Summary of Water- and Sediment-Quality Data for Anacostia River Well Sites Sampled in July-August 2002

Open-File Report 03-73

In cooperation with the

D.C. DEPARTMENT OF HEALTH

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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By Cherie V. Miller and Cheryl A. Klohe

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U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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Conversion Factors and Vertical Datum

Multiply	By	To Obtain
inch (in.)	2.54	centimeter
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
acre	4,047	square meter
acre	0.004047	square kilometer
square mile (mi^2)	259	hectare
square mile (mi^2)	2.59	square kilometer
cubic feet per second (ft^3/s)	0.02932	cubic meter per second
pound (lb)	0.4536	kilogram
ton, short (2,000 lb)	0.9072	megagram

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

$$°F = (°C \times 1.8) + 32$$

Vertical Datum: In this report, “sea level” refers to the National Geodetic Vertical Datum of 1929---a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

Summary of Water- and Sediment-Quality Data for Anacostia River Well Sites Sampled in July - August 2002

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Abstract

This data report is a summary of chemical analyses conducted by the U.S. Geological Survey on ground water and sediment in the tidal Anacostia River watershed, Washington, D.C. during July-August 2002. Cores were drilled and wells were established at three shoreline sites: two wells at the New York Avenue overpass, two wells at the Kenilworth Aquatic Gardens, and one well at Anacostia Park. Additionally, two cores were collected by hoverprobe in mudflats on the river: one by Benning Road and one in the mouth of Beaverdam Creek. Chemical analyses included volatile organic compounds, semi-volatile organic compounds or polyaromatic hydrocarbons, organochlorine pesticides, aroclors and total polychlorinated biphenyls, metals, nutrients, biochemical and chemical oxygen demands, total phenols, total cyanide, oil and grease, and total suspended and dissolved solids in aqueous phases.

Introduction

From July through August 2002, the U.S. Geological Survey (USGS) collected water- and sediment-quality samples from five sites along the Anacostia River in Washington, D.C. (fig. 1, table 1). Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) or polyaromatic hydrocarbons (PAHs), organochlorine pesticides, aroclors and total polychlorinated biphenyls (PCBs), metals, nutrients, biochemical and chemical oxygen demands (BOD and COD), total phenols, total cyanide, oil and grease, and total suspended and dissolved solids in aqueous phases (TSS and TDS). The purpose of this sampling was to determine baseline concentrations of potential contaminants in the tidal portion of the river. The selected sites have no documented point sources of contaminants, and likely represent the background levels of chemicals from nonpoint sources in the urban areas surrounding the Anacostia River. The suite of chemicals that was analyzed was selected based on previous history of contaminant sampling in the Anacostia River and includes regulated chemicals that are currently being evaluated by the D.C. Department of Health.

Site Selection, Core Collection, and Well Construction

Sets of nested wells were installed at three sites near the shoreline in the tidal Anacostia River Basin. Cores for sediment quality and lithology were collected at each site by vibracoring. At some sites, there was refusal of the vibracore method at depth. At this point, augering was used to reach the target depth. The sediment material from augering was archived for lithology, but was not used for chemical analysis. The chemical analyses of water and sediment at these sites will initially provide reference levels of the concentrations of contaminants for comparison to more contaminated areas.

Two wells were installed at the southwest bank of the Anacostia River at New York Avenue. Well DCMW001-02 was drilled and installed on July 24, 2002, and screened at a depth of 15 to 25 feet below land surface. Well DCMW004-02 was drilled and installed on July 26, 2002, and screened at a depth of 22 to 32 feet below land surface. Both wells were screened in the uppermost aquifer, which lies beneath fine-grained material that may be a semi-confining unit. These wells will provide background information on ground water discharging from the west side of the Anacostia River near the Maryland/Washington, D.C. border. Continuous core material for lithologic analysis was collected from DCMW004-02 to a depth of 33 feet below land surface. Replicate sediment samples were collected from this core at 18 to 23 feet below land surface for chemical analyses. No surface sediment was collected because the surface was too disturbed from recent construction.

Two wells were installed on July 24 and 25, 2002 at the Kenilworth Aquatic Gardens visitor center. Well DCMW002-02 was screened in the unconfined aquifer at 12.6 to 22.6 feet below land surface, and well DCMW003-02 was screened in the semi-confined aquifer at 36.3 to 46.3 feet below land surface. These wells will provide information on ground water discharging from the eastern Washington, D.C. neighborhoods in the vicinity of Kenilworth Avenue. Surface sediment (just below the O horizon) and deeper sediment (11 feet below land surface) were collected for chemical analyses from this well site.

One well was installed on July 29, 2002 at Anacostia Park on the south bank of the river near the public roller-skating rink. This well is screened at 38.5 to 48.5 feet below land surface in the uppermost aquifer beneath fine-grained material that acts as a semi-confining unit. This well will provide data on the condition of ground water for comparison to data from a well that is already in place at the same site. Surface sediment (below the O horizon) and deeper sediment (37.5 to 38.5 feet below land surface) samples were collected from the core for chemical analyses.

The USGS hoverprobe was deployed on July 2, 2002 to collect cores from two mudflats in the tidal Anacostia River. One site was a mudflat north of the Benning Bridge, and the other site was in the mouth of Beaverdam Creek at the Maryland/Washington, D.C. border. A total of 18 feet of core was collected in 5-foot core barrels at the Benning Bridge site, and a composite sample of sediment from the entire length of this core was collected for chemical analysis. No samples for sediment quality were collected from the Beaverdam Creek mudflat site. Both cores were reviewed and archived for lithology.

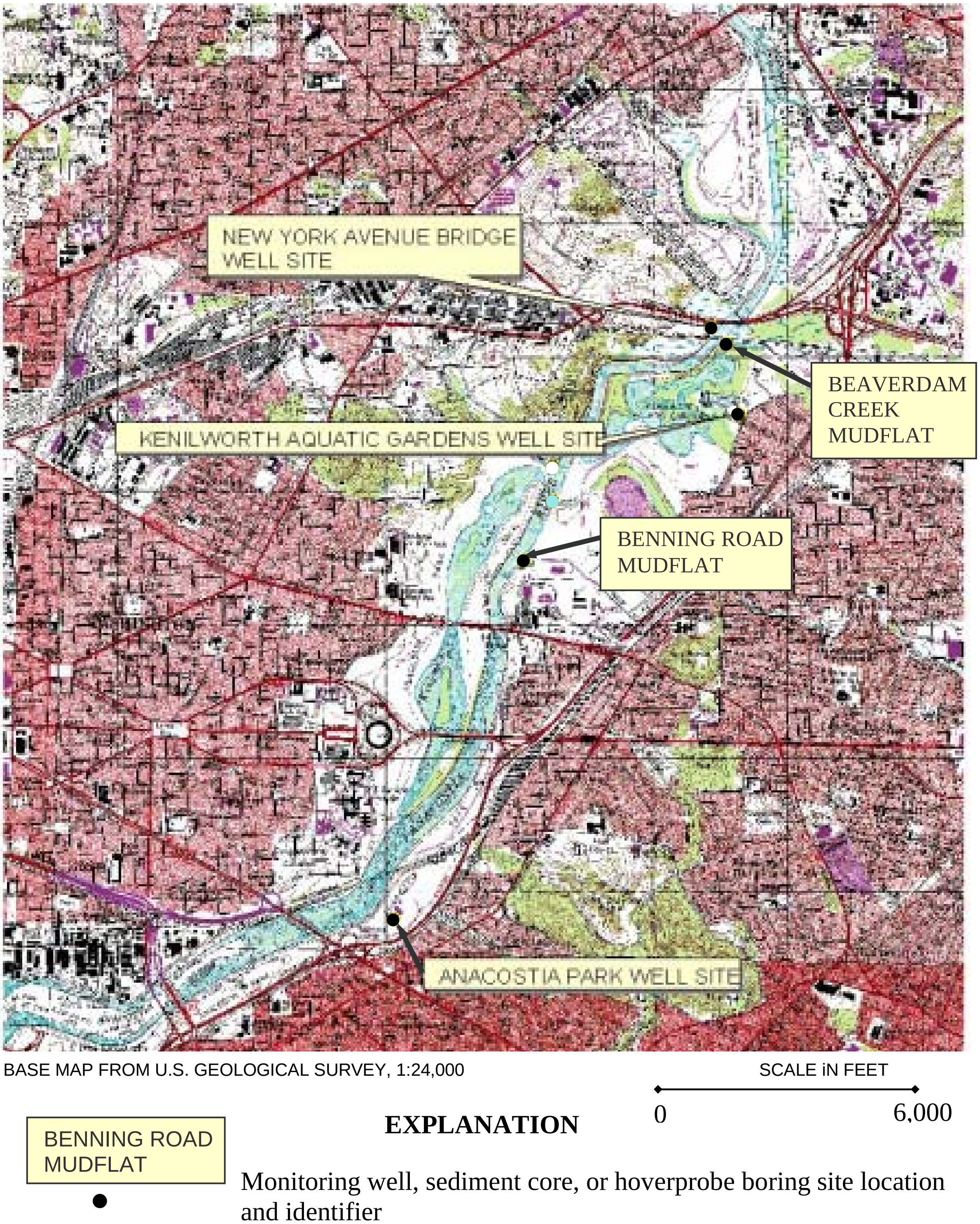

Figure 1. Location of sediment- and water-quality sampling sites along the Anacostia River, Washington, D.C., July - August 2002.

