HYDROGEOLOGIC DATA FOR CARROLL ISLAND,

ABERDEEN PROVING GROUND, MARYLAND

By Lisa K. Ham, Lewis N. Sears, Scott W. Phillips,
and Frederick J. Tenbus

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CONVERSION FACTORS, ABBREVIATIONS, AND VERTICAL DATUM

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
gallon per minute (gal/min)	0.06308	liter per second
gallon per day (gal/d)	0.00378	cubic meter per day
gallon per minute per foot [(gal/min)/ft]	0.2070	liter per second per meter

Chemical concentration, water temperature, specific conductance, and electromagnetic induction are given in metric units. Chemical concentration is expressed in micrograms per liter (μg/L). Water temperature in degrees Celsius (^{o}C) can be converted to degrees Fahrenheit (^{o}F) by using the following equation:

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

Specific conductance is expressed in microsiemens per centimeter (μS/cm) at 25 degrees Celsius. Electromagnetic-induction data are expressed in millisiemens per meter (mS/m).

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD 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."

LIST OF ACRONYMS USED IN THIS REPORT

ADR's:	Analog to digital recorders
AEHA:	U.S. Army Environmental Hygiene Agency
APG:	Aberdeen Proving Ground
BZ:	An incapacitating agent (3-Quinuclidinyl benzilate)
CN:	Tear gas, a riot control agent (Chloroacetophenone)
COE:	Corps of Engineers
CS:	Tear gas, a riot control agent (O-chlorobenzylidene malononitrile)
DANC:	Decontaminating Agent, Non-Corrosive; an organic-based decontaminant
EM:	Electromagnetic induction
GB:	The nerve agent sarin (Isopropyl methyl phosphonofluoridate)
GD:	The nerve agent soman (Pinacolyl methyl phosphonofluoridate)
HD:	Distilled mustard, a blister agent (Bis(2-chloroethyl) sulfide)
HGA:	Hydrogeologic Assessment
RCRA:	Resource Conservation and Recovery Act
RFA:	RCRA Facility Assessment
STB:	Supertropical bleach, a chemical decontaminant
SWMU:	Solid waste management units
USATHAMA:	U.S. Army Toxic and Hazardous Material Agency
USEPA:	U.S. Environmental Protection Agency
VX:	A nerve agent (B-diisopropylaminoethyl-mercapto-O-ethyl methylphosphonothioate)

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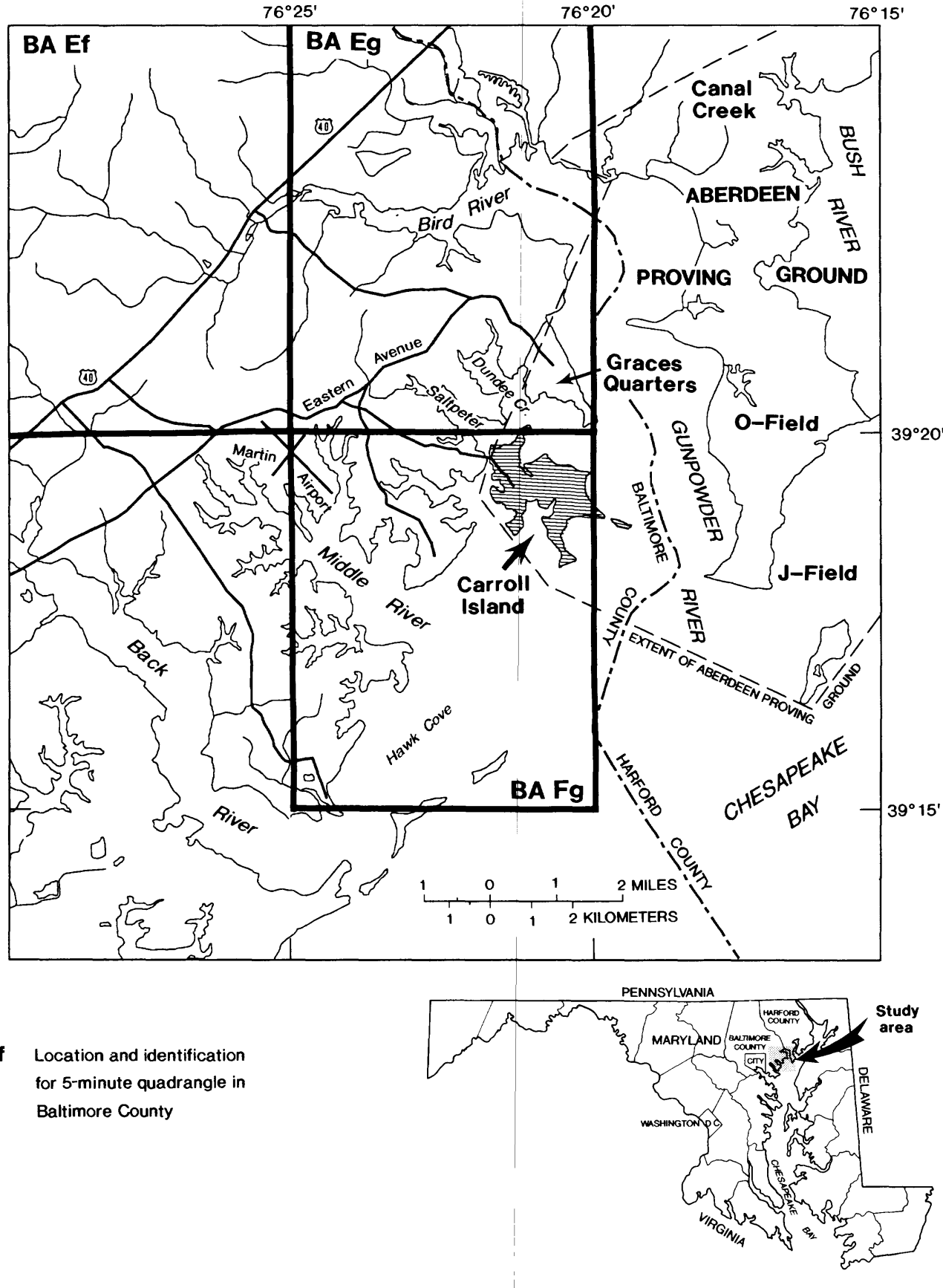
ABSTRACT

Hydrogeologic data were collected from Carroll Island, Aberdeen Proving Ground, Maryland, as part of an investigation begun in 1986 to determine the potential environmental effects of military testing on the island. The U.S. Army conducted chemical-agent and munition tests in this area from the late 1940's to 1972. This report includes a description of the well network, lithologic, and hydrologic data collected on or near Carroll Island. The observation-well network data collected includes information to aid in well placement, the location and construction data for Carroll Island wells, and an inventory of offsite wells. Lithologic data consist of lithologic and geophysical logs and analyses of the physical properties of sediment samples. Hydrologic data include tables of synoptic measurements and continuous records of ground-water levels, and pumpage, aquifer-test, tidal, and precipitation data.

INTRODUCTION

Background

The Edgewood Area of Aberdeen Proving Ground (APG), Maryland, has been used to develop, manufacture, and test military-related chemicals and munitions since World War I. Carroll Island (fig. 1), as part of the Edgewood Area of APG, was identified by the U.S. Army Toxic and Hazardous Material Agency (USATHAMA) as an area which has some degree of environmental contamination. In 1986, the U.S. Environmental Protection Agency (USEPA) issued a Resource Conservation and Recovery Act (RCRA) permit (MD3-21-002-1355) to address the environmental effects of solid waste management units (SWMU's) on Carroll Island. One requirement of the permit was to do a hydrogeologic assessment to determine the nature and extent of chemical releases from disposal areas (SWMU's) and other sources. In 1986, the U.S. Geological Survey, in cooperation with the U.S. Army, began a hydrogeologic assessment of Carroll Island.



BA Ef Location and identification for 5-minute quadrangle in Baltimore County

Figure 1.--Location of study area.

The study is being performed in two phases. The objectives of Phase I are to:

1) Identify the locations and dimensions of SWMU's and chemical-agent test sites.
2) Define the hydrogeologic system.
3) Verify whether releases have occurred or are still occurring from SWMU's in the study areas, and whether there is residual contamination from chemical-agent testing activities in the study areas.

Contingent upon the results from objective (3), Phase II will be implemented. The objectives of Phase II are to:

1) Further characterize the extent of contamination.
2) Model the hydrogeologic system.
3) Evaluate the hydrogeologic effects of various remedial action scenarios.

This report includes information collected for objective two (Phase I), which consists of hydrogeologic data obtained from May 1987 through December 1988.

Purpose and Scope

The purpose of this report is to present hydrogeologic data collected from May 1987 through December 1988 for Carroll Island. The data include (1) the description of the well network, (2) lithologic data, and (3) hydrologic data.

Forty-nine new observation wells were drilled and used in conjunction with 13 existing wells to establish a water-level and water-quality sampling network. Lithologic data were collected from 49 observation wells and 5 test holes that were drilled in 1987. The data included continuous core and split-spoon samples, and electric and gamma logs from the test holes. Continuous core samples and gamma logs were collected during the drilling of the observation wells. Grain-size distribution was determined for 21 sediment samples. The hydrologic data collected included monthly synoptic water levels measured from the wells, and continuous water-level data were collected from analog to digital recorders (ADR's) installed on 14 wells. Twenty-seven slug tests were performed to estimate hydraulic conductivity and storativity at various points in the Carroll Island aquifers. A tide gage was installed to help determine ground-water/surface-water interactions. A rain gage was installed to help quantify aquifer recharge.

Description of Study Area

Carroll Island is located in Baltimore County, 10 mi (miles) northeast of Baltimore, Maryland. The island is a flat, low-lying, 855-acre area (fig. 2) inhabited by wildlife and covered with forest, open fields, and marsh. The island is surrounded by the Chesapeake Bay, Gunpowder River, Saltpeter Creek, and Seneca Creek, which are ground-water discharge areas for Carroll Island.

