic samples were transported back to the Richmond, Va., District office and stored in the refrigerator to allow fine-grained sediment to settle. The fine-grained sediments usually settled within 1

week, and the water was decanted from the samples. These samples were then sent to the laboratory on ice.

Chemical Analysis

Streambed-sediment samples for organochlorine and semivolatile organic compounds were analyzed by the USGS, Water Resources Division, National Water Quality Laboratory in Arvada, Colo. Streambed sediment samples for inorganic constituents were analyzed by the USGS, Geologic Division, Branch of Geochemistry in Lakewood, Colo.

Minimum reporting limits for organochlorine compounds in streambed sediment are listed in table 2. The organochlorine compounds were isolated by solvent extraction, gel permeation and adsorption chromatographic fractionation, and analyzed by dual capillary-column gas chromatography with electron capture detection (Foreman and others, written commun., 1994). Minimum reporting limits for the semivolatile organic compounds in streambed sediment are listed in table 3. The semivolatile organic compounds were isolated by solvent extraction and gel permeation chromatography, and analyzed by gas chromatography/mass spectrometry (Foreman and others, written commun., 1994).

The surrogates terphenyl-d_{14}, nitrobenzene-d_5, and 2-fluorobiphenyl were added to each sample analyzed for semivolatile organic compounds. The surrogates alpha d_6-hexachlorocyclohexane, 3,5-dichlorobiphenyl, and octachlorobiphenyl were added to samples analyzed for organochlorine compounds. Surrogates enhance the evaluation of overall laboratory method performance and sample matrix effects. The surrogates and the target constituents do not react in a similar manner in all sample matrixes; thus, a correction factor for surrogate recoveries was not applied to the data.

Analytical methods, decomposition methods, and minimum reporting limits for inorganic constituents are listed in table 4. Protocols used for sample preparation, analytical methods, and laboratory quality control are described by Arbogast (1990).

Table 2. Minimum reporting levels for organochlorine compounds in streambed sediment

[µg/kg, micrograms per kilogram; DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethylene; DDT, dichlorodiphenyltrichloroethane; HCH, hexachlorocyclohexane; PCA, pentachloroanisole; PCB's, polychlorinated biphenyls]

Organochlorine compounds	Method reporting level (µg/kg)
Aldrin	1
cis-Chlordane	1
trans-Chlordane	1
Oxychlordane	1
Chloroneb	5
DCPA(Dacthal)	5
o, p' DDD	1
p, p' DDD	1
o, p' DDE	1
p, p' DDE	1
o, p' DDT	2
p, p' DDT	2
Dieldrin	1
Endosulfan I	1
Endrin	2
Hexachlorobenzene	1
alpha-HCH	1
beta-HCH	1
gamma-HCH	1
Heptachlor	1
Heptachlor Epoxide	1
Isodrin	1
o, p' Methoxychlor	5
p, p' Methoxychlor	5
Mirex	1
cis-Nonachlor	1
trans-Nonachlor	1
PCA	1
cis-Permethrin	5
trans-Permethrin	5
total PCB's	50
Toxaphene (technical)	200
alpha d_6-HCH (surrogate)	percent recovery
3,5-Dichlorobiphenyl (surrogate)	percent recovery
Octachlorobiphenyl (surrogate)	percent recovery

ORGANIC COMPOUNDS AND INORGANIC CONSTITUENTS IN STREAMBED SEDIMENT

Streambed-sediment samples were collected at 22 stations in the Albemarle-Pamlico study unit (fig. 1 and table 1).

Reporting levels for organic compounds and inorganic constituents are listed in tables 2, 3, and 4. Concentrations for organochlorine compounds are listed in table 5. Concentrations for semivolatile organic compounds are listed in table 6. Concentrations for

inorganic constituents are listed in table 7. A less than value in tables 4, 5, and 6 indicate the constituent was not detected above the reporting level. The reporting level may be raised if insufficient streambed sediment was submitted to the laboratory. Sample matrix interferences also can result in raised reporting levels. Some of the organic data are reported below reporting levels. A laboratory analyst can often identify a constituent below a reporting level, but these data are considered to be qualitative.

Two streambed-sediment samples were collected at Tar River at Tarboro, N.C., and at Neuse River at Kinston, N.C., to assess intrasite variability. At Tar River at Tarboro, N.C., the first streambed-sediment sample was collected from the edges of the streambank, and the second streambed-sediment sample was collected from the inside of meander bends in the same stream reach. At Neuse River at Kinston, N.C., the first streambed-sediment sample was collected at numerous points within a 300-meter stream reach upstream of the bridge, and the second streambed-sediment sample was collected throughout another 300-meter stream reach just upstream from the first stream reach.

Table 3. Minimum reporting levels for semivolatile organic compounds in streambed sediment
[values are reported in micrograms per kilogram, unless otherwise noted; g/kg, grams per kilogram]