Table 1. Station locations and sampling information for wells and hoverprobe cores
[NA, none assigned; °, degrees; ‘, minutes; “, seconds]

Station location	**Latitude longitude**	**Well name**	**Type of well or core**	**Well screened interval** (feet below land surface)	**Sediment core sample name**	**Depths of composite sediment sample** (feet below land surface)	**Type of chemical sampling**
Beaverdam Creek Mudflat	38° 54’ 59.5” 076° 56’ 34.0”	NA	Hoverprobe Core	NA	NA	NA	NA
Benning Road Mudflat	38° 54’ 05.8” 076° 57’ 34.2”	NA	Hoverprobe Core	NA	DCHP01-02	0 - 18.0	Sediment Quality
New York Avenue bridge	38° 55’ 03.6” 076° 56’ 37.7”	DCMW001-02	Shallow Well	15.0 - 25.0	NA	NA	Sediment and Water Quality
		DCMW004-02	Deep Well and Core	22.0 - 32.0	NYASOIL001-02	18.0 - 23.0	
Kenilworth Aquatic Gardens	38° 54’ 43.5” 076° 56’ 28.4”	DCMW002-02	Shallow Well	12.6 – 22.6	NA	NA	Sediment and Water Quality
		DCMW003-02	Deep Well and Core	36.3 – 46.3	KAGSOIL001-02	0 - 1.0	
					KAGSOIL002-02	10.0 - 11.0	
Anacostia Park	38° 52’ 38.4” 076° 58’ 15.3”	DCMW005-02	Deep Well and Core	38.5 – 48.5	APSSOIL001-02	0-1.0	Sediment and Water Quality
					APSSOIL002-02	37.5 - 38.5	

Sediment-Quality Sampling

Samples of sediment were collected from the core materials at selected strata. Where possible, sediments were pulled from the centers of the vibracore sections to avoid cross contamination. Samples for sediment quality were not collected from the augering material. Sediments were collected into clean glass jars. Prior to sampling, jars for sediment collection were cleaned by rinsing with a tap-water/Liquinox mixture, followed by soaking for 10 minutes in 10 percent HNO_3, and a final rinse of nano-pure deionized water (greater than 18 megaohm). Preservatives were not used for sediment sampling. Samples were stored in coolers filled with ice and shipped to the Severn Trent Laboratroy (STL) in Arvada, Colorado for analysis at the end of each day.

Water-Quality Sampling

Before sampling, each well was developed by continuous pumping to flush the well screens until the ground water appeared clear and free of sediment. The wells were then allowed 2 weeks to stabilize before sampling for water quality from August 21 through 23, 2002. Samples for ground-water quality were collected from the wells using a peristaltic pump and with completely dedicated tubing at each well to minimize cross contamination. Teflon tubing was used except for a 2-foot length of flexible silicon tubing in the pump. Prior to sampling, all tubing was cleaned by rinsing with a tap-water/Liquinox mixture, followed by soaking for 10 minutes in 10 percent HNO_3, and a final rinse of nano-pure deionized water (greater than 18 MOhm). Tubing was stored in acid-washed plastic zipper-lock bags until use. Each well was purged until measurements of temperature, pH, dissolved oxygen, turbidity, and specific conductance were stable. Field parameters were measured using a bucket to collect water as it was pumped from the well with continuous laminar overflow, a WTW multimeter for temperature, pH, dissolved oxygen, and specific conductance, and a HACH 2100P turbidimeter for turbidity. Samples for water quality were not filtered so that the data would meet regulatory compliance requirements. Sample preservatives are listed in table 2. Samples were sealed in plastic zipper-lock bags, packed in coolers with ice, and shipped to STL for analysis at the end of each day. All field methods and sampling procedures are documented in the USGS National Field Manual (U.S. Geological Survey, 1997 to present).

Chemical Analyses

Samples for sediment and water quality were analyzed at STL using approved U.S. Environmental Protection Agency methods (table 2). Methods, detection limits, and reporting levels for individual constituents are shown in table 3. Many of these methods are "information rich," meaning that often the chemical can be detected below the reporting level. The precision on these low-level detections is, however, not as good. Detections that are below the reporting levels are presented here, but are coded to qualify these data and should be considered to have large confidence intervals. Examples of information-rich methods are Gas-Chromatography - Mass Spectrometry (GS-MS) for organic compounds and Ion-Coupled Plasma - Mass Spectrometry (ICP-MS) for metals.

Table 2. Methods used for water- and sediment-quality analyses.
[--, not applicable]

Analyses	Preservatives used in aqueous samples	Preparation methods	Analytical methods	Preparation methods	Analytical methods	References
		Sediment		**Water**		
Total cyanide	NaOH	9012A	9012A	9012A	9012A	SW846[1]
Inductively coupled plasma (ICP) Metals	HNO_3	3550B	8015B	--	--	SW846
Metals by ICP-MS	HNO_3	3050B	6020	3010	6020	SW846
Mercury	HNO_3	7471A	7471A	7470A	7470A	SW846
Nitrate plus nitrite	H_2SO_4	353.2	353.2	353.2	353.2	MCAWW[2]
Ammonia as nitrogen	H_2SO_4	350.1	350.1	350.1	350.1	MCAWW
Organochlorine pesticides	None	3550	8081A	3510C	8081A	SW846
Percent moisture	--	Modified 160.3	Modified 160.3	--	--	MCAWW
Phenolics	H_2SO_4	9066	9066	9066	9066	SW846
PCBs	None	3550	8082	3510C	8082	SW846
Semivolatile organic compounds by GC-MS	None	3550B	8270C	3520C	8270C	SW846
Total phosphorus	H_2SO_4	365.3	365.3	365.3	365.3	MCAWW
Total Kjeldahl nitrogen	H_2SO_4	351.2	351.2	351.2	351.2	MCAWW
Trace ICP metals	HNO_3	3050B	6010B	3010A	6010B	SW846

[[1], U.S. Environmental Protection Agency, 1986; [2], U.S. Environmental Protection Agency, 1983; [3],U.S. Environmental Protection Agency, 1984]

Table 2. Methods used for water- and sediment-quality analyses -- continued.

Analyses	**Preservatives used in aqueous samples**	**Preparation methods**	**Analytical methods**	**Preparation methods**	**Analytical methods**	**References**
		Sediment		**Water**		
Volatile and gasoline-range organics (PID/FID)	HCl	--	8021B/GRO	--	--	SW846
Volatile organic compounds by GC-MS	HCl	5030	8260B	5030B/826	8260B	SW846
Biochemical oxygen demand	None			405.1	405.1	MCAWW
Chemical oxygen demand	H_2SO_4			410.4	410.4	MCAWW
Total dissolved solids (TDS)	None			160.1	160.1	MCAWW
n-hexane extractable material	None			1664	1664A	CFR136A[3]
Total suspended solids (TSS)	None			160.2	160.2	MCAWW

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory.
[MDL, method detection limits; RL, laboratory reporting levels; STL, Severn Trent Laboratory at Arvada, Colorado; CAS, Chemical Abstracts Service Registry; CVAA, Cold Vapor Atomic Absorption; ICP/MS, Inductively Coupled Plasma/Mass Spectrometry; GRO, gasoline-range organics; CVAA, cold-vapor atomic absorption; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/kg, milligrams per kilogram]

		Sediment				**Water**			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Volatile organic compounds								
67-64-1	Acetone	8260B	µg/kg	20	4.6	8260B	µg/L	10	2.9
71-43-2	Benzene	8260B	µg/kg	5	0.89	8260B	µg/L	1	0.27
75-27-4	Bromodichloromethane	8260B	µg/kg	5	0.92	8260B	µg/L	1	0.35
75-25-2	Bromoform	8260B	µg/kg	5	0.91	8260B	µg/L	1	0.46
74-83-9	Bromomethane	8260B	µg/kg	10	1.2	8260B	µg/L	2	0.28
78-93-3	2-Butanone (MEK)	8260B	µg/kg	20	4.7	8260B	µg/L	5	2.4
56-23-5	Carbon tetrachloride	8260B	µg/kg	5	1.2	8260B	µg/L	1	0.35
108-90-7	Chlorobenzene	8260B	µg/kg	5	0.75	8260B	µg/L	1	0.24
124-48-1	Chlorodibromomethane	8260B	µg/kg	5	0.9	8260B	µg/L	1	0.27
75-00-3	Chloroethane	8260B	µg/kg	10	1.3	8260B	µg/L	2	0.26
67-66-3	Chloroform	8260B	µg/kg	10	0.9	8260B	µg/L	1	0.29
74-87-3	Chloromethane	8260B	µg/kg	10	1.5	8260B	µg/L	2	0.26
75-34-3	1,1-Dichloroethane	8260B	µg/kg	5	0.98	8260B	µg/L	1	0.29
107-06-2	1,2-Dichloroethane	8260B	µg/kg	5	0.99	8260B	µg/L	1	0.43
75-35-4	1,1-Dichloroethene	8260B	µg/kg	5	1.1	8260B	µg/L	1	0.31
156-59-2	*cis*-1,2-Dichloroethene	8260B	µg/kg	2.5	0.84	8260B	µg/L	1	0.33
156-60-5	*trans*-1,2-Dichloroethene	8260B	µg/kg	2.5	0.79	8260B	µg/L	0.5	0.25