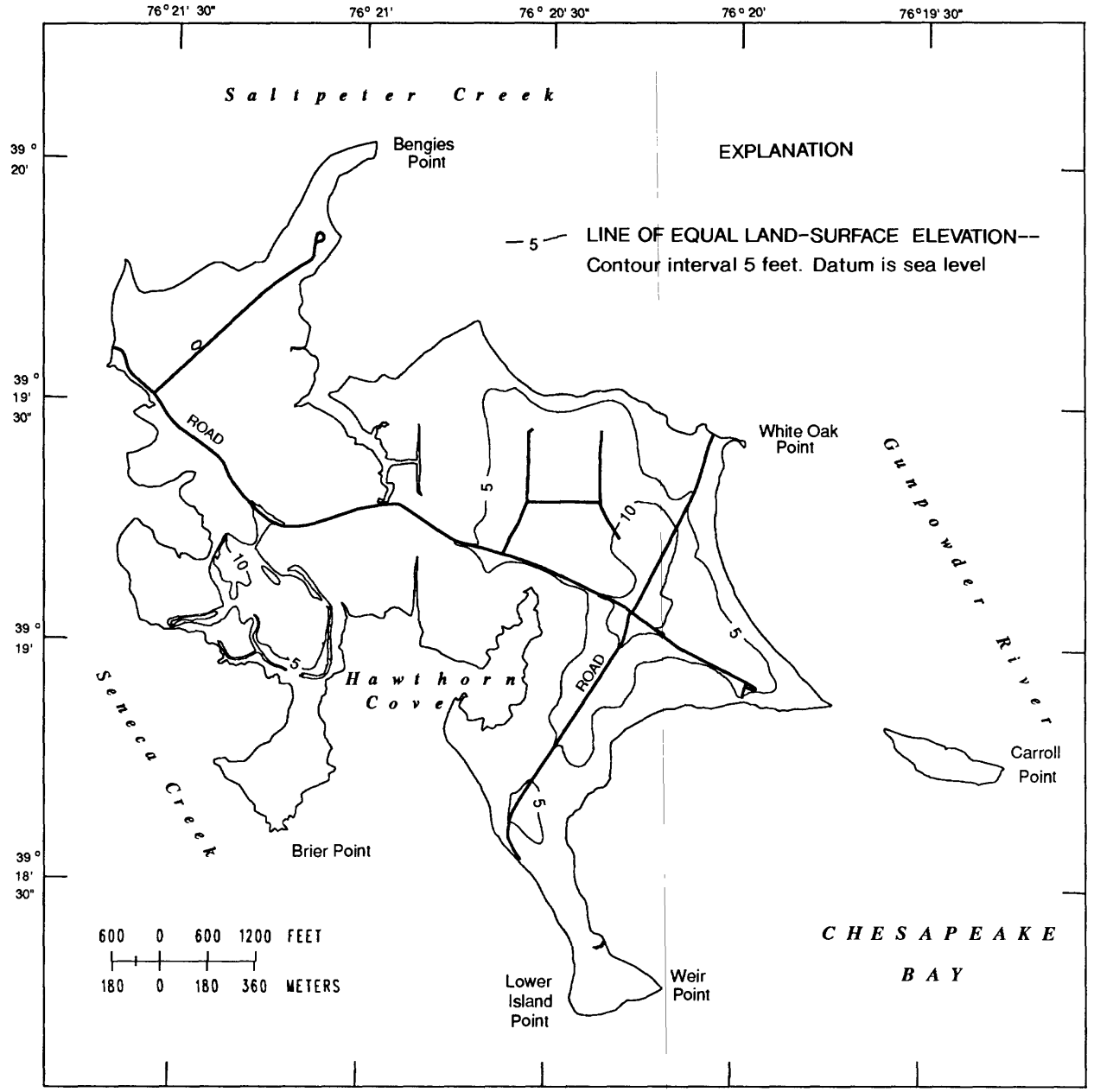


Figure 2.--Topography of Carroll Island.

The Carroll Island area is underlain by unconsolidated sediments of the Atlantic Coastal Plain (Nutter and Smigaj, 1975). The Coastal Plain sediments are mainly composed of interbedded sand, silt, and clay. The principal geologic formations underlying Carroll Island are the Talbot Formation, which functions as a surficial aquifer, and the Patapsco Formation, which functions as a confined aquifer.

Carroll Island was acquired by the U.S. Army in 1918 and leased as farmland until 1944. From the late 1940's through 1972, several sites on the island were used for testing various chemical agents (fig. 3). Nemeth and others (1983) reported that white phosphorous munitions and the following chemical agents (for this report, the common name is used instead of the chemical name) were tested: nerve (GB, VX); blister [mustard (HD), Lewisite]; vomiting (adamsite); tear (CN, CS); and incapacitating (BZ). Decontamination was performed by using calcium hypochlorite solution (STB) and a solvent-based solution (DANC). Other products used included organophosphate insecticides and herbicides. Burn pits and small dump areas were used for the disposal of test material and are considered SWMU's.

Previous Investigations

Previous investigations of Carroll Island include ecological investigations and an environmental survey conducted by USATHAMA (Nemeth and others, 1983). Additionally, an RCRA Facility Assessment (RFA) has been prepared by the U.S. Army Environmental Hygiene Agency (AEHA) (Nemeth, 1989).

A series of ecological investigations were performed by the U.S. Army during the 1970's to determine the effects of chemical-agent testing on Carroll Island. The objectives and methodology of the studies are outlined by Ward (1971). Ecological studies of various organisms were reported in Smrchek (1971a, 1971b), which included investigations of invertebrates and soil-litter invertebrate populations. Slack and others (1972) studied populations of reptiles and amphibians on Carroll Island. Roelle and Slack (1972) studied the bird population, and Speir (1972) inventoried the fish diversity. Pinkham and others (1976) compared the mammals of the eastern and western sections of Carroll Island. Weimer and others (1970) studied the acute toxicity of VX and the nerve agent GD (soman) to three estuarine species taken from the waters of the Gunpowder River near Carroll Island.

An environmental survey of Carroll Island was conducted during 1977 and 1978 by USATHAMA (Nemeth and others, 1983). The study involved conducting a historical use records search, collecting hydrogeologic data, and sampling for chemical analyses of soil, sediment, ground water, and surface water. The records search identified six potential contaminant sources on Carroll Island.

Thirteen wells were drilled at three of these sites to collect hydrogeologic data. The wells were drilled to a depth of about 25 ft (feet). Samples were collected from each well to determine the geology and physical properties of the sediments. One synoptic water-level measurement was taken on January 23, 1978.

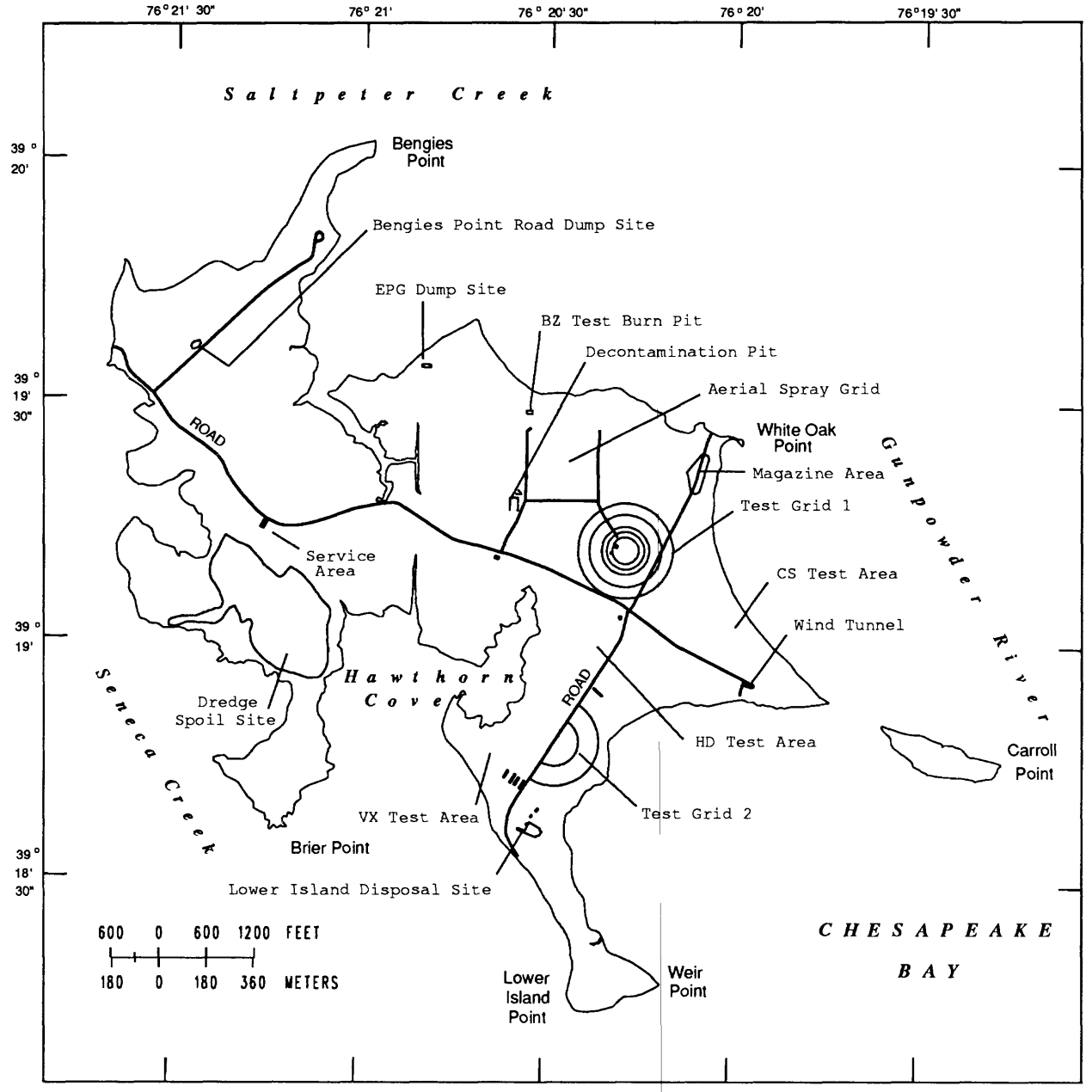


Figure 3.--Approximate location of potential sources of contamination.

Chemical sampling and analysis included a one-time collection of 2 soil samples, 7 bottom-sediment samples, 8 surface-water samples, and 13 ground-water samples. The samples were analyzed for general chemical quality and for volatile and semi-volatile organic compounds. The results indicated that low-level concentrations, 1 to 1,300 μg/L (micrograms per liter), of various hydrocarbons were present in the ground water and soil samples. The report concluded that further ground-water observation was not necessary. However, USATHAMA (U.S. Army Toxic and Hazardous Material Agency, written commun., July 20, 1983) revised their conclusions and stated that ground-water contamination on Carroll Island was not expected, but recommended that all wells be sampled quarterly for 1 year.

As part of the RCRA permit, a RFA study was done for the Edgewood Area by AEHA. The purpose of the RFA was to identify SWMU's, collect existing information on contaminant releases, and identify areas that need further investigation. The RFA study discusses previous testing, environmental studies, photographic interpretations, and descriptions of sites on Carroll Island. Fifteen sites, which include those from the RFA study, are identified as either SWMU's or areas with prior potential releases (Nemeth, 1989).

