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U.S. Geological Survey**

**Water-Quality and Water-Level Data for a Freshwater  
Tidal Wetland, West Branch Canal Creek,  
Aberdeen Proving Ground, Maryland,  
October 1998–September 1999**

**By Tracey A. Spencer, Lisa D. Olsen, Michelle M. Lorah, and Mastin M. Mount**

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## CONVERSION FACTORS, ABBREVIATIONS, AND VERTICAL DATUM

	Multiply	By	To obtain
inch (in.)		2.54	centimeter
cubic inch (in. <sup>3</sup> )		16.39	cubic centimeter
inch (in.)	25,400		micrometer
inch per year (in/yr)		0.02540	meter per year
foot (ft)		0.3048	meter
foot per day (ft/d)		0.3048	meter per day
foot per year (ft/yr)		0.3048	meter per year
foot squared per day (ft <sup>2</sup> /d)		0.09290	meter squared per day
mile (mi)		1.609	kilometer

**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.

**Other abbreviated units of measure:** Water temperature, chemical concentration, and other chemical and physical properties of constituents are given in metric units. Water temperature is given in degrees Celsius (°C) and can be converted to degrees Fahrenheit (°F) by use of the following equation:

$$^{\circ}\text{F} = 1.8 (^{\circ}\text{C}) + 32$$

Chemical concentration in water is expressed in milligrams per liter (mg/L) or micrograms per liter (µg/L).

Molecular weight and other mass expressions are expressed in grams (g), and density is given in grams per cubic centimeter (g/cm<sup>3</sup>). Other abbreviations used include milliliter (mL) or liter (L) for volume measurements and micrometer (µm), which equals 1 x 10<sup>-6</sup> meter, for length.

Specific conductance is measured in microsiemens per centimeter (µS/cm). Wavelengths are measured in nanometers (nm).

# **Water-Quality and Water-Level Data for a Freshwater Tidal Wetland, West Branch Canal Creek, Aberdeen Proving Ground, Maryland, October 1998–September 1999**

**By Tracey A. Spencer, Lisa D. Olsen, Michelle M. Lorah, and Mastin M. Mount**

## **Abstract**

This report presents water-quality data for ground-water and surface-water samples and water-level data collected by the U.S. Geological Survey from October 1998 through September 1999 at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. The report also provides a description of the sampling and analytical methods that were used to collect and analyze the samples, and includes an evaluation of the quality-assurance data.

The ground-water sampling network includes 88 wells or piezometers, including four 2-inch wells, two 4-inch wells, thirty 0.75-inch piezometers, and fifty-two 0.25-inch piezometers. Water levels were measured in 105 wells or piezometers. Surface-water samples were collected at five sites.

Samples were collected from wells and 0.75-inch piezometers for measurement of field parameters, and analysis of inorganic and organic constituents during three sampling rounds: March, May through June, and July through August of 1999. Inorganic constituents and organic constituents were analyzed in samples collected from 0.25-inch piezometers during three sampling rounds in February through March, May, and September of 1999. Water levels were measured in October and November of 1998, and in February and May of 1999. Surface-water samples were collected between February and August of 1999 for analysis of organic constituents.

## **Introduction**

The U.S. Geological Survey (USGS) collected ground-water and surface-water quality and water-level data from October 1998 through September 1999 at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. The Canal Creek site is in northeast Maryland at the U.S. Army's Aberdeen Proving Ground in Edgewood, Maryland (fig. 1). The wetland study area is along West Branch Canal Creek (fig. 2).

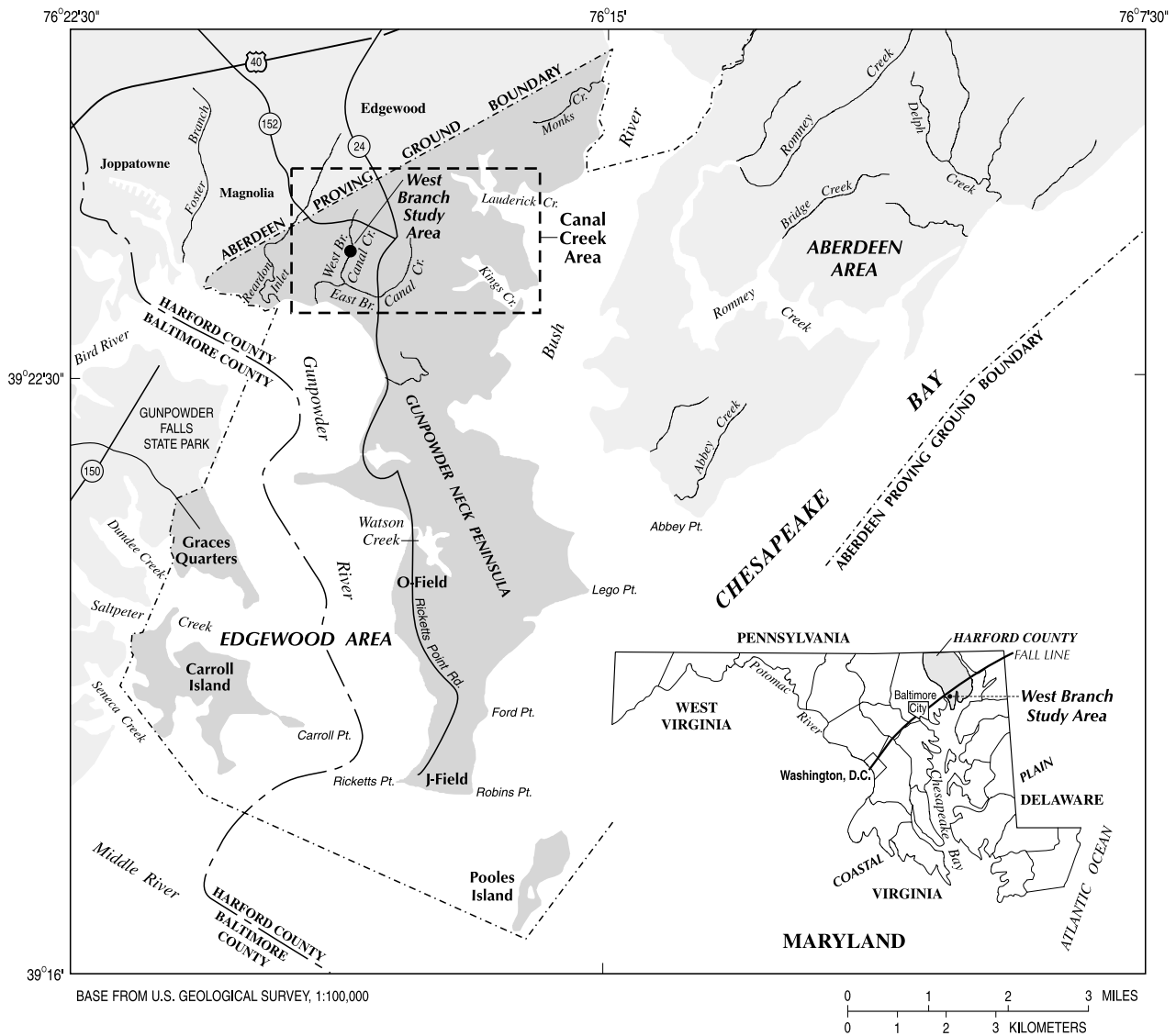
These data were collected in support of an ongoing USGS investigation of ground-water contamination in the wetland, including an evaluation of the factors controlling the fate and transport of the contaminants, and an analysis of natural attenuation as a possible remediation method. The primary contaminants in the study area are 1,1,2,2-tetrachloroethane, trichloroethene, carbon tetrachloride, chloroform, and their daughter products. Current investigations are focused on identifying natural attenuation processes in the freshwater tidal wetland and measuring the hydrologic, geochemical, and microbial processes affecting the contaminants, particularly chlorinated volatile organic compounds (VOCs).

### **Purpose and Scope**

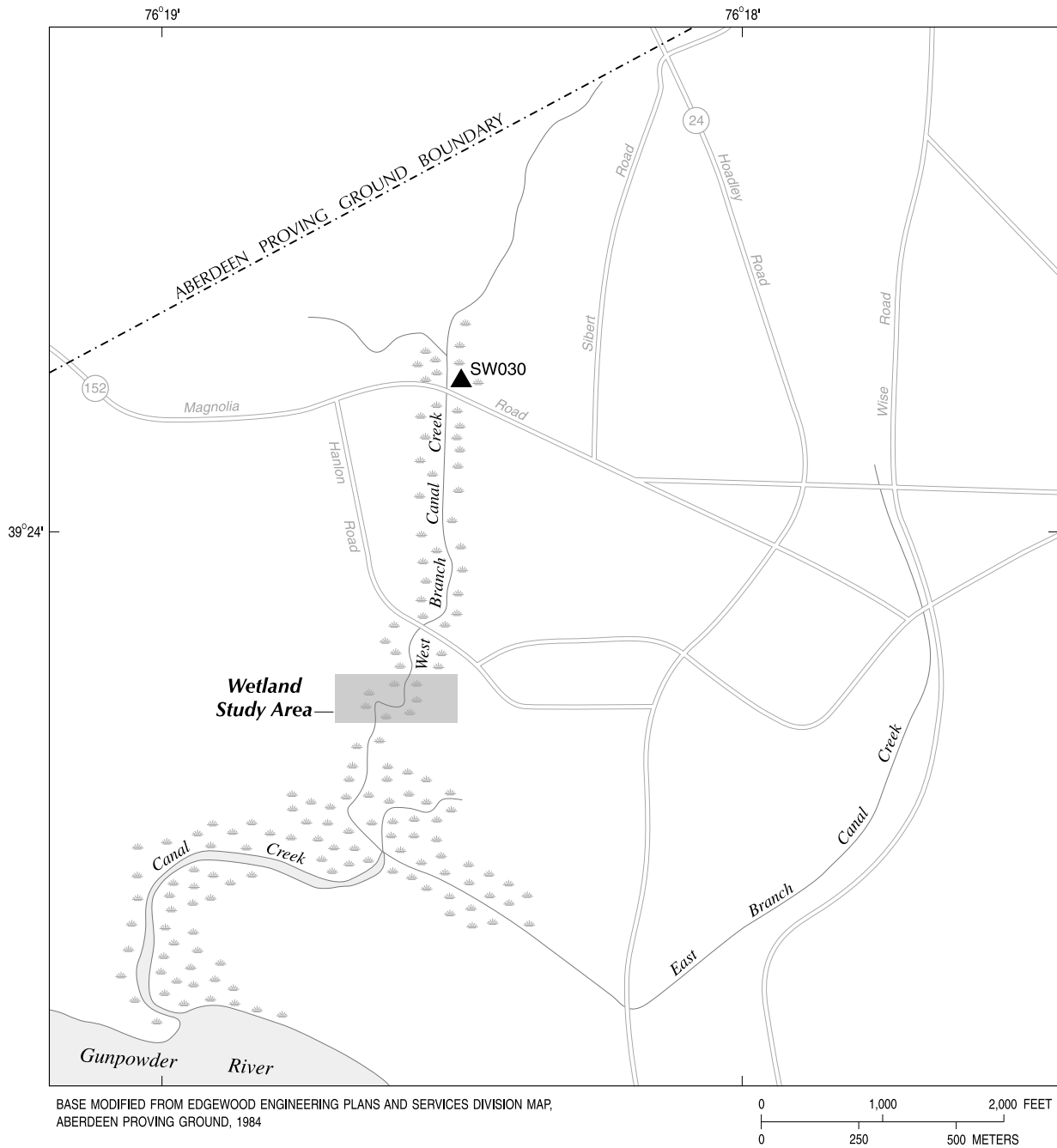
This report provides ground-water and surface-water data collected from October of 1998 through September of 1999, from a tidally influenced wetland under investigation for natural attenuation of VOCs. Methods for installation of piezometers and porous-membrane sampling devices (peepers) are presented. The report provides a description of the sample-collection and analysis methods. Quality-assurance data are also presented and evaluated.

### **Site History**

Aberdeen Proving Ground has been the U.S. Army's primary chemical warfare research and development center since 1917. West Branch Canal Creek was used as a disposal site for chlorinated solvents between World War I and the late 1970's. The chemical plant thought to be predominantly responsible for the contamination at the site has been inactive for more than 20 years and has recently been demolished. In 1990, the Comprehensive Environmental Response and Compensation Liability Act (CERCLA) placed Aberdeen Proving Ground on the National Priorities List. This action led to an Interagency Agreement between the U.S. Army and Region III of the U.S. Environmental Protection Agency that required investigation and remediation of the Canal Creek area.



**Figure 1.** Location of Canal Creek area and West Branch study area, Aberdeen Proving Ground, Maryland (modified from Lorah and others, 1997, p. 5).



**EXPLANATION**

- SW030 ▲ STREAM GAGE AND IDENTIFICATION NUMBER
- WETLAND

**Figure 2.** Location of the wetland study area along West Branch Canal Creek, Aberdeen Proving Ground, Maryland, (modified from Lorah and Clark, 1996, p.106).



## Description of Study Area

The West Branch Canal Creek study site is in a wetland in the Edgewood area of Aberdeen Proving Ground. The creek is tidally influenced and drains southward into the Gunpowder River near the head of the Chesapeake Bay (fig. 1). Tides in the area range from 0.5 to 2.0 ft (feet). Average annual precipitation in the area for 1997, 1998, and 1999 was 39.8 in. (inches) (Charles Clough, Meteorology Team, Aberdeen Test Center, U.S. Army, written commun., 2000). The primary vegetation in the study area includes grasses, sedges, cattails, arrowhead, pickerelweed and *Phragmites*, a tall plant which is approximately 6 ft tall during the summer months (Durda and others, 1991, p. 2–4).

A thick deposit of unconsolidated Coastal Plain sediments underlies the Canal Creek area (Lorah and Clark, 1996). The wetland sediments consist of peat in the upper unit and clay, silt, sandy clay, and clayey sand in the lower unit. The Canal Creek aquifer, which is 30 to 70 ft thick in the study area, underlies the wetland sediments.

## Site Investigations

The USGS has participated in investigations of the Canal Creek area since 1985. Current investigations are focused on the processes of natural attenuation of contaminants in the freshwater tidal wetland, and measurement of the hydrologic and geochemical processes affecting the contaminants. Other goals of the current study include determining the extent of surface-water contamination in the wetland area, defining the fate and transport of the contaminants in the tidal wetland, and developing a solute-transport model for these contaminants. The data contained in this report support all of these efforts.

## Previous Investigations

A USGS investigation, which began in 1985, described contamination of ground water and surface water in the Canal Creek area (fig. 1), but did not include ground-water sampling within the wetland area (Lorah and Vrobesky, 1989). A follow-up study conducted by the USGS in 1992–1996 determined the distribution and the fate and transport of chlorinated VOCs in ground water within a relatively small area of the West Branch Canal Creek wetland (Lorah and others, 1997). This follow-up study defined the ground-water flowpaths and the contaminant concentrations along these flowpaths. Major geochemical and microbial processes active in the study area were identified, and an initial evaluation of the natural attenuation of contaminants was provided. Data collected from the West Branch Canal Creek wetland area between 1992–1996 were presented in Olsen and others (1997), and the evaluation of natural attenuation of chlorinated VOCs was presented in Lorah and others (1997).

## Current Investigations

The current investigation is focused on further defining the significant hydrologic, geochemical, and microbial processes affecting the natural attenuation of contaminants within the ground water, surface water, and wetland sediments. The USGS maintains 207 wells and piezometers

in the wetland area. These include two 4-in. diameter wells, seventeen 2-in. diameter piezometers, eighty-nine 0.75-in. drive-point piezometers, two 0.25-in. flexible-tubing piezometers, and ninety-seven 0.25-in. inverted-screen piezometers. In addition to the network of piezometers, the USGS periodically installs porous-membrane sampling devices to collect pore-water samples at selected locations.

The ground-water quality data in this report were obtained from samples collected from selected piezometers and peepers that were used from November 1998 through September 1999. Ground-water levels were measured periodically from October 1998 through May 1999. Surface-water samples were also collected from five locations from February through August of 1999.

## Acknowledgments

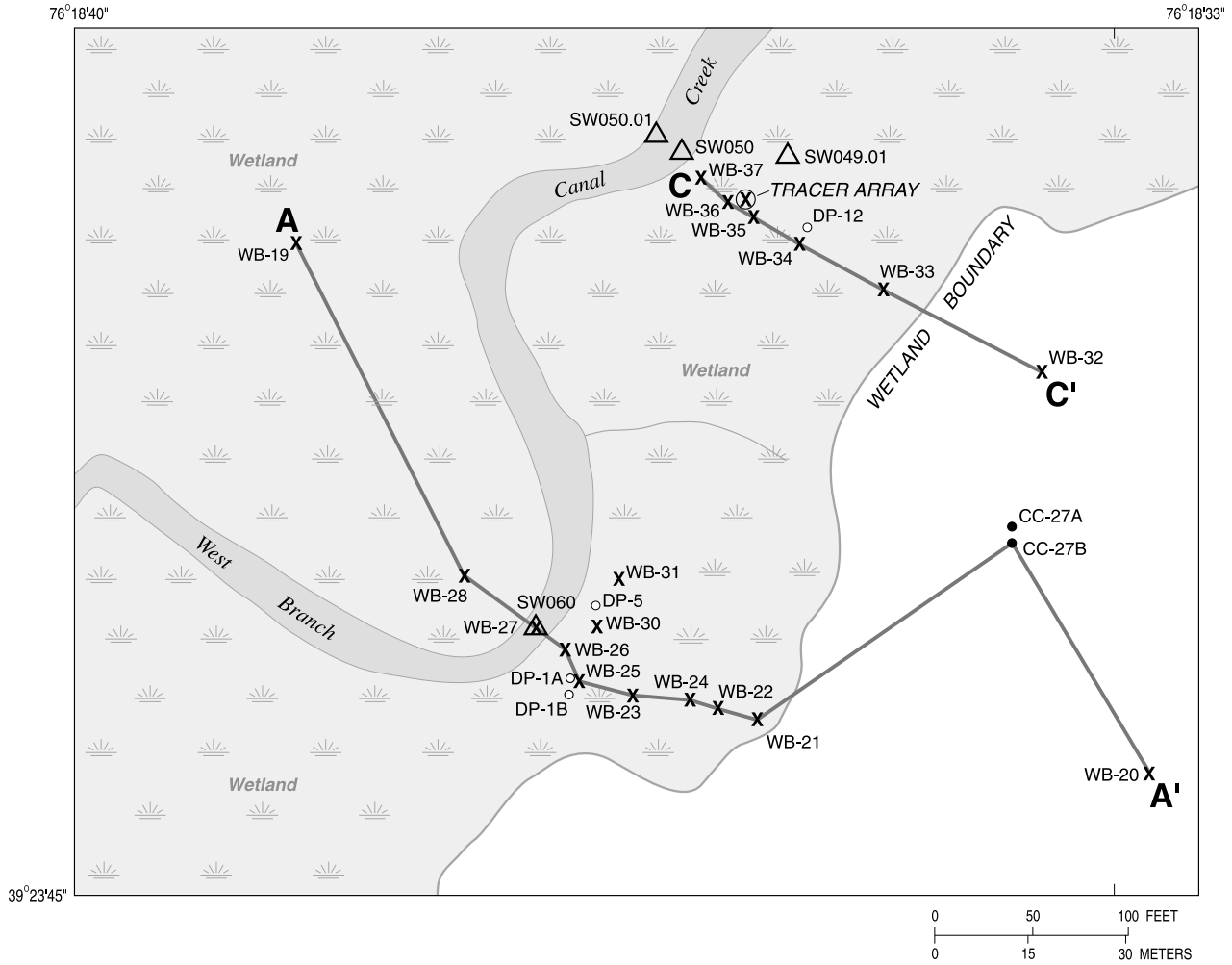
The authors thank the following people and agencies for their contributions to this study. John Wrobel, U.S. Army Environmental Conservation and Restoration Division and Allison O'Brien, contractor for the U.S. Army Environmental Conservation and Restoration Division, are thanked for their support throughout this project. Peter Pritchard of the U.S. Army Aberdeen Test Center is thanked for his ongoing efforts in maintaining the floating walkways and the bridge within the study site. Alan Rosencrance, Henry Gardner, and Thomas Shedd of the U.S. Army Center for Environmental Health Research, Fort Detrick, Maryland, have assisted the project for many years by maintaining the analytical chemistry equipment and on-site laboratory facility. The following personnel in the USGS Maryland-Delaware-D.C. District have also helped in the data-collection process: Daniel J. Phelan, Michael P. Senus, Linda J. Dyer, Elizabeth H. Marchand, and Glenn E. Miller, Jr. Finally, the Publications Unit of the Maryland-Delaware-D.C. District of the USGS is thanked for their assistance in the preparation of this report.

## Methods of Investigation

The Canal Creek sampling network includes ground-water and surface-water sampling locations. The ground-water samples were collected from 4-in. wells, 0.75-in. drive-point piezometers, 0.25-in. flexible-tubing piezometers, and 0.25-in. inverted-screen piezometers. Ground-water samples were also collected from peepers. Water-level data were collected from all three types of piezometers and from 2-in. wells installed for a previous investigation. Surface-water samples were collected at four locations in the creek and at one location in the wetland. Sampling locations are shown in figures 2 and 3.

## Ground-Water and Surface-Water Sampling Networks

Ground-water samples were obtained from 4-in. wells, 0.75-in. drive-point piezometers, 0.25-in. flexible-tubing piezometers, 0.25-in. inverted-screen piezometers, and



**EXPLANATION**

- 4" WELL FROM PREVIOUS STUDY
  - 2" PIEZOMETER SITE
  - ⊗ TRACER ARRAY
  - △ SURFACE-WATER SITE AND IDENTIFICATION NUMBER
  - ⊗ 0.75-INCH PIEZOMETER SITE
  - A—A' LINE OF SECTION
- CC-27A WELL OR PIEZOMETER  
 DP-12 SITE NUMBER  
 WB-20

**Figure 3.** Locations of sampling sites and transects A-A' and C-C' in the wetland study area along West Branch Canal Creek, Aberdeen Proving Ground, Maryland (modified from Lorah and Clark, 1996, p. 106).

porous-membrane sampling devices. Surface-water samples were collected at five sites throughout the year. Surface-water sites on West Branch Canal Creek are near the stream-gaging station at Magnolia Road (SW030), which is shown on figure 2. Other surface-water sites are shown on figure 3, and include SW050, near the end of the C–C' transect and SW060, near the bridge on the A–A' transect.

**Piezometer Network** Three types of piezometers were sampled for the current investigation: 0.75-in. drive-point piezometers, 0.25-in. flexible-tubing piezometers, and 0.25-in. inverted-screen piezometers. All but two of the piezometers on transects A–A' and C–C' are 0.75-in. drive-point piezometers. Two 0.25-in. flexible-tubing piezometers were installed at site WB33 on the C–C' transect in 1998. The 0.25-in. inverted-screen piezometers were installed between sites WB35 and WB36 along the C–C' transect as part of a ground-water tracer test that was conducted from July 1998 through September 1999. These piezometers were sampled for water-quality parameters for the current investigation. A list of sampling locations including site name, hydrogeologic unit, well diameter, depths of screened interval, and land-surface elevation is provided in Appendix A at the end of the report.

**0.75-Inch Drive-Point Piezometers**—Ground-water samples were collected from selected nests of 0.75-in. drive-point piezometers that were installed between July 1994 and February 1995. The 0.75-in. drive-point piezometers were used to obtain ground-water samples for analysis of water-quality parameters, including organic and inorganic constituents, and reduction-oxidation (redox) constituents. The 0.75-in. drive-point piezometers were installed in nests of 5 to 10 piezometers along the A–A' and C–C' transects, which are generally aligned parallel to the ground-water flowpaths. The piezometers were constructed with a 0.5-in. inner Teflon-lined polyethylene tube that extends to the top of the screened interval. The transect locations are shown in figure 3. In each nest, the piezometers are arranged in a counter-clockwise direction, generally beginning with the shallowest and ending with the deepest. Each piezometer casing is 0.75-in.-diameter stainless steel, and each piezometer has a Solinst stainless-steel 6-in. screen, with a mesh size of 150  $\mu\text{m}$  (micrometers). The depth intervals are identified by alphanumeric codes. The letter "A" corresponds to the shallowest, the letter "B" corresponds to the next shallowest, and so forth. For example, sample WB30A-1 was collected from nest location WB30, piezometer A (the shallowest piezometer in this nest), and was the first sample withdrawn because it is designated by "-1". Sample WB30A-2 is a replicate sample of WB30A-1.

**0.25-Inch Piezometers**—Two types of 0.25-in. piezometers were sampled from February through September 1999. Two 0.25-in. flexible-tubing piezometers were installed in 1998 at site WB33, WB33Y, and WB33Z. The ground-water tracer array, which was constructed in the fall of 1998, contained ninety-seven 0.25-in. inverted-screen piezometers made of rigid stainless-steel tubing. The tracer array (figs. 4A and 4B) was installed in the upper peat unit of the wetland

sediment between piezometer sites WB35 and WB36 on the C–C' transect (fig. 3).

The two 0.25-in. flexible-tubing piezometers WB33Y and WB33Z were constructed of 0.25-in.-diameter Teflon tubes with a 1-in.-long screen at the end. The screens were made of stainless steel and brass with a quick-connect adapter that attached to the tubing without threads or adhesives. The screen mesh has a 40-micron diameter. Each screen was surrounded by a 2-in.<sup>3</sup> (cubic-inch) pack of fine-grained sand to prevent clogging of the screen. The sand pack was secured around the screen with an untreated, washed cotton sack that was cinched to the top of the screen with nylon cable ties. These piezometers were used to minimize disruption of the sediment. They were easy to install manually in shallow marsh sediments, and the screens were an inexpensive alternative to the 0.75-in. Solinst screen piezometers.

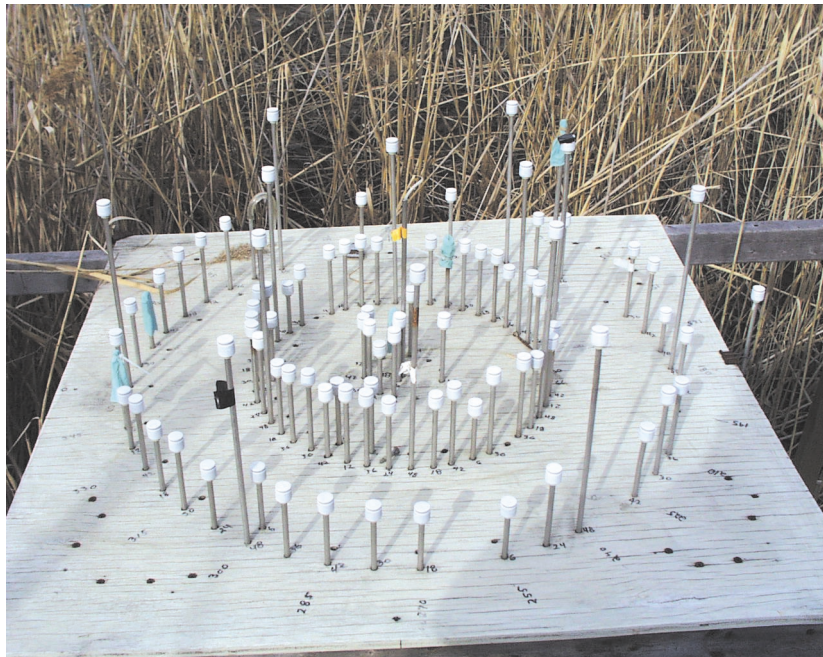
The 0.25-in. inverted-screen piezometers in the tracer array were installed to measure ground-water-flow rates and to monitor the effects of contaminant dispersion due to tidal fluctuations through the wetland sediments. The 0.25-in.-diameter piezometers were installed from 6 to 60 in. below land surface in a circular array within a 24-in. radius (fig. 4B). The piezometers were installed at 6- to 10-in. intervals. The piezometers were made of 0.25-in. stainless steel tubing with a 3-in.-long internal screen made of 100-mesh stainless steel. The screen is inverted and is contained inside the stainless-steel tubing so that water is drawn into the piezometer from a very small, discrete area near the opening of the tube. The screen orientation is important to the design of the tracer array. The inverted screen allows a sample to be withdrawn from that exact location without pulling water from the adjacent piezometers.

The 0.25-in. inverted-screen piezometers are named on the basis of their relative locations. Piezometers 6 in. below land surface begin with the letter "A". Piezometers 12 in. below land surface begin with the letter "B", and so on, down to 60 in. below land surface, which is designated with the letter "J" (table 1). The first two numerical characters represent the distance in inches from the center of the array, which was the tracer injection point. The last three numerical characters represent the position within the circular array, in degrees, increasing clockwise and beginning with 000 at the point closest to the stream. For example, sample H07-133 is located at a depth of 48 in. (H), 7 in. from the center of the array (07), and 133 degrees clockwise from the point closest to the stream (133). Selected 0.25-in. inverted-screen piezometers from the tracer array were sampled for VOCs in three sampling rounds during 1999. Seventeen piezometers were sampled in February through March, 20 were sampled in May, and 34 were sampled in September of that year.

**(A)**  
Side View



**(B)**  
Top View



**Figure 4.** Tracer array site, located on transect C-C' of the wetland study area along West Branch Canal Creek, Aberdeen Proving Ground, Maryland, (A) side view, (B) top view (Photographs by Tracey Spencer, U.S. Geological Survey).

**Table 1.** *Alphanumeric codes for 0.25-inch inverted-screen piezometers*

Alphanumeric code	A	B	C	D	E	F	G	H	I	J
Inches below land surface	6	12	18	24	30	36	42	48	54	60

**Porous-Membrane Sampling Devices (Peepers)** The peeper is a ground-water sampling tool used to gather discrete water-quality samples over a vertical section. The original device was designed by Hesslein (1976) for the study of lake-bottom sediments. The peepers are constructed of Lexan, a plastic product, in three sections (fig. 5). The first section is the main body of the peeper, and the remaining two sections are the side panels, which secure sheets of porous membrane over the sampling chambers. The main body of the peeper is 0.6 in. thick and 24 in. long, with 2 rows of 21 sampling chambers. Each side panel is 0.12 in. thick, with 2 rows of 21 windows, which allows solutes to diffuse from the surrounding pore water and through the membrane into the sampling chambers that are initially filled with deionized water. Before a peeper was installed, it was placed in a large tub of deionized water and purged with nitrogen gas overnight to remove oxygen from the water within the sample chambers.

The peepers were manually pushed vertically downward into the wetland sediment until the top of the first row of sampling chambers was level with land surface. The peepers were installed adjacent to existing wells or piezometers. The peepers were left to equilibrate with the ambient ground water for 2 to 3 weeks before the chambers were sampled and the contents analyzed.

Four peepers were installed, removed, and sampled during sampling rounds in November 1998, February, May, and August 1999. Each peeper location was named according to the well nearest the installation point. A “P” at the beginning of the sample name denotes peeper samples. For example, sample P12-14-1 was collected from peeper number 12 installed near well location DP-12, cell 14 down from the top (handle), first sample; P12-14-2 is the duplicate sample from the adjacent sample chamber.

**Surface-Water Sites** Surface-water samples were collected at five locations throughout the year. During very low tide, a seep was observed near the C–C’ transect and was sampled (SW049.01). In addition to the West Branch Canal Creek surface-water locations (table 2), samples were collected at wetland seeps during very low tide. Another seep that was black was observed directly across from the end of the C–C’ transect (SW050.01). A map of the surface-water sampling site locations is shown in figures 2 and 3.

#### **Ground-Water and Surface-Water Sampling Methods**

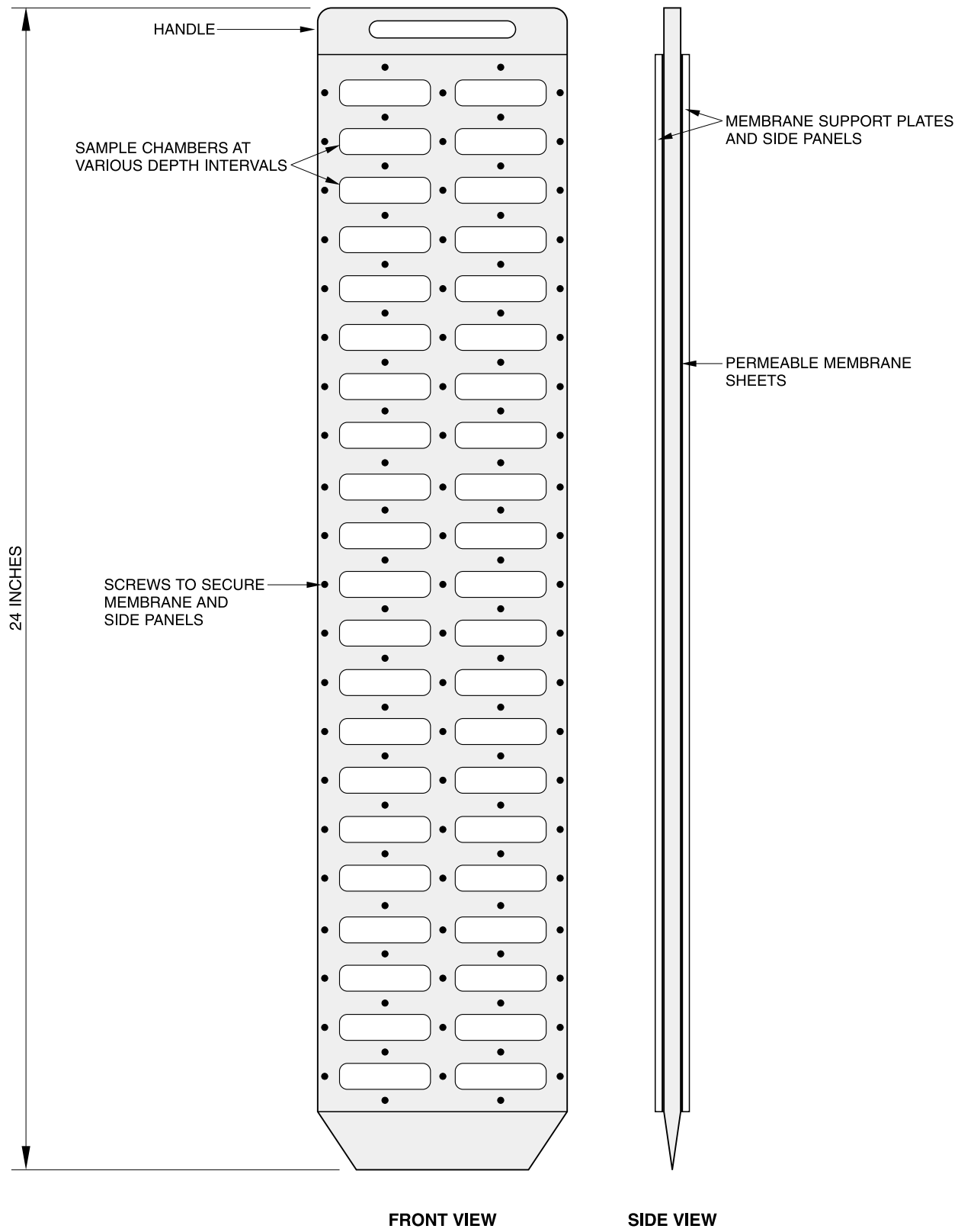
Ground-water samples were collected during three sampling rounds for piezometers and four sampling rounds for peepers. Surface-water samples were also collected during some ground-water sampling rounds. Samples were

collected and analyzed for field parameters, redox constituents, inorganic constituents, and organic constituents.

**Piezometer Sampling Methods** Three types of piezometers were sampled and the results are presented in this report. These include 0.75-in. drive-point piezometers, 0.25-in. inverted-screen piezometers, and 0.25-in. flexible-tubing piezometers. Methods of sampling varied throughout the year, depending on water availability, piezometer depth, and piezometer volume, and included a submersible pump, a peristaltic pump, a glass syringe with Teflon tubing, and a stainless-steel bailer.

**0.75-Inch Drive-Point Piezometer Sampling Methods**—Before sampling, at least two piezometer volumes were purged from each of the 0.75-in. drive-point piezometers. Piezometers were purged by use of either a glass syringe with Teflon tubing, a stainless-steel bailer, or a peristaltic pump if the piezometer produced sufficient volumes of water. The majority of the piezometers at the study site have low recovery rates and were purged using a stainless-steel bailer or a glass syringe with Teflon tubing. Piezometer recovery after purging typically took from several hours to several days before sampling could begin. After recovery, the water samples were collected using a peristaltic pump or a glass syringe with Teflon tubing assembled with a three-way stopcock valve between the syringe and tubing. This assembly allowed several milliliters of water to be expelled before sample collection and allowed water samples to be collected into sample vials with minimal aeration of the sample or the water column. Sampling rounds for the 0.75-in. drive-point piezometers took place in March, May through June, and July through August of 1999.