Semivolatile organic compounds	Minimum reporting level	Semivolatile organic compounds	Minimum reporting level
Acenapthene	50	2,4-Dinitrotoluene	50
Acenapthylene	50	2,6-Dinitrotoluene	50
Acridine	50	Di-*n*-octylphthalate	50
C_8-Alkylphenol	50	2-Ethylnaphthalene	50
Anthracene	50	Fluoranthene	50
Anthraquinone	50	9H-Fluorene	50
Azobenzene	50	Indeno(1,2,3-*c*,*d*)pyrene	50
Benz(*a*)anthracene	50	Isophorone	50
Benzo(*c*)cinnoline	50	Isoquinoline	50
Benzo(*b*)fluoranthene	50	2-Methylanthracene	50
Benzo(*k*)fluoranthene	50	1-Methyl-9H-fluorene	50
Benzo(*ghi*)perylene	50	1-Methylphenanthrene	50
Benzo(*a*)pyrene	50	1-Methylpyrene	50
2,2'-Biquinoline	50	4,5-Methylenephenanthrene	50
Bis(2-Chloroethoxy)methane	50	Naphthalene	50
Bis(2-Ethylhexyl)phthlate	50	Nitrobenzene	50
4-Bromophenyl-phenylether	50	N-nitrosodi-*n*-propylamine	50
Butylbenzylphthalate	50	N-nitrosodiphenylamine	50
9H-Carbazole	50	Pentachloronitrobenzene	50
4-Chloro-3-Methylphenol	50	Phenanthrene	50
2-Chloronapthalene	50	Phenanthridine	50
2-Chlorophenol	50	Phenol	50
4-Chlorophenyl-phenylether	50	Pyrene	50
Chrysene	50	Quinoline	50
p-Cresol	50	1,2,4-Trichlorobenzene	50
Dibenz(*a*,*h*)anthracene	50	2,3,6-Trimethylnaphthalene	50
Dibenzothiophene	50	2-Fluorobiphenyl (surrogate)	percent recovery
Di-*n*-butylphthalate	50	Nitrobenzene-d_5 (surrogate)	percent recovery
1,2-Dichlorobenzene	50	Terphenyl-d_{14} (surrogate)	percent recovery
1,3-Dichlorobenzene	50	Inorganic Carbon	.1 g/kg
1,4-Dichlorobenzene	50	Organic Carbon	.1 g/kg
Diethylphthalate	50	Inorganic + Organic Carbon	.1 g/kg
1,2-Dimethylnaphthalene	50		
1,6-Dimethylnaphthalene	50		
2,6-Dimethylnaphthalene	50		
3,5-Dimethylphenol	50		
Dimethylphthalate	50		

Table 4. Analytical methods and minimum reporting levels for inorganic constituents and carbon in fine-grained (less than 63 micrometers) streambed sediment

[values are reported in micrograms per gram, unless otherwise noted;%, percent; do, ditto; AAS, atomic absorption spectrometry; CV, cold vapor generation; DNAA, delayed neutron activation analysis; GF, graphite furnace; ICP-AES, inductively coupled plasma atomic emission spectrometry; IR, infrared detection; 4-acid, digestion by use of HCl, HNO_3, $HClO_4$, and HF acids; 3-acid, digestion by use of HNO_3, $HClO_4$, and HF acids; 2-acid; digestion by use of HCl, HF, and H_2O_2; Chromate, digestion by use of HNO_3 and $Na_2Cr_2O_7$; Combustion, decomposition method for total carbon and sulfur; $HClO_4$, digestion by use of the acid $HClO_4$]

Element	Analytical method	Decomposition method	Method reporting level
Aluminum	ICP-AES	4-acid	0.005%
Antimony	Hydride-AAS	3-acid	.1
Arsenic	do	3-acid	.1
Barium	ICP-AES	4-acid	1
Beryllium	do	4-acid	1
Bismuth	do	4-acid	10
Cadmium	GF-AAS	2-acid	.1
Calcium	ICP-AES	4-acid	.005%
Carbon, total	IR	Combustion	.05%
Carbon, organic	By difference		
Carbon, carbonate (inorganic)	Titration	$HClO_4$	.01%
Cerium	ICP-AES	4-acid	4
Chromium	do	4-acid	1
Cobalt	do	4-acid	1
Copper	do	4-acid	1
Europium	do	4-acid	2
Gallium	do	4-acid	4
Gold	do	4-acid	8
Holmium	do	4-acid	4
Iron	do	4-acid	.005%
Lanthanum	do	4-acid	2
Lead	do	4-acid	4
Lithium	do	4-acid	2
Magnesium	do	4-acid	.005%
Manganese	do	4-acid	4
Mercury	CV-AAS	Chromate	.02
Molybdenum	ICP-AES	4-acid	2
Neodymium	do	4-acid	4
Nickel	do	4-acid	2
Niobium	do	4-acid	4
Phosphorus	do	4-acid	.005%
Potassium	do	4-acid	.05%
Scandium	do	4-acid	2
Selenium	Hydride-AAS	3-acid	.1
Silver	GF-AAS	2-acid	.1
Sodium	ICP-AES	4-acid	.005%
Strontium	do	4-acid	2
Sulfur	IR	Combustion	.05%
Tantalum	ICP-AES	4-acid	40
Thorium	DNAA		1
Tin	ICP-AES	4-acid	10
Titanium	do	4-acid	.005%
Uranium	DNAA		.1
Vanadium	ICP-AES	4-acid	2
Ytterbium	do	4-acid	1
Yttrium	do	4-acid	2
Zinc	do	4-acid	2

Table 5. Analyses of organochlorine compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93