Acknowledgments

The authors wish to thank the following people for their assistance with the Carroll Island study. Cynthia Couch of the U.S. Army Environmental Management Office acted as the liaison between the U.S. Army, U.S. Environmental Protection Agency, and the U.S. Geological Survey. Gary Nemeth of AEHA supplied invaluable assistance in project planning and provided information concerning historical use of the study area. Eric Kauffman and Ira May of USATHAMA assisted in project planning and data-base management. Additionally, Doug Stevenson and Ann Ryan of USATHAMA prepared and coordinated contracts for laboratory analyses of chemical samples. Paul Buckmaster of the U.S. Army Chemical Research, Development, and Engineering Center provided a thorough critique of the project safety and health plan. The U.S. Army Corps of Engineers and Technical Escort Unit are commended for their efforts in completing remote-drilling operations on Carroll Island. James Stefano was project geologist for the Corps of Engineers (COE), John Bush was drilling foreman, and Edward Woods, William Woods, and John Sanders were the principal drillers.

DESCRIPTION OF WELL NETWORK

An observation-well network was established to determine ground-water quality and the direction of ground-water flow at Carroll Island. The network consisted of 13 observation wells from a previous study (Nemeth and others, 1983) and 49 observation wells that were installed in the fall of 1987. Figure 4 (at end of report) is a diagram showing the typical construction of the wells installed in 1987.

Network Design

Various forms of data were used to determine the placement of observation wells for the study area. Existing literature and historical data were used to locate possible sources of contamination. Field inspections were conducted to estimate the direction of ground-water flow. Electromagnetic-induction (EM) surveys were performed (fig. 5 and table 1, at end of report) to locate possible contaminant plumes.

Location and Numbering System of Wells

Additionally, five test holes were drilled to determine the geologic framework of Carroll Island, particularly the depth and thickness of the uppermost aquifer. The U.S. Geological Survey used a local well identification numbering system which incorporated sequential numbering and the use of a prefix and suffix (fig. 6, at end of report). The prefix "I" indicates the well is located on Carroll Island; the suffix "A," "B," or "C" indicates the chronological order in which each well in the cluster was drilled. Test holes are identified by the suffix "T". Wells that do not have a suffix are not part of a cluster or associated with a test hole.

In addition to the local numbering system, a regional U.S. Geological Survey number was assigned to each well and test hole in order to store them in the U.S. Geological Survey Ground-Water Site Inventory system. These numbers are based on the location of the well by county, Maryland grid coordinate system, and chronological order of the well in the grid system (that is, BA Eg 74--Baltimore County, Eg grid, and the 74th well inventoried in the Eg grid).

Observation Wells

In 1977, USATHAMA drilled and collected data from 13 observation wells on Carroll Island. In 1987, the COE drilled 49 wells and 5 test holes on the island. Locations of all wells are shown in figure 6 (multiple wells at the same site are identified by suffix letters). Well construction and development data from these wells are presented in table 2 (at end of report).

During drilling operations at the study area, safety precautions were used because of the possibility of encountering unexploded munitions. To ensure the safety of the operation, the U.S. Army Technical Escort Unit was on site during the remote-control drilling. Remote-control drilling was required for the first 15 ft of each hole, after which standard auger drilling was performed. Lithologic samples and geophysical logs were collected during the drilling to determine the placement and length of the well screen.

The COE surveyed the wells to determine the latitude and longitude of each well. The altitude of land surface and measuring point were surveyed by the U.S. Geological Survey. The well completion date shown in table 2 is the date the well was developed. This information, along with other well construction information, was recorded by the COE and provided to the U.S. Geological Survey.

Offsite Wells

All wells within a 3-mi radius of Carroll Island were inventoried to determine possible influences of pumpage on ground-water levels in and near the study area. This consisted of collecting information of wells inventoried during previous studies and of wells inventoried for the Carroll Island study; only the latter are included in this report. Well locations and data from previous reports can be found in Laughlin (1966) and Chapelle (1985). Well-completion reports compiled for this study were obtained from the Maryland Geological Survey and all wells were plotted on location maps based on the Maryland grid coordinate system (figs. 7, 8, and 9, at end of report). Well construction and development data are located in table 3 (at end of report).

Laughlin (1966, p. 302-335) inventoried 207 wells in the Maryland well grids (BA-Eg and BA-Fg) which are closest to Carroll Island. Many of the wells listed, however, are now abandoned because of the expansion of the Baltimore municipal water supply. In 1982, Chapelle (1985, p. 81-83) inventoried 14 new wells in the same quadrangles. An additional 44 wells were inventoried and located for the current study. The majority of these wells are used for domestic supply by residents on or adjacent to Carroll Island Road. The remainder are used for industry and farming and are listed and discussed under the "pumpage data" section.

LITHOLOGY

This section contains lithologic and geophysical logs compiled from samples collected during each well drilling. In addition, sediment samples were collected and analyzed for grain-size distribution.

Lithologic Logs

Field observations were recorded for each of the lithologic samples recovered during drilling operations. Continuous core and split-spoon samples were characterized by sediment type (gravel, sand, silt, clay, or variable combinations), by color, and by the presence of layering, organic material, mica, or other distinguishing characteristics. Sand and gravel were further categorized by grain size, roundness, sorting, and mineralogy (if it could be determined in the field). Sand-size categories used in this study were: fine [lower (fL), upper (fU)], medium [lower (mL), upper (mU)], coarse [lower (cL), upper (cU)], and the extremes of both ends of the scale [very fine (vf), very coarse (vc)].

Table 4 (at end of report) contains the lithologic descriptions of samples taken during the drilling of the observation wells. Depth is to the top of the bed; thickness is the distance from the top of the bed to the bottom. Lithologic descriptions of test hole samples are in table 5 (at end of report). Sample interval is the depth interval from which the sample was taken. The description for wells I01-I13 can be found in Nemeth and others (1983).

Geophysical Logs

Geophysical logs were run at each of the test hole and observation well locations by the COE (fig. 10, at end of report). Electric logs can only be obtained from uncased boreholes that contain drilling fluid; therefore, electric logs were collected from test holes only. Gamma logs were collected from both observation wells and test holes. The logging operation consisted of lowering a probe to the bottom of the hole and recording the responses as it was raised. The resulting graph is a plot of either resistance, spontaneous potential, or gamma radiation as a function of depth.

The electric logs used in this study were single-point resistance and spontaneous-potential logs, run in conjunction with each other. The probe for these electric logs consists of a single electrode lowered down the borehole, with another electrode at the surface in the mud pit. One channel of the logger measures resistivity between the two electrodes, while the other channel measures the strength of the potentials that occur at the contacts of down-hole formations.

Gamma logs measure the natural radiation emitted by materials (primarily clay) encountered in the borehole. As the probe is raised, it records the radioactivity of the surrounding formations. A gamma log may be obtained through augers, casing, and (or) any fluids encountered in the hole.

Physical Properties of Sediments

Twenty-one sediment samples were analyzed for grain-size distribution (fig. 11, at end of report) and were chosen to characterize the different lithologies in the study area. The analysis consisted of passing the sample through progressively finer sieves and recording the percentage of composition passing through each (table 6, at end of report). Nine sieve sizes were used during the analysis.

HYDROLOGY

Ground-water levels in the study area respond to tidal influences, pumpage, and seasonal variations of precipitation and evapotranspiration. To identify the response of the ground-water system to these variables, monthly water-level surveys (synoptics) were conducted by U.S. Geological Survey personnel and continuous water-level data were collected using ADR's.

Ground-Water Levels

Synoptics (table 7, at end of report) were conducted on the 13 existing wells beginning in July 1987. From November 1987 (when all new observation wells were completed) through December 1988, all 62 wells on Carroll Island were included in the synoptic surveys. A fixed measuring point was established for each well. The elevation of the measuring point, usually the top of the well casing, was surveyed by the U.S. Geological Survey. A first-order bench mark, located near Carroll Island, was used to survey the study area. The procedure for the synoptics was as follows: (1) Wells on the island were divided into three groups to be measured within a several-hour period; (2) water levels were measured with a steel tape; calculated water levels below the measuring point and time of measurement were recorded; and (3) water levels were measured at each well until the measurements agreed within 0.01 ft. The measurement was subtracted from the altitude of the measuring point in order to present the water-level data relative to sea level.

Hydrographs for Selected Wells

Fourteen ADR's were installed on selected wells to monitor the water level at 15-min (minute) intervals. These data helped in determining seasonal and short-term variations of ground-water levels. Data from the ADR's were collected each month and are presented on hydrographs, which show water level relative to sea level over time (figs. 12-25, at end of report). The water level is represented by the solid line, and missing data are indicated by a dotted line.

Pumpage Data

Seven nondomestic production wells are located within a 3-mi radius of Carroll Island (table 8 at end of report, and figs. 7, 8, and 9). Table 8 includes two columns for water usage, stated in gallons per day (gal/d). One column contains pumpage values reported by well owners. The accuracy of these quantities is dependent on the accuracy of the metering technique employed. The far right column shows annual average withdrawal estimates, as reflected on Water Appropriation Permits issued by the Maryland Water Resources Administration.

Aquifer-Test Data

Slug-injection tests by the volume-displacement method were conducted on selected wells in order to determine horizontal hydraulic conductivity and storativity at various points in the Carroll Island aquifers (table 9, at end of report). The slug is a Teflon[1]-coated cylinder (5.4 ft long and 2.3 in. in diameter). A pressure transducer and digital data logger was used to monitor the water-level recovery. The slug was placed below the water surface in the well causing a temporary rise in the water level which diminished with time to the equilibrium water level. Removal of the slug from the well caused a drop in the water level, which was recorded by the data logger until the equilibrium level was reestablished. Instantaneous water levels were recorded at intervals that varied from 0.2 s (second) at the beginning of the test to 100 s at the end of the test. Tests were run for 16 min, except in instances where the equilibrium water level was attained in less time.

Tidal Data

An ADR was installed at White Oak Point on Carroll Island (fig. 2) to help determine ground-water/surface-water interactions. Figure 26 presents the tide gage data from September 1987 to October 1988. Tidal fluctuations were recorded every 15 min, but due to the great number of data points, mean daily values are shown. Missing data are indicated by a dotted line.

Precipitation Data

A precipitation gage was installed on Carroll Island (at the southern junction of Saltpeter Creek and Gunpowder River) to help determine rainfall/recharge relationships of the aquifers. The gage was installed in a heated trailer to prevent freezing during the winter months. Data were recorded at 5-min intervals. Figure 27 shows the precipitation data from November 1987 to October 1988. Missing data are shown by a dotted line.