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Volatile organic compounds (cont.)								
540-59-0	total 1,2-Dichloroethene	8260B	µg/kg	5	1.5	8260B	µg/L	1	0.54
78-87-5	1,2-Dichloropropane	8260B	µg/kg	5	1.2	8260B	µg/L	1	0.38
10061-01-5	*cis*-1,3-Dichloropropene	8260B	µg/kg	5	0.96	8260B	µg/L	1	0.31
100-41-4	Ethylbenzene	8260B	µg/kg	5	1.2	8260B	µg/L	1	0.51
591-78-6	2-Hexanone	8260B	µg/kg	20	4.6	8260B	µg/L	5	1.8
108-10-1	4-Methyl-2-pentanone	8260B	µg/kg	20	3.9	8260B	µg/L	5	1.8
1634-04-4	Methyl-*tert*-butyl ether (MTBE)	8260B	µg/kg	20	0.79	8260B	µg/L	5	0.88
75-09-2	Methylene chloride	8260B	µg/kg	5	0.8	8260B	µg/L	1	0.86
100-42-5	Styrene	8260B	µg/kg	5	0.66	8260B	µg/L	1	0.28
79-34-5	1,1,2,2-Tetrachloroethane	8260B	µg/kg	5	1.1	8260B	µg/L	1	0.5
127-18-4	Tetrachloroethene	8260B	µg/kg	5	0.99	8260B	µg/L	1	0.27
108-88-3	Toluene	8260B	µg/kg	5	0.78	8260B	µg/L	1	0.26
71-55-6	1,1,1-Trichloroethane	8260B	µg/kg	5	0.98	8260B	µg/L	1	0.26
79-00-5	1,1,2-Trichloroethane	8260B	µg/kg	5	1.5	8260B	µg/L	1	0.41
79-01-6	Trichloroethene	8260B	µg/kg	5	0.87	8260B	µg/L	1	0.24
96-18-4	1,2,3-Trichloropropane	8260B	µg/kg	5	1.5	8260B	µg/L	1	0.76
75-01-4	Vinyl chloride	8260B	µg/kg	5	1.1	8260B	µg/L	1	0.26
1330-20-7	Xylenes [total]	8260B	µg/kg	5	2.8	8260B	µg/L	2	0.73

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Gasoline-range organics								
	Total GRO	8015 M	mg/kg	0.5	0.133	8015 M	µg/L	10	3
71-43-2	Benzene	8021	mg/kg	0.05	0.0043	8021	µg/L	0.5	0.094
108-88-3	Toluene	8021	mg/kg	0.05	0.0087	8021	µg/L	0.5	0.12
100-41-4	Ethylbenzene	8021	mg/kg	0.05	0.0058	8021	µg/L	0.5	0.1
1330-20-7	Xylenes [total]	8021	mg/kg	0.05	0.023	8021	µg/L	0.5	0.38

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Semivolatile organic compounds								
83-32-9	Acenaphthene	8270C	µg/kg	330	46	8270C	µg/L	10	1
208-96-8	Acenaphthylene	8270C	µg/kg	330	34	8270C	µg/L	10	1
120-12-7	Anthracene	8270C	µg/kg	330	78	8270C	µg/L	10	1.6
56-55-3	Benzo(a)anthracene	8270C	µg/kg	330	39	8270C	µg/L	10	1.2
205-99-2	Benzo(b)fluoranthene	8270C	µg/kg	330	100	8270C	µg/L	10	2.2
207-08-9	Benzo(k)fluoranthene	8270C	µg/kg	330	93	8270C	µg/L	10	2
65-85-0	Benzoic acid	8270C	µg/kg	1600	570	8270C	µg/L	50	12
50-32-8	Benzo(a)pyrene	8270C	µg/kg	330	94	8270C	µg/L	10	1.4
191-24-2	Benzo(g,h,i)perylene	8270C	µg/kg	330	70	8270C	µg/L	10	1.7
100-51-6	Benzyl alcohol	8270C	µg/kg	330	77	8270C	µg/L	10	2.7
111-91-1	Bis(2-chloroethoxy)methane	8270C	µg/kg	330	74	8270C	µg/L	10	1.3
111-44-4	Bis(2-chloroethyl)ether	8270C	µg/kg	330	49	8270C	µg/L	10	1.8
108-60-1	Bis(2-chloroisopropyl)ether	8270C	µg/kg	330	69	8270C	µg/L	10	1.5
117-81-7	Bis(2-ethylhexyl)phthalate	8270C	µg/kg	330	69	8270C	µg/L	10	3.1
101-55-3	4-Bromophenylphenyl ether	8270C	µg/kg	330	71	8270C	µg/L	10	1.5
85-68-7	Butyl benzyl phthalate	8270C	µg/kg	330	34	8270C	µg/L	10	1.6
59-50-7	4-Chloro-3-methylphenol	8270C	µg/kg	330	95	8270C	µg/L	10	2
91-58-7	2-Chloronaphthalene	8270C	µg/kg	330	38	8270C	µg/L	10	1.1
95-57-8	2-Chlorophenol	8270C	µg/kg	330	73	8270C	µg/L	10	1.8
7005-72-3	4-Chlorophenyl phenyl ether	8270C	µg/kg	330	71	8270C	µg/L	10	1.2
218-01-9	Chrysene	8270C	µg/kg	330	53	8270C	µg/L	10	1.7

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Semivolatile organic compounds (cont.)								
53-70-3	Dibenzo(a,h)anthracene	8270C	µg/kg	330	47	8270C	µg/L	10	1.3
132-64-9	Dibenzofuran	8270C	µg/kg	330	82	8270C	µg/L	10	5
95-50-1	1,2-Dichlorobenzene	8270C	µg/kg	330	64	8270C	µg/L	10	1.6
541-73-1	1,3-Dichlorobenzene	8270C	µg/kg	330	71	8270C	µg/L	10	1.7
106-46-7	1,4-Dichlorobenzene	8270C	µg/kg	330	55	8270C	µg/L	10	1.8
91-94-1	3,3'-Dichlorobenzidine	8270C	µg/kg	1600	70	8270C	µg/L	50	8.4
120-83-2	2,4-Dichlorophenol	8270C	µg/kg	330	88	8270C	µg/L	10	1.7
84-66-2	Diethyl phthalate	8270C	µg/kg	330	53	8270C	µg/L	10	1.1
131-11-3	Dimethyl phthalate	8270C	µg/kg	330	85	8270C	µg/L	10	5
105-67-9	2,4-Dimethylphenol	8270C	µg/kg	330	92	8270C	µg/L	10	2.9
84-74-2	Di-*n*-butyl phthalate	8270C	µg/kg	330	76	8270C	µg/L	10	1.1
534-52-1	4,6-Dinitro-2-methylphenol	8270C	µg/kg	1600	420	8270C	µg/L	50	18
51-28-5	2,4-Dinitrophenol	8270C	µg/kg	1600	500	8270C	µg/L	50	18
121-14-2	2,4-Dinitrotoluene	8270C	µg/kg	330	96	8270C	µg/L	10	2.6
606-20-2	2,6-Dinitrotoluene	8270C	µg/kg	330	100	8270C	µg/L	10	1.6
117-84-0	Di-*n*-octyl phthalate	8270C	µg/kg	330	36	8270C	µg/L	10	1.5
206-44-0	Fluoranthene	8270C	µg/kg	330	84	8270C	µg/L	10	1.5
86-73-7	Fluorene	8270C	µg/kg	330	76	8270C	µg/L	10	1.3
118-74-1	Hexachlorobenzene	8270C	µg/kg	330	76	8270C	µg/L	10	1.7
87-68-3	Hexachlorobutadiene	8270C	µg/kg	330	100	8270C	µg/L	10	1.7
77-47-4	Hexachlorocyclopentadiene	8270C	µg/kg	1600	33	8270C	µg/L	50	5

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Semivolatile organic compounds (cont.)								
67-72-1	Hexachloroethane	8270C	µg/kg	330	50	8270C	µg/L	10	2.2
193-39-5	Indeno(1,2,3-cd)pyrene	8270C	µg/kg	330	48	8270C	µg/L	10	1.2
78-59-1	Isophorone	8270C	µg/kg	330	68	8270C	µg/L	10	2.3
91-57-6	2-Methylnaphthalene	8270C	µg/kg	330	59	8270C	µg/L	10	1.5
95-48-7	2-Methylphenol	8270C	µg/kg	330	77	8270C	µg/L	10	2.1
108-39-4	3-Methylphenol	8270C	µg/kg	330	74	8270C	µg/L	10	2.1
106-44-5	4-Methylphenol	8270C	µg/kg	330	74	8270C	µg/L	10	2.1
91-20-3	Naphthalene	8270C	µg/kg	330	70	8270C	µg/L	10	1.2
88-74-4	2-Nitroaniline	8270C	µg/kg	1600	80	8270C	µg/L	50	1.8
99-09-2	3-Nitroaniline	8270C	µg/kg	1600	85	8270C	µg/L	50	7.6
100-01-6	4-Nitroaniline	8270C	µg/kg	1600	64	8270C	µg/L	50	2.1
98-95-3	Nitrobenzene	8270C	µg/kg	330	85	8270C	µg/L	10	2.5
88-75-5	2-Nitrophenol	8270C	µg/kg	330	120	8270C	µg/L	10	1.8
100-02-7	4-Nitrophenol	8270C	µg/kg	1600	95	8270C	µg/L	50	1.8
62-75-9	*N-I*Nitrosodimethylamine	8270C	µg/kg	330	59	8270C	µg/L	10	2.1
621-64-7	*N-I*Nitrosodi-n-propylamine	8270C	µg/kg	330	88	8270C	µg/L	10	1.6
86-30-6	*N*-Nitrosodiphenylamine	8270C	µg/kg	330	72	8270C	µg/L	10	1.5
87-86-5	Pentachlorophenol	8270C	µg/kg	1600	370	8270C	µg/L	50	11
85-01-8	Phenanthrene	8270C	µg/kg	330	37	8270C	µg/L	10	1.3
108-95-2	Phenol	8270C	µg/kg	330	71	8270C	µg/L	10	1.4
129-00-0	Pyrene	8270C	µg/kg	330	40	8270C	µg/L	10	2

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				**Water**			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Semivolatile organic compounds (cont.)								
95-94-3	1,2,4,5-Tetrachlorobenzene	8270C	µg/kg	330	33	8270C	µg/L	10	1.9
120-82-1	1,2,4-Trichlorobenzene	8270C	µg/kg	330	64	8270C	µg/L	10	1.5
95-95-4	2,4,5-Trichlorophenol	8270C	µg/kg	330	75	8270C	µg/L	10	1.3
88-06-2	2,4,6-Trichlorophenol	8270C	µg/kg	330	50	8270C	µg/L	10	1.3

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Polychorinated biphenyls								
12674-11-2	Aroclor 1016	8082	µg/kg	33	3.4	8082	µg/L	1.0	0.085
11104-28-2	Aroclor 1221	8082	µg/kg	33	2.9	8082	µg/L	1.0	0.12
11141-16-5	Aroclor 1232	8082	µg/kg	33	3.6	8082	µg/L	1.0	0.18
53469-21-9	Aroclor 1242	8082	µg/kg	33	2.9	8082	µg/L	1.0	0.06
12672-29-6	Aroclor 1248	8082	µg/kg	33	11	8082	µg/L	1.0	0.11
11097-69-1	Aroclor 1254	8082	µg/kg	33	4.3	8082	µg/L	1.0	0.074
11096-82-5	Aroclor 1260	8082	µg/kg	33	4.8	8082	µg/L	1.0	0.06

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory -- continued.