[values are reported in micrograms per kilogram; --, no data available; <, less than; DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethylene; DCPA, dacthal; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Aldrin	*cis*-Chlordane	*trans*-Chlordane	Oxychlordane	Chloroneb	DCPA	*o, p'* DDD	*p, p'* DDD	*o, p'* DDE	*p, p'* DDE
1	02056670	<1	2.2	3.2	<1	<5	<5	4.8	7.5	<1	9.6
2	02051000	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
3	02047000	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
4	02049500	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	1.2
5	02053490	<1	<1.0	<1.0	<1	<5	<5	<1.0	3.9	<1	9.5
6	02081500	<1	<1.0	<1.0	<1	--	<5	<1.0	<1.0	<1	<1.0
7	02082731	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
8	02082770	<1	<1.0	<1.0	<1	<5	<5	1.0	3.7	<1	2.4
9	02083500	<1	<1.0	<1.0	<1	<5	<5	<1.0	1.6	<1	1.6
9	02083500	<1	<1.0	<1.0	<1	<5	<5	<1.0	2.5	<1	2.5
10	02083833	<1	<1.0	<1.0	<1	<5	<5	1.6	6.9	<1	21.0
10	02083833	<1	<1.0	<1.0	<1	<5	<5	2.3	8.9	<1	26.0
12	02084557	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
13	02084558	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
14	02084540	<3	<3.0	<3.0	<3	<15	<15	<3.0	<3.0	<3	3.7
15	02085390	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
16	02086849	<1	1.5	2.0	<1	<5	<5	<1.0	1.3	<1	3.9
17	02087324	<1	<1.0	<1.0	<1	--	<5	<1.0	<1.0	<1	<1.0
18	02087580	<1	<1.0	<1.0	<1	<5	<5	<1.0	2.9	<1	3.5
19	02088119	<1	<1.0	<1.0	<1	--	<5	<1.0	<2.0	<1	1.2
20	02091500	<1	<1.0	<1.0	<1	<5	<5	<1.0	2.8	<1	1.4
21	02089500	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0
21	02089500	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	1.0
22	02092500	<1	<1.0	<1.0	<1	<5	<5	<1.0	<1.0	<1	<1.0

Table 5. Analyses of organochlorine compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; DDT, dichlorodiphenyltrichloroethane; HCH, hexachlorocyclohexane; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	*o, p'* DDT	*p, p'* DDT	Dieldrin	Endosulfan 1	Endrin	Hexachloro-benzene	*alpha*-HCH	*beta*-HCH	*gamma*-HCH	Heptachlor
1	02056670	<2.0	3.4	<1.0	1.6	<2	<1	<1	<1	<1	<1
2	02051000	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
3	02047000	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
4	02049500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
5	02053490	<2.0	8.4	1.6	<1.0	<2	<1	<1	<1	<1	<1
6	02081500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
7	02082731	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
8	02082770	<2.0	2.1	<1.0	<1.0	<2	<1	<1	<1	<1	<1
9	02083500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
9	02083500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
10	02083833	3.3	22.0	2.0	<1.0	<2	<1	<1	<1	<1	<1
10	02083833	4.9	22.0	2.9	<1.0	<2	<1	<1	<1	<1	<1
12	02084557	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
13	02084558	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
14	02084540	<6.0	<6.0	<3.0	<3.0	<6	<3	<3	<3	<3	<3
15	02085390	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
16	02086849	<2.0	<2.0	1.2	<1.0	<2	<1	<1	<1	<1	<1
17	02087324	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
18	02087580	<2.0	2.4	<1.0	<1.0	<2	<1	<1	<1	<1	<1
19	02088119	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
20	02091500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
21	02089500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
21	02089500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1
22	02092500	<2.0	<2.0	<1.0	<1.0	<2	<1	<1	<1	<1	<1

Table 5. Analyses of organochlorine compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; PCA, pentachloroanisole; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Heptachlor Epoxide	Isodrin	*o,p'* Methoxychlor	*p,p'* Methoxychlor	Mirex	*cis*-Nonachlor	*trans*-Nonachlor	PCA	*cis*-Permethrin	*trans*-Permethrin
1	02056670	<1	<1	<5	<5	<1	<1	2.0	<1	<5	<12
2	02051000	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
3	02047000	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
4	02049500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
5	02053490	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
6	02081500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
7	02082731	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
8	02082770	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
9	02083500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
9	02083500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
10	02083833	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
10	02083833	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
12	02084557	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
13	02084558	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
14	02084540	<3	<3	<15	<15	<3	<3	<3.0	<3	<15	<15
15	02085390	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
16	02086849	<1	<1	<5	<5	<1	<1	1.4	<1	<6	<5
17	02087324	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<6
18	02087580	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
19	02088119	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
20	02091500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
21	02089500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
21	02089500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5
22	02092500	<1	<1	<5	<5	<1	<1	<1.0	<1	<5	<5

Table 5. Analyses of organochlorine compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; unless otherwise noted; percent, <, less than; HCH, hexachlorocyclohexane; PCB's, polychlorinated biphenyls; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	PCB's, total	Toxaphene	alpha-d_6-HCH (percent surrogate recovery)	3,5-Dichlorobiphenyl (percent surrogate recovery)	Octachlorobiphenyl (percent surrogate recovery)
1	02056670	<100	<200	63	53	67
2	02051000	<100	<200	42	44	68
3	02047000	<100	<200	55	39	63
4	02049500	<100	<200	68	50	79
5	02053490	<100	<200	100	83	61
6	02081500	<100	<200	57	72	87
7	02082731	<50	<200	37	42	40
8	02082770	<100	<200	76	58	43
9	02083500	<100	<200	50	41	60
9	02083500	<100	<200	62	53	75
10	02083833	<50	<200	44	64	66
10	02083833	<50	<200	60	74	71
12	02084557	<50	<200	58	53	61
13	02084558	<50	<200	53	57	62
14	02084540	<150	<200	55	48	52
15	02085390	<100	<200	79	61	54
16	02086849	<50	<200	58	64	63
17	02087324	<100	<200	64	73	79
18	02087580	<100	<200	61	55	39
19	02088119	<100	<200	52	60	64
20	02091500	<50	<200	62	54	56
21	02089500	<100	<200	60	46	69
21	02089500	<100	<200	68	44	89
22	02092500	<100	<200	54	61	46