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[1] Use of the brand name in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

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(p.15 follows)

TABLES 1 THROUGH 9

and

FIGURES 4 THROUGH 27

Table 1.--Electromagnetic-induction data, May through October 1987

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 1 and aerial spray grid
EM line: 1
First point: On the road to the dock 100 feet from Carroll Island Road
Bearing of transect: 300 degrees
Instrument: EM 31
Date of survey: June 5, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	28		950	15	
50	32		1,000	15	
100	23		1,050	15	
150	18		1,100	14	
200	19		1,150	15	
250	19		1,200	23	
300	20		1,250	40	
350	I	Value fluctuated	1,300	40	
400	23		1,350	44	
450	20		1,400	60-90	Probably interference
500	22		1,450	64	
550	23		1,500	28	
600	23		1,550	23	
650	27		1,600	15	
700	I		1,650	11	
750	18		1,700	13	
800	17		1,750	18	
850	14		1,800	22	
900	15		1,850	21	

Location: Test grid 1
EM line: 2
First point: On road to dock 200 feet from Carroll Island Road intersection
Bearing of transect: 300 degrees
Instrument: EM 31
Date of survey: June 5, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	32		400	33	Probably interference
50	16		450	31	between these two points
100	15		500	I	
150	20		550	21	
200	I		600	27	
250	32		650	23	
300	20		700	20	
350	I		750	I	

Location: Test grid 1 and aerial spray grid
EM line: 3
First point: On the road to the dock 300 feet from Carroll Island Road intersection
Bearing of transect: 300 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 18, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	19		500	32	
50	I		550	31	
100	22		600	31	
150	18		650	30	
200	17		700	29	
250	19		750	39	
300	18		800	24	
350	26		850	19	
400	33		900	19	
450	27		950	20	

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 1 and aerial spray grid
EM line: 3
First point: On the road to the dock 300 feet from Carroll Island Road intersection (reran above line and continued 2,000 feet)
Bearing of transect: 300 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: October 29, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	35		1,300	18	
100	22		1,350	22	
200	17		1,400	23	
300	18		1,450	23	
400	19		1,500	23	
500	29		1,550	20	
600	29		1,600	16	
700	21		1,650	13	
800	21		1,700	15	
900	23		1,750	14	
1,000	I	Negative reading	1,800	16	
1,100	17		1,850	16	Decontamination pit
1,150	19		1,900	16	Decontamination pit
1,200	19		1,950	15	Decontamination pit
1,250	18		2,000	16	

Location: Test grid 1 and aerial spray grid
EM line: 4
First point: On the road to the dock, 600 feet from the Carroll Island Road intersection
Bearing of transect: 300 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: September 23, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	11		1,100	19	
50	13		1,150	19	
100	11		1,200	16	
150	13		1,250	18	
200	20		1,300	17	
250	16		1,350	19	
300	27		1,400	18	
350	29		1,450	20	
400	25		1,500	18	
450	36		1,550	19	
500	21		1,600	16	
550	16	Shifted direction	1,650	15	
600	31		1,700	8	
650	30		1,750	12	
700	18		1,800	16	
750	22		1,850	16	
800	20		1,900	18	
850	13		1,950	16	
900	16		2,000	16	
950	16		2,050	16	
1,000	13		2,100	17	
1,050	18				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 1 and aerial spray grid
EM line: 5
First point: On the road to the dock, 900 feet from Carroll Island Road intersection
Bearing of transect: 300 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: October 29, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	15		1,250	12	
50	13		1,300	13	
100	13		1,350	14	
150	11		1,400	16	
200	15		1,450	18	
250	14		1,500	19	
300	12		1,550	22	
350	61	Interference	1,600	22	
400	13		1,650	20	
450	16		1,700	19	
500	16		1,750	17	
550	18		1,800	16	
600	16		1,850	13	
650	16		1,900	17	
700	17		1,950	17	
750	30		2,000	16	
800	11		2,050	15	
850	15		2,100	14	
900	2	Interference	2,150	14	
950	11		2,200	15	
1,000	11		2,250	18	
1,050	11		2,300	14	
1,100	11		2,350	11	
1,150	12		2,400	13	
1,200	12				

Location: Aerial spray grid
EM line: 6
First point: 900 feet from road to dock along transect bearing at the edge of the outermost test grid annulus. Transect bearing intersects road to dock at a point 1,200 feet from Carroll Island Road intersection.
Bearing of transect: 300 degrees
Instrument: EM 31
Date of survey: May 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
900	8		1,500	19	
950	7		1,550	15	
1,000	7		1,600	13	
1,050	8		1,650	16	
1,100	9		1,700	13	
1,150	9		1,750	12	
1,200	10		1,800	14	
1,250	13		1,850	I	
1,300	16		1,900	11	
1,350	19		1,950	12	
1,400	18		2,000	15	
1,450	19				

Location: Aerial spray grid
EM line: 7
First point: 700 feet from road to dock along transect bearing at edge of test grid 1. Transect bearing intersects road to dock at a point 1,250 feet from Carroll Island Road intersection.
Bearing of transect: 300 degrees
Instrument: EM 31
Date of survey: September 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
700	16		1,400	21	
750	10		1,450	19	
800	9		1,500	18	
850	8		1,550	15	
900	8		1,600	16	
950	11		1,650	14	
1,000	10		1,700	13	
1,050	9		1,750	14	
1,100	8		1,800	I	
1,150	8		1,850	23	
1,200	9		1,900	12	
1,250	12		1,950	11	
1,300	15		2,000	12	
1,350	19				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 1 and aerial spray grid
EM line: 8
First point: On road to the dock 1,300 feet from Carroll Island Road intersection
Bearing of transect: 300 degrees
Instrument: EM 31
Date of survey: September 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	14		1,050	10	
50	10		1,100	8	
100	8		1,150	8	
150	--	Missing data	1,200	9	
200	8		1,250	9	
250	10		1,300	11	
300	10		1,350	15	
350	10		1,400	19	
400	12		1,450	16	
450	12		1,500	16	
500	14		1,550	15	
550	15		1,600	17	
600	14		1,650	13	
650	15		1,700	14	
700	15		1,750	15	
750	13		1,800	16	
800	10		1,850	13	
850	7		1,900	10	
900	8		1,950	11	
950	9		2,000	12	
1,000	11				

Location: Test grid 1, east of the road to the dock
EM line: 9
First point: At well I05, approx. 100 feet from the road
Bearing of transect: 210 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: June 11, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	15		700	20	
50	14		750	12	
100	25		800	12	
150	14		850	11	
200	13		900	12	
250	14		950	12	
300	15		1,000	12	
350	12		1,050	15	Center of Carroll Island
400	11		1,100	19	Road 1,080 ft
450	12		1,150	20	
500	13		1,200	21	
550	13		1,250	18	
600	13		1,300	17	
650	12		1,350	16	

Location: Test grid 1, east of road to the dock
EM line: 10
First point: On Carroll Island Road, 50 feet east of line 9 (approx. 150 ft from the intersection)
Bearing of transect: 30 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: June 11,1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	12		450	11	
50	11		500	12	
100	11		550	12	
150	10		600	13	
200	11		650	12	
250	12		700	13	
300	11		750	13	
350	11		800	13	
400	10				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 1, east of road to the dock
EM line: 11
First point: On Carroll Island Road, 50 feet east of line 10 (approx. 200 ft from intersection)
Bearing of transect: 30 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: June 11, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	--	Missing data	400	10	
50	11		450	10	
100	10		500	10	
150	9		550	11	
200	10		600	12	
250	10		650	14	
300	10		700	14	
350	10		750	14	

Location: Test grid 2, HD test area, and VX test area
EM line: 12
First point: 200 feet away from well I11 at 330 degrees
Bearing of transect: 40 degrees (parallel to road)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 21 and 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	17		1,150	20	Near telephone pole
50	18		1,200	18	
100	18		1,250	18	
150	16		1,300	18	
200	18		1,350	18	
250	15		1,400	18	
300	17		1,450	16	
350	15		1,500	18	
400	14		1,550	16	
450	14		1,600	14	
500	16		1,650	15	
550	19		1,700	12	Transect completed from 1,700 ft on August 27, 1987
600	25		1,750	12	
650	25		1,800	12	
700	28		1,850	11	
750	26		1,900	11	
800	38		1,950	12	
850	58		2,000	15	
900	59		2,050	16	
950	41		2,100	14	
1,000	62		2,150	12	
1,050	50		2,200	12	
1,100	36				

Location: Test grid 2 and HD test area
EM line: 13
First point: 100 feet west of well I11 at the side of the road, bearing from well I11 is 300 degrees.
Bearing of transect: 40 degrees (approximately; transect followed the west edge of the road)
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	11		650	16	
50	10		700	22	
100	13		750	26	
150	13		800	34	
200	9		850	40	
250	8		900	42	
300	12		950	40	
350	11		1,000	32	
400	12		1,050	27	
450	12		1,100	25	
500	13		1,150	21	
550	12		1,200	18	At telephone pole
600	13				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Test grid 2 and HD test area
EM line: 13 -- Continued
First point: At telephone pole next to road. This line is a continuation of the line done on June 3, 1987. Distances are given in relation to that transect (i.e. telephone pole = 1,200 ft.)
Bearing of transect: 40 degrees (follows road)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 6, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
1,250	20		2,150	17	
1,300	18		2,200	15	
1,350	19		2,250	14	
1,400	17		2,300	12	
1,450	16		2,350	15	
1,500	17		2,400	14	
1,550	18		2,450	12	
1,600	17		2,500	12	
1,650	16		2,550	13	
1,700	15		2,600	14	
1,750	16		2,650	14	Bearing changes to 20 degrees
1,800	13		2,700	13	
1,850	12		2,750	13	
1,900	12		2,800	14	
1,950	14		2,850	14	
2,000	14		2,900	15	
2,050	17		2,950	15	
2,100	16		3,000	26	This point is 115 ft from the corner of intersection nearest test grid 1

Location: Test grid 2
EM line: 14
First point: Well I11
Bearing of transect: 40 degrees
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	12		550	14	
50	14		600	19	
100	16		650	18	
150	13		700	27	
200	12		750	42	
250	11		800	58	
300	12		850	40	
350	12		900	26	
400	14		950	36	
450	14		1,000	19	
500	13				

Location: Test grid 2
EM line: 15
First point: 100 feet from well I11 at a bearing of 130 degrees from the well
Bearing of transect: 40 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 21, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	--	Missing data	1,150	20	
50	19		1,200	22	
100	16		1,250	26	
150	17		1,300	20	
200	12		1,350	23	
250	21		1,400	18	
300	16		1,450	21	
350	19		1,500	20	
400	24		1,550	16	
450	22		1,600	17	
500	22		1,650	17	
550	22		1,700	18	
600	25		1,750	17	Near marsh area
650	29		1,800	16	
700	48		1,850	15	
750	55		1,900	15	
800	48		1,950	15	
850	37		2,000	15	
900	24	Bearing 38 degrees	2,050	14	
950	24		2,100	14	
1,000	21		2,150	14	
1,050	20		2,200	14	
1,100	23				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Lower Island disposal site
EM line: 16
First point: Well I11
Bearing of transect: 130 degrees (toward the peninsula)
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	11		450	56	
50	12		500	60	
100	12		550	69	
150	11		600	64	
200	11		650	58	
250	20		700	52	
300	20		750	40	
350	15		800	40	Near shore
400	30				