		Sediment				**Water**			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Organochlorine pesticides								
309-00-2	Aldrin	8081A	µg/kg	1.7	0.39	8081A	µg/L	0.05	0.0042
319-84-6	*alpha*-BHC	8081A	µg/kg	1.7	0.37	8081A	µg/L	0.05	0.0076
319-85-7	*beta*-BHC	8081A	µg/kg	1.7	0.34	8081A	µg/L	0.05	0.0051
319-86-8	*delta*-BHC	8081A	µg/kg	1.7	0.11	8081A	µg/L	0.05	0.005
58-89-9	*gamma*-BHC (Lindane)	8081A	µg/kg	1.7	0.7	8081A	µg/L	0.05	0.0085
5103-71-9	Chlordane [a-]	8081A	µg/kg	1.7	0.38	8081A	µg/L	0.05	0.0054
5103-74-2	Chlordane [g-]	8081A	µg/kg	1.7	0.35	8081A	µg/L	0.05	0.0079
510-15-6	Chlorobenzilate	8081A	µg/kg	17	2.5	8081A	µg/L	0.1	0.05
72-54-8	4,4'-DDD	8081A	µg/kg	1.7	0.29	8081A	µg/L	0.05	0.005
72-55-9	4,4'-DDE	8081A	µg/kg	1.7	0.32	8081A	µg/L	0.05	0.0147
50-29-3	4,4'-DDT	8081A	µg/kg	1.7	0.33	8081A	µg/L	0.05	0.0095
60-57-1	Dieldrin	8081A	µg/kg	1.7	0.54	8081A	µg/L	0.05	0.0094
959-98-8	*alpha*-Endosulfan [I]	8081A	µg/kg	1.7	0.38	8081A	µg/L	0.05	0.0165
33213-65-9	*beta*-Endosulfan [II]	8081A	µg/kg	1.7	0.66	8081A	µg/L	0.05	0.0074
1031-07-8	Endosulfan sulfate	8081A	µg/kg	1.7	0.29	8081A	µg/L	0.05	0.0065
72-20-8	Endrin	8081A	µg/kg	1.7	0.38	8081A	µg/L	0.05	0.0086
7421-93-4	Endrin aldehyde	8081A	µg/kg	1.7	1.53	8081A	µg/L	0.05	0.014
76-44-8	Heptachlor	8081A	µg/kg	1.7	0.47	8081A	µg/L	0.05	0.0053
72-43-5	Methoxychlor	8081A	µg/kg	3.3	0.17	8081A	µg/L	0.1	0.0048
8001-35-2	Toxaphene	8081A	µg/kg	170	10	8081A	µg/L	5	0.26

Table 3. Method detection limits and laboratory reporting levels for analytes measured at the Severn Trent Laboratory L -- continued.

		Sediment				Water			
CAS #		Method	unit	STL RL	STL MDL	Method	unit	STL RL	STL MDL
	Metals by ICP/MS (total)								
7440-36-0	Antimony	6020	mg/kg	0.2	0.0029	6020	µg/L	2	0.04
7440-38-2	Arsenic	6020	mg/kg	0.5	0.017	6020	µg/L	5	0.061
7440-39-3	Barium	6020	mg/kg	0.1	0.024	6020	µg/L	1	0.057
7440-41-7	Beryllium	6020	mg/kg	0.1	0.0044	6020	µg/L	1	0.028
7440-43-9	Cadmium	6020	mg/kg	0.1	0.0014	6020	µg/L	1	0.022
7440-47-3	Chromium	6020	mg/kg	0.2	0.018	6020	µg/L	2	0.24
7440-48-4	Cobalt	6020	mg/kg	0.1	0.0012	6020	µg/L	1	0.015
7440-50-8	Copper	6020	mg/kg	0.2	0.015	6020	µg/L	2	0.63
7439-92-1	Lead	6020	mg/kg	0.1	0.0042	6020	µg/L	1	0.15
7439-96-5	Manganese	6020	mg/kg	0.1	0.023	6020	µg/L	1	0.076
7439-98-7	Molybdenum	6020	mg/kg	0.2	0.0022	6020	µg/L	2	0.023
7440-02-0	Nickel	6020	mg/kg	0.1	0.013	6020	µg/L	2	0.25
7782-49-2	Selenium	6020	mg/kg	0.5	0.049	6020	µg/L	5	0.19
7440-22-4	Silver	6020	mg/kg	0.1	0.0023	6020	µg/L	1	0.012
7440-28-0	Thallium	6020	mg/kg	0.1	0.00099	6020	µg/L	1	0.015
7440-31-5	Tin	6020	mg/kg	1	0.079	6020	µg/L	10	0.054
7440-62-2	Vanadium	6020	mg/kg	0.5	0.0056	6020	µg/L	5	0.07
7440-66-6	Zinc	6020	mg/kg	1	0.350	6020	µg/L	10	2.3
7439-97-6	Mercury by CVAA	7471A	mg/kg	0.033	0.0025	7470A	µg/L	0.2	0.028

Quality Assurance and Quality Control

One field blank for ground water (blank solution water that is processed in the field through the entire sampling procedure), one field replicate for ground water, and one field replicate for sediment analysis were collected during the July - August 2002 sampling. A trip blank for VOCs (a sample of nitrogen-purged organic-free water that travels in the coolers over the entire route of the sampling bottles from the lab, to the field, and back to the lab) was included with each shipment of samples. Additionally, with each laboratory lot of samples, the STL analyzed laboratory blanks, replicates, and spikes for all methods. Results of the quality-control samples are summarized in tables 4 - 10. Additional quality-assurance results are available on request from the USGS District Office in Baltimore, Maryland.

Low-level detections of toluene and methylene chloride in trip blanks for several of the sediment samples were within the range of concentrations found for field samples. Similar detections in field blanks were found for antimony, chromium, and HEM (oil and grease) in water and total cyanide in sediments. Samples for which the corresponding field and/or lab blanks were found to contain greater than 10 percent of ambient concentrations in the environmental samples should be considered carefully and concentrations or detections of these chemicals may be suspect. Field blanks for other methods were generally clean except for some low-level detections that were far enough below the ambient concentrations to be considered negligible.

Surrogate organic compounds were added to samples before analysis at the laboratory to determine the recovery of similar compounds in the natural environmental matrices. The recoveries of these surrogate compounds should be considered when evaluating the concentrations of the target analytes. Surrogate recoveries for VOCs in water and sediment were close to 100 percent except for two surrogates for the Anacostia Park samples that were within ± 30 percent of 100 percent. Surrogate recoveries for semivolatiles in water and sediment were consistently low -- between 38 and 69 percent for sediments and between 56 and 91 percent for water. This indicates that these constituents may be under-reported and true concentrations in the environmental samples may be up to three-fold higher than reported values. Surrogate recoveries for Aroclors were between 51 and 101 percent for sediments and 57 to 84 percent for water. Recoveries for the surrogates of the individual congeners were variable, but also were generally low, ranging from 41 to 101 percent.

Table 4. Results of selected quality-control data for volatile organic compounds in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[Compounds that were detected and quantified are in **Bold**. The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; J, estimated result, compound was detected but value was less than the laboratory reporting level; B, the associated method blank contains this analyte at a low but reportable level; Rep, field replicate; FB, field blank]

Well or core number	Toluene	Methylene chloride	Chloroform	1,1-Dichloroethene	Tenatively identified compounds (TICs)
Water					
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
DCMW001-02-FB	<1.0	<5.0	<1.0	<1.0	None
Trip Blank	<1.0	<5.0	<1.0	<1.0	None
Trip Blank	<1.0	<5.0	<1.0	<1.0	None
Trip Blank	<1.0	<5.0	<1.0	<1.0	None
DCMW005-02-Rep	<1.0	<5.0	<1.0	<1.0	None
DCMW005-02	*<1.0*	*<5.0*	*<1.0*	*<1.0*	*None*
Sediment					
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	
Trip Blank	<1.0	<5.0	<1.0	<1.0	None
Trip Blank	**J 0.4**	**J,B 2.0**	<1.0	**J 0.50**	None
Trip Blank	<1.0	**J 1.2**	<1.0	**J, 0.56**	Diphenylmethane 2-Ethylhexyl ester acetic acid 1 Unknown TIC
NYASOIL001-02-Rep	**J 6.3**	<8.6	<17	**J, 7.1**	1 Unknown TIC
NYASOIL001-02	***J 3.8***	*<8.9*	*<18*	***J, 4.5***	*6 Unknown TICs* *3-Methylheptyl actetate*

Table 5. Results of selected quality-control data for semi-volatile organic compounds in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[Compounds that were detected and quantified are in **Bold**; The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; DRO, Diesel Range Organics (for sediments); Rep, field replicate; FB, field blank; J, estimated result, compound was detected but value was less than the laboratory reporting level; --, not analyzed]