**0.25-Inch Piezometer Sampling Methods**—Sampling methods for the 0.25-in. inverted-screen piezometers and 0.25-in. flexible tubing piezometers were similar to the methods described in the 0.75-in. drive-point piezometer section. Due to low recovery rates and small water-column volumes, these piezometers were initially purged using a glass syringe and Teflon tubing. After recovery, samples were collected directly above the piezometer screen using the glass syringe and Teflon tubing assembled with a three-way stopcock valve. The 0.25-in. inverted-screen piezometers were sampled in February–March, May, and September of 1999. The 0.25-in. flexible-tubing piezometers were sampled in March, May, and August of 1999.



**Figure 5.** Schematic diagram of a porous-membrane sampling device.

**Table 2.** *Surface-water location names and descriptions at West Branch Canal Creek*

Location name	Location description
SW030	Stream-gaging station at Magnolia Road
SW049.01	Seep north of C–C' transect
SW050	End of C–C' transect
SW050.01	Seep west of C–C' transect
SW060	Walk bridge at A–A' transect

### **Porous-Membrane Sampling Device (Peeper) Sampling**

**Methods** After the peepers were assembled and installed in the wetland sediments, they were left to equilibrate with ambient ground water for 2 to 3 weeks. When the peepers were removed, they were sampled immediately for sulfide, ferrous and ferric iron, methane, and VOCs. Samples were collected from the individual chambers of the peeper by puncturing the porous membrane and immediately withdrawing the sample water using a glass syringe and rigid Teflon tubing. Each peeper sample chamber yielded 11 mL (milliliters) of pore water. The sample was then expelled into sample vials with a smooth motion to minimize aeration. The peepers were constructed with two sample chambers at each depth interval; therefore, duplicates of some constituents could be collected at many of the depth intervals. Peepers were installed during sampling rounds in November of 1998, and February, May, and August of 1999.

**Surface-Water Sampling Methods** The surface-water samples were obtained using a grab method. Sample vials were submerged 3 to 5 in. below the water surface. The vials were quickly capped underwater to prevent sample aeration.

### **Ground-Water and Surface-Water Analytical Methods**

Ground-water and surface-water samples were collected and analyzed from October 1998 through September 1999 for several field parameters, redox constituents, inorganic constituents, and organic constituents. Ground-water samples were analyzed in the field for specific conductance, pH, temperature, and if sufficient water was available, dissolved oxygen and alkalinity. Ground-water samples were analyzed at the on-site laboratory at West Branch Canal Creek for redox constituents and organic constituents. All inorganic analyses were conducted at the U.S. Geological Survey National Water-Quality Laboratory (NWQL) in Denver, Colorado. Surface-water samples were only analyzed for organic constituents at the on-site laboratory.

**Field Measurements** Parameters measured in the field included specific conductance, pH, water temperature, dissolved oxygen, and alkalinity. Specific conductance was measured with a YSI Model 3000 Temperature-Level-Conductivity meter, which was calibrated daily with three conductance standard solutions of approximately 200  $\mu\text{S}/\text{cm}$  (microsiemens per centimeter), 500  $\mu\text{S}/\text{cm}$ , and

1,000  $\mu\text{S}/\text{cm}$ . An Orion 290A meter with a gel-filled, temperature-compensated probe was used to measure pH. The pH meter was calibrated daily with two pH standards. Meter calibration was also verified against an additional standard. Water temperature was measured with the Orion 290A pH meter with a gel-filled, temperature-compensated probe or the YSI Model 3000 Temperature-Level-Conductivity meter. The piezometers often did not produce enough water to measure all of the field parameters. If there was sufficient water available, dissolved oxygen was measured using a modified Winkler titration method, and alkalinity was measured in the field after the sample had been filtered through a 0.45- $\mu\text{m}$  (micrometer) filter. Alkalinity as bicarbonate was determined using the inflection-point titration method.

**Redox Analyses** Redox-sensitive constituents that were analyzed include sulfide, ferrous and ferric iron, and methane. The samples were chilled until processed, and were analyzed at the on-site laboratory at West Branch Canal Creek.

Sulfide was measured in the field with a CHEMetrics A-1051 photometer kit using USEPA Method 376.2. The kit includes a portable spectrophotometer set to 670 nm (nanometers) that was calibrated daily, and Vacu-Vials with reagent. For each analysis, 25 mL of the sample water was acidified with three drops of a ferric chloride, hexahydrate, and hydrochloric acid mixture. Next, the sample was stirred with a Vacu-Vial filled with a reagent mixture of *N,N*-Dimethyl-*p*-phenylene diamine oxalate, isopropyl alcohol, hydrochloric acid, and deionized water. After stirring, the ampule tip was broken while submersed in the sample, allowing the sample water to be drawn up by vacuum into the reagent-filled Vacu-Vial. The vial of sample water and reagent were then allowed to react and equilibrate for 5 minutes before being placed into the spectrophotometer for analysis.

Ferrous and ferric iron samples were filtered through a 0.2- $\mu\text{m}$  filter and preserved with reagents in the field. The iron samples were processed at the on-site laboratory with a Bausch & Lomb Spectronic 21 spectrophotometer at 520 nm, using the colorimetric bipyridine technique described by Brown and others (1970) and Baedecker and

Cozzarelli (1992). After establishing an initial calibration curve, the instrument calibration was verified daily by processing several iron standards and plotting them on the calibration curve to verify accuracy. Ferric-iron concentrations were calculated by subtracting the ferrous-iron concentrations from the total-iron concentrations.

Methane samples were collected and injected by syringe into sealed serum vials, which had been preserved with mercuric chloride and purged with nitrogen gas prior to sample collection. Methane samples were analyzed using a gas chromatograph with a flame-ionization detector. The instrument calibration was verified daily using standard compressed gases before and after sample analysis. Air blanks were analyzed frequently to verify the absence of biases due to contamination from the sample vials or the laboratory equipment. Nearly all methane samples from piezometers were collected in duplicate. The detection level of the instrument depended on the volume of the sample and the volume of the vial and ranged from 55 µg/L (micrograms per liter) to 133 µg/L for samples listed in this report. This method of methane analysis is described by Baedecker and Cozzarelli (1992).

**Inorganic Analyses** The USGS NWQL in Denver, Colorado performed the inorganic analyses. Inorganic samples were chilled immediately after collection and during shipment to NWQL. Samples were analyzed for calcium, magnesium, sodium, potassium, chloride, sulfate, fluoride, silica, iron, and manganese. Methods used by NWQL for analysis of inorganic constituents in water samples are explained in detail in Fishman and Friedman (1989), and in Fishman (1993).

**Organic Analyses** VOC analyses were performed at the on-site laboratory at West Branch Canal Creek. Samples were analyzed for VOCs using a purge-and-trap capillary gas chromatograph with a mass-selective detector. The analytical method used to analyze for the VOCs is equivalent to USEPA method 524.2, and is presented in Rose and Schroeder (1995). The lower calibration (detection) limit for the VOC analyses ranged from 0.5 to 2.0 µg/L. The higher calibration (detection) limit for the VOC analyses ranged from 200 to 250 µg/L.

### Water-Level Measurement Methods

Ground-water-level measurements were conducted during October and November 1998, and February and May 1999. Water levels were measured in 4-in. wells, 2-in. piezometers, and 0.75-in. drive-point piezometers. The ground-water measurements were made using a steel tape held at a reference point at the top of the well casing. All water-level data (Appendix F) have been adjusted to the land-surface elevation in feet above or below sea level, and adjusted for the height of the reference point. Occasionally, the measured ground-water levels are not consistent with the lunar tidal pattern. Factors that may affect the magnitude of the tidal impact on ground-water levels include the distance from the measuring point to the creek, the hydraulic conductivity of the sediments, the wind direction and velocity, and ice formation on Canal Creek or on the Gunpowder River.

### Quality-Assurance Methods

Quality assurance is tested for both the field and analytical procedures. Collecting replicate samples and wash-blank samples tests quality assurance in the field. Analytical quality assurance is tested at the on-site laboratory by evaluating the internal standard and surrogate responses, and by analyzing blind samples.

Replicate sample pairs were collected and analyzed, and then classified as one of three types of sample pairs: (1) replicate pairs in which both samples were below the lower detection limit; (2) replicate pairs in which one sample was above the lower detection limit and the other was below the detection limit; and (3) replicate pairs in which both samples were above the lower detection limit. The variability between samples in replicate pairs with two detections above the limit (classification 3), was determined by calculating the percent relative standard deviation (%RSD) of the concentrations of each analyte using the following formula:

$$\%RSD = SD/x$$

where:

- %RSD* is the percent relative standard deviation;
- SD* is the standard deviation of the replicate analyses; and
- x* is the mean concentration of the replicate analyses.

The %RSD can be used to identify sources of variability among replicate samples, including variability introduced during the sampling process and intrinsic variability in the analytical method. The spatial and temporal differences in the composition of ground water or surface water were minimized by collecting samples at the same time, and sequentially in the same location.

In addition to sequential replicates, wash-blank samples were routinely collected and analyzed. These blank samples were collected in the field by processing analyte-free water using the same sampling methods and equipment used for the collection of field samples. The wash blanks were then analyzed, and if no analytes were detected, the cleaning and sampling procedures were not thought to affect sample contamination. If the blanks were analyzed and analytes were detected, then steps were isolated in the cleaning and sampling procedures to improve methods and therefore reduce the amount of contaminant carry-over from one sample to the next sample.

As part of the on-site laboratory's internal quality assurance and quality control (QA/QC), internal standards and surrogate standards were injected into every blank and sample. The injection of internal standards was necessary to determine the relative response of each target compound. Concentrations of the target compounds were calculated based on their responses relative to internal standards of known concentrations. The surrogate standards with similar properties to the analytes of interest were used to track possible variations in each analytical sample run. The



surrogate concentrations were known values; therefore, the responses of the surrogates could be evaluated to detect variations in instrument performance. If a sample was processed and either the internal standard response was low or the surrogate detection was inconsistent with the expected concentration, then the sample was reprocessed and/or the instrument was adjusted and re-calibrated before other samples were processed.

Another analytical quality-assurance method used was the analysis of blind samples. Blind samples are samples that were collected by field personnel from a site in replicate. The field personnel labeled one sample with the correct site identification and labeled the other sample with a “dummy” or “blind” sample location. After the samples were analyzed, the data were compared for variability.

## Sampling and Quality-Assurance Data

Ground-water samples were collected from 4-in. wells, piezometers, and peepers. Ground-water samples were analyzed for field parameters, redox constituents, inorganic and organic constituents. Surface-water samples were collected from five sampling sites and analyzed for organic constituents. Sequential replicate samples and wash blank samples were collected and analyzed during the entire sampling period.

### Ground-Water Data from Wells and Piezometers

Ground-water data were collected from wells and 0.75-in. piezometers during sampling rounds in March, May through June, and July through August 1999. These data are presented in Appendixes B, D, and E1.

Replicate samples, blind samples, and wash-blank samples were processed to detect variability and bias in the sampling and analytical processes.

**Field Measurements and Redox Constituents for Well and Piezometer Samples** Samples from 87 piezometers were collected and analyzed for field parameters (specific conductance, pH, air temperature, water temperature, dissolved oxygen, bicarbonate, and alkalinity) and redox constituents (sulfide, iron, and methane) during sampling rounds in March, May, June, July, and August of 1999 (Appendix B). Seventy-one replicate methane samples were collected and analyzed during these three sampling rounds. The 71 replicate methane samples were classified into three categories. Classification 1 represents replicate samples that were analyzed below the detection limit. Classification 2 represents replicate samples with 1 sample detected above the lower detection limit and 1 sample detected below the detection limit. Classification 3 represents samples that were analyzed with both samples having detections above the lower detection limit. Of the 71 replicate methane samples, 37 replicate samples were in classification 1; 3 replicate samples were in classification 2; and 31 replicate samples were in classification 3. The minimum %RSD for classification 3 was 0.05, the maximum %RSD was 75.72,

and the median %RSD for the replicate methane analyses was 3.2. Wash blanks and blind samples were not analyzed for these constituents.

### Inorganic Constituents for Well and Piezometer Samples

Inorganic constituents were analyzed for 37 piezometer samples. Three replicate samples were collected for inorganic constituents; one was a blind sample. A blind blank sample was also collected. Inorganic piezometer data are presented in Appendix D.

A listing of compounds that were detected in the three replicate piezometer samples and their %RSD is presented in table 3.

The median %RSDs for replicate analyses of inorganic constituents were less than 16; therefore, sample variability for inorganic constituents is considered low. The parameter with the greatest median %RSD was dissolved potassium (15.7), and dissolved iron exhibited the largest maximum %RSD (114.1). The variability in potassium and iron could be due to the small sample set. The wash blank contained 0.1 mg/L (milligrams per liter) of chloride, but otherwise was analyte-free.

### Organic Constituents for Well and Piezometer Samples

Ground-water samples were collected from 4-in. wells, 0.25-in., and 0.75-in. piezometers for VOC analysis at the on-site laboratory at West Branch Canal Creek. The 0.25-in. piezometers were sampled in February, March, May, and September 1999. The 0.75-in. piezometers and 4-in. wells were sampled in March, May, June, July, and August 1999. The well and piezometer data for organic analysis are presented in Appendix E1. Of the 64 compounds analyzed, 37 were not detected above the lower detection limits (0.5 µg/L – 2.0 µg/L) for well and piezometer ground-water analyses, and are listed at the top of page 13.

Ground-water samples were collected from 207 wells and piezometers from February through September of 1999, including 63 replicate samples, 3 triplicate samples, 2 quadruplicate samples, and 15 wash-blank samples. Of the 63 replicate samples, 7 were reprocessed because 1 of the 2 samples failed internal QA/QC criteria. Of the 15 wash blanks collected, 1 failed internal QA/QC criteria and 3 replicate samples were processed. Results of analyses for organic constituents in ground-water samples collected from wells and piezometers are presented in Appendix E1.

Relative standard deviations for 14 compounds that were detected in well, piezometer, and wash-blank replicate samples are presented in table 4.

Bromomethane and benzene both have relatively high median %RSDs compared to the other organic compounds. The %RSD for bromomethane may be attributed to possible laboratory contamination; this compound is frequently detected with higher than normal concentrations in calibration standards. The other organic compound median %RSDs are all below 30, and half are below 18. This overall increased variability compared to the %RSD of inorganic constituents may be due to the volatility of the compounds being analyzed. VOC concentrations in samples

*Organic constituents that were not detected in well and piezometer samples*

Bromobenzene	Bromoform	<i>n</i> -Butylbenzene
<i>sec</i> -Butylbenzene	<i>tert</i> -Butylbenzene	Chlorobenzene
2-Chlorotoluene	4-Chlorotoluene	1,2-Dibromo-3-chloropropane
Dibromomethane	1,2-Dibromomethane	1,2-Dichlorobenzene
1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichloropropane
1,3-Dichloropropane	<i>cis</i> -1,3-Dichloropropane	Ethyl benzene
Isopropylbenzene	<i>p</i> -Isopropyltoluene	Napthalene
<i>n</i> -Propylbenzene	Styrene	1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene
1,1,1,2-Tetrachloroethane	<i>m,p</i> -Xylene	<i>o</i> -Xylene
1,1,1-Trichloroethane	Bromochloromethane	2,2-Dichloropropane
1,2,3-Trichloropropane	1,1-Dichloropropene	<i>trans</i> -1,3-Dichloropropene
Hexafluorobutadiene		

**Table 3.** *Replicate well and piezometer sample analyses for inorganic constituents*

[%RSD, percent relative standard deviation; na, not applicable]

<b>Parameter</b>	<b>Number of replicate pairs</b>	<b>Minimum %RSD</b>	<b>Maximum %RSD</b>	<b>Median %RSD</b>
pH, laboratory	2	0.9	6.2	na
Calcium, dissolved	3	0	55.9	1.6
Magnesium, dissolved	3	0	53.2	1.9
Sodium, dissolved	3	0	78.7	0
Potassium, dissolved	3	0	20.2	15.7
Chloride, dissolved	2	0	0.7	na
Sulfate, dissolved	2	0	21.6	na
Fluoride, dissolved	2	0	0	na
Silica, dissolved	3	0	10.1	0
Iron, dissolved	3	1.5	114.1	3.3
Manganese, dissolved	3	0	34.4	0.6
Bromide, dissolved	2	0	12.9	na
Specific conductance, laboratory	2	0	21.9	na

**Table 4.** *Replicate well and piezometer sample analyses for organic constituents*

[%RSD, percent relative standard deviation]

Compounds detected in replicate pairs	Number of replicate pairs with detections	Minimum %RSD	Maximum %RSD	Median %RSD
1,1,2,2-Tetrachloroethane	13	2.1	77.0	22.6
1,1,2-Trichloroethane	6	0.7	43.7	12.9
1,2-Dichloroethane	4	7.3	34.3	17.5
Tetrachloroethene	6	4.6	34.1	21.6
Trichloroethene	13	5.5	61.2	29.0
<i>cis</i> -1,2-Dichloroethene	13	4.6	86.3	21.1
<i>trans</i> -1,2-Dichloroethene	12	0.9	101.8	14.0
Vinyl chloride	9	5.3	34.2	21.5
Carbon tetrachloride	8	3.3	30.7	12.2
Chloroform	8	0.2	25.9	9.2
Methylene chloride	1	15.9	15.9	15.9
Chloromethane	1	21.2	21.2	21.2
Bromomethane	4	3.1	47.1	40.7
Benzene	1	47.1	47.1	47.1

can be negatively affected if a sample is aerated during sample collection or during the transfer of the sample from the vial to the instrument for analysis.

Of the 15 wash blanks analyzed, 3 contained detections. Both wash blanks collected on March 12, 1999, contained detections. The first March 1999 wash blank contained 12.3 µg/L of 1,1,2,2-tetrachloroethane, 3.8 µg/L of trichloroethene, 6.6 µg/L of chloroform, and 1.0 µg/L of bromomethane. The second March 1999 wash blank contained 34.6 µg/L of 1,1,2,2-tetrachloroethane, 14.6 µg/L of trichloroethene, 14.0 µg/L of carbon tetrachloride, 30.3 µg/L of chloroform, and 3.0 µg/L of methylene

chloride. The third wash blank collected on September 2, 1999, contained 1.34 µg/L of trichloro-fluoromethane.

The two wash blanks collected in March 1999 were believed to have been contaminated from environmental sources. The cleaning procedures were evaluated and no other wash blanks collected after this time period contained environmental contamination. The wash blank collected in September 1999 was contaminated from a refrigerant that accumulated in the internal standard, which was injected into the sample when analyzed. The internal standard was replaced and no other wash blanks were contaminated.

### Ground-Water Porous-Membrane Sampling Device (Peeper) Data

Ground-water samples were collected from peepers during November 1998, and February, May, and August 1999. Peeper samples were analyzed for redox constituents (Appendix C) and organic constituents (Appendix E2). Replicate samples were collected from peeper devices, but wash-blank samples were not collected because of the sampling technique.

**Redox Parameters for Porous-Membrane Sampling Devices (Peepers)** Redox constituents were analyzed for 345 peeper samples from November 1998 through August 1999. Sulfide analyses included four replicate pairs. Of these, three pairs had no deviation between the two samples and one pair had a 28.3 %RSD. Iron was detected in one replicate pair with a 5.2 %RSD. Methane analyses included 24 replicate pairs (Appendix C). The methane results are presented in table 5, according to peeper location. Peeper P19 had the lowest median %RSD (1.4). Peeper P12 had the greatest median %RSD (2.3). The replicate peeper

samples have a very low median %RSD for methane.

**Organic Constituents for Porous-Membrane Sampling Devices (Peepers)** Peeper samples were collected during November 1998, February, May, and August 1999, and analyzed for 64 organic constituents. Of the 362 peeper samples collected, 33 replicate sample pairs were processed to calculate variability. Duplicate samples were processed for 29 samples because the initial sample failed laboratory internal QA/QC criteria. Organic peeper data are shown in Appendix E2.

Of the 64 VOC compounds, 39 were not detected above the lower detection limit (0.5 µg/L – 2 µg/L) in any of the samples. These compounds are therefore not listed in Appendix E2. Chloroform data are not shown in Appendix E2 because only one sample contained chloroform (sample P12–12 was collected on August 4, 1999, and contained 4.7 µg/L of chloroform).

The compounds that were not detected above the lower detection limit are listed below.

Bromobenzene	Bromochloromethane	Bromodichloromethane
Bromoform	<i>n</i> -Butylbenzene	<i>sec</i> -Butylbenzene
<i>tert</i> -Butylbenzene	Carbon tetrachloride	Chlorobenzene
Chloroform	2-Chlorotoluene	4-Chlorotoluene
1,2-Dibromoethane	Dibromochloromethane	Dibromomethane
1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene
1,1-Dichloroethane	1,1-Dichloropropane	1,2-Dichloropropane
1,3-Dichloropropane	2,2-Dichloropropane	<i>cis</i> -1,3-Dichloropropene
<i>trans</i> -1,3-Dichloropropene	Ethyl benzene	Isopropylbenzene
<i>p</i> -Isopropylbenzene	Napthalene	<i>n</i> -Propylbenzene
Styrene	Tetrachloroethene	1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene	1,1,1-Trichloroethane	1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene	<i>m,p</i> -Xylene	<i>o</i> -Xylene

**Table 5.** *Replicate porous-membrane sampling device analyses for methane*

[%RSD, percent relative standard deviation]

<b>Peeper</b>	<b>Number of replicate pairs with detections</b>	<b>Minimum %RSD</b>	<b>Maximum %RSD</b>	<b>Median %RSD</b>
P12	7	1.2	115.8	2.3
P19	7	0	4.5	1.4
P35	10	0.3	64.7	1.9

**Table 6.** *Replicate porous-membrane sampling device analyses for organic constituents*

[%RSD, percent relative standard deviation]

<b>Compounds detected</b>	<b>Number of replicate pairs with detections</b>	<b>Minimum %RSD</b>	<b>Maximum %RSD</b>	<b>Median %RSD</b>
1,1,2-Trichloroethane	3	9.1	39.7	37.3
1,2-Trichloroethane	4	1.4	56.7	36.0
Trichloroethene	3	10.2	19.1	11.8
<i>cis</i> -1,2-Trichloroethene	22	0.3	87.2	14.5
<i>trans</i> -1,2-Trichloroethene	16	2.3	90.8	16.0
Vinyl chloride	25	2.0	107.8	26.7
Bromomethane	6	1.4	72.5	23.9
Trichlorofluoromethane	1	3.8	3.8	3.8
Toluene	1	90.1	90.1	90.1

One pair of replicate peeper samples that were analyzed for VOCs had no detections in either sample. Additional replicate pairs that had detections were used to assess variability. Relative standard deviations for replicate analyses of VOCs in peeper samples are presented in table 6.

Toluene had the highest median %RSD (90.1). Vinyl chloride had the largest range between the minimum %RSD (2.0) and the maximum %RSD (107.8). Vinyl chloride is one of the target compounds in this study; it has a low molecular weight and is also very volatile, which may explain the high variability. The organic data from the peepers appear to be more variable than organic data from the wells and piezometers. Both the sampling techniques used to obtain the peeper samples and the very small 11-mL volume of sample water from the peepers may result in higher variability.

#### **Surface-Water Sampling Data**

Surface-water samples were collected at five locations from February through August of 1999. All 16 samples were analyzed for VOCs, and 1 sample was analyzed for field parameters. The sample that was analyzed for field parameters had a specific conductance of 554  $\mu\text{S}/\text{cm}$  and a pH of 6.38. Organic surface-water data are presented in Appendix E3.

Of the 16 samples, 4 were replicate pairs. Relative standard deviations for replicate analyses of VOCs in surface-water samples are presented in table 7.

Concentrations of VOCs in surface-water samples ranged from below the detection limit to 22.1  $\mu\text{g}/\text{L}$  for chloroform, which was detected at site SW060 on August 3, 1999. The most frequently detected VOC was

**Table 7.** *Replicate surface-water sample analyses for organic constituents*

[%RSD, percent relative standard deviation; na, not applicable]

Compounds detected	Number of replicate pairs with detections	Minimum %RSD	Maximum %RSD	Median %RSD
1,1,2,2-Tetrachloroethane	2	5.8	81.1	na
1,1,2-Trichloroethane	1	3.0	3.0	3.0
Trichloroethene	1	80.9	80.9	80.9
Carbon tetrachloride	2	1.2	17.1	na
Chloroform	2	4.8	6.4	na

1,1,2,2-tetrachloroethane, which was detected in 15 of 16 samples. The maximum concentration of 1,1,2,2-tetrachloroethane was 18.5 µg/L, which was detected in a sample collected on February 18, 1999, from site SW049.01. The next most frequently detected VOC was carbon tetrachloride, which was detected in 12 samples, followed by chloroform, which was detected in 10 samples.

#### **Water-Level Data**

Water-level measurements were collected in October and November 1998, and February and May 1999. Water-level data were collected from 105 locations, including 2-in. wells, 4-in. wells, and 0.75-in. drive-point piezometers. Data were generally collected at high tide, low tide, and occasionally during mid-tide. The water-level data were used to estimate ground-water flux rates. These data were also collected to assist in the development of a ground-water-flow and solute-transport model. Water-level measurements, screen depth, and hydrogeologic unit information are presented in Appendix F.

#### **Summary**

This report presents water-quality and water-level data collected by the U.S. Geological Survey from October 1998 through September 1999 at West Branch Canal Creek, Aberdeen Proving Ground, Maryland. The water-quality data were collected from ground-water and surface-water sites. This report also includes a description of the sampling and analytical methods, and an evaluation of the quality-assurance data.

Ground-water samples were collected from wells and 0.75-inch drive-point piezometers during March, May, June, July, and August 1999. Samples from 0.25-inch inverted-screen piezometers were collected during February, March, May, and September 1999. Samples from 0.25-inch flexible-tubing piezometers were collected during March,

May, and August 1999. Ground-water samples were analyzed for field parameters, redox constituents, inorganic constituents, and organic constituents. Quality-assurance data for inorganic constituents indicate that for well and piezometer sampling techniques, the variability is low. Quality-assurance data for organic constituents indicate that there is increased variability, which may be due to the volatility of the compounds being analyzed. Wash-blank and blind samples indicate that both sampling procedures and analytical techniques do not typically contribute to contamination of the samples from wells and piezometers.

Porous-membrane sampling devices (peepers) were installed in November 1998, and February, May, and August 1999. Peepers were sampled for sulfide, ferrous and ferric iron, methane, and organic constituents. Replicate samples analyzed for sulfide, iron, and methane indicate low variability in all analyses. Replicate samples collected from peepers and analyzed for organic constituents indicate higher variability than in well and piezometer samples. The increased variability may be due to the sampling techniques used to obtain the peeper samples, and the high volatility of the compounds being analyzed.

Surface-water samples were collected in 1999, and analyzed for organic constituents only. The variability in these samples was high. The variability in the surface-water samples may be due to changing environmental conditions and the volatility of the compounds being analyzed. The most frequently detected organic constituent was 1,1,2,2-tetrachloroethane. Water-level measurements were made in October and November 1998, and February and May 1999.

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**APPENDIXES A THROUGH F FOLLOW**



**Appendix A. Sampling locations in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland**

[Site identification number represents the latitude, longitude, and piezometer number within the cluster and is used for tracking water-quality samples; \*, site was used to measure water levels only, no water-quality samples were collected; --, no data; pressure transducers were installed in wells ending in “.1”]

<b>Well no.</b>	<b>Site identification no.</b>	<b>Hydrogeologic unit</b>	<b>Well diameter (inches)</b>	<b>Screened interval (feet below land surface)</b>	<b>Land surface elevation (feet above sea level)</b>
CC-27A	392343076183301	Canal Creek aquifer	4.0	18.0 - 23.0	11.2
CC-27B	392343076183302	Canal Creek aquifer	4.0	35.0 - 40.0	11.4
DP-12	392348076183401	Wetland sediments	2.0	2.6 - 3.6	1.05
DP-1A	392346076183501	Wetland sediments, upper peat unit	2.0	1.9 - 2.9	1.20
DP-1B	392346076183502	Wetland sediments, lower clayey unit	2.0	6.5 - 7.5	1.23
DP-5	392346076183503	Wetland sediments	2.0	3.7 - 4.7	1.36
Tracer array	392347076183800	Wetland sediments, upper peat unit	--	--	--
WB19A	392354076183701	Wetland sediments, upper peat unit	.75	1.3 - 1.8	1.52
WB19B	392354076183702	Wetland sediments, upper peat unit	.75	4.2 - 4.7	1.50
WB19D	392354076183704	Canal Creek aquifer	.75	13.5 - 14.0	1.51
WB19E	392354076183705	Canal Creek aquifer	.75	28.5 - 29.0	1.46
WB19F	392354076183706	Canal Creek aquifer	.75	45.0 - 45.5	1.33
WB21A	392346076183301	Wetland sediments, lower clayey unit	.75	1.5 - 2.0	3.00
WB21B	392346076183302	Canal Creek aquifer	.75	6.5 - 7.0	3.10
WB21C	392346076183303	Canal Creek aquifer	.75	13.5 - 14.0	2.74
WB21D	392346076183304	Canal Creek aquifer	.75	17.5 - 18.0	3.14
WB21E	392346076183305	Canal Creek aquifer	.75	29.5 - 30.0	3.10
WB21F	392346076183306	Canal Creek aquifer	.75	36.0 - 36.5	3.10
WB21G	392346076183307	Canal Creek aquifer	.75	45.0 - 45.5	3.25
WB21W	No site identification *	Wetland sediments, lower clayey unit	.75	0.0 - 2.0	1.65
WB22A	392342076183401	Wetland sediments, upper peat unit	.75	1.5 - 2.0	2.52
WB22B	392342076183402	Wetland sediments, upper peat unit	.75	7.0 - 7.5	2.62
WB22C	392342076183403	Canal Creek aquifer	.75	13.0 - 13.5	2.52
WB22D	392342076183404	Canal Creek aquifer	.75	17.0 - 17.5	2.47
WB22E	392342076183405	Canal Creek aquifer	.75	22.0 - 22.5	2.53

**Appendix A. Sampling locations in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland—Continued**

<b>Well no.</b>	<b>Site identification no.</b>	<b>Hydrogeologic unit</b>	<b>Well diameter (inches)</b>	<b>Screened interval (feet below land surface)</b>	<b>Land surface elevation (feet above sea level)</b>
WB22W	No site identification *	Wetland sediments, upper peat unit	0.75	0.0 - 2.0	2.48
WB23A	392341076183401	Wetland sediments, upper peat unit	.75	0.5 - 1.0	1.05
WB23B	392341076183402	Wetland sediments, lower clayey unit	.75	2.2 - 2.7	.77
WB23C	392341076183403	Wetland sediments, lower clayey unit	.75	8.5 - 9.0	1.06
WB23D	392341076183404	Canal Creek aquifer	.75	12.5 - 13.0	1.01
WB23E	392341076183405	Canal Creek aquifer	.75	16.0 - 16.5	.92
WB23F	392341076183406	Canal Creek aquifer	.75	21.0 - 21.5	1.00
WB24A	392343076183401	Wetland sediments, upper peat unit	.75	0.9 - 1.4	1.85
WB24B	392343076183402	Wetland sediments, upper peat unit	.75	3.0 - 3.5	1.77
WB24E	392343076183405	Canal Creek aquifer	.75	16.5 - 17.0	1.85
WB24F	392343076183406	Canal Creek aquifer	.75	28.0 - 28.5	1.80
WB24W	No site identification *	Wetland sediments, upper peat unit	.75	0.0 - 2.0	1.80
WB25A	392342076183502	Wetland sediments, upper peat unit	.75	0.5 - 1.0	1.23
WB25B	392342076183503	Canal Creek aquifer	.75	13.5 - 14.0	1.20
WB25C	392342076183504	Canal Creek aquifer	.75	15.5 - 16.0	1.12
WB25C.1	392342076183505	Wetland sediments, upper peat unit	2.0	0.4 - 1.4	1.21
WB25D.1	392342076183506	Canal Creek aquifer	2.0	12.0 - 13.0	1.16
WB26A	392343076183502	Wetland sediments, upper peat unit	.75	1.0 - 1.5	.38
WB26B	392343076183503	Wetland sediments, upper peat unit	.75	2.5 - 3.0	.47
WB26B.1	392343076183511	Wetland sediments, upper peat unit	2.0	2.0 - 3.0	.45
WB26C	392343076183504	Wetland sediments, upper peat unit	.75	4.0 - 4.5	.20
WB26D	392343076183505	Wetland sediments, lower clayey unit	.75	5.5 - 6.0	.33
WB26E	392343076183506	Paleochannel	.75	8.8 - 9.3	.28
WB26F	392343076183507	Canal Creek aquifer	.75	15.0 - 15.5	.33
WB26G	392343076183508	Canal Creek aquifer	.75	19.5 - 20.0	.40

**Appendix A. Sampling locations in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland—Continued**

<b>Well no.</b>	<b>Site identification no.</b>	<b>Hydrogeologic unit</b>	<b>Well diameter (inches)</b>	<b>Screened interval (feet below land surface)</b>	<b>Land surface elevation (feet above sea level)</b>
WB26H	392343076183509	Canal Creek aquifer	0.75	27.0 - 27.5	0.50
WB26W	No site identification *	Wetland sediments, upper peat unit	.75	0.0 - 2.0	.63
WB27A	392343076183521	Wetland sediments, upper peat unit	.75	1.0 - 1.5	-.92
WB27A.1	392343076183528	Wetland sediments, upper peat unit	2.0	0.7 - 1.7	-.94
WB27B	392343076183522	Wetland sediments, upper peat unit	.75	3.2 - 3.7	-.97
WB27B.1	392343076183529	Wetland sediments, upper peat unit	2.0	4.5 - 5.5	-1.00
WB27C	392343076183523	Wetland sediments, upper peat unit	.75	4.5 - 5.0	-.98
WB27D	392343076183524	Paleochannel	.75	8.2 - 8.7	-.88
WB27D.1	392343076183530	Paleochannel	2.0	9.0 - 10.0	-.95
WB27E	392343076183525	Canal Creek aquifer	.75	15.0 - 15.5	-.96
WB27E.1	392343076183531	Canal Creek aquifer	2.0	11.8 - 12.8	-.94
WB27F	392343076183526	Canal Creek aquifer	.75	18.0 - 18.5	-.90
WB27G	392343076183527	Canal Creek aquifer	.75	26.0 - 26.5	-.90
WB28A	392345076183511	Wetland sediments, upper peat unit	.75	1.2 - 1.7	.83
WB28B	392345076183512	Wetland sediments, upper peat unit	.75	4.5 - 5.0	.84
WB28C	392345076183513	Wetland sediments, upper peat unit	.75	9.0 - 9.5	.82
WB28C.1	392345076183517	Wetland sediments, upper peat unit	2.0	9.0 - 10.0	.75
WB28D	392345076183514	Canal Creek aquifer	.75	14.5 - 15.0	.89
WB28D.1	392345076183518	Canal Creek aquifer	2.0	14.0 - 15.0	.81
WB28F	392345076183516	Canal Creek aquifer	.75	34.5 - 35.0	.73
WB28W	No site identification *	Wetland sediments, upper peat unit	.75	0.0 - 2.0	.95
WB30A	392344076183401	Wetland sediments, upper peat unit	.75	0.9 - 1.4	1.45
WB30B	392344076183402	Wetland sediments, lower clayey unit	.75	2.0 - 2.5	1.44
WB30C	392344076183403	Wetland sediments, lower clayey unit	.75	4.5 - 5.0	1.49
WB30D	392344076183404	Wetland sediments, lower clayey unit	.75	6.5 - 7.0	1.41

**Appendix A. Sampling locations in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland—Continued**

<b>Well no.</b>	<b>Site identification no.</b>	<b>Hydrogeologic unit</b>	<b>Well diameter (inches)</b>	<b>Screened interval (feet below land surface)</b>	<b>Land surface elevation (feet above sea level)</b>
WB30E	392344076183405	Canal Creek aquifer	0.75	12.5 - 13.0	1.45
WB31A	392345076183401	Wetland sediments, upper peat unit	.75	1.0 - 1.5	1.60
WB31B	392345076183402	Wetland sediments, lower clayey unit	.75	3.5 - 4.0	1.61
WB31C	392345076183403	Wetland sediments, lower clayey unit	.75	5.5 - 6.0	1.61
WB31D	392345076183404	Wetland sediments, lower clayey unit	.75	7.0 - 7.5	1.54
WB31E	392345076183405	Canal Creek aquifer	.75	12.8 - 13.3	1.52
WB32B	392347076183202	Canal Creek aquifer	.75	26.5 - 27.0	10.77
WB33A	392353076183301	Canal Creek aquifer	.75	8.7 - 9.2	2.96
WB33B	392353076183302	Canal Creek aquifer	.75	14.0 - 14.5	2.95
WB33F	392353076183306	Canal Creek aquifer	.75	42.5 - 43.0	2.95
WB33Y	No site identification *	Wetland sediments, upper peat unit	.25	1.9 - 2.0	2.96
WB33Z	No site identification *	Wetland sediments, upper peat unit	.25	4.5 - 4.6	2.96
WB34A	392348076183411	Wetland sediments, upper peat unit	.75	1.5 - 2.0	1.43
WB34B	392348076183412	Canal Creek aquifer	.75	7.3 - 7.8	1.37
WB34C	392348076183413	Canal Creek aquifer	.75	15.0 - 15.5	1.36
WB34D	392348076183414	Canal Creek aquifer	.75	18.3 - 18.8	1.35
WB34E	392348076183415	Canal Creek aquifer	.75	26.5 - 27.0	1.35
WB35A	392354076183402	Wetland sediments, upper peat unit	.75	1.5 - 2.0	1.19
WB35B	392354076183403	Wetland sediments, upper peat unit	.75	2.8 - 3.3	1.29
WB35C	392354076183404	Canal Creek aquifer	.75	7.2 - 7.7	1.27
WB35D	392354076183405	Canal Creek aquifer	.75	13.0 - 13.5	1.27
WB35E	392354076183406	Canal Creek aquifer	.75	18.0 - 18.5	1.27
WB35F	392354076183407	Canal Creek aquifer	.75	27.5 - 28.0	1.31
WB36A	392355076183402	Wetland sediments, upper peat unit	.75	1.7 - 2.2	1.27
WB36B	392355076183403	Wetland sediments, upper peat unit	.75	2.7 - 3.2	.99