Location: Lower Island disposal site
EM line: 17
First point: 800 feet from well I11 on main transect for this area
Bearing of transect: 220 degrees (perpendicular to last transect-line 16)
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
50	32		200	17	
100	30		250	19	
150	23		300	30	

Location: Lower Island disposal site
EM line: 18
First point: 600 feet from well I11 on main transect for this area
Bearing of transect: 220 degrees (perpendicular to line 16)
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
50	35		200	24	
100	26		250	31	
150	23				

Location: Lower Island disposal site
EM line: 19
First point: 115 feet from well I11 at a bearing of 248 degrees from the well
Bearing of transect: 130 degrees
Instrument: EM 31
Date of survey: June 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	20		200	17	
50	15		250	17	
100	18		300	18	
150	19				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: CS test area and wind tunnel
EM line: 20
First point: At intersection of Carroll Island Road and road to the dock. First point is at the corner of the crossroad nearest test grid 1.
Bearing of transect: 135 degrees (transect follows Carroll Island Road toward the wind tunnel)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 6, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	22		1,000	18	
50	15		1,050	18	
100	16		1,100	18	
150	16		1,150	18	
200	18		1,200	18	
250	14		1,250	20	
300	11		1,300	20	
350	12		1,350	19	
400	12		1,400	18	
450	12		1,450	17	
500	11		1,500	17	
550	11		1,550	20	
600	12		1,600	22	
650	13		1,650	22	
700	14		1,700	15	At wind tunnel changed
750	14		1,750	20	bearing to 97 degrees
800	16	Bearing 118 degrees	1,800	18	
850	17		1,850	19	
900	16		1,900	22	At marsh
950	17				

Location: Wind tunnel
EM line: 21
First point: East side of wind tunnel building at the scrubber
Bearing of transect: 120 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 6, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
50	24		100	44	
75	27		125	60	

Location: Wind tunnel
EM line: 22
First point: 1,700 feet from intersection on the main transect for this area
Bearing of transect: 200 degrees (heads toward the south shoreline)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 6, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
25	20		150	25	
50	19		175	28	
75	22		200	34	
100	22		225	40	Near shoreline
125	22				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Wind tunnel and CS test area
EM line: 23
First point: 1,700 feet from intersection on the main transect for this area
Bearing of transect: 40 degrees (heads toward the north shoreline)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	13		250	18	
50	19		300	20	
100	19		350	22	Entered woods
150	20		400	34	
200	20		450	54	

Location: CS test area
EM line: 24
First point: 1,500 feet from the intersection on the main transect for this area
Bearing of transect: 40 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: August 27, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	15		150	17	
50	17		200	18	
100	17		250	28	Marsh

Location: Bengies Point Road dump site
EM line: 25
First point: At intersection of Carroll Island Road and Bengies Point Road
Bearing of transect: 52 degrees (transect follows the road)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: September 1, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	--	Power lines	1,050	13	
50	90	Probably interference	1,100	26	
100	70		1,150	28	
150	82		1,200	25	
200	85		1,250	22	
250	83		1,300	22	
300	87		1,350	18	
350	90		1,400	16	
400	74		1,450	15	
450	45	Out of marsh	1,500	15	
500	30		1,550	13	
550	27		1,600	12	
600	26		1,650	10	
650	27		1,700	10	
700	36		1,750	12	
750	35		1,800	12	
800	36		1,850	18	
850	40		1,900	22	
900	34		1,950	30	
950	31		2,000	42	
1,000	26				

Table 1.--Electromagnetic-induction data, May through October 1987--Continued

[ft = feet; mS/m = millisiemens per meter; I = interference; EM (electromagnetic-induction) line -- see figure 5; location of site -- see figure 3]

Location: Bengies Point Road dump site
EM line: 26
First point: 1,040 feet from Carroll Island Road on main transect for this area
Bearing of transect: 320 degrees, transect is north of the disposal pit
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: September 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	17		200	21	
50	22		250	21	
100	23		300	21	
150	23				

Location: Bengies Point Road dump site
EM line: 27
First point: 300 feet from Bengies Point Road along the last transect
Bearing of transect: 230 degrees (transect is roughly parallel to Bengies Point Road behind the dump site)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: September 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
50	21		200	24	
100	22		250	24	
150	23				

Location: Bengies Point Road dump site
EM line: 28
First point: At the 250 feet point of the last transect
Bearing of transect: 140 degrees (back toward the road from behind the dump site)
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: September 3, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
50	24		200	56	
100	46	Value drifted	250	50	
150	53	Bearing 174 degrees			

Location: Dredge spoil site
EM line: 29
First point: 350 feet from the south corner of the concrete pad in the service area at a bearing of 215 degrees
Bearing of transect: 140 degrees
Instrument: EM 34 [coil spacing 32.8 ft (10 m), coils vertical]
Date of survey: October 2, 1987

Distance (ft)	Conductivity (mS/m)	Remarks	Distance (ft)	Conductivity (mS/m)	Remarks
0	62		500	62	
50	60		550	69	
100	68		600	70	
150	64		650	80	
200	68		700	74	
250	68		750	71	
300	67		800	66	
350	67		850	70	
400	67	Levee or berm	900	79	
450	58				

Table 2.--Description of observation wells and test holes

[Latitude and longitude: degrees (o), minutes ('), and seconds ("). Depths and water levels are below land surface datum. Altitude is relative to sea level. gal/min, gallons per minute; ft, feet; in., inches; --, no data. Type of pump: H = hand, S = submersible, A = air lift, J = jagger. Driller: U.S. Army Corps of Engineers. Method of construction: Augered, except of test holes (T) which were drilled using mud rotary. Note: For location of observation wells and test holes, see figure 6]

Local identifier	USGS well no.	Latitude (o,',")	Longitude (o,',")	Altitude (ft)	Date of completion	Depth of well (ft)	Depth of hole (ft)	Diameter screen/casing (in.)	Aquifer
I01	BA Fg 74	391928	762031	5.70	1977	19	7-	2	surficial
I02	BA Fg 95	391926	762028	5.71	1977	19	--	2	surficial
I03	BA Fg 96	391927	762022	4.54	1977	17.5	--	2	surficial
I04	BA Fg 97	391917	762015	8.25	1977	23	--	2	surficial
I05	BA Fg 98	391913	762010	7.62	1977	19.3	--	2	surficial
I06	BA Fg 75	391910	762014	10.00	1977	23	--	2	surficial
I07	BA Fg 99	391905	762013	7.68	1977	23	--	2	surficial
I08	BA Fg 100	391903	762017	8.40	1977	26	--	2	surficial
I09	BA Fg 76	391909	762027	3.71	1977	23.3	--	2	surficial
I10	BA Fg 102	391911	762023	5.30	1977	20.3	--	2	surficial
I11	BA Fg 103	391837	762035	4.58	1977	21.2	--	2	surficial
I12	BA Fg 104	391838	762029	3.05	1977	23	--	2	surficial
I13	BA Fg 77	391835	762032	4.76	1977	20.2	--	2	surficial
I14	BA Fg 105	391837	762036	3.50	02-12-88	11	32	4	surficial
I15	BA Fg 106	391836	762034	5.23	02-05-88	22	30	4	surficial
I16A	BA Fg 107	391835	762030	4.49	02-03-88	53	61	4	confined
I16B	BA Fg 108	391835	762030	3.47	02-03-88	11	15	4	surficial
I17	BA Fg 109	391837	762031	3.31	02-06-88	18	26.5	4	surficial
I18	BA Fg 110	391838	762031	3.24	02-08-88	10	25	4	surficial
I19	BA Fg 78	391835	762035	3.40	02-18-88	19	27	4	surficial
I20A	BA Fg 111	391840	762034	4.86	02-12-88	19	30	4	surficial
I20T	BA Fg 79	391840	762034	--	08-31-87	--	148.1	--	--
I21	BA Fg 113	391844	762036	3.66	02-11-88	15	20	4	surficial
I22A	BA Fg 80	391846	762029	3.58	10-07-87	65	67	4	confined
I22B	BA Fg 81	391846	762029	3.68	10-08-87	19	27	4	surficial
I22C	BA Fg 82	391846	762029	3.65	10-07-87	10	15	4	surficial
I23	BA Fg 114	391843	762028	2.47	02-10-88	20	31	4	surficial
I24	BA Fg 115	391853	762021	4.67	02-01-88	9	15	4	surficial
I25	BA Fg 116	391847	762030	2.49	02-19-88	18	31	4	surficial
I26A	BA Fg 117	391857	762023	6.29	12-04-87	30	45	4	surficial
I26B	BA Fg 118	391857	762023	6.13	12-03-87	14	15	4	surficial
I27A	BA Fg 83	391855	761959	3.88	11-16-87	62.7	65	4	confined
I27B	BA Fg 84	391855	761959	3.81	11-16-87	8	17	4	surficial
I28	BA Fg 85	391855	761956	3.91	11-18-87	11	17	4	surficial
I29	BA Fg 120	391856	761958	4.59	11-17-87	10	30.4	4	surficial
I30	BA Fg 121	391859	761957	2.67	11-18-87	15	25	4	surficial
I31A	BA Fg 122	391919	762007	3.80	02-22-88	15	27	4	surficial
I31T	BA Fg 86	391919	762007	--	09-03-87	--	151.3	--	--
I32	BA Fg 124	391922	762027	5.68	02-11-88	16	25	4	surficial
I33	BA Fg 87	391912	762035	2.90	02-25-88	24.5	25	4	surficial
I34	BA Fg 125	391917	762035	5.33	02-20-88	26	30	4	surficial
I35	BA Fg 126	391917	762036	4.41	02-20-88	25	25	4	surficial
I36	BA Fg 127	391919	762035	5.28	02-20-88	27	29	4	surficial
I37A	BA Fg 128	391912	762021	7.20	02-20-88	64.5	65	4	confined
I37B	BA Fg 129	391912	762021	7.00	02-22-88	21	27	4	surficial
I38A	BA Fg 130	391928	762033	6.46	02-28-88	19	20	4	surficial
I38T	BA Fg 88	391928	762033	--	09-01-87	--	151	--	--
I39	BA Fg 132	391929	762032	6.29	02-22-88	21	25	4	surficial
I40	BA Fg 133	391929	762033	7.47	02-23-88	19	20	4	surficial
I41	BA Fg 134	391934	762050	2.90	02-23-88	12	15	4	surficial
I42	BA Fg 135	391934	762051	3.26	02-25-88	13	15	4	surficial
I43	BA Fg 136	391934	762051	3.63	02-11-88	10	15	4	surficial
I44	BA Fg 137	391845	762035	3.10	02-11-88	14	15	4	surficial
I45	BA Fg 138	391908	762114	8.00	11-13-87	14	20	4	surficial
I46	BA Fg 139	391910	762118	8.50	11-12-87	17	20	4	surficial