Well or core number	**Acenaphthene**	**Anthracene**	**Benzo(a)anthracene**	**Benzo(a)pyrene**	**Benzo(b)fluoranthene**
			Water		
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<10	<10	<10	<10	<10
DCMW005-02-Rep	<10	<10	<10	<10	<10
DCMW005-02	*<10*	*<10*	*<10*	*<10*	*<10*
			Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
NYASOIL001-02-Rep	<570	<570	<570	<570	<570
NYASOIL001-02	*<590*	*<590*	*<590*	***J 310***	*<590*

Table 5. Results of selected quality-control data for semi-volatile organic compounds in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	**Benzo(k)fluoranthene**	**Benzo(ghi)perylene**	**Bis(2-ethylhexyl) phthalate**	**Chrysene**	**Dibenz(a,h)anthracene**
			Water		
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<10	<10	<10	<10	<10
DCMW005-02-Rep	<10	<10	<10	<10	<10
DCMW005-02	*<10*	*<10*	*<10*	*<10*	*<10*
			Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
NYASOIL001-02-Rep	<570	<570	<570	<570	<570
NYASOIL001-02	*<590*	*<590*	*<590*	*<590*	*<590*

Table 5. Results of selected quality-control data for semi-volatile organic compounds in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene
			Water		
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<10	<10	<10	<10	<10
DCMW005-02-Rep	<10	<10	<10	<10	<10
DCMW005-02	*<10*	*<10*	*<10*	*<10*	*<10*
			Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
NYASOIL001-02-Rep	<570	<570	<570	<570	<570
NYASOIL001-02	*<590*	*<590*	*<590*	*<590*	*<590*

Table 5. Results of selected quality-control data for semi-volatile organic compounds in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	DRO	Tentatively identified compoumds (TICs)
Water		
DCMW001-02-FB	--	8 Unknown TICs
DCMW005-02-Rep	--	1,1,2-Trichloro 1-propene 6 Unknown TICs
DCMW005-02	--	*3 Unknown TICs*
Sediment	(mg/kg)	
NYASOIL001-02-Rep	<6.9	1 Unknown aldol condensate 3 Unknown TICs
NYASOIL001-02	*<7.1*	*4 Unknown TICs* *Unknown aldol condensate*

Table 6. Results of selected quality-control data for the concentrations of organo-chlorine pesticides in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; Rep, field replicate; FB, field blank]

Well or core number	**4,4'-DDD**	**4,4'-DDE**	**4,4'-DDT**
	Water		
	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<0.05	<0.05	<0.05
DCMW005-02-Rep	<0.05	<0.05	<0.05
DCMW005-02	*<0.05*	*<0.05*	*<0.05*
	Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)
NYASOIL001-02-Rep	<29	<29	<29
NYASOIL001-02	*<30*	*<30*	*<30*

Table 7. Summary of quality-control data for concentrations of selected aroclors collected in July - August 2002 at the Anacostia River stations.
[The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; Rep, field replicate; FB, field blank]

Well or core number	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total aroclors
Water								
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW005-02-Rep	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW005-02	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*	*<1.0*
Sediment								
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
NYASOIL001-02-Rep	<57	<57	<57	<57	<57	<57	<57	<57
NYASOIL001-02	*<59*	*<59*	*<59*	*<59*	*<59*	*<59*	*<59*	*<59*

Table 8. Results of selected quality-control data for total metals detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.

[Compounds that were detected and quantified are in **Bold**; The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; B, estimated result, compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level; Rep, field replicate; FB, field blank]

Well or core number	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Manganese	Nickel
				Water					
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02-FB	<2.0	<5.0	<1.0	<1.0	**B,J 0.63**	<2.0	<1.0	**B,J 0.24**	<2.0
Lab Blank	**B 0.063**	**B 0.099**	<1.0	<1.0	**B 0.28**	<2.0	<1.0	**B 0.13**	<2.0
DCMW005-02 Rep	<2.0	**B,J 3.8**	**B 0.063**	<1.0	**B,J 1.1**	**B, 1.0**	**B, 0.27**	**J 190**	**B 0.65**
DCMW005-02	*<2.0*	***B,J 3.9***	***B 0.063***	*<1.0*	***B,J 1.1***	*<2.0*	***B 0.24***	***J 190***	***B 0.52***
				Sediment					
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
Lab Blank	<200	<500	<100	<100	**B 108**	**B 51.3**	<100	**B 43.0**	**B 21.5**
Lab Blank	**B 4.0**	<500	<100	<100	**B 77.4**	**B 48.5**	<100	**B 27.5**	<100
NYASOIL001-02-Rep	<343	**2,350**	**2,000**	**349**	**J 32,400**	**J 16,200**	**12,600**	**J 431,000**	**39,800**
NYASOIL001-02	*<355*	***2,020***	***1,980***	***303***	***J 29,900***	***J 14,300***	***11,700***	***J 1,020,000***	***32,700***

Table 8. Results of selected quality-control data for total metals detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	Selenium	Silver	Thallium	Zinc	Iron	Sulfur	Mercury
			Water				
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
DCMW001-02-FB	<5.0	<5.0	<1.0	<10	<100	<0.10	<0.20
Lab Blank	<5.0	<5.0	<1.0	<10	<100	<0.10	<0.20
DCMW005-02 Rep	<5.0	<5.0	<1.0	**B 5.9**	**21,000**	<0.10	<0.20
DCMW005-02	*<5.0*	*<5.0*	*<1.0*	***B, 7.1***	***21,000***	*<0.10*	*<0.20*
			Sediment				
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Lab Blank	<500	**B 4.6**	<100	<1000	<10.0	<10.0	<0.033
Lab Blank	<500	**B 54.8**	<100	<1000	<10.0	<10.0	<0.033
NYASOIL001-02-Rep	**1,140**	**B,J 134**	**265**	**99,300**	**28,600**	**1,150**	**B 0.023**
NYASOIL001-02	***1,090***	***B,J 123***	***259***	***91,100***	***18,500***	***806***	***B 0.028***

Table 9. Results of selected quality-control data for nutrients, total cyanide, and total phenols in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[Compounds that were detected and quantified are in **Bold**; The environmental sample associated with each replicate is presented here for comparison in italics; <, less than; mg/L, milligrams per liter; mg/kg, milligrams per kilogram; B, estimated result, compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level; Q, elevated reporting limit due to high analyte levels; *, ammonia as nitrogen is greater than total Kjeldahl nitrogen, but the difference in values is within the precisions of the methods; Rep, field replicate; FB, field blank]

Well or core number	Ammonia as nitrogen	Nitrate/Nitrite as nitrogen	Total Kjeldahl nitrogen	Total phosphorus	Total cyanide	Total phenols
Water						
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
DCMW001-02-FB	**B 0.031**	<0.10	<0.50	<0.050	<0.010	<0.020
Lab Blank	<0.10	<0.10	<0.50	<0.050	<0.010	<0.020
Lab Blank	<0.10	<0.10	<0.50	<0.050	**B 0.0021**	<0.020
Lab Blank	<0.10	<0.10	<0.50	<0.050	<0.010	<0.020
DCMW005-02-Rep	**0.50***	<0.10	**B 0.40***	**0.14**	**B,J 0.0070**	<0.020
DCMW005-02	***0.48****	*<0.10*	***B 0.39****	***0.15***	***B,J 0.0068***	*<0.020*
Sediment						
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Lab Blank	<1.0	<1.0	<25.0	**B 1.9**	**B 0.13**	<2.0
Lab Blank	<1.0	**B 0.12**	<25.0	<5.0	**B 0.12**	<2.0
NYASOIL001-02-Rep	**5.7**	<1.7	**Q 3,340**	**Q 464**	**B,J 0.29**	**B, 1.9**
NYASOIL001-02	***7.7***	*<1.8*	***Q 5,180***	***Q 264***	***B,J 0.36***	***B 1.5***

Table 10. Results of quality-control data for *n*-Hexane Extractable Material (oil and grease), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids, and total suspended solids samples in ground water collected in July - August 2002 at the Anacostia River stations.

[Compounds that were detected and quantified are in **Bold**; The environmental sample associated with the replicate is presented here for comparison in italics; <, less than; mg/L, milligrams per liter; B, estimated result, compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level; HEM, *n*-Hexane Extractable Material; SGT, silica gel treated; Rep, field replicate; FB, field blank; --, not analyzed]

Well or core number	Biochemical oxygen demand	Chemical oxygen demand	HEM (oil and grease)	HEM, SGT	Total dissolved solids	Total suspended solids
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
DCMW001-02-FB	--	**B 8.0**	**B 1.3**	<5.0	<10	<4.0
Lab Blank	<2.0	<20	<5.0	--	<10	<4.0
Lab Blank	<2.0	<20	<5.0	--	**B 8.0**	<4.0
Lab Blank	<2.0	<20	**B 1.4**	--	**B 8.0**	<4.0
DCMW005-02-Rep	<2.0	**B 5.0**	<5.0	<5.0	**J 74**	**15**
DCMW005-02	*<2.0*	***B 9.7***	*<5.0*	*<5.0*	***J 77***	***33***

Results

Summaries of field data and all chemicals that were detected and quantified are presented in tables 11 through 19. Data that are less than the reporting levels are not summarized in these table, but may be inferred from Table 3, where all reporting levels are given, or obtained from water-quality database in the USGS District office in Baltimore, Maryland. Tentatively Identified Compounds (TICs) are presented for the GC-MS methods, where spectra of organic compounds were found, but not verified or adequately quantified with internal standards.

VOCs were generally undetected except for several low-level concentrations that were similar to those found in field and laboratory blanks. Semivolatile or polyaromatic hydrocarbon compounds (PAHs) were found in some of the sediment samples, particularly the shallow versus the deep sediments, but were not found in any of the ground-water samples. Generally, lower PAHs, both for the number of compounds detected and for the concentrations, were found in the tidal flat north of Benning Road, than in the surface sediments at any of the three shore stations. Conversely, the Benning Road site had the highest concentration of Diesel-Range Organics (DRO, 260 milligrams per kilogram (mg/kg)) of any of the sites. Total Gasoline-Range Organics (GRO) were analyzed with method reporting levels of approximately 0.5 to 0.8 mg/kg. There were no detections of total GRO at or above these reporting levels in any of the sediment samples.