**Appendix A. Sampling locations in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland—Continued**

<b>Well no.</b>	<b>Site identification no.</b>	<b>Hydrogeologic unit</b>	<b>Well diameter (inches)</b>	<b>Screened interval (feet below land surface)</b>	<b>Land surface elevation (feet above sea level)</b>
WB36C	392355076183404	Canal Creek aquifer	0.75	7.1 - 7.6	1.04
WB36D	392355076183405	Canal Creek aquifer	.75	13.0 - 13.5	.98
WB36E	392355076183406	Canal Creek aquifer	.75	18.0 - 18.5	1.03
WB36F	392355076183407	Canal Creek aquifer	.75	27.5 - 28.0	1.00
WB36G	392355076183408	Canal Creek aquifer	.75	32.0 - 32.5	1.09
WB37A	392356076183402	Wetland sediments, upper peat unit	.75	1.7 - 2.2	.76
WB37B	392356076183403	Wetland sediments, upper peat unit	.75	2.5 - 3.0	.71
WB37C	392356076183404	Canal Creek aquifer	.75	7.1 - 7.6	.72
WB37D	392356076183405	Canal Creek aquifer	.75	13.5 - 14.0	.75

**APPENDIX B FOLLOWS**

**Appendix B. Field measurements and redox-sensitive constituents for piezometers and 4-inch wells in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999**

[ $\mu\text{S}/\text{cm}$ , microsiemens per centimeter;  $^{\circ}\text{C}$ , degrees Celsius;  $\text{mg}/\text{L}$ , milligrams per liter;  $\mu\text{g}/\text{L}$ , micrograms per liter; --, no data available; <, less than; >, greater than]

Sample name	Date collected	Sampling method	Specific conductance ( $\mu\text{S}/\text{cm}$ )	pH (standard units)	Air temperature ( $^{\circ}\text{C}$ )	Water temperature ( $^{\circ}\text{C}$ )	Oxygen, dissolved (mg/L)
<b>First Sampling Period (March 1999)</b>							
CC27A	03/12/1999	submersible pump	926	4.47	--	12.2	0.29
CC27B	03/12/1999	submersible pump	354	4.20	--	13.6	3.15
WB19B	03/01/1999	bailer	540	6.12	--	8.5	--
WB19E	03/01/1999	peristaltic pump	192	4.34	--	11.5	5.39
WB22B	03/05/1999	bailer	293	5.58	--	11.1	--
WB22D	03/05/1999	peristaltic pump	414	5.00	--	11.2	.06
WB23B	03/05/1999	bailer	139	6.69	--	10.5	--
WB23C	03/03/1999	bailer	1,150	6.08	--	12.0	--
WB23D	03/08/1999	peristaltic pump	582	4.77	--	6.0	1.16
WB24A	03/02/1999	bailer	--	--	--	--	--
WB24B	03/03/1999	peristaltic pump	518	6.11	--	15.4	1.60
WB24E	03/13/1999	peristaltic pump	251	5.70	--	14.3	--
WB26A	03/02/1999	bailer	3,210	6.76	--	13.8	--
WB26B	03/02/1999	bailer	688	6.78	--	8.7	--
WB26C	03/02/1999	bailer	591	6.44	--	14.3	--
WB26D	03/02/1999	bailer	743	5.89	--	13.0	--
WB26E	03/02/1999	bailer	1,510	6.33	--	15.8	--
WB26F	03/02/1999	peristaltic pump	488	4.95	--	14.2	1.25
WB32B	03/09/1999	peristaltic pump	1,280	6.90	-2.5	1.5	--
WB33A	03/13/1999	syringe	603	4.40	--	7.7	--
WB33B	03/09/1999	bailer	605	3.74	--	6.7	.47
WB33Y	03/08/1999	syringe	875	5.70	--	6.6	--
WB33Z	03/08/1999	syringe	975	6.1	4.8	4.8	--
WB34A	03/30/1999	--	--	--	--	--	--
WB34B	03/11/1999	bailer	644	4.84	--	9.1	--

Bicarbonate (mg/L as HCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Sulfide (mg/L)	Iron, total (mg/L)	Iron, 2++ (mg/L)	Methane (µg/L)	Duplicate methane (µg/L)	Sample name
--	--	<0.01	0.58	0.54	96	99	CC27A
--	--	.02	.24	.06	<25	<25	CC27B
149	122	.01	10.7	11.1	15,500	12,900	WB19B
--	--	<.01	.07	<.05	<28	--	WB19E
13.7	11.3	.05	5.95	6.0	162	152	WB22B
6.1	5.0	.03	<.05	<.05	<39	<39	WB22D
--	--	--	4.14	3.98	1,100	1,100	WB23B
70.2	57.5	--	.19	.16	<40	<52	WB23C
3.1	2.5	<.01	.06	<.05	<32	<37	WB23D
--	--	--	--	--	--	--	WB24A
97.6	80.0	.25	5.24	4.96	5,660	5,670	WB24B
--	--	>.01	.50	.53	<37	<35	WB24E
588	482	.22	1.68	1.04	1,760	1,770	WB26A
337	276	--	.36	.34	1,250	1,220	WB26B
160	131	.62	.55	.52	4,420	4,280	WB26C
45.8	37.5	.14	1.23	2.41	1,100	397	WB26D
103	84.4	.23	.16	.09	<54	<28	WB26E
3.1	2.5	1.35	.37	.25	<45	<30	WB26F
--	--	--	--	--	--	--	WB32B
--	--	<.01	2.86	2.86	109	109	WB33A
--	--	.08	.15	.14	--	--	WB33B
64.1	52.5	.76	--	--	44	48	WB33Y
--	--	.72	7.2	8.5	<36	<33	WB33Z
--	--	--	15.4	72.2	1,100	--	WB34A
--	--	.51	.27	.29	<42	<33	WB34B



**Appendix B. Field measurements and redox-sensitive constituents for piezometers and 4-inch wells in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999—Continued**

Sample name	Date collected	Sampling method	Specific conductance ( $\mu\text{S}/\text{cm}$ )	pH (standard units)	Air temperature ( $^{\circ}\text{C}$ )	Water temperature ( $^{\circ}\text{C}$ )	Oxygen, dissolved (mg/L)
<b>First Sampling Period (March 1999)—Continued</b>							
WB35A	03/13/1999	syringe	467	4.79	--	8.0	--
WB35B	03/10/1999	bailer	240	4.31	--	9.0	--
WB35C	03/10/1999	peristaltic pump	399	4.01	--	10.7	2.56
WB35E	03/10/1999	peristaltic pump	298	4.09	--	11.9	1.53
WB36A	03/13/1999	bailer	125	5.70	--	8.2	--
WB36B	03/13/1999	bailer	93	5.97	--	8.5	--
WB36C	03/11/1999	peristaltic pump	287	4.44	--	12.6	1.13
<b>Second Sampling Period (May-June 1999)</b>							
CC27B	06/01/1999	centrifugal pump	350	4.18	--	16.9	--
WB19B	05/19/1999	syringe	513	6.42	--	15.5	--
WB19E	05/19/1999	syringe	198	6.87	--	15.9	6.47
WB22B	05/26/1999	syringe	387	5.36	25.0	16.0	--
WB22D	05/21/1999	peristaltic pump	426	4.82	25.5	15.8	--
WB23B	05/27/1999	syringe	774	6.46	23.0	21.8	--
WB23C	05/25/1999	peristaltic pump	714	6.42	23.0	16.2	--
WB23D	05/21/1999	peristaltic pump	558	4.66	23.0	16.5	--
WB24B	05/21/1999	syringe	515	6.50	24.1	--	--
WB24E	05/27/1999	peristaltic pump	318	5.44	--	19.5	--
WB26A	05/20/1999	syringe	251	7.30	21.9	19.2	--
WB26B	05/20/1999	syringe	133	7.18	22.0	19.6	--
WB26C	05/20/1999	syringe	608	7.14	22.3	18.4	--
WB26D	05/20/1999	syringe	699	6.89	23.0	17.6	--
WB26E	05/20/1999	syringe	763	6.29	24.6	16.6	--
WB26F	05/20/1999	peristaltic pump	499	4.65	25.3	20.6	--
WB33A	05/26/1999	syringe	465	5.53	--	15.5	--
WB33B	06/02/1999	peristaltic pump	537	3.95	30.3	16.3	--
WB33Z	05/27/1999	syringe	716	5.89	--	18.7	--
WB34A	05/27/1999	syringe	857	6.27	18.0	23.1	--

Bicarbonate (mg/L as HCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Sulfide (mg/L)	Iron, total (mg/L)	Iron, 2++ (mg/L)	Methane (µg/L)	Duplicate methane (µg/L)	Sample name
--	--	0.36	1.27	1.27	65	69	WB35A
--	--	--	--	--	<34	<26	WB35B
--	--	<.01	.06	.06	<25	<29	WB35C
--	--	.05	.11	<.05	<28	<40	WB35E
--	--	--	--	--	43	43	WB36A
--	--	<.01	8.6	6.5	<35	<43	WB36B
--	--	.54	.11	.09	<36	<35	WB36C
--	--	--	--	--	<57	<106	CC27B
189	155	.08	16.2	16.2	11,900	16,600	WB19B
9.2	7.5	.03	<.05	<.05	<.05	>47	WB19E
9.3	7.6	<.01	7.2	7.4	314	95	WB22B
--	--	<.01	<.05	<.05	<40	<54	WB22D
--	--	.03	8.76	8.12	2,240	2,400	WB23B
--	--	--	--	--	--	--	WB23C
--	--	<.01	.21	<.05	<64	<51	WB23D
107	88.0	.42	4.89	4.75	5,650	5,700	WB24B
14.6	12.0	<.01	<.05	<.05	<61	<63	WB24E
747	613	.06	3.03	3.11	2,490	3,400	WB26A
--	--	.02	11.4	10.6	3,000	3,040	WB26B
195	160	.26	.66	.67	4,100	4,070	WB26C
125	103	.13	1.53	1.50	401	412	WB26D
27.5	22.5	<.01	.29	.27	<59	<67	WB26E
--	--	<.01	<.05	<.05	<51	<51	WB26F
7.8	6.4	.01	.32	.32	79	95	WB33A
--	--	<.01	<.05	<.05	510	488	WB33B
48.8	40.0	.28	29.8	30.2	<72	1,830	WB33Z
--	--	--	--	--	1,940	<43	WB34A

**Appendix B. Field measurements and redox-sensitive constituents for piezometers and 4-inch wells in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999—Continued**

Sample name	Date collected	Sampling method	Specific conductance (μS/cm)	pH (standard units)	Air temperature (°C)	Water temperature (°C)	Oxygen, dissolved (mg/L)
<b>Second Sampling Period (May-June 1999)—Continued</b>							
WB34B	05/27/1999	syringe	713	4.67	18.0	16.0	--
WB35A	05/26/1999	syringe	462	4.67	25.8	20.0	--
WB35B	05/26/1999	syringe	367	4.79	--	18.9	--
WB35C	05/28/1999	peristaltic pump	398	4.08	27.0	17.4	--
WB35E	05/28/1999	peristaltic pump	288	4.19	--	17.9	--
WB36A	05/27/1999	bailer	248	5.32	--	24.1	--
WB36B	05/26/1999	syringe	136	5.90	25.6	22.6	--
WB36B	--	--	--	--	--	--	--
WB36C	05/26/1999	peristaltic pump	287	4.69	25.6	18.3	--
<b>Third Sampling Period (July-August 1999)</b>							
CC27A	07/30/1999	submersible pump	641	4.63	--	23.8	--
CC27B	07/30/1999	submersible pump	358	4.30	--	17.1	--
WB19B	07/20/1999	peristaltic pump	472	6.07	--	27.1	--
WB19E	07/20/1999	syringe	196	5.09	--	20.3	--
WB22B	07/26/1999	syringe	387	5.18	--	22.2	--
WB22D	07/29/1999	--	--	--	30.6	30.6	0.60
WB23B	07/26/1999	syringe	755	6.85	--	28.2	--
WB23C	07/19/1999	syringe	642	7.31	--	22.1	--
WB23D	07/26/1999	syringe	--	5.19	--	--	--
WB24A	07/19/1999	syringe	--	6.54	--	31.0	--
WB24B	07/26/1999	syringe	506	5.68	29.4	32.0	--
WB24E	07/27/1999	syringe	270	5.30	31.7	21.9	--
WB26A	07/20/1999	syringe	3,730	6.86	--	27.5	--
WB26B	07/23/1999	syringe	1,440	7.06	--	30.8	--
WB26C	07/26/1999	syringe	666	7.02	--	28.0	--

Bicarbonate (mg/L as HCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Sulfide (mg/L)	Iron, total (mg/L)	Iron, 2++ (mg/L)	Methane (µg/L)	Duplicate methane (µg/L)	Sample name
6.7	5.5	0.01	<0.05	<0.05	<46	<59	WB34B
--	--	.11	2.24	2.24	<62	<84	WB35A
--	--	.05	1.98	1.98	<47	<49	WB35B
--	--	.01	--	--	697	--	WB35C
--	--	.01	<.05	<.05	<44	<26	WB35E
--	--	<.01	6.05	5.96	<59	65	WB36A
8.3	6.8	.01	6.69	6.37	<61	<63	WB36B
--	--	--	--	--	<58	<66	WB36B
--	--	.12	<.05	<.05	<55	<56	WB36C
.61	.5	.08	.56	6.61	185	196	CC27A
--	--	.01	<.05	<.05	<95	<78	CC27B
142	116	<.01	13.7	13.0	--	13,650	WB19B
3.7	3.0	.01	<.05	<.05	<61	<73	WB19E
--	--	.01	6.77	5.97	123	125	WB22B
9.2	7.5	--	--	--	--	--	WB22D
--	--	<.01	22.6	21.9	2,220	1,830	WB23B
--	--	--	--	--	--	--	WB23C
9.2	7.5	.04	<.05	<.05	<94	<70	WB23D
--	--	--	--	--	--	--	WB24A
104	85.0	.09	--	4.42	5,530	5,460	WB24B
12.2	10.0	.74	<.05	<.05	<75	<67	WB24E
537	440	<.01	.96	.64	768	733	WB26A
625	512	<.01	.13	<.05	1,120	1,260	WB26B
177	145	.07	.63	.56	3,160	3,590	WB26C

**Appendix B. Field measurements and redox-sensitive constituents for piezometers and 4-inch wells in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999—Continued**

Sample name	Date collected	Sampling method	Specific conductance (μS/cm)	pH (standard units)	Air temperature (°C)	Water temperature (°C)	Oxygen, dissolved (mg/L)
<b>Third Sampling Period (July-August 1999)—Continued</b>							
WB26D	07/27/1999	syringe	741	6.86	--	27.1	--
WB26E	07/29/1999	syringe	760	5.63	--	24.8	--
WB26F	07/29/1999	peristaltic pump	489	4.70	--	23.2	--
WB33A	08/12/1999	syringe	481	4.92	32.5	24.3	--
WB33B	08/05/1999	peristaltic pump	601	3.85	--	18.3	--
WB33E	08/03/1999	--	--	--	--	--	--
WB33Z	08/05/1999	syringe	558	5.85	34.1	27.5	--
WB34A	08/16/1999	syringe	1,690	6.26	--	29.7	--
WB34B	08/05/1999	hand pump	703	4.61	--	21.1	--
WB35A	08/03/1999	syringe	594	5.07	--	28.9	--
WB35B	08/12/1999	syringe	448	4.03	31.9	27.8	--
WB35C	08/03/1999	syringe	382	4.17	--	24.8	--
WB35E	08/03/1999	peristaltic pump	282	4.36	--	19.3	0.0
WB36A	08/05/1999	syringe	297	4.90	--	25.3	--
WB36B	08/05/1999	syringe	235	5.99	--	24.7	--
WB36C	08/03/1999	peristaltic pump	319	4.66	26.0	18.7	0.0

Bicarbonate (mg/L as HCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Sulfide (mg/L)	Iron, total (mg/L)	Iron, 2++ (mg/L)	Methane (µg/L)	Duplicate methane (µg/L)	Sample name
94.6	77.5	0.20	1.76	1.66	189	196	WB26D
--	--	--	<.05	<.05	--	--	WB26E
9.2	7.5	.08	.08	<.05	<69	<55	WB26F
.3	.2	<.01	.57	.49	--	--	WB33A
--	--	.28	.27	.01	754	--	WB33B
--	--	--	--	--	<88	<82	WB33E
48.8	40.0	.18	>11	>11	<77	--	WB33Z
241	198	.03	98.5	95.6	1,380	--	WB34A
6.1	5.0	.08	.18	.12	<102	--	WB34B
6.1	5.0	.72	3.11	3.05	379	372	WB35A
--	--	<.01	.45	.41	<55	--	WB35B
--	--	.03	.02	.01	<78	<73	WB35C
--	--	.14	<.05	<.05	--	--	WB35E
--	--	<.01	5.20	5.16	168	--	WB36A
--	--	.01	6.85	5.65	<91	--	WB36B
6.1	5.0	.23	<.05	<.05	<82	<89	WB36C

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999**

[mg/L, milligrams per liter; µg/L, micrograms per liter; --, no data; <, less than; >, greater than; na, not applicable]

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>First Sampling Period (November 1998)</b>					
P12-1	na	11/30/1998	<0.13	--	<102
P12-2	na	11/30/1998	<.13	8.7	<94.4
P12-3	na	11/30/1998	.50	16.3	258
P12-4	na	11/30/1998	.10	21.2	326
P12-5	na	11/30/1998	.89	22.4	518
P12-6	na	11/30/1998	--	33.7	1,580
P12-7	na	11/30/1998	.29	42.1	3,100
P12-8	1	11/30/1998	--	61.3	4,190
P12-8	2	11/30/1998	--	--	4,160
P12-9	na	11/30/1998	.88	58.1	4,720
P12-10	1	11/30/1998	1.0	1.8	4,960
P12-10	2	11/30/1998	1.0	--	5,120
P12-11	na	11/30/1998	.23	106	5,240
P12-12	1	11/30/1998	.08	52.6	8,460
P12-12	2	11/30/1998	--	--	8,320
P12-13	na	11/30/1998	.16	31.3	6,720
P12-14	na	11/30/1998	.29	41.2	10,030
P12-15	na	11/30/1998	--	41.8	9,610
P12-16	na	11/30/1998	--	34.4	5,560
P12-17	na	11/30/1998	.16	28.7	4,640
P12-18	na	11/30/1998	--	47.2	3,840
P12-19	na	11/30/1998	.56	--	4,210
P12-20	1	11/30/1998	<.25	93.0	--
P12-20	2	11/30/1998	<.25	--	5,470
P12-21	na	11/30/1998	<.14	--	--

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>					
P19-1	na	11/30/1998	<0.06	--	<56
P19-2	na	11/30/1998	.16	47.7	1,100
P19-3	na	11/30/1998	.19	54.6	1,820
P19-4	1	11/30/1998	.54	65.4	3,020
P19-4	2	11/30/1998	--	--	2950
P19-5	na	11/30/1998	.27	76.9	3,980
P19-6	na	11/30/1998	.06	74.3	4,770
P19-7	na	11/30/1998	<.14	76.9	5,360
P19-8	1	11/30/1998	--	89.3	8,050
P19-8	2	11/30/1998	--	--	8,440
P19-9	na	11/30/1998	.60	77.3	6,070
P19-10	na	11/30/1998	.22	73.5	5,820
P19-11	na	11/30/1998	.25	79.2	5,920
P19-12	1	11/30/1998	.12	82.4	7,190
P19-12	2	11/30/1998	--	--	7,040
P19-13	na	11/30/1998	.06	84.0	9,310
P19-14	na	11/30/1998	.13	109	9,870
P19-15	1	11/30/1998	--	96.2	8,680
P19-15	2	11/30/1998	.13	--	8,580
P19-16	na	11/30/1998	.10	>110	9,800
P19-17	na	11/30/1998	.08	>110	11,000
P19-18	na	11/30/1998	.18	94.3	10,600
P19-19	na	11/30/1998	.60	>110	11,480
P19-20	1	11/30/1998	.21	104	12,420
P19-20	2	11/30/1998	--	--	13,240



**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>					
P19-21	na	11/30/1998	0.18	98.6	12,700
P35-1	na	11/30/1998	.05	--	<83
P35-2	na	11/30/1998	.87	10.7	--
P35-3	na	11/30/1998	2.5	11.9	6,130
P35-4	1	11/30/1998	1.0	13.5	7,250
P35-4	2	11/30/1998	--	--	7,390
P35-5	na	11/30/1998	1.4	5.7	6,900
P35-6	na	11/30/1998	3.4	9.6	4,650
P35-7	na	11/30/1998	5.1	10.2	4,310
P35-8	1	11/30/1998	--	--	2,900
P35-8	2	11/30/1998	--	--	3,000
P35-9	na	11/30/1998	7.5	16.0	2,030
P35-10	na	11/30/1998	9.0	39.7	2,320
P35-11	na	11/30/1998	7.8	--	1,790
P35-12	1	11/30/1998	9.8	16.5	1,460
P35-12	2	11/30/1998	--	--	1,490
P35-13	na	11/30/1998	9.5	7.1	1,410
P35-14	na	11/30/1998	7.7	10.7	883
P35-15	na	11/30/1998	10.7	8.9	1,350
P35-16	1	11/30/1998	11.8	8.7	1,330
P35-16	2	11/30/1998	--	--	1,350
P35-17	na	11/30/1998	12.5	9.3	1,230
P35-18	na	11/30/1998	11.3	10.1	1,410
P35-19	na	11/30/1998	14.2	10.1	1,570
P35-20	1	11/30/1998	9.5	12.7	1,440
P35-20	2	11/30/1998	--	--	1,450
P35-21	na	11/30/1998	11.6	12.3	1,280

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Second Sampling Period (February 1999)</b>					
P12-1	na	02/17/1999	0.20	17.4	1,870
P12-2	na	02/17/1999	.17	20.5	2,850
P12-3	na	02/17/1999	.45	24.1	4,320
P12-4	na	02/17/1999	.44	24.6	4,160
P12-5	na	02/17/1999	--	25.1	4,430
P12-6	na	02/17/1999	--	29.1	4,980
P12-7	1	02/17/1999	.38	28.2	6,140
P12-7	2	02/17/1999	--	--	6,220
P12-8	na	02/17/1999	--	25.8	6,990
P12-9	na	02/17/1999	.54	40.7	5,520
P12-10	na	02/17/1999	.53	41.4	7,200
P12-11	na	02/17/1999	.56	30.2	6,670
P12-12	na	02/17/1999	--	--	3,420
P12-13	na	02/17/1999		26.3	3,270
P12-14	1	02/17/1999	.88	26.2	4,057
P12-14	2	02/17/1999	--	--	3,970
P12-15	na	02/17/1999	.51	17.0	4,840
P12-16	na	02/17/1999	.56	12.7	4,390
P12-17	na	02/17/1999	.56	15.2	4,250
P12-18	1	02/17/1999	--	18.6	4,360
P12-18	2	02/17/1999	--	--	2,730
P12-19	na	02/17/1999	.37	18.5	5,000
P12-20	na	02/17/1999	.63	15.5	3,560
P12-21	na	02/17/1999	--	--	--
P19-1	na	02/17/1999	1.0	4.6	449

**Appendix C.** *Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>					
P19-2	na	02/17/1999	0.29	58.2	1,280
P19-3	na	02/17/1999	1.0	36.2	1,470
P19-4	na	02/17/1999	.71	1.6	1,700
P19-5	na	02/17/1999	--	36.0	1,520
P19-6	na	02/17/1999	.63	31.7	2,360
P19-7	na	02/17/1999	.78	28.8	2,650
P19-8	na	02/17/1999	--	--	2,720
P19-9	na	02/17/1999	--	55.6	2,910
P19-10	na	02/17/1999	.13	62.9	2,950
P19-11	1	02/17/1999	.38	74.5	3,350
P19-11	2	02/17/1999	--	--	3,320
P19-12	1	02/17/1999	.63	55.8	--
P19-12	2	02/17/1999	--	60.1	4,060
P19-13	na	02/17/1999	--	75.2	--
P19-14	1	02/17/1999	.50	73.0	5,820
P19-14	2	02/17/1999	--	--	5,820
P19-15	na	02/17/1999	.56	78.2	6,740
P19-16	na	02/17/1999	.63	88.1	8,020
P19-17	na	02/17/1999	1.3	78.0	8,970
P19-18	na	02/17/1999	--	73.7	9,750
P19-19	na	02/17/1999	.27	53.8	10,450
P19-20	na	02/17/1999	.11	68.6	10,950
P19-21	na	02/17/1999	--	51.6	10,740
P35-1	na	02/17/1999	--	<.5	<74
P35-2	na	02/17/1999	.06	5.1	433

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>					
P35-3	na	02/17/1999	0.28	29.4	1,050
P35-4	1	02/17/1999	.19	34.6	3,860
P35-4	2	02/17/1999	--	--	2,240
P35-5	na	02/17/1999	.14	47.1	7,300
P35-6	na	02/17/1999	--	48.9	6,590
P35-7	na	02/17/1999	.63	48.3	7,790
P35-8	1	02/17/1999	.27	40.4	20,040
P35-8	2	02/17/1999	--	--	7,460
P35-9	na	02/17/1999	.21	18.8	6,000
P35-10	na	02/17/1999	--	18.5	2,830
P35-11	na	02/17/1999	.36	25.5	1,540
P35-12	1	02/17/1999	.57	70.3	1,450
P35-12	2	02/17/1999	--	--	1,420
P35-13	na	02/17/1999	--	41.1	1,520
P35-14	na	02/17/1999	7.5	14.1	1,500
P35-15	na	02/17/1999	7.0	19.8	1,050
P35-16	1	02/17/1999	6.6	12.2	909
P35-16	2	02/17/1999	--	--	820
P35-17	na	02/17/1999	6.8	14.5	833
P35-18	na	02/17/1999	7.0	11.3	1,070
P35-19	na	02/17/1999	6.8	--	1,430
P35-20	na	02/17/1999	--	--	1,110
P35-21	1	02/17/1999	6.3	12.4	1,210
P35-21	2	02/17/1999	--	--	1,250
P36-1	na	02/17/1999	<.13	7.0	<74

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>					
P36-2	na	02/17/1999	0.08	6.8	525
P36-3	na	02/17/1999	.63	18.9	2,200
P36-4	na	02/17/1999	--	21.3	1,900
P36-5	na	02/17/1999	1.8	42.7	3,130
P36-6	na	02/17/1999	.54	51.4	4,910
P36-7	na	02/17/1999	--	68.3	4,870
P36-8	na	02/17/1999	1.0	64.0	5,120
P36-9	na	02/17/1999	.94	41.1	2,880
P36-10	na	02/17/1999	--	17.0	1,510
P36-11	na	02/17/1999	.79	22.4	1,570
P36-12	na	02/17/1999	1.1	18.0	1,540
P36-13	na	02/17/1999	.75	19.7	1,430
P36-14	na	02/17/1999	.91	21.6	1,030
P36-15	na	02/17/1999	1.1	28.6	836
P36-16	na	02/17/1999	.59	25.1	824
P36-17	na	02/17/1999	.88	26.3	815
P36-18	na	02/17/1999	.75	20.5	887
P36-19	na	02/17/1999	.73	--	1,050
P36-20	na	02/17/1999	.94	33.8	1,460
P36-21	na	02/17/1999	.63	30.2	1,790
<b>Third Sampling Period (May 1999)</b>					
P12-1	na	05/13/1999	.30	8.4	4,050
P12-2	na	05/13/1999	.38	4.4	4,030
P12-3	na	05/13/1999	.28	5.6	4,050
P12-4	na	05/13/1999	.44	5.4	4,300
P12-5	na	05/13/1999	.64	8.9	4,030

**Appendix C.** *Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>					
P12-6	na	05/13/1999	1.30	62.1	4,500
P12-7	na	05/13/1999	.89	16.4	6,050
P12-8	na	05/13/1999	--	<.5	--
P12-9	na	05/13/1999	.57	9.3	7,150
P12-10	na	05/13/1999	.79	13.9	6,230
P12-11	na	05/13/1999	.57	13.0	5,180
P12-12	na	05/13/1999	.36	13.1	5,000
P12-13	na	05/13/1999	.25	20.8	5,330
P12-14	na	05/13/1999	.30	23.1	4,980
P12-15	na	05/13/1999	.20	25.9	3,780
P12-16	na	05/13/1999	.46	30.3	4,700
P12-17	na	05/13/1999	.62	25.1	4,570
P12-18	na	05/13/1999	.50	25.8	5,210
P12-19	na	05/13/1999	.13	43.4	4,360
P12-20	1	05/13/1999	.60	51.0	531
P12-20	2	05/13/1999	--	--	4,700
P12-21	na	05/13/1999	.10	57.2	3,800
P19-1	na	05/13/1999	.33	37.2	11,430
P19-2	na	05/13/1999	.47	17.3	10,620
P19-3	na	05/13/1999	1.7	20.1	9,360
P19-4	na	05/13/1999	.43	20.8	8,980
P19-5	na	05/13/1999	.50	14.9	8,900
P19-6	na	05/13/1999	.80	15.0	7,250
P19-7	na	05/13/1999	.50	19.6	5,760
P19-8	na	05/13/1999	.38	--	12,320

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>					
P19-9	na	05/13/1999	0.40	17.4	6,800
P19-10	na	05/13/1999	.30	32.6	6,770
P19-11	na	05/13/1999	.25	47.1	6,890
P19-12	na	05/13/1999	.42	58.9	8,920
P19-13	na	05/13/1999	.30	60.1	9,380
P19-14	na	05/13/1999	.25	54.8	9,300
P19-15	na	05/13/1999	.20	57.0	10,300
P19-16	na	05/13/1999	.20	61.4	877
P19-17	na	05/13/1999	.20	80.0	13,500
P19-18	na	05/13/1999	.20	50.0	12,400
P19-19	na	05/13/1999	.25	56.2	14,500
P19-20	na	05/13/1999	.17	49.6	16,400
P19-21	na	05/13/1999	.19	--	18,300
P35-1	na	05/13/1999	.06	38.0	4,410
P35-2	na	05/13/1999	.26	22.0	--
P35-3	na	05/13/1999	.75	34.5	--
P35-4	na	05/13/1999	.76	64.0	9,400
P35-5	na	05/13/1999	.54	27.9	9,550
P35-6	na	05/13/1999	.88	21.0	4,470
P35-7	na	05/13/1999	3.30	23.2	4,200
P35-8	na	05/13/1999	--	3.4	2,360
P35-9	na	05/13/1999	>9.4	16.6	1,280
P35-10	na	05/13/1999	10.4	9.4	1,010
P35-11	na	05/13/1999	8.4	10.4	756
P35-12	na	05/13/1999	8.3	10.9	663

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>					
P35-13	na	05/13/1999	7.2	10.1	532
P35-14	na	05/13/1999	>9.4	8.4	771
P35-15	na	05/13/1999	9.0	9.1	723
P35-16	na	05/13/1999	9.2	9.9	559
P35-17	na	05/13/1999	9.8	8.6	496
P35-18	na	05/13/1999	8.8	10.3	596
P35-19	na	05/13/1999	11.0	10.9	1,010
P35-20	na	05/13/1999	9.6	15.0	--
P35-21	na	05/13/1999	9.1	11.9	439
P36-1	na	05/13/1999	.21	38.3	7,580
P36-2	na	05/13/1999	.50	35.9	5,390
P36-3	na	05/13/1999	.59	43.4	3,960
P36-4	na	05/13/1999	.56	31.3	2,840
P36-5	na	05/13/1999	.67	15.8	2,100
P36-6	na	05/13/1999	1.1	11.9	1,860
P36-7	na	05/13/1999	2.0	6.9	1,260
P36-8	na	05/13/1999	6.3	11.9	1,220
P36-9	na	05/13/1999	2.2	4.4	1,030
P36-10	na	05/13/1999	--	--	1,040
P36-11	na	05/13/1999	.53	12.6	849
P36-12	na	05/13/1999	1.8	7.6	912
P36-13	na	05/13/1999	2.3	8.4	979
P36-14	na	05/13/1999	2.1	10.2	1,700
P36-15	na	05/13/1999	2.3	9.5	1,270
P36-16	na	05/13/1999	2.3	8.2	2,130



**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

<b>Sample name</b>	<b>Replicate</b>	<b>Collection date</b>	<b>Sulfide (mg/L)</b>	<b>Iron, total (mg/L)</b>	<b>Methane (µg/L)</b>
<b>Third Sampling Period (May 1999)—Continued</b>					
P36-17	na	05/13/1999	2.3	8.0	2,810
P36-18	na	05/13/1999	1.6	12.3	4,460
P36-19	na	05/13/1999	1.5	26.7	4,250
P36-20	na	05/13/1999	1.5	27.0	3,690
P36-21	na	05/13/1999	1.5	31.2	4,550
<b>Fourth Sampling Period (August 1999)</b>					
P12-1	na	08/04/1999	<0.01	33.3	4,870
P12-2	na	08/04/1999	.13	32.9	6,000
P12-3	na	08/04/1999	<.01	25.1	4,400
P12-4	na	08/04/1999	<.01	30.3	5,050
P12-5	na	08/04/1999	<.01	42.4	7,770
P12-6	na	08/04/1999	.05	38.6	8,030
P12-7	na	08/04/1999	.10	52.3	8,030
P12-8	na	08/04/1999	.10	44.8	8,740
P12-9	na	08/04/1999	.14	38.0	10,600
P12-10	na	08/04/1999	.31	63.1	8,590
P12-11	na	08/04/1999	.25	48.8	13,400
P12-12	na	08/04/1999	.10	46.5	11,900
P12-13	na	08/04/1999	.13	40.3	10,600
P12-14	na	08/04/1999	.25	40.5	8,060
P12-15	na	08/04/1999	.18	42.6	8,000
P12-16	na	08/04/1999	.31	32.0	7,810
P12-17	na	08/04/1999	.13	27.8	7,610
P12-18	na	08/04/1999	.42	33.3	6,840
P12-19	na	08/04/1999	--	57.2	8,540
P12-20	na	08/04/1999	--	--	7,880

**Appendix C. Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued**

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>					
P12-21	na	08/04/1999	0.08	47.3	10,000
P19-1	na	08/04/1999	<.01	53.1	8,020
P19-2	na	08/04/1999	<.01	44.2	7,320
P19-3	na	08/04/1999	--	30.3	10,600
P19-4	na	08/04/1999	<.01	28.6	8,540
P19-5	na	08/04/1999	--	--	7,140
P19-6	na	08/04/1999	<.01	23.6	7,200
P19-7	na	08/04/1999	.01	19.5	8,090
P19-8	na	08/04/1999	<.01	27.1	8,890
P19-9	na	08/04/1999	.01	17.7	8,020
P19-10	na	08/04/1999	<.01	18.1	6,570
P19-11	na	08/04/1999	<.01	24.3	8,350
P19-12	na	08/04/1999	<.01	25.5	8,930
P19-13	na	08/04/1999	--	28.4	11,800
P19-14	na	08/04/1999	<.01	32.5	8,700
P19-15	na	08/04/1999	<.01	37.9	10,100
P19-16	na	08/04/1999	<.01	47.1	9,680
P19-17	na	08/04/1999	<.01	66.7	7,660
P19-18	na	08/04/1999	<.01	44.8	9,800
P19-19	na	08/04/1999	<.01	52.8	9,970
P19-20	na	08/04/1999	<.01	66.2	9,460
P19-21	na	08/04/1999	<.01	65.7	9,550
P35-1	na	08/04/1999	<.01	10.1	4,430
P35-2	na	08/04/1999	<.01	24.3	4,770
P35-3	na	08/04/1999	<.01	22.2	5,150