Screen (ft)	Interval of: Sand pack (ft)	Bentonite seals (ft)	Grout (ft)	Pumping rate (gal/min)	Hours pumped	Water level before pumping (ft)	Type of pump	Well no.
4.0-19.0	--	--	--	--	--	--	--	I01
4.0-19.0	--	--	--	--	--	--	--	I02
2.5-17.5	--	--	--	--	--	--	--	I03
8.0-23.0	--	--	--	--	--	--	--	I04
4.3-19.3	--	--	--	--	--	--	--	I05
8.0-23.0	--	--	--	--	--	--	--	I06
8.0-23.0	--	--	--	--	--	--	--	I07
8.3-23.3	--	--	--	--	--	--	--	I08
8.3-23.3	--	--	--	--	--	--	--	I09
5.3-20.3	--	--	--	--	--	--	--	I10
6.2-21.2	--	--	--	--	--	--	--	I11
8.0-23.0	--	--	--	--	--	--	--	I12
5.2-20.2	--	--	--	--	--	--	--	I13
6.0-11.0	5.0-13.0	3.0- 5.0	2.0- 3.0	1	6	0.2	H	I14
17.0-22.0	15.0-30.0	12.0-15.0	3.0- 12.0	2	8	3.0	H	I15
43.0-53.0	40.2-61.0	39.1-40.2	2.5- 39.1	10	9	2.8	S	I16A
6.0-11.0	5.0-15.0	--	2.5- 5.0	3	10	1.1	H	I16B
8.0-18.0	5.4-26.5	4.3- 5.4	2.5- 4.3	1	7	1.0	H	I17
5.0-10.0	3.5-25.0	0 - 3.0	2.0- 3.0	1.5	4	1.2	H	I18
14.0-19.0	12.5-27.0	9.5-12.5	3.0- 9.5	2	10	1.7	H	I19
14.0-19.0	13.0-30.0	11.0-13.1	2.5- 11.0	1	8	1.2	H	I20A
--	--	--	0 -148.1	--	--	--	--	I20T
10.0-15.0	8.0-20.0	5.0- 8.0	2.5- 5.0	10	6	.5	S	I21
55.0-65.0	52.6-67.0	51.7-52.6	2.5- 51.7	5	16	6.2	J	I22A
14.0-19.0	13.0-27.0	11.0-13.0	2.5- 11.0	1.5	8	8.0	J	I22B
5.0-10.0	4.0-10.0	10.0-15.0	2.0- 4.0	1	6	4.9	A, H	I22C
15.0-20.0	13.0-30.0	11.0-13.0	2.5- 11.0	1	8	.2	H	I23
4.0- 9.0	3.1-15.0	10.5-15.0	2.5- 3.1	.5	6	2.0	H	I24
13.0-18.0	12.0-30.0	10.0-12.0	2.5- 10.0	1.5	5	.3	H	I25
25.0-30.0	23.9-45.0	20.0-23.9	2.5- 20.0	2	5	4.5	H	I26A
9.0-14.0	8.0-15.0	6.1- 8.0	2.5- 6.1	2	4	4.5	H	I26B
52.7-62.7	50.3-65.0	48.0-50.3	2.0- 48.0	2	18	5.3	A, S	I27A
3.0- 8.0	2.5-17.0	--	0 - 2.5	1	8	1.0	H	I27B
6.0-11.0	4.0-17.0	2.5- 4.0	2.0- 2.5	.5	6	2.0	H	I28
5.0-10.0	4.5-10.0	10.6-15.3	2.5- 4.5	1	8	1.3	H	I29
10.0-15.0	8.0-25.0	6.0- 8.0	2.5- 6.0	1	8	.6	H	I30
10.0-15.0	9.0-27.0	7.0- 9.0	2.5- 7.0	1	8	1.5	H	I31A
--	--	--	0 -151.3	--	--	--	--	I31T
11.0-16.0	9.0-25.0	7.0- 9.0	3.0- 7.0	.5	7	1.5	H	I32
19.5-24.5	17.0-25.0	15.5-17.0	3.0- 15.5	5	3.5	1.5	H	I33
21.0-26.0	19.0-30.0	16.0-19.0	3.0- 16.0	8	5	1.2	H	I34
20.0-25.0	18.0-25.0	16.5-18.0	3.0- 16.5	.25	9	.7	H	I35
22.0-27.0	20.0-29.0	18.0-20.0	3.0- 18.0	10+	5	1.0	H	I36
59.5-64.5	57.0-65.0	55.0-57.0	3.0- 55.0	9	4	.9	S	I37A
16.0-21.0	14.0-27.0	12.0-14.0	3.0- 12.0	5	8	8.3	H	I37B
14.0-19.0	9.0-20.0	4.0- 9.0	2.0- 4.0	.33	5.5	--	H	I38A
--	--	--	0 -151.0	--	--	--	--	I38T
11.0-21.0	9.0-25.0	7.0- 9.0	3.0- 7.0	1.5	3.5	--	H	I39
14.0-19.0	12.0-20.0	10.0-20.0	3.0- 10.0	.20	6	--	H	I40
7.0-12.0	5.0-15.0	3.5- 5.0	2.5- 3.5	2.5	3.5	2.3	H	I41
8.0-13.0	6.1-15.0	4.2- 6.1	2.5- 4.2	1.5	4	1.0	H	I42
5.0-10.0	4.0-15.0	3.0- 4.0	2.0- 3.0	.5	4	.2	H	I43
9.0-14.0	6.9-15.0	5.4- 6.9	2.5- 5.4	.5	6	1.0	H	I44
9.0-14.0	7.0-20.0	5.5- 7.0	2.5- 5.5	1.5	8	5.9	H	I45
12.0-17.0	7.0-20.0	5.0- 7.0	2.5- 5.0	1.0	16	6.7	H	I46

Table 2.--Description of observation wells and test holes--Continued

[Latitude and longitude: degrees (o), minutes ('), and seconds ("). Depths and water levels are below land surface datum. Altitude is relative to sea level. gal/min, gallons per minute; ft, feet; in., inches; --, no data. Type of pump: H = hand, S = submersible, A = air lift, J = jagger. Driller: U.S. Army Corps of Engineers. Method of construction: Augered, except of test holes (T) which were drilled using mud rotary. Note: For location of observation wells and test holes, see figure 6]

Local identifier	USGS well no.	Latitude (o,',")	Longitude (o,',")	Altitude (ft)	Date of completion	Depth of well (ft)	Depth of hole (ft)	Diameter screen/casing (in.)	Aquifer
I47A	BA Fg 89	391912	762116	3.14	11-06-87	10	15	4	surficial
I47B	BA Fg 90	391912	762116	3.18	11-05-87	65.6	67	4	confined
I47T	BA Fg 91	391912	762116	--	08-29-87	--	180	--	--
I48	BA Fg 141	391914	762115	4.50	10-29-87	10	15	4	surficial
I49	BA Fg 142	391914	762117	4.10	11-02-87	10	15	4	surficial
I50A	BA Fg 143	391935	762127	3.78	10-28-87	19	20	4	surficial
I50T	BA Fg 92	391935	762127	--	09-03-87	--	143	--	--
I51	BA Fg 145	391937	762129	2.30	10-26-87	9	15	4	surficial
I52	BA Fg 146	391936	762126	4.20	10-20-87	11	25	4	surficial
I53	BA Fg 147	391938	762125	3.35	10-16-87	10	15	4	surficial
I54A	BA Fg 93	391938	762127	3.63	10-22-87	9	15	4	surficial
I54B	BA Fg 94	391938	762127	3.44	10-23-87	59	59	4	confined

Table 2.--Continued

Interval of								
Screen (ft)	Sand pack (ft)	Bentonite seals (ft)	Grout (ft)	Pumping rate (gal/min)	Hours pumped	Water level before pumping (ft)	Type of pump	Well no.
5.0-10.0	4.0-15.0	--	2.5- 4.0	--	16	1.9	H	I47A
60.6-65.6	58.8-67.0	56.0-58.8	2.5- 56.0	15	14	2.4	S	I47B
--	--	--	0 -180.0		--	--	--	--
5.0-10.0	4.0-15.0	0 - 2.0	2.0- 4.0	1.5	10	2.5	H	I48
5.0-10.0	4.0-15.0	--	2.0- 4.0	.5	16	2.7	H	I49
14.0-19.0	12.0-20.0	8.0-12.0	2.5- 8.0	2.5	12	3.4	S	I50A
--	--	--	0 -143.0	--	--	--	--	I50T
4.0- 9.0	3.5-15.0	2.5- 3.5	2.0- 2.5	1.5	0	2.1	H	I51
6.0-11.0	4.0-25.0	2.5- 4.0	2.0- 2.5	1	8	10.6	H	I52
5.0-10.0	4.5-15.0	3.5- 4.5	2.5- 3.5	1	4	8.6	H	I53
4.0- 9.0	3.5-15.0	2.5- 3.5	2.0- 2.5	1	8	5.2	H	I54A
49.0-59.0	47.0-59.0	45.0-47.0	3.0- 45.0	7	8	17.3	S	I54B

Table 3.-- Description of off-site wells

[Altitude is land surface relative to sea level. Depth of well and screen interval are below land surface datum. Casing-screen diameter: when casing diameter does not equal screen diameter, first value is diameter of casing, second value is diameter of screen. gal/min, gallons per minute; (gal/min)/ft, gallons per minute per foot; --, no data; ft, feet; in., inch. Method of drilling: rotary. Pumping equipment: air. Aquifer: Kp, Patapsco; Kpx, Patuxent. Use of water: D, domestic; I, industrial; A, agricultural. Note: For location of off site wells, see figures 7, 8, and 9]