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Acenapthene	Acenapthylene	Acridine	C_8-Alkylphenol	Anthracene	Anthraquinone	Azobenzene	Benz(*a*) anthracene
1	02056670	<50	27	27	<50	69	100	<50	190
2	02051000	<50	<50	<50	<50	<50	<50	<50	<50
3	02047000	<50	<50	<50	<50	<50	<50	<50	<50
4	02049500	<50	<50	<50	<50	<50	11	<50	<50
5	02053490	<50	<50	<50	<50	<50	<50	<50	<50
6	02081500	<50	<50	<50	<50	<50	<50	<50	<50
7	02082731	<50	<50	<50	<50	<50	<50	<50	<50
8	02082770	<50	<50	<50	<50	<50	<50	<50	<50
9	02083500	<50	6	<50	<50	<5	<50	<50	19
9	02083500	<50	<50	<50	<50	8	<50	<50	42
10	02083833	<50	<50	<50	<50	<50	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50	<50
11	02084160	<50	<50	7	<50	<5	28	<50	19
12	02084557	<50	<50	<50	<50	<50	<50	<50	<50
13	02084558	<50	<50	<50	<50	<50	<50	<50	<50
14	02084540	<50	<50	<50	<50	<50	<50	<50	<50
15	02085390	<50	<50	<50	<50	<50	<50	<50	<50
16	02086849	<50	39	34	<50	50	48	<50	130
17	02087324	<50	<50	12	<50	13	50	<50	80
18	02087580	<50	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	10	11	<50	15	37	<50	53
20	02091500	<50	<50	<50	<50	<50	<50	<50	<50
21	02089500	<50	<50	<50	<50	<50	10	<50	<5
21	02089500	<50	<5	<50	<50	5	<50	<50	6
22	02092500	<50	<50	<50	<50	<50	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Benzo(*c*)-cinnoline	Benzo(*b*)-fluoranthene	Benzo(*k*)-fluoranthene	Benzo(*ghi*)-perylene	Benzo(*a*)-pyrene	2,2'-Biquinoline	Bis-(2-Chloroethoxy) methane	Bis-(2-Ethylhexyl) phthalate
1	02056670	<50	300	230	54	210	<50	<50	440
2	02051000	<50	<50	<50	<50	<50	<50	<50	7
3	02047000	<50	<50	<50	<50	<50	<50	<50	9
4	02049500	<50	13	6	<50	<50	<50	<50	11
5	02053490	<50	<50	<50	<50	<50	<50	<50	11
6	02081500	<50	<50	<50	<50	<50	<50	<50	12
7	02082731	<50	<50	<50	<50	<50	<50	<50	870
8	02082770	<50	<50	<50	<50	<50	<50	<50	9
9	02083500	10	33	26	12	29	<50	<50	35
9	02083500	<50	45	47	23	52	<50	<50	59
10	02083833	<50	<50	<50	<50	<50	<50	<50	31
10	02083833	<50	<50	<50	<50	<50	<50	<50	42
11	02084160	<50	41	32	<50	33	<50	<50	35
12	02084557	<50	<50	<50	<50	<50	<50	<50	24
13	02084558	<50	<50	<50	<50	<50	30	<50	30
14	02084540	<50	<50	<50	<50	<50	<50	<50	48
15	02085390	<50	<50	<50	<50	<50	<50	<50	200
16	02086849	<50	190	120	110	140	<50	<50	430
17	02087324	<50	120	100	49	89	<50	<50	94
18	02087580	<50	<50	<50	<50	<50	<50	<50	13
19	02088119	<50	95	64	42	63	<50	<50	150
20	02091500	<50	<50	<50	<50	<50	<50	<50	31
21	02089500	<50	13	6	<50	15	14	<50	42
21	02089500	<50	22	17	<50	11	<50	<50	77
22	02092500	<50	<50	<50	<50	<50	<50	<50	7