**Appendix C.** *Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Collection date	Sulfide (mg/L)	Iron, total (mg/L)	Methane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>					
P35-4	na	08/04/1999	<0.01	15.2	5,400
P35-5	na	08/04/1999	<.01	12.7	4,860
P35-6	na	08/04/1999	.10	7.8	5,670
P35-7	na	08/04/1999	.42	11.4	5,430
P35-8	na	08/04/1999	.28	9.9	1,900
P35-9	na	08/04/1999	.83	15.1	1,150
P35-10	na	08/04/1999	.73	7.3	6,920
P35-11	na	08/04/1999	1.6	10.0	5,230
P35-12	na	08/04/1999	1.1	9.5	2,520
P35-13	na	08/04/1999	1.4	7.2	722
P35-14	na	08/04/1999	2.0	9.1	803
P35-15	na	08/04/1999	.75	9.9	529
P35-16	na	08/04/1999	2.7	10.3	697
P35-17	na	08/04/1999	4.1	8.4	1,910
P35-18	na	08/04/1999	--	0.8	7,430
P35-19	na	08/04/1999	4.8	8.9	3,400
P35-20	na	08/04/1999	4.1	9.8	13,200
P35-21	na	08/04/1999	3.8	10.4	--
P36-1	na	08/04/1999	<.01	2.3	182
P36-2	na	08/04/1999	--	--	1,500
P36-3	na	08/04/1999	<.01	18.3	4,530
P36-4	na	08/04/1999	<.01	28.0	19,900
P36-5	na	08/04/1999	<.01	31.6	4,260
P36-6	na	08/04/1999	<.01	44.9	6,610
P36-7	na	08/04/1999	<.01	36.1	7,200

**Appendix C.** *Redox-sensitive constituents for porous-membrane sampling devices (peepers) in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

<b>Sample name</b>	<b>Replicate</b>	<b>Collection date</b>	<b>Sulfide (mg/L)</b>	<b>Iron, total (mg/L)</b>	<b>Methane (µg/L)</b>
<b>Fourth Sampling Period (August 1999)—Continued</b>					
P36-8	na	08/04/1999	--	--	8,540
P36-9	na	08/04/1999	<0.01	25.1	7,230
P36-10	na	08/04/1999	--	48.2	10,300
P36-11	na	08/04/1999	--	--	5,590
P36-12	na	08/04/1999	<.01	13.5	7,420
P36-13	na	08/04/1999	<.01	12.0	5,030
P36-14	na	08/04/1999	<.01	12.0	5,520
P36-15	na	08/04/1999	<.01	--	--
P36-16	na	08/04/1999	--	12.7	7,040
P36-17	na	08/04/1999	<.01	35.7	3,650
P36-18	na	08/04/1999	<.01	17.1	4,610
P36-19	na	08/04/1999	.83	20.1	7,210
P36-20	na	08/04/1999	<.01	17.3	10,300
P36-21	na	08/04/1999	--	17.2	4,750

**Appendix D. Inorganic ground-water constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999**

[mg/L, milligrams per liter; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter; E, estimated value; --, no data; <, less than]

Sample name	Date collected	pH, (water whole laboratory, standard units)	Calcium, (dissolved mg/L as Ca)	Magnesium, (dissolved mg/L as Mg)	Sodium, (dissolved mg/L as Na)	Potassium, (dissolved mg/L as K)	Chloride, (dissolved mg/L as Cl)	Sulfate, (dissolved mg/L as SO <sub>4</sub> )
<b>First Sampling Period (March 1999)</b>								
CC27A	03/12/1999	4.7	26	14	110	2.5	150	150
CC27A	03/12/1999	4.6	26	14	110	2.4	160	150
CC27B	03/12/1999	4.3	16	5.6	27	1.9	40	79
WB19B	03/02/1999	7.4	5.5	11	58	2.4	85	<.10
WB19E	03/01/1999	7.2	5.9	6.5	14	1.3	30	29
WB22D	03/05/1999	6.0	12	5.1	57	1.5	53	85
WB23D	03/08/1999	5.5	17	6.9	79	1.6	87	110
WB24B	03/03/1999	8.1	4.4	7.6	77	.36	98	4.9
WB24B	03/03/1999	8.2	4.4	7.7	77	.48	98	3.6
WB24E	03/13/1999	6.5	7.6	4.3	42	<.10	.31	.31
WB26A	03/02/1999	8.7	63	92	480	1.6	--	--
WB26C	03/02/1999	8.2	6.7	11	97	4.3	96	2
WB26D	03/02/1999	7.8	6.3	10	51	3.4	71	61
WB26E	03/02/1999	8.0	46	30	180	7.1	260	250
WB26F	03/02/1999	--	6.1	2.9	17.1	1.5	--	--
WB26F	03/02/1999	6.7	14	6.4	60	1.9	82	81
WB35A	03/13/1999	4.6	21	12	54	2.1	89	10
WB35C	03/10/1999	4.1	14	7.2	31	1.6	39	120
WB35E	03/10/1999	4.3	7.8	4.1	30	1.0	34	72
<b>Quality-Assurance Samples for First Sampling Period (March 1999)</b>								
WASH BLANK	03/05/1999	6.3	<.02	E.002	<.06	<.10	.1	<.10

Fluoride, (dissolved mg/L as F)	Silica, (dissolved mg/L as SiO <sub>2</sub> )	Iron, (dissolved µg/L as Fe)	Manganese, (dissolved µg/L as Mn)	Bromide, (dissolved mg/L as Br)	Specific conductance, laboratory (µS/cm)	Alkalinity, unfiltered TIT 4.5 laboratory (mg/L as CaCO <sub>3</sub> )	Sample name
<0.10	25	460	360	0.05	875	--	CC27A
.10	25	450	360	.04	883	--	CC27A
.14	14	35	680	.07	340	--	CC27B
<.10	41	8,400	450	.28	484	--	WB19B
<.10	7.7	<10	73	.06	188	--	WB19E
<.10	12	36	450	.08	407	--	WB22D
.15	11	<10	530	.13	562	--	WB23D
<.10	22	4,200	250	.12	365	--	WB24B
<.10	22	4,400	250	.10	499	--	WB24B
1.0	1.0	430	360	--	266	--	WB24E
3.0	1.0	4,800	1,800	--	3,210	--	WB26A
.16	34	420	320	.08	595	--	WB26C
.19	9.7	810	310	.08	158	--	WB26D
.19	18	120	2,600	.44	1,190	--	WB26E
--	10.4	1,494	320	--	--	--	WB26F
.11	12	160	520	.10	485	--	WB26F
1.0	31	2,300	1,400	.20	535	--	WB35A
<.10	30	10	520	.05	395	--	WB35C
<.10	19	E 6.9	320	.05	291	--	WB35E
<.10	<.05	<10	<3.0	<.01	2	--	WASH BLANK

**Appendix D. Inorganic ground-water constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, March through August 1999—Continued**

Sample name	Date collected	pH, (water whole laboratory, standard units)	Calcium, (dissolved mg/L as Ca)	Magnesium, (dissolved mg/L as Mg)	Sodium, (dissolved mg/L as Na)	Potassium, (dissolved mg/L as K)	Chloride, (dissolved mg/L as Cl)	Sulfate, (dissolved mg/L as SO <sub>4</sub> )
<b>Second Sampling Period (May -June 1999)</b>								
CC27A	06/01/1999	4.4	29	15	110	2.4	170	170
CC27A	06/01/1999	4.4	29	16	110	2.5	170	170
CC27B	06/01/1999	4.2	17	5.7	30	1.7	45	85
WB19B	05/20/1999	6.9	7.5	15	71	2.5	87	.15
WB19E	05/19/1999	5.0	5.7	6.3	15	1.5	31	28
WB22B	05/21/1999	--	2.7	7.2	52	1.3	--	--
WB22D	05/21/1999	5.2	12	5.3	56	1.4	60	91
WB23D	05/21/1999	5.3	15	6.4	71	1.6	88	100
WB24B	05/21/1999	6.5	4.4	7.4	80	.43	96	3.2
WB24B	05/21/1999	7.1	4.3	7.4	80	.43	95	3.2
WB24E	05/27/1999	5.8	7.3	3.9	35	1.1	38	54
WB26A	05/20/1999	7.8	41	65	400	1.8	450	.39
WB26B	05/20/1999	7.5	12	18	280	3.0	250	.98
WB26C	05/20/1999	6.9	6.6	11	107	3.8	101	3.0
WB26D	05/20/1999	7.2	12	21	110	5.1	120	10
WB26E	05/20/1999	6.8	26	14	95	3.0	130	150
WB26F	05/20/1999	5.1	15	6.5	63	2.0	81	85
WB35A	05/26/1999	4.9	18	10	51	2.1	82	96
WB35B	05/28/1999	3.7	17	8.6	32	1.8	43	120
WB35C	05/28/1999	4.0	14	7.0	31	1.6	40	110
WB35E	05/28/1999	4.3	7.3	3.8	30	.98	32	72
WB36B	05/26/1999	--	6.1	2.9	17	1.5	--	--
WB36C	05/26/1999	4.9	4.3	2.3	40	.78	50	38
<b>Third Sampling Period (August 1999)</b>								
WB35B	08/12/1999	4.1	15.8	8.0	32	1.8	40	120

Fluoride, (dissolved mg/L as F)	Silica, (dissolved mg/L as SiO <sub>2</sub> )	Iron, (dissolved µg/L as Fe)	Manganese, (dissolved µg/L as Mn)	Bromide, (dissolved mg/L as Br)	Specific conductance, laboratory (µS/cm)	Alkalinity, unfiltered TIT 4.5 laboratory (mg/L as CaCO <sub>3</sub> )	Sample name
<0.10	27	280	370	0.036	882	--	CC27A
.10	27	280	370	.042	886	--	CC27A
.20	14	9.4	720	.072	356	--	CC27B
<.10	58	15,600	750	.41	539	--	WB19B
<.10	7.7	<10	78	.071	196	4.1	WB19E
.10	9.9	8,500	440	.18	--	--	WB22B
<.10	11	74	450	.072	426	7.9	WB22D
.13	9.4	5.5	480	.12	557	--	WB23D
<.10	22	4,700	240	.11	490	--	WB24B
<.10	22	4,600	240	.11	490	--	WB24B
<.10	10	70	320	.062	290	--	WB24E
.13	42	4,400	1,200	1.1	2,350	--	WB26A
.21	54	1,800	520	.26	1,470	--	WB26B
.125	39	525	300	.079	665	--	WB26C
<.10	16	650	520	.12	807	--	WB26D
<.10	13	440	1600	.14	773	--	WB26E
<.10	12	21	550	.10	493	3.6	WB26F
.83	32	2,000	1,200	.16	488	--	WB35A
.82	28	2,600	890	.07	449	--	WB35B
.19	29	11	520	.054	392	--	WB35C
.10	18	5.8	300	.05	282	--	WB35E
--	10	1,500	320	--	--	--	WB36B
.10	10	45	260	.06	274	--	WB36C
.65	29	5,500	840	.03	453	--	WB35B



**Appendix E1. Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999**

[µg/L, micrograms per liter; na, not applicable; <, less than; -, -, no data; E, estimated value]

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>February - March 1999 Sampling Period (0.25-inch piezometers)</b>								
A06-300	na	02-19-1999	0.5	<0.5	<0.5	0.69	<0.5	<0.5
A07-037	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
B14-187	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
B14-337	na	02-19-1999	.5	<.5	<.5	.8	<.5	<.5
C07-007	na	02-19-1999	.5	<.5	<.5	<.5	4.9	5.3
C07-127	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
D07-105	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
D07-165	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
G14-225	na	02-18-1999	.5	1.3	<.5	<.5	<.5	<.5
G14-285	na	02-18-1999	.7	3.2	<.5	<.5	<.5	<.5
G18-180	na	02-18-1999	.5	130	4.6	<.5	<.5	<.5
H14-060	na	02-18-1999	.5	144	3.5	<.5	<.5	<.5
H14-300	na	02-18-1999	.5	114	2.9	<.5	<.5	<.5
E14-217	na	03-16-1999	.5	<.5	<.5	<.5	<.5	34.9
E14-277	na	03-16-1999	.5	<.5	<.5	<.5	<.5	23.6
F07-015	na	03-16-1999	.5	<.5	<.5	<.5	<.5	13.6
F07-157	na	03-16-1999	.5	1.2	<.5	<.5	<.5	<.5
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	1	03-12-1999	.5	E 2,850	16.3	<.5	<.5	<.5
CC27A	2	03-12-1999	.5	E 1,660	14.5	<.5	<.5	<.5
CC27A	3	03-12-1999	.5	E 2,050	19.4	<.5	<.5	<.5
CC27A	4	03-12-1999	.5	E 2,430	15.5	<.5	<.5	<.5
CC27A	5	03-12-1999	.5	<.5	<.5	<.5	<.5	<.5

Chlorinated Ethenes						
Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.5	<0.5	0.6	0.6	<0.5	<0.5	A06-300
<.5	<.5	1.3	1.7	<.5	<.5	A07-037
<.5	<.5	.8	.5	<.5	.5	B14-187
<.5	<.5	1.9	1.2	<.5	<.5	B14-337
<.5	<.5	24.0	21.1	<.5	9.3	C07-007
<.5	<.5	25.7	17.5	<.5	19.8	C07-127
<.5	<.5	33.6	39.2	<.5	33.6	D07-105
<.5	<.5	48.1	47.7	<.5	51.8	D07-165
<.5	5.4	57.7	125	<.5	19.2	G14-225
<.5	7.0	52.7	110	<.5	16.3	G14-285
1.8	13.5	29.0	54.4	<.5	4.0	G18-180
1.9	11.1	26.7	77.9	<.5	5.1	H14-060
1.9	10.8	38.4	72.7	<.5	5.4	H14-300
<.5	<.5	67.7	95.7	<.5	63.4	E14-217
<.5	<.5	45.8	71.8	<.5	44.4	E14-277
<.5	2.6	79.7	173	<.5	23.7	F07-015
<.5	2.2	71.1	157	<.5	24.9	F07-157
16.1	148	27.3	7.7	<.5	7.0	CC27A
7.7	120	24.8	7.2	<.5	3.5	CC27A
12.0	161	30.0	9.3	<.5	5.4	CC27A
15.0	161	35.9	10.2	<.5	6.9	CC27A
<.5	<.5	<.5	<.5	<.5	<.5	CC27A

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
CC27B	1	03-12-1999	0.5	32.8	0.8	1.8	<0.5	<0.5
CC27B	2	03-12-1999	.5	31.3	.9	2.6	<.5	<.5
WB19B	na	03-02-1999	.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	03-16-1999	.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	03-01-1999	.5	<.5	<.5	<.5	<.5	<.5
WB22B	na	03-05-1999	.5	14.9	4.6	2.1	<.5	<.5
WB22D	na	03-05-1999	.5	26.8	.9	1.5	<.5	<.5
WB22D	na	03-16-1999	.5	35.0	<.5	2.4	<.5	<.5
WB23B	na	03-05-1999	.5	<.5	<.5	<.5	<.5	<.5
WB23B	na	03-16-1999	.5	<.5	<.5	<.5	<.5	<.5
WB23C	na	03-03-1999	.5	.6	<.5	2.2	<.5	<.5
WB23D	1	03-08-1999	.5	183	<.5	5.6	<.5	<.5
WB23D	2	03-08-1999	.5	133	1.5	6.2	<.5	<.5
WB24A	na	03-05-1999	.5	1.9	7.8	<.5	<.5	<.5
WB24A	na	03-16-1999	.5	<.5	<.5	<.5	<.5	<.5
WB24B	na	03-03-1999	.5	2.0	.9	<.5	<.5	<.5
WB24E	na	03-13-1999	.5	18.5	.5	1.4	<.5	<.5
WB26A	na	03-02-1999	.5	1.8	3.4	<.5	<.5	<.5
WB26A	na	03-03-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26B	na	03-02-1999	.5	1.5	38.3	<.5	<.5	<.5
WB26C	na	03-02-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26D	na	03-02-1999	.5	<.5	<.5	1.3	<.5	<.5
WB26E	na	03-02-1999	.5	43.7	1.6	3.6	<.5	<.5
WB26E	na	03-16-1999	.5	70.2	.6	3.6	<.5	<.5
WB26F	na	03-02-1999	.5	50.3	1.6	3.9	<.5	<.5

Chlorinated Ethenes						
Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
0.6	36.5	<0.5	<0.5	<0.5	<0.5	CC27B
.9	14.5	.8	<.5	<.5	<.5	CC27B
<.5	14.0	<.5	<.5	<.5	<.5	WB19B
<.5	<.5	<.5	<.5	<.5	<.5	WB19E
<.5	15.4	<.5	<.5	<.5	<.5	WB19E
1.7	59.9	4.0	3.8	<.5	.6	WB22B
4.2	75.0	3.0	.7	<.5	<.5	WB22D
3.9	60.1	4.4	.7	<.5	<.5	WB22D
<.5	15.2	<.5	<.5	<.5	<.5	WB23B
<.5	<.5	<.5	<.5	<.5	<.5	WB23B
<.5	19.5	29.4	1.6	<.5	9.4	WB23C
4.6	58.9	3.1	.7	<.5	<.5	WB23D
4.9	95.1	2.8	.6	<.5	<.5	WB23D
<.5	1.1	<.5	<.5	<.5	<.5	WB24A
<.5	<.5	<.5	<.5	<.5	<.5	WB24A
<.5	1.0	4.1	<.5	<.5	10.0	WB24B
1.2	24.1	2.6	1.4	<.5	<.5	WB24E
<.5	.6	<.5	<.5	<.5	<.5	WB26A
<.5	15.5	<.5	<.5	<.5	<.5	WB26A
<.5	<.5	<.5	<.5	<.5	<.5	WB26B
<.5	11.5	2.0	.6	<.5	3.1	WB26C
<.5	17.8	15.4	1.2	1.0	11.6	WB26D
2.8	43.5	22.4	12.1	<.5	2.3	WB26E
3.6	30.8	23.7	13.0	<.5	6.2	WB26E
2.9	53.8	2.1	.7	<.5	<.5	WB26F

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
WB33A	na	03-13-1999	0.5	E 1,010	40.4	<0.5	<0.5	<0.5
WB33B	na	03-05-1999	.5	<.5	<.5	<.5	<.5	<.5
WB33B	na	03-09-1999	.5	264	3.5	<.5	<.5	<.5
WB33Y	na	03-08-1999	.5	E 767	16.8	<.5	<.5	<.5
WB33Z	na	03-08-1999	.5	E 512	41.5	<.5	<.5	<.5
WB34A	na	03-13-1999	.5	.9	22.0	.9	<.5	<.5
WB34B	na	03-11-1999	.5	252	2.0	<.5	<.5	<.5
WB35A	na	03-13-1999	.5	7.2	1.9	<.5	<.5	<.5
WB35B	na	03-11-1999	.5	3.0	5.0	1.0	<.5	<.5
WB35C	na	03-10-1999	.5	95.9	<.5	<.5	<.5	<.5
WB35E	na	03-10-1999	.5	84.0	1.1	<.5	<.5	<.5
WB36A	na	03-13-1999	.5	2.0	<.5	<.5	<.5	<.5
WB36B	na	03-12-1999	.5	31.9	<.5	<.5	<.5	<.5
WB36B	na	03-13-1999	.5	9.4	<.5	2.0	<.5	<.5
WB36C	na	03-11-1999	.5	41.4	1.6	<.5	<.5	<.5
<b>Quality-Assurance Samples for March 1999 (4-inch wells and 0.75-inch piezometers)</b>								
WASH BLANK	1	03-02-1999	.5	40.5	1.4	4.2	<.5	<.5
WASH BLANK	2	03-02-1999	.5	39.9	1.1	3.4	<.5	<.5
WASH BLANK	na	03-05-1999	.5	4.7	<.5	<.5	<.5	<.5
WASH BLANK	na	03-09-1999	.5	27.9	1.4	<.5	<.5	<.5
WASH BLANK	na	03-12-1999	.5	12.3	<.5	<.5	<.5	<.5
WASH BLANK	na	03-12-1999	2.5	34.6	<2.5	<2.5	<2.5	<2.5
WASH BLANK	na	03-16-1999	.5	5.0	<.5	<.5	<.5	<.5

Chlorinated Ethenes

Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
2.1	43.5	15.3	20.7	<0.5	4.8	WB33A
<.5	15.2	<.5	<.5	<.5	<.5	WB33B
1.3	12.3	2.4	.7	<.5	<.5	WB33B
4.4	54.2	34.1	112	<.5	3.6	WB33Y
2.6	30.3	56.2	101	<.5	3.1	WB33Z
<.5	<.5	7.2	.6	.6	24.8	WB34A
1.9	11.1	7.6	1.3	<.5	<.5	WB34B
<.5	7.9	<.5	35.2	<.5	16.0	WB35A
1.8	13.1	29.5	66.2	<.5	10.5	WB35B
.6	9.7	1.1	<.5	<.5	<.5	WB35C
.7	8.0	<.5	<.5	<.5	<.5	WB35E
<.5	3.6	3.1	7.4	<.5	2.3	WB36A
<.5	10.2	2.1	4.2	<.5	1.2	WB36B
<.5	6.3	4.0	<.5	<.5	.9	WB36B
.9	34.3	1.0	.6	<.5	<.5	WB36C
2.2	43.3	21.0	12.0	.8	2.5	WASH BLANK
2.3	57.3	18.6	10.4	<.5	1.9	WASH BLANK
<.5	6.4	.5	<.5	<.5	<.5	WASH BLANK
<.5	2.2	<.5	<.5	<.5	<.5	WASH BLANK
<.5	3.8	<.5	<.5	<.5	<.5	WASH BLANK
<2.5	14.6	<2.5	<2.5	<2.5	<2.5	WASH BLANK
<.5	7.1	.8	<.5	<.5	<.5	WASH BLANK

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>May 1999 Sampling Period (0.25-inch piezometers)</b>								
A00-300	na	05-05-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
A06-300	na	05-05-1999	.5	<.5	<.5	<.5	<.5	<.5
A07-142	na	05-05-1999	.5	<.5	<.5	<.5	<.5	<.5
B07-202	na	05-05-1999	.5	<.5	<.5	<.5	<.5	<.5
B07-352	na	05-05-1999	.5	<.5	<.5	<.5	<.5	<.5
C07-007	1	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
C07-007	2	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
C07-127	1	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
C07-127	2	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
D07-165	1	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
D07-165	2	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
D14-352	na	05-07-1999	.5	<.5	<.5	<.5	<.5	<.5
E07-120	na	05-07-1999	.5	<.5	<.5	<.5	<.5	<.5
E07-307	na	05-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F07-015	na	05-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F07-157	na	05-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G18-180	na	05-11-1999	2.0	122	3.2	<2.0	<2.0	<2.0
H07-150	na	05-12-1999	.5	75.6	<.5	<.5	<.5	<.5
H07-210	na	05-12-1999	.5	<.5	3.8	<.5	<.5	<.5
I07-112	na	05-13-1999	.5	162	6.0	<.5	<.5	<.5

Chlorinated Ethenes

Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	A00-300
<.5	<.5	<.5	<.5	<.5	<.5	A06-300
<.5	<.5	<.5	<.5	<.5	<.5	A07-142
<.5	<.5	<.5	<.5	<.5	2.4	B07-202
<.5	<.5	1.2	<.5	<.5	24.4	B07-352
<.5	<.5	24.9	22.1	<.5	87.9	C07-007
<.5	<.5	26.5	16.7	<.5	94.8	C07-007
<.5	<.5	28.0	13.5	<.5	68.7	C07-127
<.5	<.5	<.5	12.9	<.5	47.0	C07-127
<.5	<.5	40.9	32.6	<.5	92.6	D07-165
<.5	<.5	35.3	32.1	<.5	79.8	D07-165
<.5	<.5	7.2	2.3	<.5	56.2	D14-352
<.5	1.6	59.1	128	<.5	37.6	E07-120
<2.0	<2.0	43.9	76.9	<2.0	22.1	E07-307
<2.0	2.7	63.4	125	<2.0	19.0	F07-015
<2.0	2.6	56.6	130	<2.0	13.0	F07-157
<2.0	19.8	17.3	33.1	<2.0	4.2	G18-180
<.5	42.6	101	147	.5	11.6	H07-150
<.5	18.5	20.4	58.0	<.5	3.0	H07-210
1.4	48.9	4.1	5.4	<.5	.6	I07-112



**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Quality-Assurance Samples for May 1999 (0.25-inch piezometers)</b>								
WASH BLANK	na	05-05-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WASH BLANK	na	05-06-1999	.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	na	05-07-1999	.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	1	05-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	2	05-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	na	05-11-1999	.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	na	05-12-1999	.5	<.5	<.5	<.5	<.5	<.5
<b>May - June 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	1	06-01-1999	66.7	E 3,780	<66.7	<66.7	<66.7	<66.7
CC27A	2	06-01-1999	2.0	E 3,200	12.1	<2.0	<2.0	<2.0
CC27A	3	06-01-1999	2.0	E 3,160	12.0	<2.0	<2.0	<2.0
CC27B	na	06-01-1999	2.0	28.8	<2.0	<2.0	<2.0	<2.0
WB19B	na	05-19-1999	.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	05-19-1999	.5	<.5	<.5	<.5	<.5	<.5
WB22B	na	05-25-1999	.5	7.8	<.5	<.5	<.5	<.5
WB22D	na	05-21-1999	2.0	71.0	<2.0	<2.0	<2.0	<2.0
WB23B	na	05-21-1999	.5	<.5	<.5	<.5	<.5	<.5
WB23D	1	05-21-1999	.5	79.2	<.5	<.5	<.5	<.5
WB23D	2	05-21-1999	2.0	125	<2.0	6.3	<2.0	<2.0
WB23D	3	05-21-1999	2.0	182	<2.0	<2.0	<2.0	<2.0
WB24A	na	05-25-1999	2.0	<2.0	10.6	<2.0	<2.0	<2.0
WB24B	na	05-21-1999	.5	<.5	<.5	<.5	<.5	<.5
WB24E	1	05-26-1999	2.0	27.7	<2.0	<2.0	<2.0	<2.0

Chlorinated Ethenes

Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	WASH BLANK
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WASH BLANK
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<66.7	210	72.6	<66.7	<66.7	<66.7	CC27A
11.1	236	24.6	8.2	<2.0	4.7	CC27A
13.8	E 360	28.0	9.5	<2.0	6.4	CC27A
<2.0	14.5	<2.0	<2.0	<2.0	<2.0	CC27B
<.5	<.5	<.5	<.5	<.5	<.5	WB19B
<.5	<.5	<.5	<.5	<.5	<.5	WB19E
2.3	27.1	2.2	2.7	<.5	.7	WB22B
6.3	57.8	<2.0	<2.0	<2.0	<2.0	WB22D
<.5	1.0	<.5	<.5	<.5	<.5	WB23B
5.4	110	2.3	.5	<.5	<.5	WB23D
3.7	71.3	<2.0	<2.0	<2.0	<2.0	WB23D
3.3	79.8	<2.0	<2.0	<2.0	<2.0	WB23D
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WB24A
<.5	2.0	5.4	<.5	<.5	20.3	WB24B
2.2	44.6	3.6	<2.0	<2.0	<2.0	WB24E

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>May - June 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
WB24E	2	05-26-1999	2.0	26.8	<2.0	<2.0	<2.0	<2.0
WB26A	na	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26B	na	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26C	1	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26C	2	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26D	1	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26D	2	05-20-1999	.5	<.5	<.5	<.5	<.5	<.5
WB26E	1	05-20-1999	.5	46.6	2.1	2.9	<.5	<.5
WB26E	2	05-20-1999	2.0	88.2	<2.0	4.8	<2.0	<2.0
WB26F	na	05-20-1999	.5	44.3	1.7	2.8	<.5	<.5
WB33A	1	05-25-1999	2.0	E 475	10.5	<2.0	<2.0	<2.0
WB33A	2	05-25-1999	2.0	E 899	9.4	<2.0	<2.0	<2.0
WB33B	na	06-02-1999	2.0	E 467	3.2	<2.0	<2.0	<2.0
WB33Z	na	05-27-1999	2.0	E 1,360	9.6	<2.0	<2.0	<2.0
WB34A	na	05-25-1999	2.0	4.9	<2.0	<2.0	<2.0	<2.0
WB34A	na	05-26-1999	2.0	<2.0	13.0	<2.0	<2.0	<2.0
WB34B	na	05-27-1999	2.0	E 300	3.5	<2.0	<2.0	<2.0
WB35B	na	05-25-1999	2.0	6.2	4.8	<2.0	<2.0	<2.0
WB35E	1	05-28-1999	2.0	73.7	<2.0	<2.0	<2.0	<2.0
WB35E	2	05-28-1999	2.0	88.4	<2.0	<2.0	<2.0	<2.0
WB36B	1	05-26-1999	2.0	3.2	<2.0	<2.0	<2.0	<2.0
WB36B	2	05-26-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36B	3	05-26-1999	2.0	2.7	4.5	<2.0	<2.0	<2.0
WB36C	na	05-26-1999	4.0	16.3	<4.0	<4.0	<4.0	<4.0

Chlorinated Ethenes

Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
2.1	41.3	3.3	<2.0	<2.0	<2.0	WB24E
<.5	<.5	<.5	<.5	<.5	<.5	WB26A
<.5	<.5	<.5	<.5	<.5	<.5	WB26B
<.5	<.5	<.5	<.5	<.5	5.5	WB26C
<.5	<.5	1.8	<.5	<.5	3.3	WB26C
<.5	3.8	28.7	1.6	<.5	41.4	WB26D
<.5	4.2	40.7	1.3	2.2	27.0	WB26D
<.5	68.9	7.5	9.3	<.5	3.0	WB26E
2.8	41.4	10.2	10.7	<2.0	2.7	WB26E
<.5	77.1	2.2	.9	<.5	<.5	WB26F
<2.0	34.5	5.0	10.4	<2.0	<2.0	WB33A
3.1	39.8	8.7	13.1	<2.0	4.2	WB33A
<2.0	29.4	3.3	<2.0	<2.0	<2.0	WB33B
5.4	118	18.4	63.0	<2.0	3.2	WB33Z
<2.0	2.7	7.2	<2.0	<2.0	33.0	WB34A
<2.0	<2.0	5.2	<2.0	<2.0	29.7	WB34A
<2.0	25.5	8.5	2.3	<2.0	<2.0	WB34B
<2.0	9.3	32.6	60.0	<2.0	18.5	WB35B
<2.0	11.4	<2.0	<2.0	<2.0	<2.0	WB35E
<2.0	7.3	<2.0	<2.0	<2.0	<2.0	WB35E
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WB36B
<2.0	<2.0	5.3	8.3	<2.0	<2.0	WB36B
<2.0	9.0	22.0	51.1	<2.0	7.2	WB36B
<4.0	7.8	<4.0	<4.0	<4.0	<4.0	WB36C

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Quality-Assurance Sample for May - June 1999 (4-inch wells and 0.75-inch piezometers)</b>								
WASH BLANK	na	05-21-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
<b>July - August 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	na	07-30-1999	66.7	E 4,810	<66.7	<66.7	<66.7	<66.7
CC27B	na	07-30-1999	.5	35.8	<.5	3.0	<.5	<.5
WB19B	na	07-15-1999	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
WB19E	na	07-20-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB22B	na	07-26-1999	1.0	30.0	4.1	4.6	<1.0	<1.0
WB22D	na	07-29-1999	1.0	37.7	<1.0	<1.0	<1.0	<1.0
WB23B	na	07-29-1999	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WB24A	1	07-23-1999	.5	<.5	<.5	<.5	<.5	<.5
WB24A	2	07-23-1999	.5	<.5	<.5	<.5	<.5	<.5
WB24B	na	07-26-1999	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WB24E	na	07-27-1999	.5	23.5	<.5	2.1	<.5	<.5
WB26A	na	07-20-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26B	na	07-20-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26C	na	07-20-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26D	na	07-27-1999	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WB26D	na	08-27-1999	2.0	<2.0	<2.0	3.3	<2.0	<2.0
WB26E	na	07-29-1999	1.0	92.5	<1.0	<1.0	<1.0	<1.0
WB26F	1	07-23-1999	.5	17.3	2.0	3.7	<.5	<.5
WB26F	2	07-23-1999	.5	38.1	1.0	3.2	<.5	<.5
WB26F	na	07-27-1999	1.0	87.6	<1.0	<1.0	<1.0	<1.0

Chlorinated Ethenes						
Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WASH BLANK
<66.7	725	83.5	<66.7	<66.7	<66.7	CC27A
<.5	16.7	<.5	<.5	<.5	<.5	CC27B
<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	WB19B
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WB19E
4.2	74.2	3.8	7.3	<1.0	<1.0	WB22B
5.8	101	3.9	<1.0	<1.0	<1.0	WB22D
<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	WB23B
<.5	<.5	<.5	<.5	<.5	<.5	WB24A
<.5	<.5	<.5	<.5	<.5	<.5	WB24A
<1.0	<1.0	5.3	<1.0	<1.0	13.6	WB24B
3.5	63.3	2.8	<.5	<.5	<.5	WB24E
<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	WB26A
<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	WB26B
<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	WB26C
<1.0	14.0	45.8	2.4	1.9	10.8	WB26D
<2.0	10.1	45.3	2.5	2.1	8.4	WB26D
2.2	55.6	<1.0	7.8	<1.0	1.4	WB26E
<.5	51.4	2.0	.8	<.5	<.5	WB26F
1.7	29.4	1.6	.6	<.5	<.5	WB26F
5.4	99.7	<1.0	<1.0	<1.0	<1.0	WB26F

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>July - August 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
WB33B	na	08-05-1999	0.5	133	4.0	<0.5	<0.5	<0.5
WB33E	na	08-03-1999	2.0	98.4	<2.0	<2.0	<2.0	<2.0
WB33Z	1	08-05-1999	.5	E 1,170	20.2	<.5	<.5	<.5
WB33Z	2	08-05-1999	20.0	E 1,640	24.4	<20.0	<20.0	<20.0
WB34A	na	08-12-1999	2.0	6.5	4.8	<2.0	<2.0	<2.0
WB34B	na	08-05-1999	.5	230	4.5	<.5	<.5	<.5
WB35A	na	08-03-1999	.5	49.1	<.5	<.5	<.5	<.5
WB35B	na	08-12-1999	2.0	4.0	7.6	<2.0	<2.0	<2.0
WB35C	na	08-03-1999	.5	<.5	<.5	1.7	<.5	<.5
WB36A	na	08-05-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36B	na	08-05-1999	.5	<.5	<.5	3.1	<.5	<.5
WB36C	na	08-03-1999	.5	12.0	<.5	<.5	<.5	<.5
<b>Quality-Assurance Samples for July - August 1999 (4-inch wells and piezometers)</b>								
WASH BLANK	1	07-29-1999	.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	2	07-29-1999	.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	1	08-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	2	08-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
<b>September 1999 Sampling Period (0.25-inch piezometers)</b>								
A06-300	na	09-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
A07-247	na	09-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
B14-037	na	09-09-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
B14-337	na	09-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
C07-067	na	09-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Chlorinated Ethenes

Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
1.4	13.9	1.8	0.9	<0.5	<0.5	WB33B
<2.0	6.6	<2.0	<2.0	<2.0	<2.0	WB33E
7.3	127	15.9	34.8	<.5	1.4	WB33Z
<20.0	84.0	24.1	49.1	<20.0	<20.0	WB33Z
<2.0	<2.0	7.6	<2.0	<2.0	22.3	WB34A
2.0	18.0	7.6	2.2	<.5	<.5	WB34B
1.6	43.9	1.2	<.5	<.5	<.5	WB35A
<2.0	15.0	29.3	55.1	<2.0	7.7	WB35B
.8	15.7	40.1	69.3	<.5	18.6	WB35C
<2.0	7.4	5.3	16.3	<2.0	3.8	WB36A
<.5	7.3	2.8	16.5	<.5	.5	WB36B
<.5	5.1	<.5	<.5	<.5	<.5	WB36C
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<.5	<.5	<.5	<.5	<.5	<.5	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	A06-300
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	A07-247
<2.0	<2.0	<2.0	<2.0	<2.0	7.4	B14-037
<2.0	<2.0	<2.0	<2.0	<2.0	4.6	B14-337
<2.0	<2.0	26.0	2.9	<2.0	92.1	C07-067