USGS well no.	State permit no.	Owner	Driller	Date completed	Altitude (ft)	Depth of well (ft)	Casing screen (in.)	Length of casing (ft)
BA Ef 172	BA-81-4665	John Dumer	W. Frank	04/14/86	35	90	4-2	80
BA Ef 173	BA-81-2047	James Haga	W. Frank	09/26/83	40	115	4-2	105
BA Ef 174	BA-73-5119	Milton Gardner	J. Branham	11/21/77	45	87	4-2	80
BA Ef 175	BA-81-2662	Jay McCleave	R. Frank	05/11/84	65	208	4-2	198
BA Ef 176	BA-73-8064	Matthew Cook	W. Frank	03/24/81	45	55	4-2	45
BA Eg 177	BA-81-2212	James Baker	W. Frank	11/25/83	45	97	4-2	87
BA Eg 178	BA-81-0352	Dept. of the Army	W. Frank	11/19/81	15	199	4	189
BA Eg 179	BA-81-2012	Veronica Barbour	W. Frank	09/09/83	10	115	4-2	105
BA Eg 180	BA-73-1592	Thomas O'Day	W. Leonard	09/30/74	10	110	4-2	103
BA Eg 181	BA-81-0134	Daniel Bevans	W. Frank	08/17/81	15	120	4-2	113
BA Eg 182	BA-73-7954	Mike Meagher	W. Frank	02/25/81	15	115	4-2	105
BA Eg 183	BA-73-2294	William Budreski	W. Frank	07/16/75	20	75	4-2	70
BA Eg 184	BA-81-1459	Mike Murphy	W. Frank	04/01/83	20	120	4-2	110
BA Eg 186	BA-81-0550	Leroy Johnson	W. Frank	02/15/82	15	130	4-2	120
BA Eg 187	BA-81-2026	Rita McMullen	W. Frank	09/14/83	65	140	4-2	130
BA Eg 188	BA-81-2838	T & A Excavating	W. Frank	07/05/84	80	100	4-2	90
BA Eg 189	BA-81-2114	Clifton Mizelle	W. Frank	10/21/83	20	60	4-2	50
BA Eg 190	BA-81-5683	Leroy Burrs	W. Frank	09/25/86	20	62	4-2	55
BA Eg 191	BA-81-5557	Dorothy Tischler	W. Frank	09/04/86	25	72	4-2	62
BA Eg 192	BA-81-5556	Dorothy Tischler	W. Frank	09/05/86	15	60	4-2	50
BA Eg 193	BA-81-5978	Elsie Steinmann	W. Frank	01/06/87	10	55	4-2	48
BA Eg 194	BA-81-5637	Steven Kline	W. Frank	09/26/86	15	60	4-2	52
BA Eg 195	BA-73-7406	Frank Wallis	W. Leonard	05/07/80	10	90	4-2	83
BA Eg 196	BA-81-7195	Charlotte Diffendall	W. Frank	09/14/87	5	120	4-2	113
BA Eg 197	BA-81-7318	Veronica Barbour	W. Frank	10/29/87	10	110	4-2	103
BA Eg 198	BA-81-7396	Moore Precast Concrete	W. Frank	11/24/87	40	220	4-2	213
BA Fg 153	BA-87-G014	Baltimore G & E	Branham	12/16/87	5	110	6-4	70
BA Fg 154	BA-73-0108	Richard Fantom	W. Leonard	08/22/72	10	104	4-2	99
BA Fg 155	BA-73-7310	Charles Miller	W. Frank	03/04/80	10	100	4-2	110
BA Fg 156	BA-81-5684	Elizabeth Edwards	W. Frank	10/22/86	10	110	4-2	100
BA Fg 157	BA-81-0596	Frank Carlotta	W. Frank	03/29/82	10	87	4-2	77
BA Fg 158	BA-73-5786	Ruth Conrad's Villa	W. Frank	05/25/78	5	50	4-2	45
BA Fg 159	BA-73-7197	Jerry Hanincheck	W. Frank	12/12/79	10	135	4-2	125
BA Fg 160	BA-73-6521	Willner Raymond	W. Frank	03/06/79	10	100	4-3	93
BA Fg 151	BA-81-5445	Thomas Lamar	W. Frank	08/14/86	5	140	4-2	130
BA Fg 162	BA-73-6219	Kathleen Butler	W. Frank	10/18/78	5	145	4-2	140
BA Fg 148	BA-81-5142	Edgar Lassahn	W. Frank	06/09/86	5	38	4-2	31
BA Fg 164	BA-81-6866	Charles Ritter	W. Frank	08/12/87	10	250	4-2	237
BA Fg 150	BA-81-6641	Elizabeth Martin	W. Frank	04/27/87	5	67	4-2	60
BA Fg 166	BA-81-3216	Virginia Smith	W. Frank	11/07/84	5	40	4-2	33
BA Fg 167	BA-81-1547	Romuald Nickles	W. Frank	05/03/83	5	60	4-2	50
BA Fg 149	BA-81-2079	James Wilhelm	W. Frank	09/27/83	5	65	4-2	55
BA Fg 169	BA-81-2098	Carol Spultz	W. Frank	10/12/83	5	65	4-2	55
BA Fg 170	BA-73-7276	Denver Cross	W. Frank	02/14/80	5	67	4-2	60

Screen interval (ft)	Aquifer	Water level (feet below land surface) Static	Pumping	Date	Yield (gal/min)	Length of test (hours)	Specific capacity [(gal/min)/ft]	Use of water	Remarks	USGS well no.
80- 90	Kp	12	21	04/14/86	60	3	6.67	D		BA Ef 172
105-115	Kp	22	32	09/26/83	30	3	3.0	D	Replacement well	BA Ef 173
80- 87	Kp	38	58	11/21/77	60	2	3.0	D	Replacement well	BA Ef 174
198-208	Kpx	85	93	05/11/84	30	3	3.75	D		BA Ef 175
45- 55	Kp	11	21	03/21/84	30	2	3.0	D	Replacement well	BA Ef 176
87- 97	Kp	41	51	11/25/83	15	3	1.50	D	Replacement well	BA Eg 177
189-199	Kpx	1	55	11/19/81	--	4	--	I		BA Eg 178
105-115	Kp	2	12	09/09/83	60	3	6.0	D	Replacement well	BA Eg 179
103-110	Kp	1	30	09/30/74	25	1	.86	D	Replacement well	BA Eg 180
113-120	Kp	6	16	08/17/81	30	2	3.0	D	Replacement well	BA Eg 181
105-115	Kp	3	13	02/25/81	30	2	3.0	D	Replacement well	BA Eg 182
70- 75	Kp	10	20	07/16/75	30	2	3.0	D	Replacement well	BA Eg 183
110-120	Kpx	23	33	04/01/83	50	3	5.0	D	Replacement well	BA Eg 184
120-130	Kp	14	29	02/15/82	40	3	2.67	D		BA Eg 186
130-140	Kpx	63	73	09/14/83	25	3	2.5	D	Replacement well	BA Eg 187
90-100	Kp	20	31	07/05/84	20	3	1.82	I		BA Eg 188
50- 60	Kp	16	26	10/21/83	20	3	2.0	D	Replacement well	BA Eg 189
55- 62	Kp	23	32	09/26/86	20	3	2.22	D	Replacement well	BA Eg 190
62- 72	Kp	24	33	09/04/86	15	3	1.67	D	Replacement well	BA Eg 191
50- 60	Kp	15	24	09/05/86	20	3	2.22	D	Replacement well	BA Eg 192
48- 55	Kp	10	19	01/06/87	30	3	3.33	D	Replacement well	BA Eg 193
52- 60	Kp	16	25	09/26/86	25	3	2.78	D	Replacement well	BA Eg 194
83- 90	Kp	16	25	05/07/80	35	2	3.89	D	Replacement well	BA Eg 195
113-120	Kp	6	15	09/14/87	50	3	5.56	D	Replacement well	BA Eg 196
103-110	Kp	7	18	10/29/87	60	3	5.45	D	Replacement well	BA Eg 197
213-220	Kpx	28	37	11/24/87	50	3	5.56	I		BA Eg 198
70-105	Kp	11	28	12/29/87	150	24	8.82	I		BA Fg 153
99-104	Kp	5	100	08/22/72	15	2	.16	D		BA Fg 154
103-110	Kp	3	13	03/04/80	30	2	3.0	D	Replacement well	BA Fg 155
100-110	Kp	9	18	10/22/86	20	3	2.22	D	Replacement well	BA Fg 156
77- 87	Kp	10	20	03/29/82	15	3	1.5	D	Replacement well	BA Fg 157
45- 50	Kp	3	15	05/25/78	21	2	1.75	I	Replacement well	BA Fg 158
125-135	Kp	8	18	12/12/79	40	2	4.0	D	Replacement well	BA Fg 159
93-100	Kp	13	23	03/06/79	25	2	2.5	D	Replacement well	BA Fg 160
130-140	Kp	21	30	08/14/86	20	3	2.22	D	Replacement well	BA Fg 151
140-145	Kp	8	18	10/18/78	25	2	2.5	D	Replacement well	BA Fg 162
31- 38	Kp	3	12	06/09/86	25	3	2.78	D	Replacement well	BA Fg 148
237-250	Kpx	23	32	08/12/87	80	3	8.89	A		BA Fg 164
60- 67	Kp	9	19	04/27/87	30	3	3.0	D	Replacement well	BA Fg 150
33- 40	Kp	12	21	11/07/84	21	3	2.33	D	Replacement well	BA Fg 166
50- 60	Kp	3	13	05/03/83	60	3	6.0	D	Replacement well	BA Fg 167
55- 65	Kp	3	13	09/27/83	30	3	3.0	D	Replacement well	BA Fg 149
55- 65	Kp	3	13	10/12/83	50	3	5.0	D	Replacement well	BA Fg 169
60- 67	Kp	3	13	02/14/80	30	2	3.0	D	Replacement well	BA Fg 170

Table 4.--Lithologic logs of observation wells

[Depth in ft (feet) from land surface datum. Note: For location of observation wells, see figure 6]

Grain sizes are as follows:

cobbles	= 64.0	- 256.000 millimeters	mU	= 0.350	- 0.500 millimeters
pebbles	= 2.0	- 64.000 millimeters	mL	= 0.250	- 0.350 millimeters
vcU	= 1.410	- 2.000 millimeters	fU	= 0.177	- 0.250 millimeters
vcL	= 1.000	- 1.140 millimeters	fL	= 0.125	- 0.177 millimeters
cU	= 0.710	- 1.000 millimeters	vfU	= 0.088	- 0.125 millimeters
cL	= 0.500	- 0.710 millimeters	vfL	= 0.062	- 0.088 millimeters

Description	Depth (feet)	Thickness (feet)
Well I14		
Soil zone, silt, dark-brown; trace of sand (mU-cL), subangular, abundant roots, trace of mica.	0	0.7
Silt, grading to sandy silt, top is light brownish-gray with some orange mottling; some mica and some organic matter, trace of sand, friable. Color grades to orange with gray, moisture increases with depth. Bottom is sandy silt, sand is mL-cL, subrounded, organic (black) material present.	.7	3.3
Sand, orange with gray mottling; poorly sorted, vfU-cL, subrounded to subangular, some organic matter, trace of mica.	4.0	.8
Sand, silt, and clay interbedded, orange, light-gray, and brown; iron-oxide staining at the contacts. Beds average 1 inch thick, some organic matter. Top sand is poorly sorted, fU-cL, subrounded.	4.8	3.2
Sand, orange; mL-cU, subrounded to rounded, abundant organic material, trace of mica.	8.0	6.3
Sand, orange and brown; mU-mL, subrounded, some organic material (lignite).	14.3	.9
Silt, clayey, brown with orange bands; turns gray at 17.7 ft and orange at 18.3 ft.	15.2	3.5
Sand, silty, orange grading to brown; vfU-mL, fairly well-sorted but changes size with depth (med-fine-med), micaceous.	18.7	.8
Sand, brown; grades from fU to mU, micaceous at top, less micaceous at the bottom, band of iron staining at 23 ft.	19.5	5.0
No sample from 24.5 to 32 ft. Found dark-gray silt at 30 ft. (Sample from solid auger.)		