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	4-Bromophenyl-phenylether	Butylbenzyl-phthalate	9H-Carbazole	4-Chloro-3-methylphenol	2-Chloro-napthalene	2-Chlorophenol	4-Chlorophenyl-phenylether	Chrysene
1	02056670	<50	25	42	<50	<50	<50	<50	320
2	02051000	<50	<50	<50	<50	<50	<50	<50	<50
3	02047000	<50	8	<50	<50	<50	<50	<50	<50
4	02049500	<50	<50	<50	<50	<50	<50	<50	6
5	02053490	<50	<50	<50	<50	<50	<50	<50	<50
6	02081500	<50	11	<50	<50	<50	<50	<50	<50
7	02082731	<50	11	<50	<50	<50	<50	<50	<50
8	02082770	<50	<50	<50	<50	<50	<50	<50	<50
9	02083500	<50	10	<50	<50	<50	<50	<50	25
9	02083500	<50	<50	<50	<50	<50	<50	<50	55
10	02083833	<50	15	<50	<50	<50	<50	<50	<50
10	02083833	<50	19	<50	<50	<50	<50	<50	<50
11	02084160	<50	<50	<50	<50	<50	<50	<50	37
12	02084557	<50	<50	<50	<50	<50	<50	<50	<50
13	02084558	<50	15	<50	<50	<50	<50	<50	<50
14	02084540	<50	<1,100	<50	<50	<50	<50	<50	<50
15	02085390	<50	<50	<50	<50	<50	<50	<50	<50
16	02086849	<50	30	18	<50	<50	<50	<50	160
17	02087324	<50	8	21	<50	<50	<50	<50	130
18	02087580	<50	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	14	11	<50	<50	<50	<50	96
20	02091500	<50	14	<50	<50	<50	<50	<50	<50
21	02089500	<50	<50	<50	<50	<50	<50	<50	6
21	02089500	<50	10	<50	<50	<50	<50	<50	18
22	02092500	<50	10	<50	<50	<50	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	*p*-Cresol	Dibenz(*a,h*)-anthracene	Dibenzothiophene	Di-*n*-butylphthalate	1,2-Dichloro-benzene	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Diethyl-phthalate
1	02056670	210	<50	22	43	<50	<50	<50	8
2	02051000	<50	<50	<50	48	<50	<50	<50	7
3	02047000	<50	<50	<50	23	<50	<50	<50	6
4	02049500	<50	<50	<50	23	<50	<50	<50	7
5	02053490	<50	<50	<50	32	<50	<50	<50	8
6	02081500	<50	<50	<50	45	<50	<50	<50	<50
7	02082731	<50	<50	<50	52	<50	<50	<50	<50
8	02082770	<50	<50	<50	24	<50	<50	<50	<50
9	02083500	<50	<50	<50	27	<50	<50	<50	7
9	02083500	<50	<50	<50	29	<50	<50	<50	7
10	02083833	<50	<50	<50	59	<50	<50	<50	13
10	02083833	<50	<50	<50	68	<50	<50	<50	12
11	02084160	<50	<50	<50	17	<50	<50	<50	<50
12	02084557	<50	<50	<50	47	<50	<50	<50	<50
13	02084558	<50	<50	<50	46	<50	<50	<50	<50
14	02084540	260	<50	<50	96	<50	<50	<50	<50
15	02085390	<50	<50	<50	19	<50	<50	<50	<50
16	02086849	<50	44	<50	57	<50	<50	<50	10
17	02087324	<50	9	<50	33	<50	<50	<50	<50
18	02087580	<50	<50	<50	36	<50	<50	<50	9
19	02088119	<50	24	<50	35	<50	<50	<50	<50
20	02091500	<50	<50	<50	43	<50	<50	<50	<50
21	02089500	<50	<50	<50	28	<50	<50	<50	9
21	02089500	17	<50	<50	14	<50	<50	<50	<50
22	02092500	<50	<50	<50	14	<50	<50	<50	12