**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>September 1999 Sampling Period (0.25-inch piezometers)—Continued</b>								
C07-262	na	09-13-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
D14-052	na	09-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
D14-247	na	09-10-1999	2.0	2.4	<2.0	<2.0	<2.0	<2.0
D24-045	na	09-03-1999	2.0	4.1	<2.0	<2.0	<2.0	<2.0
E07-000	na	09-10-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
E14-082	na	09-07-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
E14-315	na	09-08-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F14-135	na	09-07-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F14-210	na	09-07-1999	2.0	2.0	<2.0	<2.0	<2.0	<2.0
F14-292	na	09-07-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G14-022	na	09-07-1999	2.0	22.3	<2.0	<2.0	<2.0	<2.0
G14-225	na	09-03-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G14-330	na	09-03-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G18-180	na	09-02-1999	1.0	1.5	8.1	<1.0	<1.0	<1.0
H07-030	na	09-02-1999	1.0	69.4	4.7	<1.0	<1.0	<1.0
H07-090	na	09-02-1999	1.0	21.7	2.8	<1.0	<1.0	<1.0
H07-150	na	09-02-1999	1.0	141	6.5	<1.0	<1.0	<1.0
H07-210	na	09-02-1999	1.0	44.2	3.7	<1.0	<1.0	<1.0
H07-330	na	09-02-1999	4.0	35.1	<4.0	<4.0	<4.0	<4.0
H14-000	na	09-02-1999	4.0	85.1	<4.0	<4.0	<4.0	<4.0
H14-060	na	09-02-1999	1.0	138	5.4	<1.0	<1.0	<1.0
H14-120	na	09-02-1999	1.0	28.5	4.7	<1.0	<1.0	<1.0
H14-180	na	09-02-1999	1.0	145	8.2	<1.0	<1.0	<1.0
H14-240	na	09-02-1999	4.0	114	7.6	<4.0	<4.0	<4.0
H14-300	na	09-02-1999	1.0	52.8	4.5	<1.0	<1.0	<1.0

Chlorinated Ethenes						
Tetrachloroethene (µg/L)	Trichloroethene (µg/L)	<i>cis</i> -1,2- Dichloroethene (µg/L)	<i>trans</i> -1,2- Dichloroethene (µg/L)	1,1- Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<2.0	<2.0	7.4	<2.0	<2.0	34.9	C07-262
<2.0	<2.0	62.4	57.7	<2.0	111	D14-052
<2.0	<2.0	59.2	42.9	<2.0	97.9	D14-247
<2.0	9.9	49.2	126	<2.0	65.5	D24-045
<2.0	<2.0	80.5	140	<2.0	35.9	E07-000
<2.0	<2.0	86.9	175	<2.0	36.8	E14-082
<2.0	5.8	82.5	156	<2.0	49.8	E14-315
<2.0	14.1	67.2	192	<2.0	12.2	F14-135
<2.0	2.5	77.0	141	<2.0	25.9	F14-210
<2.0	3.0	94.0	164	<2.0	27.0	F14-292
<2.0	13.9	48.3	137	<2.0	11.3	G14-022
<2.0	9.6	54.3	121	<2.0	13.7	G14-225
2.2	17.8	55.5	179	<2.0	17.3	G14-330
2.3	79.7	31.1	68.9	<1.0	2.8	G18-180
2.0	21.4	43.6	125	<1.0	7.0	H07-030
2.5	26.7	42.1	141	<1.0	7.4	H07-090
2.0	19.5	35.4	87.0	<1.0	4.3	H07-150
2.1	18.0	31.4	105	<1.0	4.9	H07-210
<4.0	12.2	31.0	99.7	<4.0	7.3	H07-330
<4.0	31.6	35.8	78.4	<4.0	5.3	H14-000
2.6	21.9	23.8	92.0	<1.0	3.1	H14-060
1.7	17.3	40.3	121	<1.0	5.7	H14-120
1.5	17.7	28.8	40.9	<1.0	1.7	H14-180
<4.0	18.1	32.0	90.9	<4.0	5.6	H14-240
2.0	17.3	38.2	106	<1.0	5.3	H14-300

**Appendix E1. Organic constituents for wells and piezometers in the  
West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland,  
February through September 1999—Continued**

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	1,1-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>September 1999 Sampling Period (0.25-inch piezometers)—Continued</b>								
I07-112	na	09-03-1999	2.0	236	5.4	<2.0	<2.0	<2.0
I06-285	na	09-07-1999	2.0	211	4.8	<2.0	<2.0	<2.0
J06-000	na	09-03-1999	2.0	E 616	6.1	<2.0	<2.0	<2.0
J07-187	na	09-03-1999	2.0	262	6.6	<2.0	<2.0	<2.0
<b>Quality-Assurance Sample for September 1999 (0.25-inch piezometer)</b>								
WASH BLANK	na	09-02-1999	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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**Chlorinated Ethenes**

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<b>Tetrachloroethene (µg/L)</b>	<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2- Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2- Dichloroethene (µg/L)</b>	<b>1,1- Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<2.0	22.5	6.3	2.9	<2.0	<2.0	I07-112
<2.0	11.9	11.9	19.7	<2.0	<2.0	I07-285
3.2	12.1	5.7	6.1	<2.0	<2.0	J06-000
<2.0	42.8	3.2	<2.0	<2.0	<2.0	J07-187
<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	WASH BLANK

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**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>February - March 1999 Sampling Period (0.25-inch piezometers)</b>								
A06-300	na	02-19-1999	0.5	<0.5	<0.5	0.69	<0.5	<0.5
A07-037	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
B14-187	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
B14-337	na	02-19-1999	.5	<.5	<.5	.8	<.5	<.5
C07-007	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
C07-127	na	02-19-1999	.5	<.5	<.5	<.5	<.5	<.5
D07-105	na	02-19-1999	<.5	<.5	<.5	<.5	<.5	<.5
D07-165	na	02-19-1999	<.5	<.5	<.5	<.5	<.5	<.5
G14-225	na	02-18-1999	<.5	<.5	<.5	<.5	<.5	<.5
G14-285	na	02-18-1999	<.5	<.5	<.5	<.5	<.5	<.5
G18-180	na	02-18-1999	<.5	<.5	<.5	.7	<.5	<.5
H14-060	na	02-18-1999	<.5	<.5	<.5	<.5	<.5	<.5
H14-300	na	02-18-1999	<.5	<.5	<.5	<.5	<.5	<.5
E14-217	na	03-16-1999	<.5	<.5	<.5	<.5	<.5	<.5
E14-277	na	03-16-1999	<.5	<.5	<.5	<.5	<.5	<.5
F07-015	na	03-16-1999	<.5	<.5	<.5	1.2	<.5	<.5
F07-157	na	03-16-1999	<.5	<.5	<.5	<.5	<.5	<.5
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	1	03-12-1999	<.5	1.0	<.5	.8	<.5	<.5
CC27A	2	03-12-1999	<.5	<.5	<.5	<.5	<.5	<.5
CC27A	3	03-12-1999	1.8	1.2	<.5	<.5	<.5	<.5
CC27A	4	03-12-1999	1.2	1.2	<.5	<.5	<.5	<.5
CC27A	5	03-12-1999	<.5	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
0.7	<0.5	0.5	<0.5	<0.5	29.0	29.8	25.2	A06-300
.5	<.5	.7	<.5	<.5	28.7	31.4	25.9	A07-037
.9	<.5	.7	<.5	<.5	23.3	32.4	30.6	B14-187
<.5	<.5	1.4	2.5	<.5	29.2	32.0	29.5	B14-337
.8	<.5	.8	<.5	<.5	28.6	31.8	28.8	C07-007
.8	<.5	.8	<.5	<.5	27.4	31.6	32.0	C07-127
.6	<.5	<.5	<.5	<.5	29.5	29.2	28.3	D07-105
.5	<.5	<.5	<.5	<.5	31.3	30.9	27.0	D07-165
1.0	<.5	<.5	<.5	<.5	31.3	31.9	30.9	G14-225
1.5	<.5	<.5	<.5	<.5	28.1	31.6	32.2	G14-285
.9	<.5	<.5	<.5	<.5	29.2	29.4	31.7	G18-180
1.5	.9	<.5	<.5	<.5	30.4	30.6	41.7	H14-060
1.2	<.5	<.5	<.5	<.5	28.6	31.6	42.7	H14-300
1.6	<.5	<.5	<.5	<.5	29.4	32.1	35.1	E14-217
1.8	<.5	<.5	<.5	<.5	27.3	35.8	39.7	E14-277
1.3	<.5	<.5	<.5	.6	27.0	38.9	38.9	F07-015
1.3	<.5	<.5	<.5	<.5	32.0	25.4	37.7	F07-157
.9	<.5	<.5	<.5	<.5	21.0	31.5	285	CC27A
<.5	<.5	<.5	<.5	<.5	21.4	26.8	144	CC27A
.5	<.5	<.5	<.5	<.5	23.2	30.6	209	CC27A
1.2	<.5	<.5	<.5	<.5	26.4	31.8	252	CC27A
<.5	<.5	<.5	<.5	<.5	16.5	22.1	21.5	CC27A

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
CC27B	1	03-12-1999	14.7	29.0	<0.5	<0.5	<0.5	<0.5
CC27B	2	03-12-1999	15.4	35.3	.8	1.0	<.5	<.5
WB19B	na	03-02-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	03-16-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	03-01-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB22B	na	03-05-1999	<.5	4.8	<.5	<.5	<.5	<.5
WB22D	na	03-05-1999	15.5	63.0	.6	<.5	<.5	<.5
WB22D	na	03-16-1999	17.3	69.1	.6	<.5	<.5	<.5
WB23B	na	03-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB23B	na	03-16-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB23C	na	03-03-1999	<.5	1.0	<.5	<.5	<.5	<.5
WB23D	1	03-08-1999	85.1	213	.9	<.5	<.5	<.5
WB23D	2	03-08-1999	132	242	.7	.6	<.5	.7
WB24A	na	03-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB24A	na	03-16-1999	<.5	<.5	<.5	.8	<.5	<.5
WB24B	na	03-03-1999	<.5	<.5	.6	<.5	<.5	<.5
WB24E	na	03-13-1999	7.1	32.7	.8	<.5	<.5	<.5
WB26A	na	03-02-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26A	na	03-03-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26B	na	03-02-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26C	na	03-02-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26D	na	03-02-1999	<.5	<.5	<.5	<.5	2.5	<.5
WB26E	na	03-02-1999	25.6	72.3	<.5	<.5	<.5	<.5
WB26E	na	03-16-1999	16.4	71.1	1.6	<.5	<.5	<.5
WB26F	na	03-02-1999	67.9	137	.6	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	26.2	24.1	21.7	CC27B
1.0	<.5	<.5	<.5	<.5	30.8	30.7	30.6	CC27B
.5	<.5	<.5	<.5	<.5	27.7	26.4	25.7	WB19B
2.8	<.5	<.5	<.5	<.5	31.6	40.6	41.7	WB19E
.6	<.5	<.5	<.5	<.5	29.6	26.8	22.9	WB19E
<.5	<.5	<.5	<.5	<.5	26.3	26.5	20.3	WB22B
<.5	<.5	<.5	<.5	<.5	30.1	29.3	28.9	WB22D
1.1	2.4	<.5	<.5	<.5	35.0	31.4	31.0	WB22D
.5	<.5	<.5	<.5	<.5	29.7	28.1	25.1	WB23B
2.5	<.5	<.5	<.5	<.5	22.9	40.9	42.1	WB23B
1.1	<.5	<.5	<.5	<.5	25.5	30.4	30.3	WB23C
1.2	<.5	<.5	<.5	<.5	28.3	39.4	54.3	WB23D
.7	<.5	<.5	<.5	<.5	30.8	27.6	29.9	WB23D
.7	<.5	<.5	<.5	.6	31.2	28.5	26.2	WB24A
2.6	<.5	<.5	<.5	<.5	30.6	36.9	43.3	WB24A
.6	<.5	<.5	<.5	<.5	26.7	28.3	23.1	WB24B
.7	<.5	<.5	<.5	<.5	29.7	31.6	30.2	WB24E
.6	<.5	<.5	<.5	<.5	27.6	31.5	29.7	WB26A
<.5	<.5	<.5	<.5	<.5	28.3	26.5	25.8	WB26A
<.5	<.5	<.5	<.5	.5	26.4	28.6	29.5	WB26B
1.4	<.5	<.5	<.5	<.5	28.0	30.3	26.7	WB26C
1.1	<.5	<.5	<.5	<.5	25.8	30.2	25.5	WB26D
.5	<.5	<.5	<.5	<.5	29.3	25.4	27.0	WB26E
2.1	2.2	<.5	<.5	<.5	31.6	42.6	49.9	WB26E
.7	<.5	<.5	<.5	<.5	29.0	26.9	27.0	WB26F



**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>March 1999 Sampling Period (4-inch wells and 0.75-inch piezometers) -- Continued</b>								
WB33A	na	03-13-1999	<0.5	1.6	<0.5	<0.5	<0.5	<0.5
WB33B	na	03-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB33B	na	03-09-1999	3.3	5.6	<.5	<.5	<.5	<.5
WB33Y	na	03-08-1999	<.5	1.5	<.5	<.5	<.5	<.5
WB33Z	na	03-08-1999	<.5	1.0	<.5	<.5	<.5	<.5
WB34A	na	03-13-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB34B	na	03-11-1999	2.3	7.4	<.5	<.5	<.5	<.5
WB35A	na	03-13-1999	<.5	<.5	<.5	1.1	<.5	<.5
WB35B	na	03-11-1999	<.5	1.3	<.5	<.5	<.5	<.5
WB35C	na	03-10-1999	5.3	16.9	<.5	<.5	<.5	<.5
WB35E	na	03-10-1999	4.6	12.2	<.5	<.5	<.5	<.5
WB36A	na	03-13-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB36B	na	03-12-1999	<.5	<.5	<.5	.7	<.5	<.5
WB36B	na	03-13-1999	<.5	<.5	<.5	.5	<.5	<.5
WB36C	na	03-11-1999	6.0	25.3	<.5	<.5	<.5	<.5
<b>Quality-Assurance Samples for March 1999 (4-inch wells and 0.75-inch piezometers)</b>								
WASH BLANK	1	03-02-1999	27.9	68.0	.5	<.5	<.5	<.5
WASH BLANK	2	03-02-1999	28.0	63.9	<.5	<.5	<.5	<.5
WASH BLANK	na	03-05-1999	2.0	5.6	<.5	<.5	<.5	<.5
WASH BLANK	na	03-09-1999	1.2	1.4	<.5	<.5	<.5	<.5
WASH BLANK	na	03-12-1999	<.5	6.6	<.5	<.5	<.5	<.5
WASH BLANK	na	03-12-1999	14.0	30.3	3.0	<2.5	<2.5	<2.5
WASH BLANK	na	03-16-1999	2.2	7.4	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	28.7	30.9	101	WB33A
.5	<.5	<.5	<.5	<.5	29.7	28.1	25.1	WB33B
<.5	<.5	<.5	<.5	<.5	28.5	27.5	40.5	WB33B
<.5	<.5	<.5	<.5	<.5	27.4	28.4	74.1	WB33Y
.5	<.5	<.5	<.5	<.5	27.4	29.9	53.7	WB33Z
<.5	<.5	<.5	<.5	<.5	30.8	29.3	31.9	WB34A
.5	<.5	<.5	<.5	<.5	24.4	31.3	50.4	WB34B
1.4	<.5	<.5	<.5	<.5	30.6	41.8	58.5	WB35A
1.0	<.5	<.5	<.5	<.5	30.2	31.4	30.9	WB35B
<.5	<.5	<.5	<.5	<.5	29.8	27.8	30.6	WB35C
<.5	<.5	<.5	<.5	<.5	26.4	29.0	30.0	WB35E
1.1	<.5	<.5	<.5	<.5	31.8	31.0	29.6	WB36A
.9	<.5	<.5	<.5	<.5	26.2	44.6	52.5	WB36B
.9	<.5	<.5	<.5	<.5	30.6	30.7	29.8	WB36B
1.1	<.5	<.5	<.5	<.5	28.7	28.0	28.3	WB36C
1.1	<.5	<.5	<.5	<.5	25.6	26.4	26.6	WASH BLANK
<.5	<.5	<.5	<.5	<.5	27.2	26.1	27.3	WASH BLANK
.8	<.5	<.5	<.5	<.5	26.6	28.9	26.2	WASH BLANK
<.5	<.5	<.5	<.5	<.5	25.4	31.2	28.7	WASH BLANK
1.0	<.5	<.5	<.5	<.5	30.1	39.2	62.0	WASH BLANK
<2.5	<2.5	<2.5	<2.5	<2.5	29.2	31.4	30.4	WASH BLANK
2.8	<.5	<.5	<.5	<.5	36.3	34.7	34.5	WASH BLANK

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>May 1999 Sampling Period (0.25-inch piezometers)</b>								
A00-300	na	05-05-1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
A06-300	na	05-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
A07-142	na	05-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
B07-202	na	05-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
B07-352	na	05-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
C07-007	1	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
C07-007	2	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
C07-127	1	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
C07-127	2	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
D07-165	1	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
D07-165	2	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
D14-352	na	05-07-1999	<.5	<.5	<.5	<.5	<.5	<.5
E07-120	na	05-07-1999	<.5	<.5	<.5	<.5	<.5	<.5
E07-307	na	05-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F07-015	na	05-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F07-157	na	05-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G18-180	na	05-11-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
H07-150	na	05-12-1999	<.5	<.5	<.5	9.3	<.5	<.5
H07-210	na	05-12-1999	<.5	<.5	<.5	<.5	<.5	<.5
I07-112	na	05-13-1999	<.5	<.5	<.5	.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
0.8	<0.5	<0.5	<0.5	<0.5	24.9	27.8	25.7	A00-300
<.5	<.5	<.5	<.5	<.5	23.8	27.2	29.3	A06-300
<.5	<.5	<.5	<.5	.5	25.7	27.2	29.4	A07-142
<.5	<.5	<.5	<.5	.6	26.0	27.3	27.8	B07-202
<.5	<.5	<.5	<.5	<.5	20.7	43.6	51.2	B07-352
<.5	<.5	<.5	<.5	<.5	29.6	29.1	29.5	C07-007
<.5	<.5	<.5	<.5	<.5	26.0	35.9	41.7	C07-007
<.5	<.5	<.5	<.5	<.5	28.0	27.7	26.5	C07-127
<.5	<.5	<.5	<.5	<.5	23.8	26.9	25.9	C07-127
<.5	<.5	<.5	<.5	<.5	29.3	31.6	30.5	D07-165
<.5	<.5	<.5	<.5	<.5	25.3	31.3	36.6	D07-165
<.5	<.5	<.5	2.3	<.5	26.2	31.2	38.3	D14-352
<.5	<.5	<.5	<.5	<.5	25.9	29.2	29.0	E07-120
<2.0	<2.0	<2.0	<2.0	<2.0	24.0	26.6	22.6	E07-307
<2.0	<2.0	<2.0	<2.0	<2.0	27.4	27.7	31.3	F07-015
<2.0	<2.0	<2.0	<2.0	<2.0	25.6	25.2	21.6	F07-157
<2.0	<2.0	<2.0	<2.0	<2.0	24.0	29.5	26.9	G18-180
4.3	<.5	<.5	<.5	1.4	66.8	35.6	78.8	H07-150
<.5	<.5	<.5	<.5	<.5	19.8	27.2	27.3	H07-210
<.5	<.5	<.5	<.5	<.5	20.7	31.2	44.2	I07-112

**Appendix E1. Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued**

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>Quality-Assurance Samples for May 1999 (0.25-inch piezometers)</b>								
WASH BLANK	na	05-05-1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WASH BLANK	na	05-06-1999	<.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	na	05-07-1999	<.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	1	05-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	2	05-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	na	05-11-1999	<.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	na	05-12-1999	<.5	<.5	<.5	<.5	<.5	<.5
<b>May - June 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	1	06-01-1999	<66.7	<66.7	<66.7	<66.7	<66.7	<66.7
CC27A	2	06-01-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
CC27A	3	06-01-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
CC27B	na	06-01-1999	14.0	30.0	<2.0	<2.0	<2.0	<2.0
WB19B	na	05-19-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB19E	na	05-19-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB22B	na	05-25-1999	<.5	10.3	<.5	<.5	<.5	<.5
WB22D	na	05-21-1999	13.7	87.3	<2.0	<2.0	<2.0	<2.0
WB23B	na	05-21-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB23D	1	05-21-1999	152	179	.5	<.5	<.5	<.5
WB23D	2	05-21-1999	128	181	<2.0	<2.0	<2.0	<2.0
WB23D	3	05-21-1999	156	193	<2.0	<2.0	<2.0	<2.0
WB24A	na	05-25-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB24B	na	05-21-1999	<.5	<.5	<.5	<.5	1.5	<.5
WB24E	1	05-26-1999	8.8	42.5	<2.0	<2.0	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	24.2	28.9	28.4	WASH BLANK
1.5	<.5	<.5	<.5	<.5	22.8	30.6	29.1	WASH BLANK
<.5	<.5	<.5	<.5	<.5	24.1	29.6	24.1	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	24.3	25.1	21.8	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	22.7	30.2	28.4	WASH BLANK
<.5	<.5	<.5	<.5	<.5	21.4	30.9	37.2	WASH BLANK
<.5	<.5	<.5	<.5	<.5	21.5	36.5	47.4	WASH BLANK
<66.7	<66.7	<66.7	<66.7	<66.7	29.6	30.0	30.4	CC27A
<2.0	<2.0	<2.0	<2.0	<2.0	19.8	20.1	21.1	CC27A
<2.0	<2.0	<2.0	<2.0	<2.0	20.3	21.2	23.2	CC27A
<2.0	<2.0	<2.0	<2.0	<2.0	26.4	24.3	24.0	CC27B
1.0	<.5	<.5	<.5	<.5	22.1	34.5	34.2	WB19B
1.0	<.5	<.5	<.5	<.5	18.9	31.4	30.7	WB19E
<.5	<.5	<.5	<.5	<.5	25.7	26.4	26.3	WB22B
2.7	<2.0	<2.0	<2.0	<2.0	30.5	30.7	35.7	WB22D
.6	<.5	<.5	<.5	<.5	19.8	28.0	21.1	WB23B
<.5	<.5	<.5	<.5	<.5	21.8	25.5	27.4	WB23D
<2.0	<2.0	<2.0	<2.0	<2.0	22.1	24.4	21.8	WB23D
<2.0	<2.0	<2.0	<2.0	<2.0	25.3	21.2	20.0	WB23D
<2.0	<2.0	<2.0	<2.0	<2.0	24.6	25.0	22.0	WB24A
.5	<.5	<.5	<.5	<.5	19.8	28.9	25.0	WB24B
<2.0	<2.0	<2.0	<2.0	<2.0	27.2	21.4	23.6	WB24E

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>May - June 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
WB24E	2	05-26-1999	8.1	42.7	<2.0	<2.0	<2.0	<2.0
WB26A	na	05-20-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26B	na	05-20-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26C	1	05-20-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB26C	2	05-20-1999	<.5	<.5	<.5	<.5	.8	<.5
WB26D	1	05-20-1999	<.5	<.5	<.5	<.5	2.5	<.5
WB26D	2	05-20-1999	<.5	<.5	<.5	<.5	3.4	<.5
WB26E	1	05-20-1999	57.9	113	1.6	<.5	<.5	<.5
WB26E	2	05-20-1999	50.5	164	<2.00	<2.00	<2.0	<2.00
WB26F	na	05-20-1999	80.4	111	.7	<.5	<.5	<.5
WB33A	1	05-25-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB33A	2	05-25-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB33B	na	06-02-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB33Z	na	05-27-1999	<2.0	2.0	<2.0	<2.0	<2.0	<2.0
WB34A	na	05-25-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB34A	na	05-26-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB34B	na	05-27-1999	2.3	7.6	<2.0	<2.0	<2.0	<2.0
WB35B	na	05-25-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB35E	1	05-28-1999	4.3	10.8	<2.0	<2.0	<2.0	<2.0
WB35E	2	05-28-1999	5.2	11.4	<2.0	<2.0	<2.0	<2.0
WB36B	1	05-26-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36B	2	05-26-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36B	3	05-26-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36C	na	05-26-1999	<4.0	20.6	<4.0	<4.0	<4.0	<4.0

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	<2.0	28.3	23.8	26.1	WB24E
.5	<.5	<.5	<.5	<.5	20.6	26.3	24.8	WB26A
<.5	<.5	<.5	<.5	<.5	21.1	27.4	25.4	WB26B
1.3	<.5	<.5	<.5	<.5	18.7	38.8	44.2	WB26C
.6	<.5	<.5	<.5	<.5	22.6	23.1	21.3	WB26C
1.1	<.5	<.5	<.5	<.5	18.7	43.6	63.5	WB26D
<.5	<.5	<.5	<.5	<.5	23.2	25.1	29.6	WB26D
<.5	<.5	<.5	<.5	<.5	19.0	24.7	27.3	WB26E
<2.0	<2.0	<2.00	<2.0	<2.00	26.5	23.2	21.5	WB26E
.5	<.5	<.5	<.5	<.5	19.9	24.5	26.5	WB26F
<2.0	<2.0	<2.0	<2.0	<2.0	24.2	25.6	21.7	WB33A
<2.0	<2.0	<2.0	<2.0	<2.0	26.1	31.7	34.8	WB33A
<2.0	<2.0	<2.0	<2.0	<2.0	23.6	24.2	23.2	WB33B
<2.0	<2.0	<2.0	<2.0	<2.0	21.5	23.6	22.1	WB33Z
2.4	<2.0	<2.0	<2.0	<2.0	28.0	24.6	27.7	WB34A
<2.0	<2.0	<2.0	<2.0	<2.0	24.8	23.1	27.6	WB34A
<2.0	<2.0	<2.0	<2.0	<2.0	23.7	25.7	22.2	WB34B
3.0	<2.0	<2.0	<2.0	<2.0	31.3	31.0	45.9	WB35B
<2.0	<2.0	<2.0	<2.0	<2.0	26.9	22.5	21.4	WB35E
<2.0	<2.0	<2.0	<2.0	<2.0	24.1	22.5	21.2	WB35E
<2.0	<2.0	<2.0	<2.0	<2.0	25.7	24.5	23.9	WB36B
3.6	<2.0	<2.0	<2.0	<2.0	21.3	40.9	74.1	WB36B
<2.0	<2.0	<2.0	<2.0	<2.0	25.6	20.8	20.0	WB36B
<4.0	<4.0	<4.0	<4.0	<4.0	26.5	23.0	23.2	WB36C



**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>Quality-Assurance Sample for May - June 1999 (4-inch wells and 0.75-inch piezometers)</b>								
WASH BLANK	1	05-21-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
<b>July - August 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)</b>								
CC27A	na	07-30-1999	<66.7	<66.7	<66.7	<66.7	<66.7	<66.7
CC27B	na	07-30-1999	16.7	32.4	<5	<5	<5	<5
WB19B	na	07-15-1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
WB19E	na	07-20-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB22B	na	07-26-1999	2.9	17.5	<1.0	<1.0	<1.0	<1.0
WB22D	na	07-29-1999	27.8	70.7	<1.0	<1.0	<1.0	<1.0
WB23B	na	07-29-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WB24A	1	07-23-1999	<5	<5	<5	<5	<5	<5
WB24A	2	07-23-1999	<5	<5	<5	<5	<5	<5
WB24B	na	07-26-1999	<1.0	<1.0	<1.0	<1.0	1.8	<1.0
WB24E	na	07-27-1999	14.0	40.5	<5	<5	<5	<5
WB26A	na	07-20-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26B	na	07-20-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26C	na	07-20-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
WB26D	na	07-27-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
WB26D	na	08-27-1999	<2.0	<2.0	<2.0	<2.0	3.2	<2.0
WB26E	na	07-29-1999	70.1	139	<1.0	<1.0	<1.0	<1.0
WB26F	1	07-23-1999	47.9	76.1	<5	<5	<5	<5
WB26F	2	07-23-1999	34.8	67.6	<5	<5	<5	<5
WB26F	na	07-27-1999	110	138	<1.0	<1.0	<1.0	<1.0

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	<2.0	23.8	28.7	24.4	WASH BLANK
<66.7	<66.7	<66.7	<66.7	<66.7	27.1	31.0	31.6	CC27A
<.5	<.5	<.5	<.5	<.5	25.7	22.6	20.7	CC27B
<5.0	<5.0	<5.0	<5.0	<5.0	27.1	23.1	26.8	WB1B
<2.0	<2.0	<2.0	<2.0	<2.0	31.2	25.6	26.7	WB19E
<1.0	<1.0	<1.0	<1.0	<1.0	25.4	23.2	21.4	WB22B
<1.0	<1.0	<1.0	<1.0	<1.0	27.0	26.1	24.1	WB22D
<1.0	<1.0	<1.0	<1.0	<1.0	27.0	23.5	20.9	WB23B
<.5	<.5	<.5	<.5	<.5	24.4	23.7	18.7	WB24A
<.5	<.5	<.5	<.5	<.5	24.9	23.7	17.3	WB24A
<1.0	<1.0	<1.0	<1.0	<1.0	24.5	22.0	20.8	WB24B
<.5	<.5	<.5	<.5	<.5	24.5	22.6	20.1	WB24E
<4.0	<4.0	<4.0	<4.0	<4.0	27.6	30.2	26.3	WB26A
<4.0	<4.0	<4.0	<4.0	<4.0	28.1	31.0	27.9	WB26B
<4.0	<4.0	<4.0	<4.0	<4.0	23.9	30.3	29.6	WB26C
<1.0	<1.0	<1.0	<1.0	<1.0	25.3	22.2	19.9	WB26D
<2.0	<2.0	<2.0	<2.0	<2.0	26.7	27.9	26.7	WB26D
<1.0	<1.0	<1.0	<1.0	<1.0	24.3	22.5	22.5	WB26E
<.5	<.5	<.5	<.5	<.5	21.9	25.0	20.2	WB26F
<.5	<.5	<.5	<.5	<.5	25.0	24.1	21.6	WB26F
<1.0	<1.0	<1.0	<1.0	<1.0	25.0	22.9	23.3	WB26F

**Appendix E1. Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued**

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>July - August 1999 Sampling Period (4-inch wells and 0.75-inch piezometers)—Continued</b>								
WB33B	na	08-05-1999	6.9	1.7	<0.5	<0.5	<0.5	<0.5
WB33E	na	08-03-1999	4.2	14.1	<2.0	<2.0	<2.0	<2.0
WB33Z	1	08-05-1999	<.5	2.2	<.5	<.5	<.5	<.5
WB33Z	2	08-05-1999	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
WB34A	na	08-12-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB34B	na	08-05-1999	3.9	8.8	<.5	<.5	<.5	<.5
WB35A	na	08-03-1999	11.3	14.6	<.5	<.5	<.5	<.5
WB35B	na	08-12-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB35C	na	08-03-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB36A	na	08-05-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WB36B	na	08-05-1999	<.5	<.5	<.5	<.5	<.5	<.5
WB36C	na	08-03-1999	8.0	22.7	<.5	<.5	<.5	<.5
<b>Quality-Assurance Samples for July - August 1999 (4-inch wells and piezometers)</b>								
WASH BLANK	1	07-29-1999	<.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	2	07-29-1999	<.5	<.5	<.5	<.5	<.5	<.5
WASH BLANK	1	08-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
WASH BLANK	2	08-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
<b>September 1999 Sampling Period (0.25-inch piezometers)</b>								
A06-300	na	09-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
A07-247	na	09-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
B14-037	na	09-09-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
B14-337	na	09-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
C07-067	na	09-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	24.3	25.8	27.3	WB33B
<2.0	<2.0	<2.0	<2.0	<2.0	27.7	29.0	35.0	WB33E
<.5	<.5	<.5	<.5	<.5	23.7	24.9	108	WB33Z
<20.0	<20.0	<20.0	<20.0	<20.0	25.6	26.2	30.8	WB33Z
<2.0	<2.0	<2.0	<2.0	<2.0	26.3	24.5	21.3	WB34A
.7	<.5	<.5	<.5	<.5	25.2	25.8	30.5	WB34B
<.5	<.5	<.5	<.5	<.5	24.0	23.8	20.3	WB35A
<2.0	<2.0	<2.0	<2.0	<2.0	25.1	22.2	20.0	WB35B
<.5	<.5	20.5	<.5	<.5	25.2	26.8	30.9	WB35C
<2.0	<2.0	<2.0	<2.0	<2.0	25.9	27.8	23.2	WB36A
<.5	<.5	<.5	<.5	<.5	20.3	29.9	20.5	WB36B
<.5	<.5	<.5	<.5	<.5	23.6	26.3	19.0	WB36C
.5	<.5	<.5	<.5	<.5	18.7	23.8	19.5	WASH BLANK
<.5	<.5	<.5	<.5	<.5	25.8	23.4	19.4	WASH BLANK
<2.0	<2.0	<2.0	<2.0	2.2	25.2	22.5	21.1	WASH BLANK
<2.0	<2.0	<2.0	<2.0	<2.0	25.4	26.7	19.4	WASH BLANK
<2.0	<2.0	<2.0	<2.0	2.2	23.2	24.3	21.3	A06-300
<2.0	<2.0	<2.0	<2.0	3.2	29.2	26.0	24.9	A07-247
<2.0	<2.0	<2.0	<2.0	2.3	23.5	26.6	27.3	B14-037
<2.0	<2.0	<2.0	<2.0	2.6	24.7	27.9	28.0	B14-337
<2.0	<2.0	<2.0	<2.0	2.0	25.9	25.7	26.2	C07-067

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>September 1999 Sampling Period (0.25-inch piezometers)—Continued</b>								
C07-262	na	09-13-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
D14-052	na	09-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
D14-247	na	09-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
D24-045	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
E07-000	na	09-10-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
E14-082	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
E14-315	na	09-08-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F14-135	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F14-210	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
F14-292	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G14-022	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G14-225	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G14-330	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
G18-180	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H07-030	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H07-090	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H07-150	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H07-210	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H07-330	na	09-02-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
H14-000	na	09-02-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
H14-060	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H14-120	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H14-180	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
H14-240	na	09-02-1999	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
H14-300	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Organic Compounds				Surrogate Standards				Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	3.0	29.2	23.2	21.2	C07-262
<2.0	<2.0	<2.0	<2.0	2.8	30.5	24.6	22.6	D14-052
<2.0	<2.0	<2.0	<2.0	3.4	30.2	30.0	28.4	D14-247
<2.0	<2.0	<2.0	<2.0	<2.0	29.3	31.2	29.7	D24-045
<2.0	<2.0	<2.0	<2.0	2.2	31.9	23.2	22.9	E07-000
<2.0	<2.0	<2.0	<2.0	2.4	28.5	22.8	19.9	E14-082
<2.0	<2.0	<2.0	<2.0	2.3	29.0	26.5	29.1	E14-315
<2.0	<2.0	<2.0	<2.0	2.3	31.0	28.4	27.5	F14-135
<2.0	<2.0	<2.0	<2.0	2.7	30.8	25.2	21.3	F14-210
<2.0	<2.0	<2.0	<2.0	2.1	29.4	31.7	25.8	F14-292
<2.0	<2.0	<2.0	<2.0	2.9	30.5	29.5	27.1	G14-022
<2.0	<2.0	<2.0	<2.0	3.0	30.1	30.4	26.9	G14-225
<2.0	<2.0	<2.0	<2.0	<2.0	29.1	26.2	25.3	G14-330
<1.0	<1.0	<1.0	<1.0	1.6	17.7	26.6	20.4	G18-180
<1.0	<1.0	<1.0	<1.0	2.2	30.0	25.0	25.8	H07-030
<1.0	<1.0	<1.0	<1.0	1.9	28.4	25.7	22.0	H07-090
<1.0	<1.0	<1.0	<1.0	1.6	29.8	25.9	29.5	H07-150
<1.0	<1.0	<1.0	<1.0	1.6	28.8	24.6	22.0	H07-210
<4.0	<4.0	<4.0	<4.0	6.1	30.7	26.6	25.0	H07-330
<4.0	<4.0	<4.0	<4.0	6.7	28.3	23.5	26.4	H14-000
<1.0	<1.0	<1.0	<1.0	1.5	28.8	26.3	28.9	H14-060
<1.0	<1.0	<1.0	<1.0	1.1	29.7	27.4	26.6	H14-120
<1.0	<1.0	<1.0	<1.0	1.5	29.2	16.3	29.0	H14-180
<4.0	<4.0	<4.0	<4.0	5.6	29.0	26.6	29.0	H14-240
<1.0	<1.0	<1.0	<1.0	1.8	28.0	22.5	23.0	H14-300

**Appendix E1.** *Organic constituents for wells and piezometers in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through September 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes				Additional Volatile	
			Carbon tetrachloride (µg/L)	Chloroform (µg/L)	Methylene chloride (µg/L)	Chloro-methane (µg/L)	Benzene (µg/L)	Bromo-dichloro-methane (µg/L)
<b>September 1999 Sampling Period (0.25-inch piezometers)—Continued</b>								
107-112	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
107-285	na	09-07-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
J06-000	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
J07-187	na	09-03-1999	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
<b>Quality-Assurance Sample for September 1999 (0.25-inch piezometer)</b>								
WASH BLANK	na	09-02-1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Organic Compounds					Surrogate Standards			Sample name
Bromo-methane (µg/L)	Dibromo-chloro-methane (µg/L)	Dichloro-difluoro-methane (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	<2.0	25.0	25.3	31.8	I07-112
<2.0	<2.0	<2.0	<2.0	<2.0	25.1	28.2	31.5	I07-285
<2.0	<2.0	<2.0	<2.0	2.1	27.9	30.8	64.5	J06-000
<2.0	<2.0	<2.0	<2.0	<2.0	22.9	25.7	31.9	J07-187
<1.0	<1.0	<1.0	<1.0	1.3	28.8	29.0	22.1	WASH BLANK