Of the organochlorine compounds that were analyzed, only DDT and its degradation products, DDE and DDD, were found in the surface sediments at Kenilworth Aquatic Gardens and Anacostia Park. DDT has been banned since 1973, so the detections at Kenilworth Aquatic Gardens demonstrate the persistence of this compound and its degradation products in the environment. The concentrations of DDE and DDT in surface sediments at this site were 120 and 100 micrograms per kilogram (μg/kg), respectively.

Of the aroclor mixtures that were analyzed, only Aroclor 1260 was detected (table 15). This mixture was found in similar concentrations of 160 to 180 μg/kg in surface sediments at all three shore stations. Aroclor 1260 is a complex mixture of a number of PCB congeners defined with a numerical identifier of the percentage of chlorines in the molecules (e.g. Aroclor 1260 has 60 percent chlorine). Figure 2 (U.S. Environmental Protection Agency, 2002) shows a typical distribution of the congeners for Aroclor 1260. A complete analysis of individual congeners was also determined on the mudflat sample from Benning Road, and most of these congeners were detected in the picogram to nanogram per liter concentration range (table 16). Complete PCB congener analysis was not done for any of the other samples.

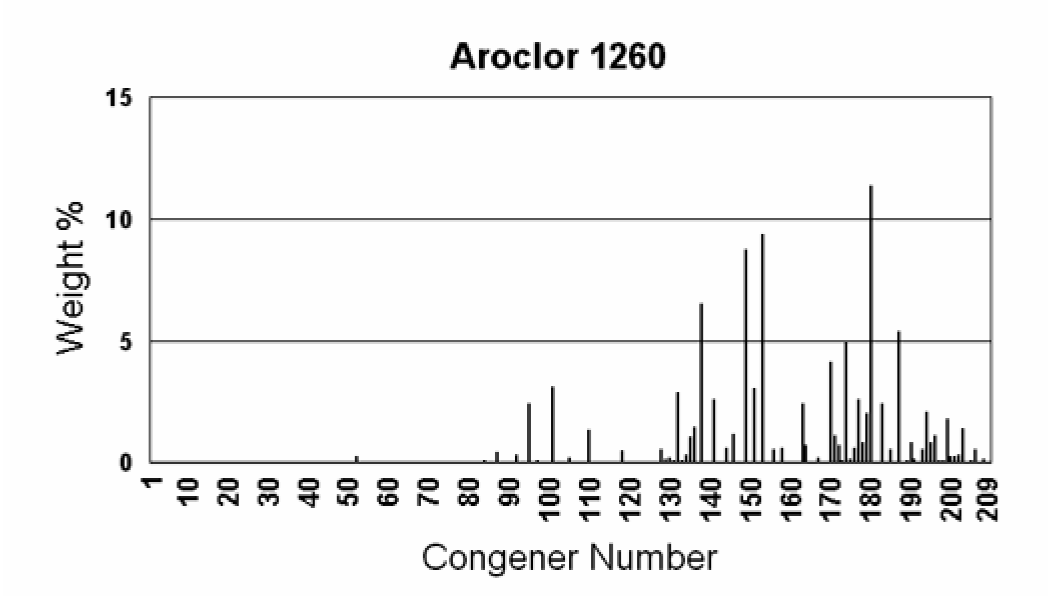

Figure 2. Plot of Aroclor 1260 composition data (from U.S. Environmental Protection Agency, 2002)

Trace metals were found in most of the sediment samples (table 17). Concentrations of trace metals in average crustal materials are shown at the bottom of this table for comparison to the sediment concentrations and appear to be similar in range. The highest concentrations of lead, arsenic, silver, mercury, and sulfur were found in the shallow sediment at the Kenilworth Aquatic Gardens, and in some cases these were an order of magnitude or more higher than occurs in average crustal material. Concentrations of selenium in almost all of the sediment samples were also more than an order of magnitude higher than average crustal material.

Concentrations of Kjeldahl nitrogen and total phosphorus appeared to be somewhat high in the sediment materials, and were found in moderate to high concentrations in the ground water as well (table 18).

Table 11. Field parameters for ground water collected at Anacostia River wells in July - August 2002.
[<, less than; °C, degrees Celsius; ANC, acid-neutralizing capacity or unfiltered alkalinity; mg/L as $CaCO_3$, milligrams per liter as calcium carbonate; μS/cm, microsiemens per centimeter; NTU, Nephelometric Turbidity Units; mg/L, milligrams per liter]

Well or core number	**Date**	**Water temperature** (°C)	**pH** (standard units)	**Dissolved oxygen** (mg/L)	**Specific conductance** (μS/cm)	**Turbidity** (NTU)	**ANC** (mg/L as $CaCO_3$)
DCMW001-02	8/21/2002	15.5	6.1	<1	327	0.72	141
DCMW004-02	8/21/2002	15.4	6.1	<1	286	2.7	105
DCMW002-02	8/22/2002	17.6	5.0	5.9	305	2.6	4.0
DCMW003-02	8/22/2002	17.3	6.5	<1	91	0.85	30.5
DCMW005-02	8/23/2002	17.1	6.3	<1	153	2.6	57.0

Table 12. Summary of volatile organic compounds detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[Compounds that were detected and quantified are in **Bold**; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; J, estimated result, compound was detected but value was less than the laboratory reporting level; --, not analyzed]

Well or core number	Toluene	Methylene chloride	Chloroform	1,1-Dichlorethene	Tentatively identified compounds (TICs)
			Water		
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
DCMW001-02	<1.0	<5.0	<1.0	<1.0	None
DCMW004-02	<1.0	<5.0	<1.0	<1.0	None
DCMW002-02	<1.0	<5.0	**5.7**	<1.0	2-Ethylthiocyclohexane
DCMW003-02	<1.0	<5.0	<1.0	<1.0	None
DCMW005-02	<1.0	<5.0	<1.0	<1.0	None
			Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	
DCHP01-02	<7.4	**J 2.0**	<7.4	<7.4	1 Unknown TIC Decahydro-naphthalene 7-Methyl-tridecane 2,6,10- trimethyl-Dodecane
NYASOIL001-02	**J 3.8**	<8.9	<18	**J, 4.5**	6 Unknown TICs 3-Methylheptyl actetate
KAGSOIL001-02	**5.5**	<5.3	<11	<5.3	None
KAGSOIL002-02	<5.5	<5.5	<11	<5.5	2 Unknown TICs 2-Ethylhexyl ester acetic acid
APSOIL001-02	<5.7	<5.7	<11	**J, 1.7**	None
APSOIL002-02	**J 3.6**	<8.4	<17	**J, 4.8**	3 Unknown TICs 2-Ethylhexyl ester acetic acid

Table 13. Summary of semi-volatile organic compounds detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.
[Compounds that were detected and quantified are in **Bold**; <, less than; μg/L, micrograms per liter; μg/kg, micrograms per kilogram; J, estimated result, compound was detected but value was less than the laboratory reporting level; DRO, Diesel-Range Organics (for sediments only); --, not analyzed]

Well or core number	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
			Water		
	(μg/L)	(μg/L)	(μg/L)	(μg/L)	(μg/L)
DCMW001-02	<10	<10	<10	<10	<10
DCMW004-02	<10	<10	<10	<10	<10
DCMW002-02	<10	<10	<10	<10	<10
DCMW003-02	<10	<10	<10	<10	<10
DCMW005-02	<10	<10	<10	<10	<10
			Sediment		
	(μg/kg)	(μg/kg)	(μg/kg)	(μg/kg)	(μg/kg)
DCHP01-02	<490	<490	<490	<490	<490
NYASOIL001-02	<590	<590	<590	**J 310**	<590
KAGSOIL001-02	**J 97**	**360**	**1,100**	**920**	**770**
KAGSOIL002-02	<370	<370	<370	<370	<370
APSOIL001-02	<380	<380	**J 56**	<380	<380
APSOIL002-02	<550	<550	<550	<550	<550

Table 13. Summary of semi-volatile organic compounds detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	Benzo(k)fluoranthene	Benzo(ghi)perylene	Bis (2-ethylhexyl) phthalate	Chrysene	Dibenz(a,h)anthracene
Water					
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02	<10	<10	<10	<10	<10
DCMW004-02	<10	<10	<10	<10	<10
DCMW002-02	<10	<10	<10	<10	<10
DCMW003-02	<10	<10	<10	<10	<10
DCMW005-02	<10	<10	<10	<10	<10
Sediment					
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
DCHP01-02	<490	<490	**J 340**	<490	<490
NYASOIL001-02	<590	<590	<590	<590	<590
KAGSOIL001-02	**840**	**520**	<350	**990**	**J 250**
KAGSOIL002-02	<370	<370	<370	<370	<370
APSOIL001-02	<380	<380	<380	**J 74**	<380
APSOIL002-02	<550	<550	<550	<550	<550

Table 13. Summary of semi-volatile organic compounds detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	Fluoranthene	Fluorene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene
			Water		
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02	<10	<10	<10	<10	<10
DCMW004-02	<10	<10	<10	<10	<10
DCMW002-02	<10	<10	<10	<10	<10
DCMW003-02	<10	<10	<10	<10	<10
DCMW005-02	<10	<10	<10	<10	<10
			Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
DCHP01-02	<490	<490	<490	<490	**J 91**
NYASOIL001-02	<590	<590	<590	<590	<590
KAGSOIL001-02	**2,400**	**J 100**	**490**	**1,400**	**1,900**
KAGSOIL002-02	<370	<370	<370	<370	<370
APSOIL001-02	<380	<380	<380	<380	<380
APSOIL002-02	<550	<550	<550	<550	<550

Table 13. Summary of semi-volatile organic compounds detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	DRO	Tentatively identified compoumds (TICs)
	Water	
DCMW001-02	--	5 Unknown TICs 1,2,3-Trichloro-1-propene
DCMW004-02	--	5 Unknown TICs
DCMW002-02	--	4 Unknown TICs
DCMW003-02	--	2 Unknown TICs 1,1,2-Trichloro-1-propene
DCMW005-02	--	3 Unknown TICs
	Sediment	
	(mg/kg)	
DCHP01-02	**260**	10 Unknown TICs Unknown aldol condensate 5-Methyl-undecane 3,7-Dimethyl-nonane 2-Methyl-8-propyl-dodecane
NYASOIL001-02	<7.1	4 Unknown TICs Unknown aldol condensate
KAGSOIL001-02	**33**	3-Unknown TICs Unknown aldol condensate 2-Methyl anthracene 4H-cyclopenta[def]phenanthrene 9,10-Anthracenedione
KAGSOIL002-02	<4.4	4 Unknown TICs Unknown aldol condensate
APSOIL001-02	<4.6	4 Unknown TICs Unknown aldol condensate
APSOIL002-02	<6.7	4 Unknown TICs Unknown aldol condensate

Table 14. Summary of the concentrations of organo-chlorine pesticides detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.