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	1,2-Dimethyl-naphthalene	1,6-Dimethyl-naphthalene	2,6-Dimethyl-naphthalenel	3,5-Dimethyl-phenol	Dimethyl-phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Di-*n*-octylphthalate
1	02056670	<50	36	86	<50	14	<50	<50	120
2	02051000	<50	<50	10	<50	<50	<50	<50	<50
3	02047000	<50	<50	<50	<50	<50	<50	<50	<50
4	02049500	<50	<50	<50	<50	<50	<50	<50	<50
5	02053490	<50	<50	13	<50	<50	<50	<50	<50
6	02081500	<50	<50	<50	<50	7	<50	<50	<50
7	02082731	<50	<50	<50	<50	<50	<50	<50	<50
8	02082770	<50	<50	<50	<50	<50	<50	<50	<50
9	02083500	<50	<50	12	<50	<50	<50	<50	<50
9	02083500	<50	<50	21	<50	<50	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50	<50
10	02083833	<50	<50	26	<50	<50	<50	<50	<50
11	02084160	<50	<50	<50	<50	<50	<50	<50	<50
12	02084557	<50	<50	<50	<50	<50	<50	<50	<50
13	02084558	<50	<50	<50	<50	<50	<50	<50	<50
14	02084540	<50	<50	<50	<50	<50	<50	<50	<50
15	02085390	<50	<50	<50	<50	<50	<50	<50	<50
16	02086849	<50	<50	<50	<50	<50	<50	<50	<50
17	02087324	<50	<50	<50	<50	7	<50	<50	<50
18	02087580	<50	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	<50	19	<50	<50	<50	<50	<50
20	02091500	<50	<50	13	<50	<50	<50	<50	<50
21	02089500	<50	<50	<50	<50	<50	<50	<50	<50
21	02089500	<50	<50	8	<50	<5	<50	<50	<50
22	02092500	<50	<50	<50	<50	14	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	2-Ethyl-napthalene	Fluoranthene	9H-Flourene	Indeno(1,2,3-*c,d*)-pyrene	Isophorone	Isoquinoline	2-Methyl-anthracene
1	02056670	9	550	31	80	<50	<50	15
2	02051000	<50	<50	<50	<50	<50	<50	<50
3	02047000	<50	<5	<50	<50	<50	<50	<50
4	02049500	<50	17	<50	<50	<50	<50	<50
5	02053490	<50	<50	<50	<50	<50	<50	<50
6	02081500	<50	<50	<50	<50	<50	<50	<50
7	02082731	<50	<50	<50	<50	<50	<50	<50
8	02082770	<50	8	<50	<50	<50	68	<50
9	02083500	<50	36	<50	14	<50	<50	<50
9	02083500	<50	61	<50	24	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50
11	02084160	<50	66	<50	19	<50	<50	<50
12	02084557	<50	<50	<50	<50	<50	<50	<50
13	02084558	<50	<50	<50	<50	<50	<50	<50
14	02084540	<50	24	<50	<50	<50	<50	<50
15	02085390	<50	<50	<50	<50	<50	<50	<50
16	02086849	<50	240	<50	110	<50	<50	22
17	02087324	<50	240	<50	83	<50	<50	<50
18	02087580	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	140	<50	66	<50	<50	<50
20	02091500	<50	<50	<50	<50	<50	<50	<50
21	02089500	<50	12	<50	<50	<50	100	<50
21	02089500	<50	23	<50	<50	<50	<50	<50
22	02092500	<50	<50	<50	<50	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	1-Methyl-9H-fluorene	1-Methyl-phenanthrene	1-Methylpyrene	4,5-Methylene-phenanthrene	Naphthalene	Nitrobenzene	N-nitrosodi-*n*-propylamine	N-nitroso-diphenylamine
1	02056670	14	36	29	56	51	<50	<50	<50
2	02051000	<50	<50	<50	<50	<50	<50	<50	<50
3	02047000	<50	<50	<50	<50	<50	<50	<50	<50
4	02049500	<50	<50	<50	<50	<50	<50	<50	<50
5	02053490	<50	<50	<50	<50	<50	<50	<50	<50
6	02081500	<50	<50	<50	<50	<50	<50	<50	<50
7	02082731	<50	<50	<50	<50	<50	<50	<50	<50
8	02082770	<50	<50	<50	<50	<50	<50	<50	<50
9	02083500	<50	<50	<50	<50	<50	<50	<50	<50
9	02083500	<50	<50	13	<50	<50	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50	<50
10	02083833	<50	<50	<50	<50	<50	<50	<50	<50
11	02084160	<50	<50	<50	<50	<50	<50	<50	<50
12	02084557	<50	<50	<50	<50	<50	<50	<50	<50
13	02084558	<50	<50	<50	<50	<50	<50	<50	<50
14	02084540	<50	<50	<50	<50	<50	<50	<50	<50
15	02085390	<50	<50	<50	<50	<50	<50	<50	<50
16	02086849	<50	35	22	<50	<50	<50	<50	<50
17	02087324	<50	<50	<50	12	<50	<50	<50	<50
18	02087580	<50	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	<50	7	9	<50	<50	<50	<50
20	02091500	<50	<50	<50	<50	<50	<50	<50	<50
21	02089500	<50	<50	<50	<50	<50	<50	<50	<50
21	02089500	<50	<50	<50	<50	<50	<50	<50	<50
22	02092500	<50	<50	<50	<50	<50	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram; <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Pentachloro-nitrobenzene	Phenanthrene	Phenanthridine	Phenol	Pyrene	Quinoline	1,2,4-Trichloro-benzene
1	02056670	<50	310	<50	17	460	<50	<50
2	02051000	<50	<50	<50	<50	<50	<50	<50
3	02047000	<50	<50	<50	9	<50	<50	<50
4	02049500	<50	<50	<50	16	13	<50	<50
5	02053490	<50	<50	<50	<50	<50	<50	<50
6	02081500	<50	<50	<50	18	<50	<50	<50
7	02082731	<50	<50	<50	<50	<50	<50	<50
8	02082770	<50	<50	<50	58	<50	<50	<50
9	02083500	<50	12	<50	<50	34	<50	<50
9	02083500	<50	16	<50	12	65	<50	<50
10	02083833	<50	<50	<50	30	<50	<50	<50
10	02083833	<50	<50	<50	23	<50	<50	<50
11	02084160	<50	22	<50	10	49	<50	<50
12	02084557	<50	<50	<50	38	<50	<50	<50
13	02084558	<50	<50	<50	<50	<50	<50	<50
14	02084540	<50	<50	<50	87	<55	<50	<50
15	02085390	<50	<50	<50	9	<50	<50	<50
16	02086849	<50	120	<50	19	210	<50	<50
17	02087324	<50	85	<50	26	170	<50	<50
18	02087580	<50	<50	<50	<50	<50	<50	<50
19	02088119	<50	52	<50	14	110	<50	<50
20	02091500	<50	<50	<50	51	<50	<50	<50
21	02089500	<50	5	<50	9	12	<50	<50
21	02089500	<50	9	<50	12	21	<50	<50
22	02092500	<50	<50	<50	<50	<50	<50	<50

Table 6. Analyses of semivolatile organic compounds in the less than 2 millimeter grain-size fraction of streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per kilogram, unless otherwise noted; g/kg, grams per kilogram; percent, <, less than; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	2,3,6-Trimethyl-naphthalene	2-Flourobiphenyl (percent surrogate recovery)	Nitrobenzene-d_5 (percent surrogate recovery)	Terphenyl-d_{14} (percent surrogate recovery)	Carbon, inorganic (g/kg)	Carbon, organic (g/kg)	Carbon, inorganic + organic (g/kg)
1	02056670	14	55	56	81	2.0	37.0	39.0
2	02051000	<50	45	33	86	<.1	8.2	8.2
3	02047000	<50	43	37	68	<.1	6.8	6.8
4	02049500	<50	49	39	76	.4	12.0	12.0
5	02053490	<50	41	35	74	<.1	8.2	8.2
6	02081500	<50	73	83	88	<.1	3.8	3.8
7	02082731	<50	60	52	89	<.1	5.4	5.4
8	02082770	<50	40	34	68	<.1	8.1	8.1
9	02083500	<50	46	33	74	1.5	20.0	21.0
9	02083500	<50	56	44	81	<.1	12.0	12.0
10	02083833	<50	47	38	73	<.1	34.0	34.0
10	02083833	<50	48	40	78	<.1	36.0	36.0
11	02084160	<50	33	24	60	<.1	5.6	5.6
12	02084557	<50	53	57	68	<.1	16.0	16.0
13	02084558	<50	37	33	74	<.1	5.0	5.0
14	02084540	<50	100	80	94	<.1	180.0	180.0
15	02085390	<50	46	37	67	.4	2.6	3.0
16	02086849	<50	43	38	75	<.1	5.7	5.7
17	02087324	<50	55	55	79	.6	2.0	2.6
18	02087580	<50	52	39	78	<.1	18.0	18.0
19	02088119	<50	58	46	74	.4	14.0	14.0
20	02091500	<50	45	46	62	<.1	9.8	9.8
21	02089500	<50	45	37	68	<.1	6.0	6.0
21	02089500	<50	75	60	100	<.1	8.1	8.1
22	02092500	<50	85	84	110	<.1	3.7	3.7