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999*

[µg/L, micrograms per liter; na, not applicable; <, less than; --, no data]

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>First Sampling Period (November 1998)</b>								
P12-1	na	11-30-1998	0.5	<0.5	<0.5	1.0	<0.5	<0.5
P12-4	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-5	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-9	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-10	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-16	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-17	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-18	na	11-30-1998	.5	<.5	.5	<.5	<.5	<.5
P12-19	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-20	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P12-21	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-1	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-2	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-3	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-4	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-5	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-6	na	11-30-1998	.5	<.5	<.5	.5	<.5	<.5
P19-7	na	11-30-1998	.5	<.5	.6	<.5	<.5	<.5
P19-8	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-9	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-10	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-11	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-12	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<.5	<.5	<.5	<.5	<.5	P12-1
<.5	<.5	<.5	<.5	<.5	P12-4
<.5	<.5	<.5	<.5	<.5	P12-5
<.5	<.5	<.5	<.5	<.5	P12-9
<.5	<.5	<.5	<.5	<.5	P12-10
<.5	<.5	<.5	<.5	<.5	P12-16
<.5	<.5	<.5	<.5	1.7	P12-17
<.5	1.8	<.5	<.5	11.8	P12-18
<.5	5.6	<.5	<.5	30.4	P12-19
<.5	9.5	.5	<.5	46.9	P12-20
<.5	17.1	1.3	<.5	60.7	P12-21
<.5	<.5	<.5	<.5	<.5	P19-1
<.5	<.5	<.5	<.5	<.5	P19-2
<.5	<.5	<.5	<.5	<.5	P19-3
<.5	<.5	<.5	<.5	<.5	P19-4
<.5	<.5	<.5	<.5	<.5	P19-5
<.5	<.5	<.5	<.5	<.5	P19-6
<.5	<.5	<.5	<.5	<.5	P19-7
<.5	<.5	<.5	<.5	<.5	P19-8
<.5	<.5	<.5	<.5	<.5	P19-9
<.5	<.5	<.5	<.5	<.5	P19-10
<.5	<.5	<.5	<.5	<.5	P19-11
<.5	<.5	<.5	<.5	<.5	P19-12

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>								
P19-13	na	11-30-1998	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P19-14	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-15	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-16	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-17	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P19-18	na	11-30-1998	.5	<.5	<.5	.6	<.5	<.5
P19-19	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-1	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-2	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-3	na	11-30-1998	.5	<.5	<.5	.5	<.5	<.5
P35-4	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-5	na	11-30-1998	.5	<.5	<.5	.6	<.5	<.5
P35-6	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-7	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-8	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-9	na	11-30-1998	.5	<.5	<.5	.6	<.5	<.5
P35-10	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-11	na	11-30-1998	.5	<.5	<.5	<.5	1.0	<.5
P35-12	na	11-30-1998	.5	<.5	<.5	<.5	1.2	<.5
P35-13	1	11-30-1998	.5	<.5	<.5	<.5	.9	<.5
P35-13	2	11-30-1998	.5	<.5	<.5	<.5	.6	<.5
P35-14	na	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-15	na	11-30-1998	.5	.5	<.5	<.5	.6	<.5
P35-16	na	11-30-1998	.5	<.5	<.5	.5	<.5	<.5

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<0.5	<0.5	<0.5	<0.5	<0.5	P19-13
<.5	<.5	<.5	<.5	<.5	P19-14
<.5	<.5	<.5	<.5	<.5	P19-15
<.5	<.5	<.5	<.5	<.5	P19-16
<.5	<.5	<.5	<.5	<.5	P19-17
<.5	<.5	<.5	<.5	<.5	P19-18
<.5	<.5	<.5	<.5	<.5	P19-19
<.5	<.5	<.5	<.5	<.5	P35-1
<.5	1.1	1.0	<.5	1.2	P35-2
<.5	1.7	.8	<.5	4.5	P35-3
<.5	2.6	.9	<.5	9.1	P35-4
<.5	4.0	1.7	<.5	18.5	P35-5
<.5	4.4	4.2	<.5	22.4	P35-6
1.2	7.0	20.4	<.5	16.4	P35-7
1.0	6.6	22.6	<.5	11.1	P35-8
1.2	6.4	25.4	<.5	12.1	P35-9
1.2	7.0	26.8	<.5	9.2	P35-10
1.8	8.4	34.9	<.5	7.9	P35-11
2.2	12.9	48.5	<.5	12.9	P35-12
1.0	7.2	30.8	<.5	8.0	P35-13
.9	6.3	27.3	<.5	5.1	P35-13
1.1	6.6	28.1	<.5	6.3	P35-14
1.4	6.9	32.1	<.5	6.3	P35-15
1.4	6.7	33.8	<.5	5.4	P35-16

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>								
P35-17	na	11-30-1998	0.5	<0.5	<0.5	0.7	<0.5	0.6
P35-18	1	11-30-1998	.5	<.5	<.5	<.5	<.5	<.5
P35-18	2	11-30-1998	.5	<.5	<.5	<.5	1.1	<.5
P35-19	na	11-30-1998	.5	<.5	<.5	.9	.5	<.5
P35-20	na	11-30-1998	.5	<.5	<.5	1.7	.8	<.5
P35-21	na	11-30-1998	.5	.8	<.5	1.1	.5	<.5
<b>Second Sampling Period (February 1999)</b>								
P12-1	na	02-17-1999	.5	<.5	<.5	1.0	<.5	<.5
P12-2	na	02-17-1999	.5	<.5	<.5	<.5	1.2	<.5
P12-3	na	02-17-1999	.5	<.5	<.5	1.1	<.5	<.5
P12-4	na	02-17-1999	.5	<.5	<.5	.7	.7	<.5
P12-5	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-6	na	02-17-1999	.5	<.5	<.5	.8	<.5	<.5
P12-7	na	02-17-1999	.5	<.5	<.5	.8	<.5	<.5
P12-8	na	02-17-1999	.5	<.5	<.5	1.2	<.5	<.5
P12-9	na	02-17-1999	.5	<.5	<.5	.7	.6	<.5
P12-10	1	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-10	2	02-17-1999	.5	--	--	--	--	--
P12-11	na	02-17-1999	.5	<.5	<.5	1.1	<.5	<.5
P12-12	1	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-12	2	02-17-1999	.5	<.5	<.5	<.5	1.1	1.1
P12-13	na	02-17-1999	.5	<.5	<.5	1.3	<.5	<.5
P12-14	1	02-17-1999	.5	<.5	<.5	1.6	<.5	<.5
P12-14	2	02-17-1999	.5	<.5	<.5	<.5	1.3	8.0

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
1.4	6.8	32.3	<0.5	5.8	P35-17
1.8	6.6	33.6	<.5	4.9	P35-18
1.4	6.7	31.0	<.5	4.8	P35-18
1.5	5.9	35.3	<.5	5.2	P35-19
1.8	6.6	37.6	<.5	6.4	P35-20
1.7	6.5	36.0	<.5	3.9	P35-21
5.0	<.5	<.5	<.5	<.5	P12-1
<.5	<.5	<.5	<.5	<.5	P12-2
5.6	<.5	<.5	<.5	<.5	P12-3
<.5	<.5	<.5	<.5	1.6	P12-4
<.5	<.5	<.5	<.5	.9	P12-5
5.0	<.5	<.5	<.5	.8	P12-6
5.2	<.5	<.5	<.5	.6	P12-7
<.5	<.5	<.5	<.5	<.5	P12-8
<.5	<.5	<.5	<.5	<.5	P12-9
3.4	<.50	<.50	<.50	<.50	P12-10
--	--	--	--	--	P12-10
5.0	<.5	<.5	<.5	1.1	P12-11
<.5	<.5	<.5	<.5	10.9	P12-12
<.5	.6	<.5	<.5	1.5	P12-12
<.5	1.8	<.5	<.5	13.2	P12-13
4.7	11.9	.6	<.5	38.9	P12-14
<.5	2.8	<.5	<.5	15.2	P12-14

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>								
P12-15	na	02-17-1999	0.5	<0.5	<0.5	0.9	1.2	9.9
P12-16	na	02-17-1999	.5	<.5	<.5	<.5	1.2	12.9
P12-17	na	02-17-1999	.5	<.5	<.5	<.5	1.2	15.4
P12-18	na	02-17-1999	.5	<.5	<.5	<.5	1.2	17.8
P12-19	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-20	na	02-17-1999	.5	<.5	<.5	<.5	1.4	24.5
P12-21	na	02-17-1999	.5	<.5	<.5	2.3	1.4	<.5
P19-1	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-3	na	02-17-1999	1.0	--	<1.0	<1.0	<1.0	<1.0
P19-4	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-5	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-6	na	02-17-1999	.5	--	<.5	<.5	<.5	<.5
P19-7	na	02-17-1999	.5	--	<.5	<.5	<.5	<.5
P19-8	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-10	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-11	na	02-17-1999	.5	<.5	.7	<.5	<.5	<.5
P19-12	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-13	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-14	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-15	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-16	na	02-17-1999	.5	<.5	1.2	<.5	<.5	<.5
P19-17	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-1	na	02-17-1999	.5	<.5	<.5	<.5	1.2	<.5
P35-2	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<0.5	3.1	<0.5	<0.5	18.9	P12-15
<.5	5.1	<.5	<.5	23.9	P12-16
<.5	5.6	<.5	<.5	29.0	P12-17
<.5	9.1	.7	<.5	32.9	P12-18
<.5	10.8	<.5	<.5	<.5	P12-19
<.5	14.4	.6	<.5	46.2	P12-20
<.5	23.0	1.2	<.5	65.5	P12-21
<.5	<.5	<.5	<.5	<.5	P19-1
<1.0	<1.0	<1.0	<1.0	<1.0	P19-3
<.5	<.5	<.5	<.5	<.5	P19-4
<.5	<.5	<.5	<.5	<.5	P19-5
<.5	<.5	<.5	<.5	<.5	P19-6
<.5	<.5	<.5	<.5	<.5	P19-7
<.5	<.5	<.5	<.5	<.5	P19-8
<.5	<.5	<.5	<.5	<.5	P19-10
<.5	<.5	<.5	<.5	<.5	P19-11
<.5	<.5	<.5	<.5	<.5	P19-12
<.5	<.5	<.5	<.5	<.5	P19-13
<.5	<.5	<.5	<.5	<.5	P19-14
<.5	<.5	<.5	<.5	<.5	P19-15
<.5	<.5	<.5	<.5	<.5	P19-16
<.5	<.5	<.5	<.5	<.5	P19-17
<.5	<.5	<.5	<.5	<.5	P35-1
<.5	1.1	.6	<.5	.6	P35-2



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>								
P35-3	na	02-17-1999	0.7	<0.7	<0.7	<0.7	<0.7	<0.7
P35-5	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-6	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-9	na	02-17-1999	.5	<.5	<.5	1.1	<.5	<.5
P35-10	na	02-17-1999	.5	<.5	<.5	<.5	.7	<.5
P35-11	na	02-17-1999	.5	<.5	<.5	.7	<.5	<.5
P35-13	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-14	na	02-17-1999	.5	<.5	<.5	.6	1.2	3.7
P35-15	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-16	na	02-17-1999	.5	<.5	<.5	<.5	<.5	4.8
P35-17	na	02-17-1999	.5	<.5	<.5	<.5	.5	<.5
P35-18	na	02-17-1999	.5	<.5	<.5	<.5	<.5	6.4
P35-19	na	02-17-1999	.5	<.5	<.5	<.5	<.5	1.0
P35-20	na	02-17-1999	.5	<.5	<.5	<.5	.5	<.5
P35-21	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-1	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-2	1	02-17-1999	.5	<.5	<.5	<.5	1.2	<.5
P36-2	2	02-17-1999	.5	<.5	<.5	<.5	.5	<.5
P36-3	1	02-17-1999	.5	--	<.5	<.5	1.1	<.5
P36-3	2	02-17-1999	.5	<.5	<.5	<.5	.6	<.5
P36-4	na	02-17-1999	.5	<.5	<.5	1.5	<.5	<.5
P36-5	1	02-17-1999	.5	<.5	<.5	1.3	<.5	<.5
P36-5	2	02-17-1999	.5	<.5	<.5	.7	.8	<.5
P36-6	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5

Chlorinated Ethenes

Trichloroethene (µg/L)	<i>cis</i> -1,2-Dichloroethene (µg/L)	<i>trans</i> -1,2-Dichloroethene (µg/L)	1,1-Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.7	1.4	0.9	<0.7	4.1	P35-3
<.5	<.5	<.5	<.5	.9	P35-5
<.5	<.5	<.5	<.5	<.5	P35-6
<.5	2.4	2.8	<.5	13.2	P35-9
<.5	3.7	7.7	<.5	13.6	P35-10
<.5	3.5	8.8	<.5	10.6	P35-11
.5	5.0	14.8	<.5	8.3	P35-13
.8	5.5	14.7	<.5	7.0	P35-14
.9	6.0	15.8	<.5	8.3	P35-15
<.5	6.5	15.3	<.5	9.6	P35-16
.9	6.8	16.6	<.5	7.6	P35-17
<.5	8.8	18.2	<.5	11.4	P35-18
<.5	2.8	3.4	<.5	<.5	P35-19
1.0	7.1	15.7	<.5	8.0	P35-20
1.0	5.2	11.7	<.5	14.1	P35-21
<.5	<.5	<.5	<.5	<.5	P36-1
<.5	.5	<.5	<.5	<.5	P36-2
<.5	<.5	<.5	<.5	.5	P36-2
<.5	.6	<.5	<.5	1.0	P36-3
<.5	.5	<.5	<.5	.8	P36-3
<.5	<.5	.5	<.5	1.1	P36-4
<.5	<.5	<.5	<.5	1.5	P36-5
<.5	<.5	<.5	<.5	1.1	P36-5
<.5	.6	.5	<.5	1.4	P36-6

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>								
P36-7	na	02-17-1999	0.5	<0.5	<0.5	1.9	<0.5	<0.5
P36-8	na	02-17-1999	.5	<.5	<.5	1.7	<.5	<.5
P36-9	na	02-17-1999	.5	<.5	<.5	1.8	<.5	<.5
P36-10	na	02-17-1999	.5	<.5	<.5	<.5	.6	<.5
P36-11	1	02-17-1999	.5	<.5	<.5	1.4	<.5	<.5
P36-11	2	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-12	1	02-17-1999	.5	<.5	<.5	1.4	<.5	<.5
P36-12	2	02-17-1999	.5	<.5	<.5	1.2	1.4	4.8
P36-13	na	02-17-1999	.5	<.5	<.5	1.7	<.5	<.5
P36-14	1	02-17-1999	.5	<.5	<.5	1.2	<.5	<.5
P36-14	2	02-17-1999	.5	<.5	<.5	<.5	.5	<.5
P36-15	na	02-17-1999	.5	--	<.5	<.5	.5	4.7
P36-16	1	02-17-1999	.5	<.5	<.5	1.3	<.5	<.5
P36-16	2	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-17	1	02-17-1999	.5	<.5	<.5	1.3	<.5	<.5
P36-17	2	02-17-1999	.5	<.5	<.5	<.5	.6	<.5
P36-18	na	02-17-1999	.5	<.5	<.5	<.5	1.2	2.7
P36-19	na	02-17-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-20	na	02-17-1999	.5	<.5	<.5	1.4	.5	<.5
P36-21	1	02-17-1999	.5	<.5	<.5	1.3	.5	<.5
P36-21	2	02-17-1999	.5	<.5	<.5	<.5	.5	<.5

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**Chlorinated Ethenes**

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<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<0.5	0.5	0.6	<0.5	1.8	P36-7
<.5	.5	.6	<.5	1.6	P36-8
<.5	1.8	1.9	<.5	7.6	P36-9
<.5	2.3	1.8	<.5	9.5	P36-10
<.5	.6	.6	<.5	2.2	P36-11
<.5	2.2	2.7	<.5	11.5	P36-11
<.5	2.1	3.0	<.5	8.2	P36-12
<.5	2.5	3.7	<.5	8.6	P36-12
<.5	2.4	4.8	<.5	8.0	P36-13
<.5	2.4	4.7	<.5	8.1	P36-14
<.5	2.7	4.5	<.5	10.9	P36-14
<.5	2.4	5.0	<.5	8.8	P36-15
<.5	2.2	4.6	<.5	7.8	P36-16
<.5	2.6	3.2	<.5	10.5	P36-16
<.5	2.6	4.1	<.5	8.8	P36-17
<.5	2.9	2.7	<.5	10.1	P36-17
<.5	2.6	2.0	2.4	5.4	P36-18
<.5	2.6	4.1	<.5	7.2	P36-19
<.5	2.9	4.3	<.5	7.6	P36-20
<.5	2.3	4.3	<.5	6.4	P36-21
<.5	3.1	3.6	<.5	10.3	P36-21

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Third Sampling Period (May 1999)</b>								
P12-1	na	05-13-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P12-2	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-3	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-4	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-5	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-5	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-6	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-7	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-9	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-10	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-11	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-12	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-13	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-14	na	05-13-1999	.5	<.5	<.5	.8	<.5	<.5
P12-15	1	05-13-1999	.5	<.5	<.5	.9	<.5	<.5
P12-15	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-16	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-17	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-18	na	05-13-1999	.5	<.5	<.5	.9	<.5	<.5
P12-19	1	05-13-1999	.5	<.5	<.5	2.0	<.5	<.5
P12-19	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-20	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-21	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-1	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<.5	<.5	<.5	<.5	<.5	P12-1
<.5	<.5	<.5	<.5	<.5	P12-2
<.5	<.5	<.5	<.5	<.5	P12-3
<.5	<.5	<.5	<.5	<.5	P12-4
<.5	<.5	<.5	<.5	1.0	P12-5
<.5	<.5	<.5	<.5	1.1	P12-5
<.5	<.5	<.5	<.5	1.6	P12-6
<.5	<.5	<.5	<.5	.7	P12-7
<.5	.6	<.5	<.5	1.5	P12-9
<.5	<.5	<.5	<.5	2.8	P12-10
<.5	2.4	.6	<.5	9.0	P12-11
<.5	3.8	<.5	<.5	29.5	P12-12
<.5	9.3	.7	<.5	34.5	P12-13
<.5	12.7	.9	<.5	55.3	P12-14
<.5	18.2	2.3	<.5	55.2	P12-15
<.5	10.1	<.5	<.5	39.0	P12-15
<.5	22.7	2.4	<.5	86.1	P12-16
<.5	16.8	1.4	<.5	56.0	P12-17
<.5	31.0	5.2	<.5	77.7	P12-18
<.5	23.2	7.9	<.5	94.2	P12-19
<.5	25.5	5.3	<.5	71.1	P12-19
<.5	32.1	13.4	<.5	76.1	P12-20
<.5	35.3	20.7	<.5	66.3	P12-21
<.5	<.5	<.5	<.5	<.5	P19-1

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>								
P19-2	na	05-13-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P19-3	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-4	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-4	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-5	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-6	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-7	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-8	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-9	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-10	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-11	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-12	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-13	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-14	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-15	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-16	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-17	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-18	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-19	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-20	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P19-21	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-1	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-2	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-4	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<0.5	<0.5	<0.5	<0.5	<0.5	P19-2
<.5	<.5	<.5	<.5	<.5	P19-3
<.5	<.5	<.5	<.5	<.5	P19-4
<.5	<.5	<.5	<.5	<.5	P19-4
<.5	<.5	<.5	<.5	<.5	P19-5
<.5	<.5	<.5	<.5	<.5	P19-6
<.5	<.5	<.5	<.5	<.5	P19-7
<.5	<.5	<.5	<.5	<.5	P19-8
<.5	<.5	<.5	<.5	<.5	P19-9
<.5	<.5	<.5	<.5	<.5	P19-10
<.5	<.5	<.5	<.5	<.5	P19-11
<.5	<.5	<.5	<.5	<.5	P19-12
<.5	<.5	<.5	<.5	<.5	P19-13
<.5	<.5	<.5	<.5	<.5	P19-14
<.5	<.5	<.5	<.5	<.5	P19-15
<.5	<.5	<.5	<.5	<.5	P19-16
<.5	<.5	<.5	<.5	<.5	P19-17
<.5	<.5	<.5	<.5	<.5	P19-18
<.5	<.5	<.5	<.5	<.5	P19-19
<.5	<.5	<.5	<.5	<.5	P19-20
<.5	<.5	<.5	<.5	<.5	P19-21
<.5	<.5	<.5	<.5	<.5	P35-1
<.5	<.5	<.5	<.5	1.2	P35-2
<.5	<.5	<.5	<.5	1.9	P35-4



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>								
P35-5	na	05-13-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P35-6	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-7	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-8	na	05-13-1999	.5	<.5	<.5	<.5	.8	<.5
P35-9	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-9	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-10	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-11	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-12	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-13	na	05-13-1999	.5	<.5	<.5	1.6	<.5	<.5
P35-14	na	05-13-1999	.5	<.5	<.5	2.0	<.5	<.5
P35-15	na	05-13-1999	.5	<.5	<.5	1.1	<.5	<.5
P35-16	na	05-13-1999	.5	<.5	<.5	2.7	<.5	<.5
P35-17	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-17	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-18	na	05-13-1999	.5	<.5	<.5	1.3	<.5	<.5
P35-19	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P35-20	na	05-13-1999	.5	1.1	<.5	3.3	<.5	<.5
P35-21	1	05-13-1999	.5	2.0	<.5	2.6	<.5	<.5
P35-21	2	05-13-1999	.5	<.5	<.5	1.5	<.5	<.5
P36-1	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-1	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-2	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-3	na	05-13-1999	.5	<.5	<.5	<.5	1.5	<.5

Chlorinated Ethenes

Trichloroethene (µg/L)	<i>cis</i> -1,2-Dichloroethene (µg/L)	<i>trans</i> -1,2-Dichloroethene (µg/L)	1,1-Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.5	<0.5	<0.5	<0.5	1.6	P35-5
<.5	4.0	1.3	<.5	29.8	P35-6
<.5	6.3	11.0	<.5	41.9	P35-7
<.5	5.5	20.0	<.5	16.9	P35-8
.7	7.0	24.3	<.5	9.9	P35-9
.8	5.2	17.5	<.5	6.8	P35-9
.7	6.3	24.1	<.5	12.9	P35-10
.8	6.3	24.2	<.5	6.2	P35-11
.6	5.0	19.8	<.5	5.0	P35-12
.7	8.3	23.6	<.5	13.8	P35-13
<.5	6.3	23.4	<.5	6.7	P35-14
.9	5.7	19.9	<.5	2.2	P35-15
.8	6.5	22.2	<.5	4.9	P35-16
<.5	6.7	19.1	<.5	5.0	P35-17
1.0	6.7	22.5	<.5	3.1	P35-17
.9	6.6	24.4	<.5	4.0	P35-18
1.0	6.4	22.7	<.5	2.5	P35-19
1.3	8.1	23.2	<.5	3.6	P35-20
<.5	5.0	12.3	<.5	2.5	P35-21
1.0	5.2	17.5	<.5	1.6	P35-21
<.5	2.2	1.5	<.5	10.9	P36-1
<.5	.7	<.5	<.5	2.3	P36-1
<.5	4.2	2.8	<.5	15.7	P36-2
<.5	6.1	4.4	<.5	22.0	P36-3

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>								
P36-4	na	05-13-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P36-5	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-6	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-7	1	05-13-1999	.5	<.5	<.5	<.5	.5	<.5
P36-7	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-8	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-9	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-10	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-11	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-12	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-13	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-14	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-14	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-15	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-16	1	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-16	2	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-17	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-18	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-19	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-20	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-21	na	05-13-1999	.5	<.5	<.5	<.5	<.5	<.5

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**Chlorinated Ethenes**

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<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<0.5	7.3	5.4	<0.5	23.4	P36-4
<.5	6.5	4.9	<.5	26.5	P36-5
<.5	6.2	5.1	<.5	27.3	P36-6
<.5	6.7	4.5	<.5	41.8	P36-7
<.5	4.3	4.0	<.5	20.6	P36-7
<.5	5.5	5.9	<.5	26.8	P36-8
<.5	4.6	5.0	<.5	40.4	P36-9
<.5	4.3	5.6	<.5	27.9	P36-10
<.5	4.6	6.6	<.5	28.5	P36-11
<.5	4.4	7.2	<.5	22.4	P36-12
<.5	4.8	6.4	<.5	21.3	P36-13
<.5	4.3	7.8	<.5	15.8	P36-14
<.5	3.7	9.3	<.5	13.3	P36-14
<.5	4.0	9.5	<.5	12.9	P36-15
<.5	4.3	5.0	<.5	20.2	P36-16
<.5	3.8	6.5	<.5	19.2	P36-16
<.5	3.6	6.6	<.5	14.5	P36-17
<.5	4.0	4.0	<.5	16.6	P36-18
<.5	3.3	4.1	<.5	14.5	P36-19
<.5	4.0	5.8	<.5	13.5	P36-20
<.5	5.3	6.1	<.5	17.1	P36-21

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Fourth Sampling Period (August 1999)</b>								
P12-1	na	08-04-1999	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
P12-2	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-3	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-4	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-5	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-6	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-7	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-8	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-9	1	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-9	2	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-10	na	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-11	1	08-04-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-11	2	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-12	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-13	1	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-13	2	08-04-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-14	1	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-14	2	08-04-1999	4.0	<4.0	<4.0	<4.0	<4.0	<4.0
P12-15	1	08-04-1999	.5	<.5	<.5	<.5	<.5	<.5
P12-15	2	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-16	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-18	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-19	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P12-20	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0

**Chlorinated Ethenes**

<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<1.0	<1.0	<1.0	<1.0	<1.0	P12-1
<4.0	<4.0	<4.0	<4.0	<4.0	P12-2
<4.0	<4.0	<4.0	<4.0	<4.0	P12-3
<4.0	<4.0	<4.0	<4.0	<4.0	P12-4
<4.0	<4.0	<4.0	<4.0	<4.0	P12-5
<4.0	<4.0	<4.0	<4.0	<4.0	P12-6
<4.0	<4.0	<4.0	<4.0	<4.0	P12-7
<4.0	<4.0	<4.0	<4.0	<4.0	P12-8
<4.0	<4.0	<4.0	<4.0	<4.0	P12-9
<4.0	<4.0	<4.0	<4.0	<4.0	P12-9
<4.0	<4.0	<4.0	<4.0	<4.0	P12-10
<.5	<.5	<.5	<.5	<.5	P12-11
<4.0	<4.0	<4.0	<4.0	<4.0	P12-11
3.3	17.2	37.6	<2.0	28.3	P12-12
<2.0	<2.0	<2.0	<2.0	6.5	P12-13
<.5	10.6	<.5	<.5	12.7	P12-13
<4.0	<4.0	<4.0	<4.0	<4.0	P12-14
<4.0	15.3	<4.0	<4.0	21.8	P12-12
<.5	8.1	<.5	<.5	14.6	P12-15
<2.0	16.2	<2.0	<2.0	26.1	P12-15
<2.0	30.3	<2.0	<2.0	56.7	P12-16
<2.0	21.3	<2.0	<2.0	29.1	P12-18
<2.0	25.2	<2.0	<2.0	31.7	P12-19
<2.0	25.1	2.2	<2.0	30.2	P12-20

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>								
P12-21	na	08-04-1999	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
P19-1	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-1	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-2	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-3	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-4	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-6	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-9	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-10	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-11	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-12	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-13	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-14	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-16	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-17	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-18	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-19	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-20	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P19-21	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-1	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-2	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-3	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-4	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-5	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Chlorinated Ethenes

Trichloroethene (µg/L)	<i>cis</i> -1,2-Dichloroethene (µg/L)	<i>trans</i> -1,2-Dichloroethene (µg/L)	1,1-Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<0.5	2.1	<0.5	<0.5	<0.5	P12-21
<2.0	<2.0	<2.0	<2.0	<2.0	P19-1
<2.0	<2.0	<2.0	<2.0	<2.0	P19-1
<2.0	<2.0	<2.0	<2.0	<2.0	P19-2
<2.0	<2.0	<2.0	<2.0	<2.0	P19-3
<2.0	<2.0	<2.0	<2.0	<2.0	P19-4
<2.0	<2.0	<2.0	<2.0	<2.0	P19-6
<2.0	<2.0	<2.0	<2.0	<2.0	P19-9
<2.0	<2.0	<2.0	<2.0	<2.0	P19-10
<2.0	<2.0	<2.0	<2.0	<2.0	P19-11
<2.0	<2.0	<2.0	<2.0	<2.0	P19-12
<2.0	<2.0	<2.0	<2.0	<2.0	P19-13
<2.0	<2.0	<2.0	<2.0	<2.0	P19-14
<2.0	<2.0	<2.0	<2.0	<2.0	P19-16
<2.0	<2.0	<2.0	<2.0	<2.0	P19-17
<2.0	<2.0	<2.0	<2.0	<2.0	P19-18
<2.0	<2.0	<2.0	<2.0	<2.0	P19-19
<2.0	<2.0	<2.0	<2.0	<2.0	P19-20
<2.0	<2.0	<2.0	<2.0	<2.0	P19-21
<2.0	<2.0	<2.0	<2.0	<2.0	P35-1
<2.0	<2.0	<2.0	<2.0	<2.0	P35-2
<2.0	<2.0	<2.0	<2.0	<2.0	P35-3
<2.0	<2.0	<2.0	<2.0	<2.0	P35-4
<2.0	<2.0	<2.0	<2.0	10.8	P35-5



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>								
P35-6	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-7	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-8	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-9	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-10	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-11	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-12	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-13	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-14	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-15	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-16	na	08-04-1999	2.0	<2.0	<2.0	<2.0	3.5	<2.0
P35-17	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P35-18	na	08-04-1999	2.0	<2.0	<2.0	3.7	6.7	<2.0
P35-19	na	08-04-1999	2.0	<2.0	<2.0	<2.0	12.7	<2.0
P35-20	na	08-04-1999	2.0	<2.0	<2.0	<2.0	5.9	<2.0
P36-1	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-2	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-8	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-9	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-10	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-11	1	08-04-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-11	2	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-12	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-13	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0

Chlorinated Ethenes

Trichloroethene (µg/L)	<i>cis</i> -1,2-Dichloroethene (µg/L)	<i>trans</i> -1,2-Dichloroethene (µg/L)	1,1-Dichloroethene (µg/L)	Vinyl chloride (µg/L)	Sample name
<2.0	6.6	<2.0	<2.0	18.2	P35-6
<2.0	8.3	4.9	<2.0	28.4	P35-7
<2.0	11.9	14.5	<2.0	36.6	P35-8
2.1	13.2	27.4	<2.0	27.1	P35-9
<2.0	14.4	34.9	<2.0	22.2	P35-10
<2.0	16.1	44.2	<2.0	17.3	P35-11
3.1	13.9	42.5	<2.0	12.0	P35-12
2.0	15.4	42.0	<2.0	17.8	P35-13
2.4	17.8	48.0	<2.0	11.9	P35-14
3.9	20.2	50.6	<2.0	13.3	P35-15
3.7	14.6	38.7	<2.0	8.7	P35-16
3.9	23.5	50.7	<2.0	11.1	P35-17
3.0	16.3	29.6	<2.0	6.7	P35-18
<2.0	24.1	41.2	<2.0	13.9	P35-19
4.1	22.3	39.9	<2.0	6.7	P35-20
<2.0	<2.0	<2.0	<2.0	<2.0	P36-1
<2.0	<2.0	<2.0	<2.0	<2.0	P36-2
<2.0	<2.0	<2.0	<2.0	<2.0	P36-8
<2.0	<2.0	<2.0	<2.0	2.2	P36-9
<2.0	5.9	<2.0	<2.0	<2.0	P36-10
<.5	<.5	<.5	<.5	<.5	P36-11
<2.0	8.9	2.7	<2.0	22.3	P36-11
<2.0	8.8	4.2	<2.0	31.4	P36-12
<2.0	9.6	6.8	<2.0	31.3	P36-13

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Detection limit (µg/L)	Chlorinated Ethanes				
				1,1,2,2-Tetrachloroethane (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2-Trichloroethane (µg/L)	1,2-Dichloroethane (µg/L)	Chloroethane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>								
P36-14	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-15	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-16	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-17	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-18	1	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-18	2	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-19	na	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
P36-21	1	08-04-1999	.5	<.5	<.5	<.5	<.5	<.5
P36-21	2	08-04-1999	2.0	<2.0	<2.0	<2.0	<2.0	<2.0

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**Chlorinated Ethenes**

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<b>Trichloroethene (µg/L)</b>	<b><i>cis</i>-1,2-Dichloroethene (µg/L)</b>	<b><i>trans</i>-1,2-Dichloroethene (µg/L)</b>	<b>1,1-Dichloroethene (µg/L)</b>	<b>Vinyl chloride (µg/L)</b>	<b>Sample name</b>
<2.0	8.5	6.8	<2.0	26.8	P36-14
<2.0	9.8	5.6	<2.0	30.9	P36-15
<2.0	9.4	6.6	<2.0	35.2	P36-16
<2.0	7.3	9.3	<2.0	42.2	P36-17
<2.0	7.0	11.0	<2.0	32.5	P36-18
2.1	10.4	17.1	<2.0	11.8	P36-18
<2.0	9.7	20.2	<2.0	10.1	P36-19
<.5	16.4	<.5	<.5	<.5	P36-21
<2.0	6.8	14.1	<2.0	11.8	P36-21

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**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>First Sampling Period (November 1998)</b>							
P12-1	na	11-30-1998	<0.5	<0.5	<0.5	<0.5	<0.5
P12-4	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-5	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-9	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-10	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-16	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-17	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-18	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-19	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-20	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P12-21	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-1	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-2	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-3	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-4	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-5	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-6	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-7	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-8	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-9	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-10	na	11-30-1998	<.5	<.5	<.5	<.5	1.3
P19-11	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-12	na	11-30-1998	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	1.0	<0.5	26.7	28.0	23.6	P12-1
<.5	<.5	<.5	1.0	<.5	28.5	28.4	28.8	P12-4
<.5	<.5	<.5	1.1	<.5	29.0	26.6	24.7	P12-5
<.5	<.5	<.5	1.2	1.0	30.0	28.2	24.4	P12-9
<.5	<.5	<.5	1.0	<.5	30.2	27.8	26.5	P12-10
<.5	<.5	<.5	1.1	<.5	29.4	31.1	28.6	P12-16
<.5	<.5	<.5	.9	<.5	28.6	27.8	24.3	P12-17
<.5	<.5	<.5	.9	<.5	29.0	28.1	25.0	P12-18
<.5	<.5	<.5	.8	<.5	27.2	27.0	22.5	P12-19
<.5	<.5	<.5	.9	<.5	28.5	28.8	24.7	P12-20
<.5	<.5	<.5	1.0	<.5	28.4	27.8	24.1	P12-21
<.5	<.5	<.5	.8	<.5	29.4	27.3	23.2	P19-1
<.5	<.5	<.5	.9	<.5	29.2	27.7	24.5	P19-2
<.5	<.5	<.5	1.2	<.5	29.4	26.9	24.5	P19-3
<.5	<.5	<.5	1.2	<.5	29.2	26.8	25.1	P19-4
<.5	<.5	<.5	1.0	<.5	30.1	26.4	25.0	P19-5
<.5	<.5	1.7	1.5	<.5	31.3	28.9	26.3	P19-6
<.5	<.5	1.2	1.2	<.5	28.6	28.6	25.3	P19-7
<.5	<.5	<.5	.9	<.5	29.1	29.3	24.6	P19-8
<.5	<.5	<.5	1.1	<.5	28.3	28.3	24.2	P19-9
1.1	<.5	<.5	4.3	<.5	27.2	26.8	24.9	P19-10
<.5	<.5	<.5	1.4	<.5	32.0	29.3	28.8	P19-11
<.5	<.5	<.5	1.4	<.5	31.3	29.8	27.1	P19-12