[Compounds that were detected and quantified are in **Bold**; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; J, estimated result, compound was detected but value was less than the laboratory reporting level]

Well or core number	**4,4'-DDD**	**4,4'-DDE**	**4,4'-DDT**
	Water		
	(µg/L)	(µg/L)	(µg/L)
DCMW001-02	<0.05	<0.05	<0.05
DCMW004-02	<0.05	<0.05	<0.05
DCMW002-02	<0.05	<0.05	<0.05
DCMW003-02	<0.05	<0.05	<0.05
DCMW005-02	<0.05	<0.05	<0.05
	Sediment		
	(µg/kg)	(µg/kg)	(µg/kg)
DCHP01-02	<50	<50	<50
NYASOIL001-02	<30	<30	<30
KAGSOIL001-02	**J 7.0**	**120**	**100**
KAGSOIL002-02	<1.9	<1.9	<1.9
APSOIL001-02	**J 4.5**	**J 5.8**	**J 11**
APSOIL002-02	<28	<28	<28

Table 15. Summary of the concentrations of selected aroclors collected in July - August 2002 at the Anacostia River stations. [Aroclors that were detected and quantified are in **Bold**; <, less than; µg/L, micrograms per liter; µg/kg, micrograms per kilogram]

Well or core number	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total aroclors
				Water				
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW004-02	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW002-02	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW003-02	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
DCMW005-02	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
				Sediment				
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
DCHP01-02	<49	<49	<49	<49	<49	<49	**180**	**180**
NYASOIL001-02	<59	<59	<59	<59	<59	<59	<59	<59
KAGSOIL001-02	<35	<35	<35	<35	<35	<35	**160**	**160**
KAGSOIL002-02	<37	<37	<37	<37	<37	<37	<37	<37
APSOIL001-02	<38	<38	<38	<38	<38	<38	**180**	**180**
APSOIL002-02	<55	<55	<55	<55	<55	<55	<55	<55

Table 16. Total polychlorinated biphenyls (PCBs) congeners measured in stream sediment at hoverprove station DCHP01-02 on July 2, 2002.

[All units are in pg/g (picograms per gram); Congeners that were detected and quantified are in **Bold**; <, less than; C, co-eluting isomer; E, estimated result because the concentration exceeded the calibration range; B, the associated method blank contains this analyte at a low but reportable level; G, elevated reporting limit due to matrix interference; JA, the analyte was positively identified but the quantitation is an estimate; [1], IUPAC PCB Congener 109; [2], IUPAC Congener PCB 107; [3], IUPAC PCB Congener 108; [4], IUPAC PCB Congener 200; [5], IUPAC Congener PCB 201; [6], IUPAC PCB Congener 199].

PCB 1	PCB 2	PCB 3	PCB 4	PCB 5	PCB 6	PCB 7	PCB 8
110	<29	**160**	**C 210**	**C 1,800**	**250**	**C 100**	**C 1,800**
PCB 9	PCB 10	PCB 11	PCB 12	PCB 13	PCB 14	PCB 15	PCB 16
C 100	**180**	<29	**C 120**	**C 120**	<29	**1,200**	**C 2,200**
PCB 17	PCB 18	PCB 19	PCB 20	PCB 21	PCB 22	PCB 23	PCB 24
1,200	**2,900**	**200**	**C 2,900**	**C 2,900**	**2,000**	<29	**C 270**
PCB 25	PCB 26	PCB 27	PCB 28	PCB 29	PCB 30	PCB 31	PCB 32
390	**880**	**C 270**	**E 4,700**	**31**	<29	**E 4,300**	**C 2,200**
PCB 33	PCB 34	PCB 35	PCB 36	PCB 37	PCB 38	PCB 39	PCB 40
C 2,900	<29	**100**	<29	**2,100**	<29	<29	<29
PCB 41	PCB 42	PCB 43	PCB 44	PCB 45	PCB 46	PCB 47	PCB 48
C 2,500	**930**	**C,E 3,100**	**B 2,800**	**600**	**240**	**C 1,200**	**C 1,200**
PCB 49	PCB 50	PCB 51	PCB 52	PCB 53	PCB 54	PCB 55	PCB 56
C,E, 3,100	<29	**200**	**C,E,B 3,900**	**530**	<29	<29	**C,E 3,200**
PCB 57	PCB 58	PCB 59	PCB 60	PCB 61	PCB 62	PCB 63	PCB 64
470	**170**	**300**	**C,E 3,200**	**C 2,600**	<29	**160**	**C 2,500**

Table 16. Total PCB congeners measured in stream sediment at hoverprove station DCHP01-02 on July 2, 2002 -- continued.

PCB 65	PCB 66	PCB 67	PCB 68	PCB 69	PCB 70	PCB 71	PCB 72
<29	**C,E 3,100**	<29	**C 2,500**	<29	**E 5,500**	**940**	**36**
PCB 73	PCB 74	PCB 75	PCB 76	PCB 77	PCB 78	PCB 79	PCB 80
C,E,B 3,900	**C 2,600**	**C 1,200**	**E,C 4,600**	G <560	<29	**47**	**C,E 3,100**
PCB 81	PCB 82	PCB 83	PCB 84	PCB 85	PCB 86	PCB 87	PCB 88
G <79	**1,100**	**C 310**	**1,500**	**C 1,000**	**C,E 3,300**	**C,E 3,300**	<29
PCB 89	PCB 90	PCB 91	PCB 92	PCB 93	PCB 94	PCB 95	PCB 96
C,E,B 7,400	**C,E,B 7,400**	**800**	**1,800**	**C,E,B 7,100**	**32**	**C,E,B 7,100**	**41**
PCB 97	PCB 98	PCB 99	PCB 100	PCB 101	PCB 102	PCB 103	PCB 104
C,E 3,300	**C 160**	**E 3,000**	<29	**C,E,B 7,400**	**C 160**	<29	<29
PCB 105	PCB 106	PCB 107[1]	PCB 108[2]	PCB 109[3]	PCB 110	PCB 111	PCB 112
C,B 1,800	**C,E,B 4,500**	**C 530**	**C 310**	**C 530**	**E 7,500**	**C,E 3,300**	<29
PCB 113	PCB 114	PCB 115	PCB 116	PCB 117	PCB 118	PCB 119	PCB 120
<29	**100**	**C,E 3,300**	**C,E 3,300**	**C,E 3,300**	**C,E,B 4,500**	**210**	**C 1,000**
PCB 121	PCB 122	PCB 123	PCB 124	PCB 125	PCB 126	PCB 127	PCB 128
<29	**67**	G <330	**360**	**C,E 3,300**	**JA 74**	**C,B 1,800**	**1,300**
PCB 129	PCB 130	PCB 131	PCB 132	PCB 133	PCB 134	PCB 135	PCB 136
560	**940**	**C,E 3,400**	**C,E 4,700**	**320**	**850**	**C,E 3,900**	**2,800**
PCB 137	PCB 138	PCB 139	PCB 140	PCB 141	PCB 142	PCB 143	PCB 144
320	**C,E 18,000**	**C,E,B 18,000**	**72**	**E 5,100**	**C,E 3,400**	<29	**C,E 3,900**

Table 16. Total PCB congeners measured in stream sediment at hoverprove station DCHP01-02 on July 2, 2002 -- continued.

PCB 145	PCB 146	PCB 147	PCB 148	PCB 149	PCB 150	PCB 151	PCB 152
<29	<29	**150**	<29	**C,E,B 18,000**	<29	**E 6,500**	<29
PCB 153	PCB 154	PCB 155	PCB 156	PCB 157	PCB 158	PCB 159	PCB 160
E 19,000	**180**	<29	**1,100**	**140**	**C 1,600**	**290**	**C 1,600**
PCB 161	PCB 162	PCB 163	PCB 164	PCB 165	PCB 166	PCB 167	PCB 168
<29	**180**	**C,E 18,000**	**C,E 18,000**	**C,E 3,400**	**34**	**450**	**C,E 4,700**
PCB 169	PCB 170	PCB 171	PCB 172	PCB 173	PCB 174	PCB 175	PCB 176
7.0	**C,E,B 8,600**	**2,300**	**C,1,400**	**180**	**E 10,000**	**410**	**1,200**
PCB 177	PCB 178	PCB 179	PCB 180	PCB 181	PCB 182	PCB 183	PCB 184
E 5,700	**1,900**	**E 3,900**	**E,B 19,000**	<29	**C,E 11,000**	**E 5500**	<29
PCB 185	PCB 186	PCB 187	PCB 188	PCB 189	PCB 190	PCB 191	PCB 192
1,200	<29	**C,E 11,000**	<29	**330**	**C,E,B 8,600**	**370**	**C 1,400**
PCB 193	**PCB 194**	**PCB 195**	**PCB 196**	**PCB 197**	**PCB 198**	**PCB 199**[4]	**PCB 200**[5]
1,000	**E 4,000**	**1,400**	**C,E 5,600**	**180**	**270**	**E 4,600**	**670**
PCB 201[6]	PCB 202	PCB 203	PCB 204	PCB 205	PCB 206	PCB 207	PCB 208
660	**650**	**C,E 5,600**	<29	**230**	**2,000**	**170**	**380**
PCB 209							
B 730							

Table 17. Summary of the concentrations of total metals detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations.