Table 7. Analyses of inorganic constituents and carbon in fine-grained (less than 63 micrometers) streambed sediment from the Albemarle-Pamlico Basin, 1992-93

[values are reported in micrograms per gram, unless otherwise noted; --, no data available; <, less than;%, percent; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Aluminum (%)	Antimony	Arsenic	Barium	Beryllium	Bismuth	Cadmium	Calcium	Carbon, total (%)	Carbon, organic (%)	Carbon, carbonate (%)	Cerium	Chromium
1	02056670	7.2	0.6	4.9	--	2	<10	0.5	1.90	2.74	2.16	0.58	99	54
2	02051000	7.9	.2	2.4	--	1	<10	.1	2.00	1.80	1.78	.02	62	88
3	02047000	8.9	.4	4.1	--	3	<10	.3	.67	3.49	3.47	.02	120	74
4	02049500	6.8	.7	6.5	--	2	<10	.5	.50	6.27	6.25	.02	88	75
5	02053490	8.4	.5	4.8	--	2	<10	.3	.26	2.62	2.62	<.01	76	99
6	02081500	8.1	.6	4.0	--	2	<10	.1	.55	1.91	1.91	<.01	64	70
7	02082731	10.0	.8	8.8	900	2	<10	.2	.36	--	--	--	140	46
8	02082770	8.1	.2	2.8	--	2	<10	.2	.47	2.23	2.21	.02	85	69
9	02083500	8.7	2.0	6.0	--	2	<10	.5	.50	3.20	3.18	.02	86	76
9	02083500	7.8	2.0	5.3	--	2	<10	.4	.56	3.06	3.04	.02	79	68
10	02083833	8.7	.6	5.5	400	6	<10	.8	.34	--	--	--	120	62
10	02083833	8.8	1.0	5.6	400	7	<10	1.0	.35	--	--	--	130	63
11	02084160	7.3	.5	5.5	--	1	<10	.3	--	5.64	5.64	<.01	66	75
12	02084557	6.0	.6	2.5	340	1	<10	.1	.37	--	--	--	70	66
14	02084540	5.0	.3	2.2	250	<1	<10	.4	.33	--	--	--	35	44
15	02085390	6.7	.7	4.0	--	1	<10	.2	.54	1.80	1.80	<.01	58	49
16	02086849	8.8	1.0	5.1	510	2	<10	.7	.95	--	--	--	95	110
17	02087324	9.6	.9	4.4	--	2	<10	.3	--	1.61	1.60	.01	91	59
18	02087580	8.5	.5	4.4	--	1	<10	.1	.92	1.04	1.04	<.01	44	37
19	02088119	9.3	.5	3.7	--	2	<10	.4	.75	1.96	1.94	.02	87	62
20	02091500	7.7	.7	6.3	410	2	<10	1.0	.36	--	--	--	110	85
21	02089500	8.6	.7	5.3	--	2	<10	.5	.61	2.46	2.46	<.01	85	69
21	02089500	8.5	.6	4.8	--	2	<10	.5	.57	2.32	2.31	.01	86	69
22	02092500	6.8	1.0	6.0	--	2	<10	1.4	1.20	9.77	9.73	.04	75	110

Table 7. Analyses of inorganic constituents and carbon in fine-grained (less than 63 micrometers) streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per gram, unless otherwise noted; --, no data available; <, less than;%, percent; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Cobalt	Copper	Europium	Gallium	Gold	Holmium	Iron (%)	Lanthanum	Lead	Lithium	Magnesium (%)	Manganese	Mercury
1	02056670	17	31	53	19	<8	<4	3.9	53	51	50	1.10	540	0.07
2	02051000	26	32	34	19	<8	<4	4.9	34	16	20	.62	1,500	.03
3	02047000	33	20	57	22	<8	<4	4.5	57	33	50	.41	1,700	.11
4	02049500	33	12	42	17	<8	<4	3.9	42	35	50	.37	940	.12
5	02053490	18	18	40	21	<8	<4	3.8	40	35	40	.29	510	.06
6	02081500	22	24	34	20	<8	<4	3.9	34	23	30	.40	2,200	.08
7	02082731	36	31	<2	22	<8	<4	5.4	73	41	40	.30	20,000	.06
8	02082770	18	22	43	21	<8	<4	3.7	43	27	40	.33	1,300	.05
9	02083500	25	25	43	23	<8	<4	4.4	43	41	40	.35	2,100	.09
9	02083500	22	23	40	19	<8	<4	4.4	40	37	40	.31	1,400	.06
10	02083833	20	16	<2	19	<8	<4	2.5	65	39	40	.23	190	.09
10	02083833	23	18	<2	19	<8	<4	2.5	66	45	30	.25	170	.07
11	02084160	17	23	35	18	<8	<4	2.5	--	36	50	.29	340	.15
12	02084557	5	7	<2	13	<8	<4	1.8	37	18	30	.26	150	.04
14	02084540	4	7	<2	14	<8	<4	1.6	20	28	30	.19	86	.15
15	02085390	17	55	27	17	<8	<4	3.4	27	26	20	.32	1,700	.02
16	02086849	22	53	<2	19	<8	<4	3.9	45	94	40	.71	1,300	.12
17	02087324	19	36	46	24	<8	<4	5.9	--	51	20	.43	1,500	.05
18	02087580	14	22	21	19	<8	<4	4.4	21	20	20	.39	840	.03
19	02088119	19	33	46	25	<8	<4	4.2	46	43	40	.40	2,100	.10
20	02091500	14	21	<2	19	<8	<4	3.8	50	44	40	.33	570	.12
21	02089500	22	26	45	22	<8	<4	4.3	45	34	40	.40	1,400	.15
21	02089500	21	26	45	21	<8	<4	4.2	45	34	40	.40	1,100	.09
22	02092500	16	10	43	17	<8	<4	4.0	43	37	50	.43	510	.18