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>							
P19-13	na	11-30-1998	<0.5	<0.5	<0.5	<0.5	<0.5
P19-14	na	11-30-1998	<.5	<.5	<.5	.6	<.5
P19-15	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-16	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-17	na	11-30-1998	<.5	<.5	.6	<.5	<.5
P19-18	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P19-19	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-1	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-2	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-3	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-4	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-5	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-6	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-7	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-8	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-9	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-10	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-11	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-12	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-13	1	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-13	2	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-14	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-15	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-16	na	11-30-1998	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	1.2	<0.5	28.8	32.4	30.1	P19-13
<.5	<.5	<.5	1.0	<.5	20.1	28.5	25.6	P19-14
<.5	<.5	<.5	1.2	<.5	29.6	27.6	23.2	P19-15
<.5	<.5	<.5	.9	<.5	28.9	27.8	26.4	P19-16
<.5	<.5	<.5	1.3	<.5	30.1	29.2	25.9	P19-17
<.5	<.5	<.5	1.3	<.5	29.2	29.2	25.9	P19-18
<.5	<.5	<.5	1.1	<.5	29.5	30.8	29.1	P19-19
<.5	<.5	<.5	.9	<.5	28.2	27.7	24.2	P35-1
<.5	<.5	.8	1.0	<.5	28.7	28.0	26.1	P35-2
<.5	<.5	1.3	1.0	<.5	28.6	29.8	24.6	P35-3
<.5	<.5	2.0	1.3	<.5	27.8	29.4	24.7	P35-4
<.5	<.5	2.2	1.0	<.5	29.3	29.0	26.3	P35-5
<.5	<.5	1.4	1.0	<.5	27.8	28.7	23.4	P35-6
<.5	<.5	1.3	1.0	<.5	28.8	28.1	23.9	P35-7
<.5	<.5	<.5	1.0	<.5	29.4	29.2	24.4	P35-8
<.5	<.5	.5	.9	<.5	28.9	28.8	25.7	P35-9
<.5	<.5	.5	.8	<.5	28.4	28.8	23.6	P35-10
<.5	<.5	.7	.8	<.5	28.3	26.6	24.3	P35-11
<.5	<.5	.6	1.1	<.5	32.4	28.0	27.7	P35-12
<.5	<.5	<.5	1.2	<.5	29.3	28.8	26.9	P35-13
<.5	<.5	<.5	1.2	<.5	29.2	25.7	23.1	P35-13
<.5	<.5	.5	.9	<.5	29.4	29.2	25.4	P35-14
<.5	<.5	<.5	1.0	<.5	30.6	29.0	25.1	P35-15
<.5	<.5	<.5	1.1	<.5	28.8	28.1	24.9	P35-16



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>First Sampling Period (November 1998)—Continued</b>							
P35-17	na	11-30-1998	<0.5	1.4	<0.5	<0.5	<0.5
P35-18	1	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-18	2	11-30-1998	<.5	1.1	<.5	<.5	<.5
P35-19	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-20	na	11-30-1998	<.5	<.5	<.5	<.5	<.5
P35-21	na	11-30-1998	.5	<.5	<.5	<.5	<.5
<b>Second Sampling Period (February 1999)</b>							
P12-1	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-2	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-3	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-4	na	02-17-1999	<.5	<.5	<.5	.5	<.5
P12-5	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-6	na	02-17-1999	<.5	<.5	<.5	.6	<.5
P12-7	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-8	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-9	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-10	1	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-10	2	02-17-1999	--	--	--	--	--
P12-11	na	02-17-1999	<.5	<.5	<.5	.5	<.5
P12-12	1	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-12	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-13	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-14	1	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-14	2	02-17-1999	<.5	<.5	<.5	.7	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	0.9	<0.5	30.0	29.2	26.1	P35-17
<.5	<.5	<.5	1.1	<.5	27.9	28.9	25.8	P35-18
<.5	<.5	.5	1.2	<.5	29.9	26.8	23.3	P35-18
<.5	<.5	<.5	1.0	<.5	28.5	28.9	25.2	P35-19
<.5	<.5	<.5	.9	<.5	28.4	30.8	28.1	P35-20
<.5	<.5	<.5	1.0	<.5	26.6	28.3	25.7	P35-21
<.5	<.5	<.5	3.5	<.5	28.7	27.5	24.2	P12-1
<.5	<.5	<.5	<.5	<.5	28.5	27.2	25.1	P12-2
.6	<.5	<.5	3.4	<.5	27.9	26.7	25.0	P12-3
.6	<.5	<.5	3.4	<.5	28.5	27.6	24.3	P12-4
.6	<.5	<.5	3.3	<.5	28.6	26.9	24.4	P12-5
.7	<.5	<.5	3.1	<.5	27.0	27.6	26.1	P12-6
.6	<.5	<.5	2.9	.5	26.8	28.9	27.6	P12-7
.6	<.5	<.5	2.9	<.5	27.9	26.7	23.6	P12-8
.6	<.5	<.5	2.8	<.5	28.3	26.1	24.0	P12-9
1.1	<.5	<.5	2.3	<.5	18.4	37.6	37.4	P12-10
--	--	--	--	--	11.2	31.9	24.1	P12-10
<.5	<.5	<.5	2.7	0.5	28.8	25.8	25.3	P12-11
.8	<.5	<.5	2.4	<.5	16.7	36.0	34.5	P12-12
<.5	<.5	<.5	<.5	<.5	25.4	26.5	24.4	P12-12
.6	<.5	<.5	3.0	<.5	30.0	29.8	27.7	P12-13
.8	<.5	<.5	3.1	<.5	27.8	25.2	24.5	P12-14
<.5	<.5	<.5	<.5	<.5	27.7	26.4	23.8	P12-14

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>							
P12-15	na	02-17-1999	<0.5	<0.5	<0.5	<0.5	<0.5
P12-16	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-17	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-18	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P12-19	na	02-17-1999	<.5	<.5	<.5	1.3	<.5
P12-20	na	02-17-1999	<.5	.9	<.5	<.5	<.5
P12-21	na	02-17-1999	<.5	<.5	<.5	.5	.5
P19-1	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-3	na	02-17-1999	<1.0	<1.0	<1.0	<1.0	<1.0
P19-4	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-5	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-6	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-7	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-8	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P19-10	na	02-17-1999	<.5	.6	<.5	2.0	<.5
P19-11	na	02-17-1999	<.5	<.5	<.5	2.9	<.5
P19-12	na	02-17-1999	<.5	1.2	<.5	2.6	<.5
P19-13	na	02-17-1999	<.5	<.5	<.5	1.4	<.5
P19-14	na	02-17-1999	<.5	<.5	<.5	1.9	<.5
P19-15	na	02-17-1999	<.5	<.5	<.5	1.6	<.5
P19-16	na	02-17-1999	<.5	<.5	<.5	2.5	<.5
P19-17	na	02-17-1999	<.5	<.5	<.5	2.5	<.5
P35-1	na	02-17-1999	<.5	<.5	<.5	.5	<.5
P35-2	na	02-17-1999	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	28.0	25.7	23.6	P12-15
<.5	<.5	<.5	<.5	<.5	26.4	25.8	23.3	P12-16
<.5	<.5	<.5	<.5	<.5	27.1	26.3	23.5	P12-17
<.5	<.5	<.5	<.5	<.5	28.7	26.7	24.0	P12-18
<.5	<.5	<.5	<.5	<.5	32.0	30.1	31.8	P12-19
<.5	<.5	<.5	<.5	<.5	27.6	27.3	23.8	P12-20
1.2	<.5	.5	5.4	<.5	26.9	25.9	23.8	P12-21
<.5	<.5	<.5	<.5	<.5	28.2	28.5	25.4	P19-1
<1.0	<1.0	<1.0	<1.0	<1.0	24.1	27.4	23.8	P19-3
<.5	<.5	<.5	<.5	<.5	26.9	26.4	25.0	P19-4
<.5	<.5	<.5	<.5	<.5	27.1	26.8	24.2	P19-5
<.5	<.5	<.5	<.5	<.5	25.8	26.6	25.5	P19-6
<.5	<.5	<.5	<.5	<.5	25.8	26.5	24.6	P19-7
<.5	<.5	<.5	<.5	<.5	25.8	28.5	27.8	P19-8
<.5	2.0	<.5	.8	<.5	32.4	34.3	30.8	P19-10
<.5	<.5	<.5	.5	<.5	32.0	40.3	41.5	P19-11
<.5	<.5	<.5	<.5	<.5	35.2	32.2	29.5	P19-12
<.5	<.5	<.5	<.5	<.5	34.1	32.9	31.2	P19-13
<.5	<.5	<.5	<.5	<.5	35.9	37.0	34.4	P19-14
<.5	<.5	<.5	<.5	<.5	36.6	36.5	36.3	P19-15
<.5	<.5	<.5	<.5	<.5	28.6	36.3	41.5	P19-16
<.5	<.5	<.5	<.5	<.5	30.0	31.1	31.4	P19-17
<.5	<.5	<.5	<.5	<.5	27.9	27.3	22.7	P35-1
<.5	<.5	<.5	<.5	<.5	28.4	28.6	25.8	P35-2

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>							
P35-3	na	02-17-1999	<0.7	<0.7	<0.7	<0.7	<0.7
P35-5	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P35-6	na	02-17-1999	<.5	<.5	<.5	2.9	<.5
P35-9	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P35-10	na	02-17-1999	<.5	.6	<.5	<.5	<.5
P35-11	na	02-17-1999	<.5	8.9	<.5	8.1	<.5
P35-13	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P35-14	na	02-17-1999	<.5	<.5	<.5	.9	<.5
P35-15	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P35-16	na	02-17-1999	<.5	<.5	<.5	1.8	<.5
P35-17	na	02-17-1999	<.5	.6	<.5	.7	<.5
P35-18	na	02-17-1999	<.5	<.5	<.5	1.8	<.5
P35-19	na	02-17-1999	1.0	<.5	<.5	1.3	<.5
P35-20	na	02-17-1999	<.5	.7	<.5	<.5	<.5
P35-21	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-1	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-2	1	02-17-1999	<.5	<.5	<.5	.6	<.5
P36-2	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-3	1	02-17-1999	<.5	<.5	<.5	.8	<.5
P36-3	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-4	na	02-17-1999	<.5	<.5	<.5	1.6	<.5
P36-5	1	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-5	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-6	na	02-17-1999	<.5	<.5	<.5	1.2	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.7	<0.7	<0.7	<0.7	<0.7	29.9	28.1	28.2	P35-3
<.5	<.5	<.5	<.5	<.5	28.2	27.2	25.3	P35-5
<.5	<.5	<.5	<.5	<.5	30.9	32.0	28.8	P35-6
<.5	<.5	3.4	<.5	<.5	29.0	27.1	25.2	P35-9
<.5	<.5	<.5	<.5	<.5	28.5	27.6	24.6	P35-10
<.5	<.5	<.5	<.5	<.5	22.9	26.3	23.5	P35-11
<.5	<.5	<.5	<.5	<.5	28.7	28.5	25.9	P35-13
<.5	<.5	<.5	<.5	<.5	27.6	25.9	23.1	P35-14
<.5	<.5	<.5	<.5	<.5	29.2	27.0	24.4	P35-15
<.5	<.5	<.5	<.5	<.5	29.9	31.5	29.1	P35-16
<.5	<.5	<.5	<.5	<.5	29.0	26.5	24.2	P35-17
<.5	<.5	<.5	<.5	<.5	31.4	30.0	31.4	P35-18
<.5	<.5	<.5	.7	<.5	31.3	31.6	28.0	P35-19
<.5	<.5	2.5	<.5	<.5	28.6	27.1	24.5	P35-20
<.5	<.5	<.5	<.5	<.5	17.3	41.8	31.7	P35-21
<.5	<.5	<.5	<.5	<.5	27.7	27.0	23.0	P36-1
<.5	<.5	<.5	<.5	<.5	26.4	25.9	23.8	P36-2
<.5	<.5	<.5	<.5	<.5	27.4	25.6	23.7	P36-2
<.5	<.5	<.5	<.5	<.5	28.3	26.8	24.4	P36-3
<.5	<.5	<.5	<.5	<.5	27.0	25.1	24.0	P36-3
<.5	<.5	<.5	3.2	<.5	27.2	25.4	23.5	P36-4
<.5	<.5	<.5	2.9	<.5	26.1	28.2	26.9	P36-5
<.5	<.5	<.5	<.5	<.5	28.1	26.3	22.5	P36-5
.5	<.5	<.5	2.9	<.5	28.4	26.5	23.4	P36-6

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Second Sampling Period (February 1999)—Continued</b>							
P36-7	na	02-17-1999	<0.5	<0.5	<0.5	1.3	<0.5
P36-8	na	02-17-1999	<.5	<.5	<.5	.8	<.5
P36-9	na	02-17-1999	<.5	<.5	<.5	.8	<.5
P36-10	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-11	1	02-17-1999	<.5	<.5	<.5	.6	<.5
P36-11	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-12	1	02-17-1999	<.5	<.5	<.5	.7	<.5
P36-12	2	02-17-1999	<.5	<.5	<.5	1.0	<.5
P36-13	na	02-17-1999	<.5	<.5	<.5	.7	<.5
P36-14	1	02-17-1999	<.5	<.5	<.5	.7	<.5
P36-14	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-15	na	02-17-1999	<.5	<.5	<.5	.6	<.5
P36-16	1	02-17-1999	<.5	<.5	<.5	.6	<.5
P36-16	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-17	1	02-17-1999	<.5	<.5	<.5	.7	<.5
P36-17	2	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-18	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-19	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-20	na	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-21	1	02-17-1999	<.5	<.5	<.5	<.5	<.5
P36-21	2	02-17-1999	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
0.8	<0.5	0.6	4.2	<0.5	28.2	27.6	24.1	P36-7
.7	<.5	<.5	3.2	<.5	28.6	27.5	25.7	P36-8
.6	<.5	<.5	3.2	<.5	28.1	26.1	25.0	P36-9
<.5	<.5	<.5	<.5	<.5	28.8	25.5	22.6	P36-10
.6	<.5	<.5	3.0	<.5	27.7	26.7	24.1	P36-11
<.5	<.5	<.5	<.5	<.5	27.6	28.6	26.0	P36-11
.6	<.5	<.5	2.9	<.5	28.3	26.4	23.6	P36-12
<.5	<.5	<.5	<.5	<.5	28.2	27.6	24.8	P36-12
.7	<.5	<.5	3.1	<.5	28.4	26.0	23.9	P36-13
.7	<.5	<.5	3.2	<.5	27.8	26.7	25.4	P36-14
<.5	<.5	<.5	<.5	<.5	28.3	26.8	22.9	P36-14
<.5	<.5	<.5	<.5	<.5	27.3	27.9	25.5	P36-15
.6	<.5	<.5	3.0	<.5	26.6	25.9	24.5	P36-16
<.5	<.5	<.5	<.5	<.5	28.3	28.0	24.7	P36-16
.7	<.5	<.5	2.8	<.5	26.4	28.7	28.6	P36-17
<.5	<.5	<.5	<.5	<.5	27.5	25.9	23.8	P36-17
<.5	<.5	<.5	<.5	<.5	27.5	24.7	22.4	P36-18
<.5	<.5	<.5	<.5	<.5	27.8	26.2	23.6	P36-19
.7	<.5	<.5	3.5	<.5	28.9	27.6	24.9	P36-20
.5	<.5	<.5	3.4	<.5	28.4	25.7	22.6	P36-21
<.5	<.5	<.5	<.5	<.5	28.5	26.6	23.6	P36-21



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Third Sampling Period (May 1999)</b>							
P12-1	na	05-13-1999	<0.5	0.7	<0.5	1.4	<0.5
P12-2	na	05-13-1999	<.5	<.5	<.5	1.1	<.5
P12-3	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-4	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P12-5	1	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-5	2	05-13-1999	<.5	.9	<.5	1.1	<.5
P12-6	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P12-7	na	05-13-1999	<.5	<.5	<.5	1.0	<.5
P12-9	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-10	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-11	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-12	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P12-13	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-14	na	05-13-1999	<.5	<.5	<.5	.8	<.5
P12-15	1	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-15	2	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-16	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P12-17	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P12-18	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-19	1	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-19	2	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-20	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P12-21	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-1	na	05-13-1999	<.5	.5	<.5	2.0	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	24.2	26.1	24.6	P12-1
<.5	<.5	<.5	<.5	<.5	26.4	27.7	25.7	P12-2
<.5	<.5	<.5	.5	<.5	26.8	25.9	26.6	P12-3
<.5	<.5	<.5	<.5	<.5	23.6	29.6	28.4	P12-4
<.5	<.5	<.5	<.5	<.5	20.9	40.3	44.2	P12-5
<.5	<.5	<.5	<.5	<.5	20.3	27.3	22.3	P12-5
<.5	<.5	<.5	.7	<.5	26.6	28.0	27.7	P12-6
<.5	<.5	2.7	<.5	<.5	22.4	30.7	29.4	P12-7
<.5	<.5	<.5	.9	<.5	24.8	29.8	30.3	P12-9
<.5	<.5	<.5	.6	<.5	27.3	30.1	27.1	P12-10
<.5	<.5	1.1	.6	<.5	25.7	28.4	29.8	P12-11
<.5	<.5	<.5	<.5	<.5	24.8	30.4	30.3	P12-12
<.5	<.5	<.5	.8	<.5	26.5	25.4	25.6	P12-13
<.5	<.5	<.5	.9	<.5	26.6	28.7	25.8	P12-14
<.5	<.5	<.5	.7	<.5	25.8	27.4	27.5	P12-15
<.5	<.5	<.5	<.5	<.5	23.7	29.3	31.5	P12-15
<.5	<.5	<.5	.7	<.5	28.2	29.4	30.6	P12-16
<.5	<.5	<.5	<.5	<.5	21.8	31.5	30.5	P12-17
<.5	<.5	<.5	.5	<.5	27.7	28.6	28.2	P12-18
<.5	<.5	<.5	<.5	<.5	25.2	31.5	39.5	P12-19
<.5	<.5	<.5	<.5	<.5	26.6	30.9	30.9	P12-19
<.5	<.5	<.5	.8	<.5	26.8	31.3	31.2	P12-20
<.5	<.5	<.5	.7	<.5	28.7	28.9	28.2	P12-21
<.5	<.5	20.4	<.5	<.5	22.4	31.5	31.0	P19-1

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>							
P19-2	na	05-13-1999	<0.5	<0.5	<0.5	0.6	<0.5
P19-3	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P19-4	1	05-13-1999	<.5	<.5	<.5	.7	<.5
P19-4	2	05-13-1999	<.5	<.5	<.5	.6	<.5
P19-5	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P19-6	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-7	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-8	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-9	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-10	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-11	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-12	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-13	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P19-14	na	05-13-1999	<.5	.6	<.5	<.5	<.5
P19-15	na	05-13-1999	<.5	<.5	<.5	1.0	<.5
P19-16	na	05-13-1999	<.5	<.5	<.5	.9	<.5
P19-17	na	05-13-1999	<.5	<.5	<.5	.5	<.5
P19-18	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P19-19	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P19-20	na	05-13-1999	<.5	<.5	<.5	.8	<.5
P19-21	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P35-1	na	05-13-1999	<.5	<.5	<.5	.9	<.5
P35-2	na	05-13-1999	<.5	<.5	<.5	2.3	<.5
P35-4	na	05-13-1999	<.5	<.5	<.5	.6	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	10.6	<0.5	<0.5	23.9	28.5	31.2	P19-2
<.5	<.5	14.7	<.5	<.5	23.3	29.4	25.4	P19-3
<.5	<.5	27.9	<.5	<.5	23.8	31.3	23.6	P19-4
<.5	<.5	6.2	<.5	<.5	21.7	31.9	26.3	P19-4
<.5	<.5	2.8	<.5	<.5	26.6	28.2	30.5	P19-5
<.5	<.5	1.2	<.5	<.5	26.6	30.7	25.2	P19-6
<.5	<.5	1.7	<.5	<.5	28.3	31.9	31.7	P19-7
<.5	<.5	1.4	<.5	<.5	26.0	30.3	30.0	P19-8
<.5	<.5	.5	<.5	<.5	24.5	27.5	28.6	P19-9
<.5	<.5	<.5	<.5	<.5	24.8	29.7	29.8	P19-10
<.5	<.5	<.5	<.5	<.5	24.3	28.3	29.2	P19-11
<.5	<.5	.8	<.5	<.5	24.5	28.7	31.2	P19-12
<.5	<.5	<.5	<.5	<.5	24.6	30.6	28.0	P19-13
<.5	<.5	<.5	<.5	<.5	24.1	29.8	30.9	P19-14
<.5	<.5	<.5	<.5	<.5	26.0	30.8	31.6	P19-15
<.5	<.5	<.5	<.5	<.5	25.6	31.4	30.6	P19-16
<.5	<.5	<.5	<.5	<.5	23.5	31.1	31.9	P19-17
<.5	<.5	<.5	<.5	<.5	24.8	28.4	27.9	P19-18
<.5	<.5	1.7	<.5	<.5	24.6	30.1	31.3	P19-19
<.5	<.5	1.8	<.5	<.5	24.5	31.9	30.0	P19-20
<.5	<.5	8.1	<.5	<.5	26.3	30.6	26.9	P19-21
<.5	<.5	<.5	<.5	<.5	26.6	30.7	30.4	P35-1
<.5	<.5	13.9	.7	<.5	27.7	30.3	34.4	P35-2
<.5	<.5	7.2	.7	<.5	27.0	31.8	29.0	P35-4

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>							
P35-5	na	05-13-1999	<0.5	<0.5	<0.5	1.0	<0.5
P35-6	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P35-7	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P35-8	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P35-9	1	05-13-1999	<.5	<.5	<.5	.9	<.5
P35-9	2	05-13-1999	<.5	<.5	<.5	<.5	<.5
P35-10	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P35-11	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P35-12	na	05-13-1999	<.5	<.5	<.5	.8	<.5
P35-13	na	05-13-1999	<.5	<.5	<.5	1.1	<.5
P35-14	na	05-13-1999	<.5	1.1	<.5	.8	<.5
P35-15	na	05-13-1999	<.5	<.5	<.5	.5	<.5
P35-16	na	05-13-1999	<.5	.7	<.5	.7	<.5
P35-17	1	05-13-1999	<.5	<.5	<.5	.6	<.5
P35-17	2	05-13-1999	.6	<.5	<.5	.9	<.5
P35-18	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P35-19	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P35-20	na	05-13-1999	<.5	.6	<.5	.6	<.5
P35-21	1	05-13-1999	<.5	<.5	<.5	<.5	<.5
P35-21	2	05-13-1999	.6	<.5	<.5	.6	<.5
P36-1	1	05-13-1999	<.5	.5	<.5	1.0	<.5
P36-1	2	05-13-1999	<.5	<.5	<.5	1.0	<.5
P36-2	na	05-13-1999	<.5	<.5	<.5	.5	<.5
P36-3	na	05-13-1999	<.5	<.5	<.5	<.5	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	1.8	0.9	<0.5	27.4	30.6	32.0	P35-5
<.5	<.5	1.0	.9	<.5	26.5	28.3	29.0	P35-6
<.5	<.5	<.5	<.5	<.5	25.1	31.7	31.4	P35-7
<.5	<.5	<.5	<.5	<.5	25.5	29.4	28.3	P35-8
<.5	<.5	<.5	<.5	<.5	26.4	31.1	33.2	P35-9
<.5	<.5	<.5	<.5	<.5	20.1	24.7	25.5	P35-9
<.5	<.5	<.5	.6	<.5	26.4	30.1	30.9	P35-10
<.5	<.5	<.5	<.5	<.5	25.7	28.0	26.8	P35-11
<.5	<.5	<.5	<.5	<.5	25.4	30.7	31.9	P35-12
<.5	<.5	<.5	.8	<.5	28.0	29.7	29.5	P35-13
<.5	<.5	<.5	<.5	<.5	25.8	30.5	30.8	P35-14
<.5	<.5	<.5	<.5	<.5	22.6	27.3	23.2	P35-15
<.5	<.5	<.5	.6	<.5	23.9	26.7	25.3	P35-16
<.5	<.5	<.5	<.5	<.5	25.9	38.4	50.0	P35-17
<.5	<.5	<.5	<.5	<.5	20.2	28.4	27.0	P35-17
<.5	<.5	<.5	<.5	<.5	23.8	27.8	29.2	P35-18
<.5	<.5	<.5	<.5	<.5	24.5	29.1	31.4	P35-19
<.5	<.5	<.5	.6	<.5	24.5	30.4	31.1	P35-20
<.5	<.5	<.5	<.5	<.5	25.2	31.4	40.3	P35-21
<.5	<.5	<.5	<.5	<.5	20.5	28.0	23.8	P35-21
<.5	<.5	<.5	<.5	<.5	24.7	28.5	28.1	P36-1
<.5	<.5	.6	<.5	<.5	20.3	27.7	27.9	P36-1
<.5	<.5	<.5	<.5	<.5	24.9	25.6	24.1	P36-2
<.5	<.5	<.5	<.5	<.5	25.4	31.1	26.1	P36-3

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Third Sampling Period (May 1999)—Continued</b>							
P36-4	na	05-13-1999	<0.5	<0.5	<0.5	0.6	<0.5
P36-5	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-6	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P36-7	1	05-13-1999	<.5	<.5	<.5	1.6	<.5
P36-7	2	05-13-1999	<.5	.6	<.5	1.0	<.5
P36-8	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-9	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-10	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P36-11	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P36-12	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P36-13	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P36-14	1	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-14	2	05-13-1999	<.5	<.5	<.5	.8	<.5
P36-15	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-16	1	05-13-1999	<.5	<.5	<.5	.6	<.5
P36-16	2	05-13-1999	<.5	<.5	<.5	1.8	<.5
P36-17	na	05-13-1999	<.5	<.5	<.5	<.5	<.5
P36-18	na	05-13-1999	<.5	<.5	<.5	.6	<.5
P36-19	na	05-13-1999	<.5	.7	<.5	.5	<.5
P36-20	na	05-13-1999	<.5	<.5	<.5	.7	<.5
P36-21	na	05-13-1999	<.5	<.5	<.5	.7	<.5

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	26.0	30.8	24.9	P36-4
<.5	<.5	<.5	<.5	<.5	23.5	27.9	29.2	P36-5
<.5	<.5	<.5	<.5	<.5	25.4	30.9	23.9	P36-6
<.5	<.5	<.5	<.5	<.5	28.8	30.7	38.9	P36-7
<.5	<.5	<.5	<.5	<.5	21.5	24.2	21.1	P36-7
<.5	<.5	<.5	<.5	<.5	26.6	27.7	26.1	P36-8
<.5	<.5	<.5	<.5	<.5	23.8	31.9	30.8	P36-9
<.5	<.5	<.5	<.5	<.5	26.5	29.8	30.6	P36-10
<.5	<.5	<.5	<.5	<.5	23.7	31.5	30.0	P36-11
<.5	<.5	<.5	<.5	<.5	28.0	30.5	30.9	P36-12
<.5	<.5	<.5	<.5	<.5	29.1	29.2	31.9	P36-13
<.5	<.5	<.5	<.5	<.5	28.3	30.6	31.5	P36-14
<.5	<.5	<.5	<.5	<.5	22.3	31.0	29.2	P36-14
<.5	<.5	<.5	<.5	<.5	27.4	28.0	27.6	P36-15
<.5	<.5	<.5	<.5	<.5	26.9	31.0	37.1	P36-16
<.5	<.5	<.5	<.5	<.5	21.3	37.3	40.1	P36-16
<.5	<.5	<.5	<.5	<.5	24.1	26.6	25.2	P36-17
<.5	<.5	<.5	<.5	<.5	27.8	31.7	31.8	P36-18
<.5	<.5	<.5	<.5	<.5	24.6	28.8	29.2	P36-19
<.5	<.5	<.5	<.5	<.5	27.7	28.9	31.0	P36-20
<.5	<.5	<.5	<.5	<.5	28.5	31.6	31.4	P36-21



**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Fourth Sampling Period (August 1999)</b>							
P12-1	na	08-04-1999	<1.0	<1.0	<1.0	<1.0	<1.0
P12-2	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-3	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-4	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-5	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-6	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-7	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-8	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-9	1	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-9	2	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-10	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-11	1	08-04-1999	<.5	<.5	<.5	<.5	<.5
P12-11	2	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-12	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P12-13	1	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P12-13	2	08-04-1999	<.5	<.5	<.5	<.5	<.5
P12-14	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-12	na	08-04-1999	<4.0	<4.0	<4.0	<4.0	<4.0
P12-15	1	08-04-1999	<.5	<.5	<.5	<.5	<.5
P12-15	2	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P12-16	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P12-18	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P12-19	na	08-04-1999	<2.0	<2.0	6.6	<2.0	<2.0
P12-20	na	08-04-1999	<2.0	<2.0	3.5	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<1.0	<1.0	<1.0	<1.0	<1.0	25.9	23.7	18.8	P12-1
<4.0	<4.0	<4.0	<4.0	<4.0	28.4	26.1	21.0	P12-2
<4.0	<4.0	<4.0	<4.0	<4.0	27.3	27.6	22.6	P12-3
<4.0	<4.0	<4.0	<4.0	<4.0	25.6	24.3	19.0	P12-4
<4.0	<4.0	<4.0	<4.0	<4.0	24.3	22.9	18.7	P12-5
<4.0	<4.0	<4.0	2.0	<4.0	26.8	26.1	25.2	P12-6
<4.0	<4.0	<4.0	<4.0	<4.0	27.5	27.2	21.7	P12-7
<4.0	<4.0	<4.0	<4.0	<4.0	25.4	23.4	18.8	P12-8
<4.0	<4.0	58.4	3.4	<4.0	28.3	30.6	30.8	P12-9
<4.0	<4.0	<4.0	<4.0	<4.0	24.9	26.5	23.2	P12-9
<4.0	<4.0	6.0	<4.0	<4.0	24.4	24.6	19.5	P12-10
<.5	<.5	<.5	<.5	<.5	19.7	20.5	17.0	P12-11
<4.0	<4.0	<4.0	<4.0	<4.0	26.0	24.7	20.7	P12-11
<2.0	<2.0	<2.0	<2.0	<2.0	29.8	31.0	28.6	P12-12
<2.0	<2.0	<2.0	<2.0	<2.0	21.8	24.0	17.6	P12-13
<.5	<.5	<.5	<.5	<.5	24.2	23.9	18.5	P12-13
<4.0	<4.0	<4.0	<4.0	<4.0	26.2	29.4	31.4	P12-14
<4.0	<4.0	<4.0	2.8	<4.0	29.2	28.8	22.7	P12-12
<.5	<.5	<.5	<.5	<.5	24.7	23.8	17.9	P12-15
<2.0	<2.0	<2.0	3.4	<2.0	30.9	24.8	22.4	P12-15
<2.0	<2.0	<2.0	<2.0	<2.0	28.3	27.4	22.2	P12-16
<2.0	<2.0	<2.0	2.4	<2.0	26.7	26.3	20.6	P12-18
<2.0	<2.0	2.0	3.0	<2.0	29.9	26.5	23.2	P12-19
<2.0	<2.0	2.1	2.2	<2.0	29.4	26.4	22.2	P12-20

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>							
P12-21	na	08-04-1999	<0.5	<0.5	<0.5	<0.5	<0.5
P19-1	1	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-1	2	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-2	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-3	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-4	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-6	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-9	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-10	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-11	na	08-04-1999	<2.0	2.4	<2.0	<2.0	<2.0
P19-12	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-13	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-14	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-16	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-17	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-18	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-19	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-20	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P19-21	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-1	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-2	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-3	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-4	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-5	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	<0.5	<0.5	19.8	21.2	13.2	P12-21
<2.0	<2.0	5.6	<2.0	<2.0	26.3	20.5	19.1	P19-1
<2.0	<2.0	<2.0	<2.0	<2.0	25.6	26.0	19.3	P19-1
<2.0	<2.0	<2.0	<2.0	<2.0	21.3	24.1	20.9	P19-2
<2.0	<2.0	<2.0	<2.0	<2.0	24.8	22.9	18.0	P19-3
<2.0	<2.0	<2.0	<2.0	<2.0	27.1	19.4	18.0	P19-4
<2.0	<2.0	<2.0	<2.0	<2.0	20.5	21.8	19.5	P19-6
<2.0	<2.0	<2.0	<2.0	<2.0	27.8	24.3	24.0	P19-9
<2.0	<2.0	<2.0	<2.0	<2.0	26.7	27.8	27.1	P19-10
<2.0	<2.0	<2.0	<2.0	<2.0	26.4	24.0	21.6	P19-11
<2.0	<2.0	<2.0	<2.0	<2.0	27.2	23.7	19.0	P19-12
<2.0	<2.0	<2.0	<2.0	<2.0	26.0	25.2	20.9	P19-13
<2.0	<2.0	<2.0	<2.0	<2.0	25.2	25.6	18.7	P19-14
<2.0	<2.0	<2.0	<2.0	<2.0	25.3	23.7	18.0	P19-16
<2.0	<2.0	<2.0	<2.0	<2.0	28.6	28.8	21.9	P19-17
<2.0	<2.0	<2.0	<2.0	<2.0	24.1	26.0	19.9	P19-18
<2.0	<2.0	<2.0	<2.0	<2.0	27.1	25.9	19.1	P19-19
<2.0	<2.0	<2.0	<2.0	<2.0	26.7	25.4	21.6	P19-20
<2.0	<2.0	<2.0	<2.0	<2.0	29.0	27.5	23.9	P19-21
<2.0	<2.0	<2.0	<2.0	<2.0	29.7	25.9	19.8	P35-1
<2.0	<2.0	<2.0	<2.0	<2.0	26.8	26.1	19.0	P35-2
<2.0	<2.0	<2.0	<2.0	<2.0	31.7	27.6	22.5	P35-3
<2.0	<2.0	<2.0	<2.0	<2.0	41.0	30.8	31.9	P35-4
<2.0	<2.0	<2.0	<2.0	<2.0	15.6	32.3	39.5	P35-5

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>							
P35-6	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-7	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-8	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-9	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-10	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-11	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-12	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-13	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-14	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-15	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-16	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-17	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-18	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-19	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P35-20	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-1	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-2	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-8	na	08-04-1999	<2.0	2.1	<2.0	<2.0	<2.0
P36-9	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-10	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-11	1	08-04-1999	.5	<.5	<.5	<.5	<.5
P36-11	2	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-12	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-13	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	<2.0	27.3	24.7	20.2	P35-6
<2.0	<2.0	<2.0	<2.0	<2.0	28.9	29.3	18.8	P35-7
<2.0	<2.0	<2.0	<2.0	<2.0	31.4	26.5	21.1	P35-8
<2.0	<2.0	<2.0	<2.0	<2.0	27.6	29.6	20.7	P35-9
<2.0	<2.0	<2.0	<2.0	<2.0	30.0	29.4	21.8	P35-10
<2.0	<2.0	<2.0	<2.0	<2.0	30.7	26.5	21.2	P35-11
<2.0	<2.0	<2.0	<2.0	<2.0	28.8	24.7	18.9	P35-12
<2.0	<2.0	<2.0	<2.0	<2.0	30.8	30.4	24.4	P35-13
<2.0	<2.0	<2.0	<2.0	<2.0	29.3	29.4	27.5	P35-14
<2.0	<2.0	<2.0	<2.0	<2.0	11.4	31.5	23.0	P35-15
<2.0	<2.0	<2.0	<2.0	<2.0	25.0	25.6	19.2	P35-16
<2.0	<2.0	<2.0	<2.0	<2.0	31.2	31.2	25.1	P35-17
<2.0	<2.0	<2.0	<2.0	<2.0	28.1	26.9	20.2	P35-18
<2.0	<2.0	<2.0	<2.0	<2.0	31.6	30.4	30.1	P35-19
<2.0	<2.0	<2.0	<2.0	<2.0	31.3	25.2	22.3	P35-20
<2.0	<2.0	<2.0	<2.0	<2.0	29.2	28.2	22.3	P36-1
<2.0	<2.0	<2.0	<2.0	<2.0	31.7	30.7	29.8	P36-2
<2.0	<2.0	<2.0	<2.0	<2.0	25.7	27.5	24.9	P36-8
<2.0	<2.0	<2.0	<2.0	<2.0	20.5	31.4	31.3	P36-9
<2.0	<2.0	<2.0	<2.0	<2.0	28.0	29.8	31.2	P36-10
<.5	<.5	<.5	<.5	<.5	24.0	23.7	19.5	P36-11
<2.0	<2.0	4.2	<2.0	<2.0	28.1	26.1	20.0	P36-11
<2.0	<2.0	<2.0	<2.0	<2.0	27.4	27.4	20.1	P36-12
<2.0	<2.0	<2.0	<2.0	<2.0	28.9	28.9	22.7	P36-13

**Appendix E2.** *Organic constituents for porous-membrane sampling devices in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, November 1998 through August 1999—Continued*

Sample name	Replicate	Date collected	Chlorinated Methanes		Additional Volatile		
			Methylene chloride (µg/L)	Chloromethane (µg/L)	Benzene (µg/L)	Bromomethane (µg/L)	1,2-Dibromo-3-chloropropane (µg/L)
<b>Fourth Sampling Period (August 1999)—Continued</b>							
P36-14	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-15	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-16	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-17	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-18	1	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-18	2	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-19	na	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0
P36-21	1	08-04-1999	<.5	<.5	<.5	<.5	<.5
P36-21	2	08-04-1999	<2.0	<2.0	<2.0	<2.0	<2.0