[Compounds that were detected and quantified are in **Bold**; For comparison in the sediment samples, average crustal abundances of the elements are presented from Lide (1996); <, less than; µg/L, micrograms per liter; mg/L, milligrams per liter; µg/kg, micrograms per kilogram; mg/kg, milligrams per kilogram; B, estimated result, compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level]

Well or core number	**Antimony**	**Arsenic**	**Beryllium**	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Manganese**	**Nickel**
				Water					
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
DCMW001-02	**B,J 0.073**	**B,J 0.44**	**B 0.048**	<1.0	**B,J 1.1**	<2.0	<1.0	**J 2,300**	**B 0.99**
DCMW004-02	<2.0	**B,J 0.54**	**B 0.059**	<1.0	**B,J 1.1**	**B 0.76**	**B 0.16**	**J 1,800**	**B 0.94**
DCMW002-02	<2.0	**B,J 0.20**	**B 0.15**	**B 0.54**	**B,J 0.67**	**B 0.88**	<1.0	**J 120**	**8.0**
DCMW003-02	<2.0	**B,J 2.4**	<1.0	<1.0	**B,J 0.62**	<2.0	<1.0	**J 220**	**B 0.76**
DCMW005-02	<2.0	**B,J 3.9**	**B 0.063**	<1.0	**B,J 1.1**	<2.0	**B 0.24**	**J 190**	**B 0.52**
				Sediment					
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
DCHP01-02	<294	**4,510**	**1,200**	**469**	**J 53,800**	**J 23,100**	**33,900**	**J 266, 000**	**J 14,500**
NYASOIL001-02	<355	**2,020**	**1,980**	**303**	**J 29,900**	**J 14,300**	**11,700**	**J 1,020,000**	**32,700**
KAGSOIL001-02	**B,J 62.9**	**6,490**	**681**	**383**	**J 25,500**	**J 23,900**	**197,000**	**J 214,000**	**12,600**
KAGSOIL002-02	**B,J 11.9**	**2,210**	**409**	**B 57.3**	**J 11,100**	**J 7,340**	**3,190**	**J 122,000**	**8,420**
APSOIL001-02	**B,J 11.5**	**3,850**	**977**	**362**	**J 30,700**	**J 22,600**	**58,500**	**J 536,000**	**19,600**
APSOIL002-02	<335	**2,430**	**1,590**	**307**	**J 26,700**	**J 15,400**	**12,800**	**J 949,000**	**28,200**
				Average crustal abundance					
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
	200	1,800	2,800	150	102,000	60,000	14,000	950,000	84,000

Table 17. Summary of the concentrations of total metals detected in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations -- continued.

Well or core number	**Selenium**	**Silver**	**Thallium**	**Zinc**	**Iron**	**Sulfur**	**Mercury**
			Water				
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(µg/L)
DCMW001-02	<5.0	<5.0	<1.0	**B 8.2**	**47,000**	**0.26**	**B 0.035**
DCMW004-02	<5.0	<5.0	<1.0	**B 7.2**	**38,000**	**0.15**	**B 0.043**
DCMW002-02	**B 0.65**	<5.0	<1.0	**14**	**680**	**21**	<0.20
DCMW003-02	<5.0	<5.0	<1.0	**B 6.9**	**14,000**	**1.7**	<0.20
DCMW005-02	<5.0	<5.0	<1.0	**B, 7.1**	**21,000**	<0.10	<0.20
			Sediment				
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
DCHP01-02	**1,010**	**J 397**	**264**	**81,300**	**23,700**	**282**	**0.11**
NYASOIL001-02	**1,090**	**B,J 123**	**259**	**91,100**	**18,500**	**806**	**B 0.028**
KAGSOIL001-02	**672**	**J 2,500**	**146**	**88,700**	**14,600**	**454**	**0.36**
KAGSOIL002-02	**B 182**	**B,J 11.3**	**B 49.9**	**56,400**	**16,000**	**46.1**	<0.037
APSOIL001-02	**792**	**J 1,130**	**217**	**82,600**	**22,900**	**575**	**0.26**
APSOIL002-02	**963**	**B,J 117**	**229**	**81,500**	**33,000**	**867**	**B 0.033**
			Average crustal abundance				
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
	50	75	850	70,000	56,300	250	0.085

Table 18. Summary of the concentrations of nutrients, total cyanide, and total phenols in ground-water and sediment samples collected in July - August 2002 at the Anacostia River stations
[Compounds or measurements that were detected and quantified are in **Bold**; <, less than; mg/L, milligrams per liter; mg/kg, milligrams per kilogram; B, estimated result, compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level; Q, elevated reporting limit due to high analyte levels; --, not analyzed; *, ammonia (as nitrogen) is greater than total Kjeldahl nitrogen, but the difference in values is within the precision of the methods]

Well or core number	Ammonia as nitrogen	Nitrate plus nitrite as nitrogen	Total Kjeldahl nitrogen	Total phosphorus	Total cyanide	Total phenols
			Water			
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
DCMW001-02	**2.1**	<0.10	**2.3**	**0.49**	<0.010	**B 0.0034**
DCMW004-02	**1.5**	<0.10	**1.8**	**0.42**	<0.010	<0.020
DCMW002-02	<0.10	**6.9**	<0.50	<0.050	<0.010	<0.020
DCMW003-02	**0.14**	<0.10	<0.50	**0.079**	<0.010	<0.020
DCMW005-02	**0.48***	<0.10	**B 0.39***	**0.15**	**B,J 0.0068**	<0.020
			Sediment			
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
DCHP01-02	**65.1**	**B 0.46**	**Q 1,190**	**J,Q 416**	**B,J 0.50**	<2.9
NYASOIL001-02	**7.7**	<1.8	**Q 5,180**	**Q 264**	**B,J 0.36**	**B 1.5**
KAGSOIL001-02	**B 1.0**	**J 16.1**	**Q 1,990**	**Q 715**	**B,J 0.13**	**B 1.6**
KAGSOIL002-02	<1.1	**J 1.9**	< 55.3	**Q 154**	**B,J 0.15**	<2.2
APSOIL001-02	<1.1	**J 18.5**	**Q 4,000**	**Q 153**	**B,J 0.51**	<2.3
APSOIL002-02	**25.5**	<1.7	**Q 4,050**	**Q 636**	**B,J 0.32**	<3.4

Table 19. Summary of the concentrations of *n*-Hexane Extractable Material (oil and grease), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids, and total suspended solids samples in ground water collected in July - August 2002 at the Anacostia River stations.

[Parameters that were detected and quantified are in **Bold**; <, less than; mg/L, milligrams per liter; HEM, n-Hexane Extractable Material; SGT, silica-gel treated; B, Estimated result, Compound was detected but value was less than the laboratory reporting level; J, the associated method blank contains this analyte at a low but reportable level]

Well	**Biochemical oxygen demand**	**Chemical oxygen demand**	**HEM (oil and grease)**	**HEM, SGT**	**Total dissolved solids**	**Total suspended solids**
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
DCMW001-02	**7.5**	**B 16**	<5.0	<5.0	**120**	**28**
DCMW004-02	**4.3**	**B 12**	**B 1.2**	<5.0	**130**	**22**
DCMW002-02	<2.0	<20	**B,J 1.6**	<5.0	**J 220**	**B 2.8**
DCMW003-02	<2.0	<20	**B,J 1.4**	<5.0	**J 22**	**14**
DCMW005-02	<2.0	**B 9.7**	<5.0	<5.0	**J 77**	**33**

Summary

Data for water and sediment quality presented in this report provide baseline conditions for the chemistry of ground water in selected areas of the lower Anacostia River watershed. Samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) or polyaromatic hydrocarbons (PAHs), organochlorine pesticides, aroclors and total polychlorinated biphenyls (PCBs), metals, nutrients, biochemical and chemical oxygen demands (BOD and COD), total phenols, total cyanide, oil and grease, and total suspended and dissolved solids in aqueous phases (TSS and TDS). Concentrations of most aqueous-phases chemicals were generally low or less than the reporting levels. Higher levels of some of the contaminants occurred in shallow as compared to deeper sediments at all sites. Samples collected at the Kenilworth Aquatic Gardens and from the Benning Road Mudflat had the most detections and the highest observed concentrations of cantaminants of all of the sites.

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Appendix A. Cross-reference table for USGS well identifiers that can be used to review data in the USGS National Water Information System (NWIS) database. These data may be accessed on the world wide web at http://waterdata.usgs.gov/nwis. [NA; none assigned]

Well Name	Core Name	USGS Station Name	USGS Station ID	Site Location
NA	DCHP01-02	WE Ca 30	385406076573401	Benning Road Mudflat
DCMW001-02	NA	WE Bb 3	385504076563801	New York Ave
DCMW004-02	NYASOIL001-02	WE Bb 4	385504076563802	
DCMW002-02	NA	WE Cb 5	385443076562801	Kenilworth Aquatic Gardens
DCMW003-02	KAGSOIL001-02 KAGSOIL002-02	WE Cb 6	385443076562802	
DCMW005-02	APSOIL001-02 APSOIL002-02	WE Ca 29	385238076581501	Anacostia Park