Table 7. Analyses of inorganic constituents and carbon in fine-grained (less than 63 micrometers) streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per gram, unless otherwise noted; <, less than;%, percent; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Molybdenum	Neodymium	Nickel	Niobium	Phosphorus (%)	Potassium (%)	Scandium	Selenium	Silver	Sodium (%)	Strontium	Sulfur	Tantalum
1	02056670	<2	52	23	10	0.10	2.80	13	0.4	0.3	0.43	130	0.07	<40
2	02051000	<2	34	24	6	.06	.90	21	.4	<.1	.68	180	<.05	<40
3	02047000	<2	46	25	15	.12	1.20	14	.6	.1	.39	120	.11	<40
4	02049500	<2	36	20	11	.15	.83	10	.9	.2	.13	70	.17	<40
5	02053490	<2	34	21	18	.14	.81	14	.8	<.1	.16	63	.08	<40
6	02081500	<2	28	20	11	.08	1.30	14	.6	.1	.42	100	.05	<40
7	02082731	3	57	16	21	.14	1.50	12	.8	.1	.23	95	.06	<40
8	02082770	<2	33	22	16	.08	1.20	16	.5	.1	.25	64	.05	<40
9	02083500	<2	36	25	15	.19	1.20	15	.7	.4	.33	88	.10	<40
9	02083500	<2	33	21	13	.19	1.20	13	.6	.4	.40	96	.10	<40
10	02083833	<2	45	18	18	.17	1.10	13	1.9	.2	.17	63	.29	<40
10	02083833	<2	47	20	19	.17	1.10	13	1.9	.2	.18	63	.31	<40
11	02084160	<2	30	14	13	.23	.69	11	1.0	.1	.09	74	.17	<40
12	02084557	<2	31	11	13	.05	1.00	10	.6	.2	.47	90	.14	<40
14	02084540	<2	15	10	8	.13	.57	6	1.0	.3	.18	63	.31	<40
15	02085390	<2	27	15	10	.07	.80	12	.6	.1	.35	74	.05	<40
16	02086849	<2	39	34	15	.14	1.50	16	.6	3.8	.79	150	.07	<40
17	02087324	<2	46	20	10	.11	1.10	22	.5	.2	.65	140	.05	<40
18	02087580	<2	23	10	5	.05	.95	22	.4	<.1	.81	120	<.05	<40
19	02088119	<2	38	21	10	.13	1.30	16	.5	.4	.61	120	.07	<40
20	02091500	<2	41	20	21	.35	.72	11	.8	.3	.09	66	.21	<40
21	02089500	<2	37	22	11	.16	1.10	15	.7	.4	.45	100	.10	<40
21	02089500	<2	38	22	12	.15	1.10	15	.7	.4	.43	98	.09	<40
22	02092500	<2	34	24	12	.39	.53	9	1.8	.2	.05	62	.52	<40

Table 7. Analyses of inorganic constituents and carbon in fine-grained (less than 63 micrometers) streambed sediment from the Albemarle-Pamlico Basin, 1992-93—Continued

[values are reported in micrograms per gram, unless otherwise noted; --, do data available; <, less than;%, percent; location of streambed-sediment sampling station is shown in figure 1]

Station code	Station number	Thorium	Tin	Titanium (%)	Uranium	Vanadium	Ytterbium	Yttrium	Zinc
1	02056670	12.0	<10	0.39	3.0	70	4	37	170
2	02051000	8.0	<10	.60	2.8	150	3	30	63
3	02047000	19.0	<10	.62	7.2	100	3	27	120
4	02049500	11.0	<10	.46	5.3	98	2	19	120
5	02053490	12.0	<10	.78	4.6	130	2	19	84
6	02081500	13.0	<10	.60	4.3	110	2	18	68
7	02082731	16.0	<10	--	8.6	95	4	36	87
8	02082770	15.0	<10	.69	5.9	100	3	27	76
9	02083500	16.0	<10	.62	6.4	110	2	24	150
9	02083500	16.0	<10	.59	6.1	94	2	22	140
10	02083833	14.0	<10	--	6.2	120	3	33	130
10	02083833	11.0	<10	--	6.0	120	3	35	150
11	02084160	13.0	<10	.54	4.5	94	2	13	98
12	02084557	12.0	<10	--	3.5	82	2	14	47
14	02084540	5.7	<10	--	2.5	56	1	6	47
15	02085390	8.0	<10	.57	3.1	96	2	25	100
16	02086849	12.0	<10	--	4.3	110	2	22	290
17	02087324	18.0	<10	.94	6.9	150	3	33	130
18	02087580	7.0	<10	.53	2.2	120	2	24	86
19	02088119	17.0	<10	.57	5.9	99	3	25	130
20	02091500	17.0	<10	--	6.4	100	2	22	150
21	02089500	17.0	<10	.60	6.2	100	2	22	140
21	02089500	17.0	<10	0.61	6.0	100	2	22	140
22	02092500	11.0	<10	0.50	7.9	96	2	19	240

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