Organic Compounds					Surrogate Standards			Sample name
Dichloro-difluoro-methane (µg/L)	Hexa-chloro-butadiene (µg/L)	Toluene (µg/L)	Trichloro-fluoro-methane (µg/L)	1,2,3-Tri-chloro-propane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<2.0	<2.0	<2.0	<2.0	<2.0	28.4	29.8	21.2	P36-14
<2.0	<2.0	6.4	<2.0	<2.0	28.0	27.9	20.0	P36-15
<2.0	<2.0	<2.0	<2.0	<2.0	27.2	30.7	20.3	P36-16
<2.0	<2.0	<2.0	<2.0	<2.0	29.7	31.7	30.7	P36-17
<2.0	<2.0	<2.0	<2.0	<2.0	24.5	30.7	26.8	P36-18
<2.0	<2.0	3.2	<2.0	<2.0	26.9	25.1	22.5	P36-18
<2.0	<2.0	5.5	<2.0	<2.0	30.1	30.4	26.0	P36-19
<5	<5	<5	<5	<5	28.0	21.5	18.5	P36-21
<2.0	<2.0	<2.0	<2.0	<2.0	23.6	24.1	24.5	P36-21



**Appendix E3. Organic surface-water constituents in the West Branch Canal Creek study area, Aberdeen Proving Ground, Maryland, February through August 1999**

[µg/L, micrograms per liter; na, not applicable; --, no data]

Sample name	Replicate sample	Date collected	Tide	Reporting limit (µg/L)	Chlorinated Ethanes			Chlorinated	
					1,1,2,2-Tetra-chloro-ethane (µg/L)	1,1,2-Tri-chloro-ethane (µg/L)	1,2-Di-chloro-ethane (µg/L)	Tetra-chloro-ethene (µg/L)	Tri-chloro-ethene (µg/L)
SW030	na	07-29-1999	mid	0.5	3.0	<0.5	<0.5	<0.5	<0.5
SW030	na	07-29-1999	low	1.0	1.4	<1.0	<1.0	1.2	<1.0
SW049.01	na	02-18-1999	low	.5	18.5	2.0	.6	<.5	1.2
SW049.01	1	05-27-1999	low	2.0	3.2	<2.0	<2.0	<2.0	<2.0
SW049.01	2	05-27-1999	low	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
SW050	na	03-05-1999	--	.5	6.4	.8	<.5	1.0	1.7
SW050	na	03-16-1999	--	.5	8.3	<.5	<.5	1.1	1.3
SW050	1	05-27-1999	low	2.0	8.4	<2.0	<2.0	<2.0	<2.0
SW050	2	05-27-1999	low	2.0	7.8	<2.0	<2.0	<2.0	<2.0
SW050.01	na	03-08-1999	low	.5	1.4	1.0	2.2	<.5	.7
SW060	na	03-08-1999	low	.5	7.8	.9	<.5	1.1	.7
SW060	na	03-16-1999	--	.5	7.8	<.5	<.5	1.5	1.2
SW060	1	07-23-1999	low	.5	1.0	1.2	<.5	<.5	2.4
SW060	2	07-23-1999	low	.5	3.8	1.2	<.5	<.5	.6
SW060	na	07-23-1999	mid	.5	2.8	1.0	<.5	<.5	1.4
SW060	na	08-03-1999	high	.5	1.4	<.5	<.5	4.2	<.5

Ethenes			Chlorinated Methanes		Additional Compound	Surrogate Standards			Sample name
<i>cis</i> -1,2-Di-chloro-ethene (µg/L)	<i>trans</i> -1,2-Di-chloro-ethene (µg/L)	Vinyl chloride (µg/L)	Carbon tetra-chloride (µg/L)	Chloro-form (µg/L)	Bromomethane (µg/L)	Dibromo-fluoro-methane (µg/L)	Toluene-d8 (µg/L)	Bromo-fluoro-benzene (µg/L)	
<0.5	<0.5	<0.5	4.3	5.7	<0.5	28.6	23.3	20.1	SW030
<1.0	<1.0	<1.0	3.8	5.0	<1.0	25.9	25.7	23.9	SW030
2.0	1.2	.7	.6	<.5	.9	31.4	31.1	31.5	SW049.01
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	23.4	28.1	26.2	SW049.01
<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	25.5	25.6	26.1	SW049.01
<.5	<.5	<.5	6.4	4.0	1.1	28.0	28.8	20.1	SW050
<.5	<.5	<.5	5.2	4.1	1.3	30.9	31.6	31.7	SW050
<2.0	<2.0	<2.0	3.0	3.1	<2.0	24.6	21.2	20.1	SW050
<2.0	<2.0	<2.0	3.8	3.3	<2.0	26.7	21.9	22.0	SW050
<.5	<.5	<.5	<.5	<.5	1.1	28.0	28.0	20.6	SW050.01
<.5	<.5	<.5	6.3	3.1	1.2	27.9	27.4	25.3	SW060
<.5	<.5	<.5	6.4	6.9	1.5	25.9	33.0	33.0	SW060
<.5	<.5	<.5	2.9	2.5	<.5	18.9	25.3	19.5	SW060
<.5	<.5	<.5	2.8	2.3	<.5	26.2	26.3	18.2	SW060
<.5	<.5	<.5	3.5	3.1	<.5	22.6	23.5	19.2	SW060
<.5	<.5	<.5	21.9	22.1	<.5	24.6	25.1	18.2	SW060

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999**

[Land surface elevation is reported in feet above or below (-) sea level; screen depth is in feet below land surface;  
water levels are in feet above or below (-) sea level; E, estimated value; --, no data available]

**SITE: DP-1A**

Land surface elevation: 1.20

Screen depth: 1.9-2.9

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1525	1.37	1033	1.30	--	--
10/07/1998	--	--	--	--	1037	1.38
11/30/1998	1033	1.06	1426	1.05	1708	1.08
05/11/1999	1149	1.34	--	--	1703	1.32

**SITE: DP-1B**

Land surface elevation: 1.23

Screen depth: 6.5-7.5

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1035	2.00	1525	2.17	--	--
10/07/1998	--	--	--	--	1038	2.32
11/30/1998	1034	2.95	1427	2.94	1710	2.94
05/11/1999	1145	2.88	--	--	1704	2.87

**SITE: DP-5**

Land surface elevation: 1.36

Screen depth: 3.7-4.7

Hydrogeologic unit: wetland sediments

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/07/1998	--	--	--	--	1110	2.41
05/11/1999	1248	2.01	--	--	1738	2.04

---

**SITE: DP-12**

Land surface elevation: 1.05

Screen depth: 2.6-3.6

Hydrogeologic unit: wetland sediments

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1006	0.79	1347	0.91	1633	1.70
02/17/1999	1405	0.81	--	--	907	1.73
05/11/1999	1319	0.64	--	--	1803	1.26

**SITE: WB19A**

Land surface elevation: 1.52

Screen depth: 1.3-1.8

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1552	1.43	1119	1.44	--	--
10/07/1998	--	--	--	--	1102	2.18
11/30/1998	1059	1.35	--	--	1507	1.39
05/11/1999	1218	1.36	--	--	1725	1.33

**SITE: WB19B**

Land surface elevation: 1.5

Screen depth: 4.2-4.7

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1553	1.56	1120	1.51	--	--
10/07/1998	--	--	--	--	1102	1.55
11/30/1998	1508	1.41	--	--	1059	1.41
05/11/1999	1218	1.39	--	--	1727	1.41

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB19D**

Land surface elevation: 1.51

Screen depth: 13.5-14.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1556	2.11	1122	2.18	--	--
10/07/1998	--	--	--	--	1103	2.13
11/30/1998	1509	2.08	--	--	1059	2.12
05/11/1999	1220	3.11	--	--	1730	3.18

**SITE: WB19E**

Land surface elevation: 1.46

Screen depth: 28.5-29.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1123	1.45	--	--	1558	1.24
10/07/1998	1104	1.96	--	--	--	--
11/30/1998	1101	3.56	--	--	1509	1.50
05/11/1999	1221	3.84	--	--	1730	FLOWING

**SITE: WB19F**

Land surface elevation: 1.33

Screen depth: 45.0-45.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1600	2.72	1124	2.58	--	--
10/07/1998	--	--	--	--	1104	1.84
11/30/1998	1510	1.76	--	--	1102	2.64
05/11/1999	1221	1.06	--	--	1730	3.43

---

**SITE: WB21A**

Land surface elevation: 3

Screen depth: 1.5-2.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1454	2.94	1020	2.85	--	--
10/07/1998	--	--	--	--	1017	2.89
11/30/1998	1334	2.82	951	2.84	1638	2.77
05/11/1999	1107	3.01	--	--	1635	2.99

**SITE: WB21B**

Land surface elevation: 3.10

Screen depth: 6.5-7.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1457	3.38	1020	3.42	--	--
10/07/1998	--	--	--	--	1017	3.84
11/30/1998	1345	3.32	952	3.23	1639	3.50
05/11/1999	1109	3.60	--	--	1636	3.75

**SITE: WB21C**

Land surface elevation: 2.74

Screen depth: 13.5-14.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1457	3.38	1021	3.50	--	--
10/07/1998	--	--	--	--	1018	3.88
11/30/1998	1346	3.32	953	3.22	1639	3.55
05/11/1999	1110	3.59	--	--	1636	3.78

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB21D**

Land surface elevation: 3.14

Screen depth: 17.5-18.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1458	3.82	1021	3.79	--	--
10/07/1998	--	--	--	--	1018	3.82
11/30/1998	1347	3.39	953	3.44	1640	3.45
05/11/1999	1111	3.92	--	--	1637	3.91

**SITE: WB21E**

Land surface elevation: 3.10

Screen depth: 29.5-30.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1458	6.43	1022	6.44	--	--
10/07/1998	--	--	--	--	1019	6.43
11/30/1998	1348	6.17	954	6.25	1640	6.17
05/11/1999	1111	6.31	--	--	1637	6.31

**SITE: WB21F**

Land surface elevation: 3.10

Screen depth: 36.0-36.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1459	3.78	1023	3.93	--	--
10/07/1998	--	--	--	--	1019	4.03
11/30/1998	1351	3.76	955	3.78	1641	3.78
05/11/1999	1112	4.49	--	--	1638	4.48

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**SITE: WB21G**

Land surface elevation: 3.25

Screen depth: 45.0-45.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1459	4.94	1024	4.98	--	--
10/07/1998	--	--	--	--	1020	5.00
11/30/1998	1351	4.37	955	4.46	1642	4.44
05/11/1999	1112	4.71	--	--	1138	4.70

**SITE: WB21W**

Land surface elevation: 1.65

Screen depth: 0.0-2.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1500	2.76	1025	2.86	--	--
10/07/1998	--	--	--	--	1020	2.82
11/30/1998	1352	2.82	957	2.69	1642	2.71
05/11/1999	1113	2.82	--	--	1639	2.72

**SITE: WB22A**

Land surface elevation: 2.52

Screen depth: 1.5-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1501	2.05	947	2.07	--	--
10/07/1998	--	--	--	--	1021	2.08
11/30/1998	958	2.06	--	2.07	1644	2.06
05/11/1999	1117	2.36	--	--	1642	2.34



**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB22B**

Land surface elevation: 2.62

Screen depth: 7.0-7.5

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1502	3.11	950	3.12	--	--
10/07/1998	--	--	--	--	1022	3.18
11/30/1998	1356	2.93	959	2.93	1644	2.93
05/11/1999	1118	3.33	--	--	1642	3.33

**SITE: WB22C**

Land surface elevation: 2.52

Screen depth: 13.0-13.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1503	4.13	951	4.13	--	--
10/07/1998	--	--	--	--	1022	4.11
11/30/1998	1358	4.67	959	3.73	1645	3.60
05/11/1999	1118	3.70	--	--	1642	3.69

**SITE: WB22D**

Land surface elevation: 2.47

Screen depth: 17.0-17.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1503	3.28	953	3.14	--	--
10/07/1998	--	--	--	--	1023	3.84
11/30/1998	1359	3.30	1000	3.05	1645	3.47
05/11/1999	1118	3.44	--	--	1643	3.72

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**SITE: WB22E**

Land surface elevation: 2.53

Screen depth: 22.0-22.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1504	4.71	955	4.71	--	--
10/07/1998	--	--	--	--	1023	4.71
11/30/1998	1400	4.70	1001	4.70	1645	4.70
05/11/1999	1121	4.93	--	--	1643	4.93

**SITE: WB22W**

Land surface elevation: 2.48

Screen depth: 0.0-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1506	2.13	958	2.18	--	--
10/07/1998	--	--	--	--	1025	2.51
11/30/1998	1402	2.05	1006	2.10	1648	2.01
05/11/1999	1238	2.09	--	--	1645	2.1

**SITE: WB23A**

Land surface elevation: 1.05

Screen depth: 0.5-1.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1513	1.37	1006	--	--	--
10/07/1998	--	--	--	--	958	2.36
11/30/1998	1014	1.04	1416	1.37	1653	1.79
05/11/1999	1133	1.06	--	--	1651	1.44

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB23B**

Land surface elevation: 0.77

Screen depth: 2.2-2.7

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1516	1.32	1008	1.29	--	--
10/07/1998	--	--	--	--	1031	1.27
11/30/1998	1414	1.19	1016	1.19	1654	1.21
05/11/1999	1137	1.31	--	--	1654	1.22

**SITE: WB23C**

Land surface elevation: 1.06

Screen depth: 8.5-9.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1516	0.33	1010	0.31	--	--
10/07/1998	--	--	--	--	1032	0.33
11/30/1998	1414	0.30	1016	0.28	1655	0.29

**SITE: WB23D**

Land surface elevation: 1.01

Screen depth: 12.5-13.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1517	3.49	1011	3.41	--	--
10/07/1998	--	--	--	--	1032	3.82
11/30/1998	1415	3.19	1017	3.09	1655	3.31
05/11/1999	1139	3.35	--	--	1657	3.68

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**SITE: WB23E**

Land surface elevation: 0.92

Screen depth: 16.0-16.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1517	3.39	1011	3.42	--	--
10/07/1998	--	--	--	--	1033	3.83
11/30/1998	1416	1.83	1018	1.71	16.56	1.94
05/11/1999	1141	3.43	--	--	1657	3.54

**SITE: WB23F**

Land surface elevation: 1.00

Screen depth: 21.0-21.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1518	3.50	1011	3.64	--	--
10/07/1998	--	--	--	--	1033	4.06
11/30/1998	1418	3.57	1018	3.33	1656	4.78
05/11/1999	1142	3.76	--	--	1658	3.98

**SITE: WB24A**

Land surface elevation: 1.85

Screen depth: 0.9-1.4

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1507	1.56	1000	1.58	--	--
10/07/1998	--	--	--	--	1026	1.58
11/30/1998	1409	1.46	1007	1.52	1649	1.46
05/11/1999	1124	1.87	--	--	1646	1.59

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB24B**

Land surface elevation: 1.77

Screen depth: 3.0-3.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1508	1.71	1000	1.63	--	--
10/07/1998	--	--	--	--	1027	2.23
11/30/1998	1008	1.57	1412	1.55	1649	1.65
05/11/1999	1143	1.17	--	--	1647	1.30

**SITE: WB24E**

Land surface elevation: 1.85

Screen depth: 16.5-17.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1004	--	1510	3.18	--	--
10/07/1998	--	--	--	--	954	3.64
11/30/1998	1011	3.02	1414	3.09	1651	3.34
05/11/1999	1131	3.43	--	--	1648	3.51

**SITE: WB24F**

Land surface elevation: 1.80

Screen depth: 28.0-28.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1511	3.88	1028	3.79	--	--
10/07/1998	--	--	--	--	1030	4.20
11/30/1998	1419	3.73	1011	3.65	1651	3.94
05/11/1999	1132	3.97	--	--	1649	3.97

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**SITE: WB24W**

Land surface elevation: 1.8

Screen depth: 0.0-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1512	1.65	1005	1.68	--	--
10/07/1998	--	--	--	--	1029	2.43
11/30/1998	1414	1.65	1013	1.59	1653	1.93
05/11/1999	1132	1.60	--	--	1650	1.65

**SITE: WB25A**

Land surface elevation: 1.23

Screen depth: 0.5-1.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1522	1.11	1029	1.23	--	--
10/07/1998	--	--	--	--	1034	1.81
11/30/1998	--	--	--	1.16	--	--
05/11/1999	1146	0.95	--	--	1659	0.97

**SITE: WB25B**

Land surface elevation: 1.20

Screen depth: 13.5-14.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1522	3.18	1030	3.32	--	--
10/07/1998	1035	--	--	--	1035	3.79
11/30/1998	1031	3.02	1424	3.28	1658	3.46
05/11/1999	1147	3.36	--	--	1700	3.65

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB25C**

Land surface elevation: 1.12

Screen depth: 15.5-16.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1522	3.15	1031	3.31	1035	3.79
11/30/1998	1032	3.02	1425	3.27	1707	3.46
05/11/1999	1148	3.35	--	--	1701	3.63

**SITE: WB25C.1**

Land surface elevation: 1.21

Screen depth: 0.4-1.4

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1523	1.05	1032	1.37	--	--
10/07/1998	--	--	--	--	1036	2.32
11/30/1998	1032	0.80	1426	1.15	1707	1.77
05/11/1999	1148	0.94	--	--	1702	1.31

**SITE: WB25D.1**

Land surface elevation: 1.16

Screen depth: 12.0-13.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1524	2.93	1034	2.96	--	--
10/07/1998	--	--	--	--	1037	3.25
11/30/1998	1035	2.83	1427	2.85	1709	2.93
05/11/1999	1149	3.29	--	--	1703	3.28

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**SITE: WB26A**

Land surface elevation: 0.38

Screen depth: 1.0-1.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1526	0.56	1042	1.72	--	--
10/07/1998	--	--	--	--	1038	2.44
11/30/1998	1040	0.49	1428	1.52	1711	2.03
05/11/1999	1152	1.18	--	--	1704	1.58

**SITE: WB26B**

Land surface elevation: 0.47

Screen depth: 2.5-3.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1528	2.03	1043	2.08	--	--
10/07/1998	--	--	--	--	1039	2.15
11/30/1998	1041	1.89	1429	1.90	1712	1.90
05/11/1999	1152	2.28	--	--	1706	2.27

**SITE: WB26B.1**

Land surface elevation: 0.45

Screen depth: 2.0-3.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1533	0.91	1047	0.91	--	--
10/07/1998	--	--	--	--	1044	0.93
11/30/1998	1434	0.75	1046	0.72	1716	0.79
05/11/1999	1155	0.71	--	--	1708	0.72



**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB26C**

Land surface elevation: 0.20

Screen depth: 4.0-4.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1528	1.19	1044	1.25	--	--
10/07/1998	--	--	--	--	1040	1.45
11/30/1998	1041	0.90	1430	0.96	1712	0.97
05/11/1999	1153	1.25	--	--	1706	1.33

**SITE: WB26D**

Land surface elevation: 0.33

Screen depth: 5.5-6.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1529	-0.34	1045	-0.37	--	--
10/07/1998	--	--	--	--	1041	-0.28
11/30/1998	1042	-0.67	1431	-0.69	1714	-0.71
05/11/1999	1153	-0.46	--	--	1706	-0.46

**SITE: WB26E**

Land surface elevation: 0.28

Screen depth: 8.8-9.3

Hydrogeologic unit: old stream channel deposit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1529	4.79	1045	4.97	--	--
10/07/1998	--	--	--	--	1041	5.60
11/30/1998	1042	4.50	1432	4.87	1714	5.17
05/11/1999	1153	4.68	--	--	1707	5.13

---

**SITE: WB26F**

Land surface elevation: 0.33

Screen depth: 15.0-15.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1046	0.45	1530	0.17	--	--
10/07/1998	--	--	--	--	1042	0.95
11/30/1998	1043	0.05	1433	0.39	1714	0.53
05/11/1999	1159	0.35	--	--	1707	0.69

**SITE: WB26G**

Land surface elevation: 0.40

Screen depth: 19.5-20.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1531	2.97	1047	3.12	--	--
10/07/1998	--	--	--	--	1042	3.58
11/30/1998	1433	3.12	1044	2.85	1715	3.32
05/11/1999	1154	3.21	--	--	1708	3.52

**SITE: WB26H**

Land surface elevation: 0.50

Screen depth: 27.0-27.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1532	6.19	1046	6.29	--	--
10/07/1998	--	--	--	--	1043	6.76
11/30/1998	1434	6.30	1045	6.04	1715	6.47
05/11/1999	1154	6.67	--	--	1708	6.67

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB26W**

Land surface elevation: 0.63

Screen depth: 0.0-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1533	1.14	1048	2.87	--	--
10/07/1998	--	--	--	--	1000	2.77
11/30/1998	1435	2.07	1047	0.92	1716	2.26
05/11/1999	1156	0.86	--	--	1709	1.79

**SITE: WB27A**

Land surface elevation: -0.92

Screen depth: 1.0-1.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1050	-2.77	1537	-2.81	--	--
10/07/1998	--	--	--	--	1045	-2.70
11/30/1998	1043	-2.88	1436	-2.89	1719	-2.92
05/11/1999	1157	-2.68	--	--	1710	-2.64

**SITE: WB27A.1**

Land surface elevation: -0.94

Screen depth: 0.1-1.7

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1542	0.04	1058	1.14	--	--
10/07/1998	--	--	--	--	1049	2.30
11/30/1998	1052	0.07	1448	1.27	1725	1.82
05/11/1999	1202	0.06	--	--	1715	1.36

---

**SITE: WB27B**

Land surface elevation: -0.97

Screen depth: 3.2-3.7

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1537	0.77	1050	0.80	--	--
10/07/1998	--	--	--	--	1045	0.89
11/30/1998	1438	0.51	1045	0.56	1720	0.63
05/11/1999	1158	0.89	--	--	1711	0.95

**SITE: WB27B.1**

Land surface elevation: -1.00

Screen depth: 4.5-5.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1543	1.22	1059	1.25	--	--
10/07/1998	--	--	--	--	1051	1.24
11/30/1998	1449	1.11	1053	1.13	1728	1.11
05/11/1999	1203	1.03	--	--	1716	1.04

**SITE: WB27C**

Land surface elevation: -0.98

Screen depth: 4.5-5.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1538	1.09	1051	1.14	--	--
10/07/1998	--	--	--	--	1046	1.11
11/30/1998	1046	0.77	1443	0.76	1721	0.74
05/11/1999	1158	1.07	--	--	1712	1.07

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB27D**

Land surface elevation: -0.88

Screen depth: 8.2-8.7

Hydrogeologic unit: old stream channel deposit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1539	2.42	1052	2.71	--	--
10/07/1998	--	--	--	--	1047	3.42
11/30/1998	1047	2.36	1444	2.89	1722	3.07
05/11/1999	1159	2.51	--	--	1713	3.02

**SITE: WB27D.1**

Land surface elevation: -0.95

Screen depth: 9.0-10.0

Hydrogeologic unit: Paleochannel

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1544	3.73	1103	4.06	--	--
10/07/1998	--	--	--	--	1052	4.79
11/30/1998	1450	4.17	1055	3.74	1728	4.46
05/11/1999	1209	3.95	--	--	1716	4.36

**SITE: WB27E**

Land surface elevation: -0.96

Screen depth: 15.0-15.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1541	5.02	1056	5.25	--	--
10/07/1998	--	--	--	--	1048	5.97
11/30/1998	1050	4.94	1446	5.36	1724	5.58
05/11/1999	1200	5.15	--	--	1713	5.57

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**SITE: WB27E.1**

Land surface elevation: -0.94

Screen depth: 11.8-12.8

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1545	-0.98	1106	-0.97	--	--
10/07/1998	--	--	--	--	1053	-0.95
11/30/1998	1450	-1.15	1056	-1.13	1730	-1.14
05/11/1999	1204	-0.99	--	--	1717	-0.99

**SITE: WB27F**

Land surface elevation: -0.90

Screen depth: 18.0-18.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1540	3.17	1053	3.15	--	--
10/07/1998	--	--	--	--	1048	3.23
11/30/1998	1445	3.21	1049	3.24	1723	-1.79
05/11/1999	1159	3.09	--	--	1714	3.23

**SITE: WB27G**

Land surface elevation: -0.90

Screen depth: 26.0-26.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1541	3.73	1057	3.81	--	--
10/07/1998	--	--	--	--	1049	4.31
11/30/1998	1447	3.89	1051	3.59	1725	4.03
05/11/1999	1201	3.99	--	--	1714	4.26

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB28A**

Land surface elevation: 0.83

Screen depth: 1.2-1.7

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1546	1.03	1109	1.09	--	--
10/07/1998	--	--	--	--	1054	2.14
11/30/1998	1451	1.33	--	--	1049	0.77
05/11/1999	1206	0.75	--	--	1718	1.29

**SITE: WB28B**

Land surface elevation: 0.84

Screen depth: 4.5-5.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1547	1.01	1110	0.99	--	--
10/07/1998	--	--	--	--	1055	1.23
11/30/1998	1452	0.83	--	--	1050	0.84
05/11/1999	1208	1.00	--	--	1720	0.98

**SITE: WB28C**

Land surface elevation: 0.82

Screen depth: 9.0-9.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1547	1.44	1111	1.59	--	--
10/07/1998	--	--	--	--	1055	1.47
11/30/1998	1452	1.14	--	--	1051	1.22
05/11/1999	1209	1.32	--	--	1720	1.30

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**SITE: WB28C.1**

Land surface elevation: 0.75

Screen depth: 9.0-10.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1548	1.58	1113	1.55	--	--
10/07/1998	--	--	--	--	1056	1.57
11/30/1998	1455	1.19	--	--	1053	1.17
05/11/1999	1211	1.31	--	--	1721	1.30

**SITE: WB28D**

Land surface elevation: 0.89

Screen depth: 14.5-15.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1548	2.34	1112	2.55	--	--
10/07/1998	--	--	--	--	1055	3.31
11/30/1998	1452	2.84	--	--	1051	2.27
05/11/1999	1209	2.47	--	--	1721	2.94

**SITE: WB28D.1**

Land surface elevation: 0.81

Screen depth: 14.0-15.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1549	2.20	1113	2.20	--	--
10/07/1998	--	--	--	--	1057	2.16
11/30/1998	1455	2.07	--	--	1053	2.05
05/11/1999	1211	2.06	--	--	1722	1.98



**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB28F**

Land surface elevation: 0.73

Screen depth: 34.5-35.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1548	3.80	1112	2.80	--	--
10/07/1998	--	--	--	--	1056	3.86
11/30/1998	1453	3.67	--	--	1052	3.66
05/11/1999	1209	4.26	--	--	1721	4.24

**SITE: WB28W**

Land surface elevation: 0.95

Screen depth: 0.0-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1550	1.13	1114	1.20	--	--
10/07/1998	--	--	--	--	1058	2.23
11/30/1998	1456	1.42	--	--	1054	0.83
05/11/1999	1212	0.70	--	--	1722	1.26

**SITE: WB30A**

Land surface elevation: 1.45

Screen depth: 0.9-1.4

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1604	1.48	1127	1.33	--	--
10/07/1998	--	--	--	--	1107	2.23
11/30/1998	1459	1.60	1020	1.53	1703	1.92
05/11/1999	1226	1.22	--	--	1736	1.24

---

**SITE: WB30B**

Land surface elevation: 1.44

Screen depth: 2.0-2.5

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1129	2.23	--	--	1605	2.27
10/07/1998	--	--	1108	2.21	--	--
11/30/1998	1021	2.11	1459	2.14	1704	2.14
05/11/1999	1226	2.47	--	--	1737	2.54

**SITE: WB30C**

Land surface elevation: 1.49

Screen depth: 4.5-5.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1605	2.78	1130	2.78	--	--
10/07/1998	--	--	--	--	1108	2.74
11/30/1998	1500	2.41	1022	2.39	1705	2.43
05/11/1999	1227	2.49	--	--	1737	2.57

**SITE: WB30D**

Land surface elevation: 1.41

Screen depth: 6.5-7.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1606	3.11	1130	3.03	--	--
10/07/1998	--	--	--	--	1108	3.08
11/30/1998	1022	2.72	1501	2.67	1705	2.73
05/11/1999	1228	3.15	--	--	1737	3.29

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

**SITE: WB30E**

Land surface elevation: 1.45

Screen depth: 12.5-13.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1607	3.34	1131	3.36	--	--
10/07/1998	--	--	--	--	1109	3.33
11/30/1998	1706	3.26	1502	3.22	1023	3.24
05/11/1999	1230	3.20	--	--	1738	3.31

**SITE: WB31A**

Land surface elevation: 1.60

Screen depth: 1.0-1.5

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1607	1.68	1133	1.67	--	--
10/07/1998	--	--	--	--	1111	1.66
11/30/1998	1650	1.59	1502	1.58	1025	1.55
05/11/1999	1232	1.68	--	--	1739	1.68

**SITE: WB31B**

Land surface elevation: 1.61

Screen depth: 3.5-4.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1608	2.18	1134	2.17	--	--
10/07/1998	--	--	--	--	1112	2.25
11/30/1998	1502	2.08	1025	2.04	1651	2.26
05/11/1999	1232	2.09	--	--	1740	2.24

---

**SITE: WB31C**

Land surface elevation: 1.61

Screen depth: 5.5-6.0

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1609	2.20	1134	2.34	--	--
10/07/1998	--	--	--	--	1112	2.77
11/30/1998	1502	2.07	1026	2.00	1651	2.21
05/11/1999	1230	2.13	--	--	1740	2.26

**SITE: WB31D**

Land surface elevation: 1.54

Screen depth: 7.0-7.5

Hydrogeologic unit: wetland sediments, lower clayey unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1609	2.72	--	--	--	--
10/07/1998	--	--	1113	2.71	1007	2.75
11/30/1998	1027	2.48	1503	2.50	1652	2.48
05/11/1999	1235	2.83	--	--	1741	2.83

**SITE: WB31E**

Land surface elevation: 1.52

Screen depth: 12.8-13.3

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
10/06/1998	1610	2.71	1136	2.87	--	--
10/07/1998	--	--	--	--	1113	3.42
11/30/1998	1654	3.16	1504	2.94	1028	2.59
05/11/1999	1235	2.82	--	--	1654	3.16

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB32B**

Land surface elevation: 10.77

Screen depth: 26.5-27.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	945	4.49	1327	4.51	1624	4.49
02/17/1999	1428	4.47	--	--	927	4.43

**SITE: WB33A**

Land surface elevation: 2.96

Screen depth: 8.7-9.2

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	952	1.29	1340	1.29	1628	1.31
02/17/1999	1421	3.13	--	--	919	3.07
05/11/1999	1328	2.25	--	--	1755	2.37

**SITE: WB33B**

Land surface elevation: 2.95

Screen depth: 14.0-14.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	952	2.61	1338	2.77	1627	3.07
02/17/1999	1422	3.20	--	--	921	3.41
05/11/1999	1328	2.79	--	--	1755	3.32

---

**SITE: WB33F**

Land surface elevation: 2.95

Screen depth: 42.5-43.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	950	2.83	1334	2.82	1426	2.80
02/17/1999	1423	3.03	--	--	923	3.06
05/11/1999	1330	3.20	--	--	1756	3.23

**SITE: WB34A**

Land surface elevation: 1.43

Screen depth: 1.5-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1003	1.41	1345	1.41	1632	1.42
02/17/1999	1415	1.66	--	--	908	1.48
05/11/1999	1321	1.39	--	--	1757	1.40

**SITE: WB34B**

Land surface elevation: 1.37

Screen depth: 7.3-7.8

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1002	1.83	1344	2.01	1631	2.49
02/17/1999	1416	2.26	--	--	909	2.58
05/11/1999	1324	1.99	--	--	1757	2.31

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB34C**

Land surface elevation: 1.36

Screen depth: 15.0-15.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	958	2.29	1343	2.42	1631	2.79
02/17/1999	1417	2.89	--	--	909	2.97E
05/11/1999	1324	2.44	--	--	1758	2.87

**SITE: WB34D**

Land surface elevation: 1.35

Screen depth: 18.3-18.8

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	956	2.46	1342	2.45	1630	2.47
02/17/1999	1417	2.78	--	--	912	2.76
05/11/1999	1325	2.80	--	--	1758	2.81

**SITE: WB34E**

Land surface elevation: 1.35

Screen depth: 26.5-27.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	955	3.67	1340	3.83	1629	4.07
02/17/1999	1419	4.48E	--	--	914	4.53E
05/11/1999	1326	4.00	--	--	1759	4.27

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**SITE: WB35A**

Land surface elevation: 1.19

Screen depth: 1.5-2.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1014	1.03	1353	1.05	1637	1.77
02/17/1999	1355	1.22	--	--	901	1.73
05/11/1999	1313	1.87	--	--	1800	1.27

**SITE: WB35B**

Land surface elevation: 1.29

Screen depth: 2.8-3.3

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1013	1.09	1352	1.11	1636	1.75
02/17/1999	1356	1.25	--	--	902	1.76
05/11/1999	1314	1.00	--	--	1800	1.34

**SITE: WB35C**

Land surface elevation: 1.27

Screen depth: 7.2-7.7

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1012	1.88	1352	2.19	1635	2.63
02/17/1999	1357	2.25	--	--	902	--
05/11/1999	1316	2.03	--	--	1801	2.41



**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB35D**

Land surface elevation: 1.27

Screen depth: 13.0-13.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1011	2.06	1350	2.36	1635	2.78
02/17/1999	1558	2.46	--	--	905	2.34
05/11/1999	1317	2.17	--	--	1802	2.61

**SITE: WB35E**

Land surface elevation: 1.27

Screen depth: 18.0-18.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1010	2.17	1349	2.44	1635	2.85
02/17/1999	1559	1.63	--	--	905	1.99
05/11/1999	1317	2.32	--	--	1802	2.72

**SITE: WB35F**

Land surface elevation: 1.31

Screen depth: 27.5-28.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1008	3.91	1348	3.90	1634	3.89
02/17/1999	1400	3.76	--	--	906	3.76
05/11/1999	1318	4.14	--	--	1802	4.15

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**SITE: WB36A**

Land surface elevation: 1.27

Screen depth: 1.7-2.2

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1024	0.98	1402	1.00	1643	1.03
02/17/1999	1348	1.27	--	--	842	1.17
05/11/1999	1302	1.10	--	--	1804	1.14

**SITE: WB36B**

Land surface elevation: 0.99

Screen depth: 2.7-3.2

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1023	0.96	1401	0.96	1642	1.01
02/17/1999	1349	1.30	--	--	843	1.29
05/11/1999	1303	0.95	--	--	1805	0.91

**SITE: WB36C**

Land surface elevation: 1.04

Screen depth: 7.1-7.6

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1021	2.93	1400	2.92	1642	2.93
02/17/1999	1350	2.70	--	--	--	--
05/11/1999	1307	2.37	--	--	1805	2.80

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB36D**

Land surface elevation: 0.98

Screen depth: 13.0-13.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1020	1.99	1359	2.33	1641	2.75
02/17/1999	1351	1.56	--	--	846	1.85
05/11/1999	1308	2.24	--	--	1806	2.55

**SITE: WB36E**

Land surface elevation: 1.03

Screen depth: 18.0-18.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1018	1.94	1357	2.27	1640	2.70
02/17/1999	--	1.27	--	--	846	1.44
05/11/1999	1310	2.22	--	--	1806	2.48

**SITE: WB36F**

Land surface elevation: 1.00

Screen depth: 27.5-28.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1017	3.76	1356	3.76	1639	3.77
02/17/1999	1352	3.82	--	--	847	3.82
05/11/1999	1310	4.46	--	--	1807	4.46

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**SITE: WB36G**

Land surface elevation: 1.09

Screen depth: 32.0-32.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1015	3.65	--	--	1638	4.02
02/17/1999	1353	4.02	--	--	848	3.37E
05/11/1999	1311	4.03	--	--	1807	4.05

**SITE: WB37E**

Land surface elevation: 1.03

Screen depth: 18.0-18.5

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1027	1.85	1405	1.91	1644	2.12
05/11/1999	1300	0.38	--	--	1809	1.95

**SITE: WB37A**

Land surface elevation: 0.76

Screen depth: 1.7-2.2

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1032	0.48	1409	0.74	1647	1.42
02/17/1999	1335	1.05	--	--	830	1.33
05/11/1999	1258	0.57	--	--	1807	1.13

**Appendix F. Water-level measurements in the West Branch Canal Creek study area,  
Aberdeen Proving Ground, Maryland, October 1998 through May 1999—Continued**

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**SITE: WB37B**

Land surface elevation: 0.71

Screen depth: 2.5-3.0

Hydrogeologic unit: wetland sediments, upper peat unit

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1031	0.74	1407	0.74	1646	0.76
02/17/1999	1336	-0.81	--	--	831	0.89
05/11/1999	1259	0.84	--	--	1808	0.93

**SITE: WB37C**

Land surface elevation: 0.72

Screen depth: 7.1-7.6

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1030	1.95	1407	2.33	1646	2.74
02/17/1999	1338	0.94	--	--	835	2.82
05/11/1999	1259	2.17	--	--	1808	2.50

**SITE: WB37D**

Land surface elevation: 0.75

Screen depth: 13.5-14.0

Hydrogeologic unit: Canal Creek aquifer

Date	Low tide		Mid tide		High tide	
	Time	Water level	Time	Water level	Time	Water level
11/30/1998	1029	2.12	1406	2.11	1645	2.20
02/17/1999	--	--	--	--	839	0.86
05/11/1999	1300	2.32	--	--	1809	2.37

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