Description	Depth (feet)	Thickness (feet)
Well I15		
Soil zone, sandy silt, brown; abundant roots.	0	0.7
Silt, sandy, light orange brown; hard, friable.	.7	1.5
Sand, silty, light orange brown; poorly sorted, subrounded, fL-cL, hard, friable.	2.2	2.3
Sand, orange brown; fU-cU, subrounded, poorly sorted, fairly dry. Thin layer of finer poorly sorted sand (majority fL-fU, some larger grains) occurred near the top of the recovery. Color changes to lighter orange toward the bottom, then back to orange brown.	4.5	5.0
Clay interbedded with sand. Clay is brownish-white to gray, micaceous, some lignite; sand varies from orange to brown. Clay beds predominate, sands get thinner with depth.	9.5	5.0
Clay, silty, dark-gray; some mica. Gradational contact with next bed.	14.5	1.7
Sand, silty, lighter gray than above; micaceous, sandy silt at top. Sand is fL-fU, subrounded, well-sorted. Abrupt contact with next bed.	16.2	1.8
Silt, sandy, brown with some light-orange staining near the top, some mica and lignite. Grades to a silty sand at bottom, fL-fU.	18.0	1.5
Sand, silty, brownish-gray; fL-fU, grades to mL-mU, and then finer again. Some iron staining in the mL-mU sand. Abrupt color change.	19.5	3.0
Silt, sandy, dark-gray; micaceous.	22.5	2.0
Clay, dark-gray; micaceous, grades from silty clay to clay.	24.5	5.0
No sample collected from 29.5 to 30.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I16A		
Soil zone, sandy silt, dark-brown; organic matter, roots.	0	1.0
Sand, tan to light-orange; fU-cL, subangular to subrounded, some iron oxide near bottom in small rounded concretions, some roots and organic matter throughout. Abrupt contact with next bed.	1.0	3.6
Silt, gray to orange (color follows bedding); some organic matter, mica, and sand grains present.	4.6	.7
Sand, tan to orange; fL-cU, subangular to subrounded, some organic matter and mica, few cobbles (up to 2 inches).	5.3	1.9
Sand and clay interbedded, light-gray; fL-cU, lenses are approximately 2 inches thick.	7.2	.8
Sand, orange and tan; fU-mU, rounded to subrounded, micaceous, a few clay stringers, sorting improves with depth. Gradual contact with next bed.	8.0	6.5
Sand, silty, tan to orange; fL-fU, subrounded, some mica, some silt lenses.	14.5	.5
Sand, silty, dark-gray (orange from 18.5 to 19.5 ft); fU-mL, subrounded, micaceous, abundant organic matter. Abrupt contact with next bed.	15.0	5.3
Clay, silty, dark-gray; micaceous and some organic matter. Grades from silty clay to clay.	20.3	6.7
Clay, dark-gray; hard chunks of clay throughout (0.5 to 1 inch, subangular), some mica and organic matter.	27.0	2.3
Clay, dark-gray; abundant shell fragments, some mica, organic matter, and vivianite.	29.3	.7
Clay, dark-gray; abundant shell fragments and fully preserved shells, some mica and organic matter.	30.0	7.0
Clay, dark-gray; some mica and organic matter.	37.0	6.0
Sand, silty, dark-gray; fU-cL, subangular to subrounded, micaceous with some organic matter. Pebbles up to 0.5 inches, rounded and a piece of wood near base of the core.	43.0	1.5
Sand, gravel, and cobbles with some clay matrix; clay is brown to red; sand is mL-vcU, subangular to subrounded; cobbles are up to 3 inches and rounded.	44.5	.5
No recovery from 45 to 61 ft (running sand). Varigated clay was recovered at 61 ft from the solid auger that was used to clean out the hole.		

Description	Depth (feet)	Thickness (feet)
Well I16B		
Soil zone.	0	1.0
Sand, silty, brown.	1.0	1.2
Sand, silty, gray to orange.	2.2	1.7
Silt, sandy.	3.9	.4
Sand.	4.3	.7
Sand, silty, grayish-brown; light-orange mottling.	5.0	2.2
Clay, some interbedded sand.	7.2	.8
Sand, gray; some silt.	8.0	2.0
Sand, orange brown; lignite.	10.0	5.0
Well I17		
Soil zone, silt, brown; roots and organic material present.	0	1.2
Silt, gray with orange mottling; organic material, hard, friable.	1.2	2.1
Sand, grayish-white grading to orange; mL-cL, moderately well-sorted.	3.3	.7
Silt, sandy, gray with orange on both ends; some organic material throughout.	4.0	.8
Sand, silty, light-brown with light-orange mottling; sand is fL-cL, subrounded, poorly sorted, lignitic; 1-inch clay lens at about 6.5 ft.	4.8	3.9
Sand, grayish-white; fL-mL, micaceous, lignitic, fairly well-sorted, orange contact at top.	8.7	.3
Sand, beige; fU-mU, subrounded to rounded, moderately well-sorted, micaceous, some orange, yellow, and black particles.	9.0	5.0
Sand, gray; well-sorted, micaceous, trace of lignite, runny on top, small section of gray silt toward the bottom with sand after it.	14.0	5.0
Silt, sandy, dark-gray; micaceous. Gradational contact with next bed.	19.0	1.5
Clay, silty, dark-gray; micaceous, tight.	20.5	3.5
No sample collected from 24.0 to 26.5 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I18		
Soil zone, silt, dark-brown; several tree root fragments, other roots present.	0	1.0
Silt, grayish-white with light-orange mottling; organic material (roots) throughout. Gradational contact with next bed.	1.0	1.6
Sand, silty, grayish-white with orange; vfU-cU, very poorly sorted, hard, friable.	2.6	1.9
Sand, orange and light-brown; orange sand (top) is fU-mL; light-brown sand grades from fU-cL to fL-fU, contains thin clay layer.	4.5	2.7
Clay and sand interbedded, beige; clay predominates.	7.2	.7
Sand, grayish-white; fL-mL, subangular to subrounded, micaceous, lignitic.	7.9	1.6
Sand, same as above except orange. Abrupt contact with next bed.	9.5	.3
Clay, silty grading to sandy silt. Silty clay grades from orange to dark-gray; sandy silt is gray. Micaceous, some lignite. Gradational contact with next bed.	9.8	2.0
Sand, silty, gray; fL-mL, subrounded, trace of mica.	11.8	2.7
Sand, silty, gray to dark-gray; micaceous.	14.5	5.5
Silt, dark-gray; micaceous, trace of organics, sandy at top, grades finer with depth.	20.0	4.5
No sample collected from 24.5 to 25 ft.		
Well I19		
Soil zone, sandy silt, dark-brown; abundant roots.	0	1.0
Sand, silty, dark-brown grading to light-brown; mL, subrounded, well-sorted, abundant roots. Abrupt contact with next bed.	1.0	1.1
Sand, tan; some pebbles present, sand is mU, subangular. Some of the pebbles were iron-oxide cemented, and the pebble size was about 0.5 inches. Some organic material present.	2.1	1.2
Silt, sandy grading to clayey, gray with orange mottling; abundant roots (decreases with depth).	3.3	1.2
Clay, silty, with some fine silt layers, gray with orange mottling; some mica, roots decrease with depth.	4.5	5.0
Well I19--Continued		
Silt, clayey, dark-gray; micaceous, rock at top contact (about three inches in diameter).	9.5	4.1
Sand, silty, medium-gray; fL, micaceous.	13.6	5.4
Silt, sandy, dark-gray; micaceous, grades to silt.	19.0	5.0
No sample collected from 24.0 to 27.0 ft.		
Well I20A		
Soil zone, sandy silt, medium-brown; micaceous, roots present.	0	0.8
Sandy silt interbedded with sand, orange brown with darker orange mottling; sand is fL-cL, some lignite, roots present, sorting improves with depth.	.8	4.7
Sand, light-brown with some orange and gray; mU, subrounded, some mica and lignite throughout.	5.5	3.5
Sand, color varies with depth from brown to bright-orange to gray; mL-mU, well-sorted, subrounded to subangular. Some lignite present in the orange sand, some silt layers in the gray sand. Sand gets coarser and more angular with depth. Abrupt contact with next bed.	9.0	2.2
Clay, silty, medium-gray; trace of mica. Abrupt contact with next bed.	11.2	1.9
Silt, gray; very micaceous.	13.1	.9
Sand, gray; fU, rounded, well-sorted, micaceous.	14.0	5.0
Silt, sandy, grading to silt, dark-gray; very micaceous, some organic material.	19.0	5.0
Clay, dark-gray; some mica present, and large amount of decomposed wood at the bottom (30.0 ft).	24.0	5.0
Well I21		
Soil zone, silt, dark-brown; micaceous, roots present.	0	0.6
Silt, sandy, orange and light-brown; micaceous, some organic material. Gradational contact with next bed.	.6	.9
Sand, silty, grades to sand, color grades from orange to orange brown to gray; mU-cL, trace of mica, trace of lignite.	1.5	8.5

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I21--Continued		
Sand and clay interbedded. Top sand is tan, followed by orange iron staining at the clay contact. The subsequent clays and sands are gray and dark-gray. Sand is mL-cL. Abrupt contact with next bed.	10.0	2.9
Sand, tan, brown, bright-orange and bright reddish-orange; mL-cU, not well-sorted, some lignite present.	12.9	1.0
No sample collected from 13.9 to 20.0 ft.		
Well I22A		
Undifferentiated fill, gravel, sand.	0	0.4
Soil zone, sandy silt dark-grayish-brown; abundant roots	.4	.6
Silt, gray with orange mottling; grades to a sand, silt, and clay mixture. Top contains abundant roots; sands in the bottom layers are fL-mU and subangular; material is micaceous throughout. Some organic material is present in the sand, silt, and clay mixture. Gradational contact with next bed.	1.0	4.3
Sand, silty, gray with some orange mottling; fL-fU, micaceous, some organic material.	5.3	.8
Sand, grayish-white grading to light-brown and orange; fL-cU, subrounded, some yellow, black, pink, and dark-gray grains. Abrupt contact with next bed.	6.1	2.8
Silt, dark-gray; very micaceous, grading slowly to a silty clay of the same color, some organic material present throughout.	8.9	4.3
Silt, sandy, dark-gray; grades to silty sand, vfU-fL, subrounded, some mica present.	13.2	1.1
Sand, silty, medium-gray; fL-fU, subrounded, some mica, silt content varies throughout.	14.3	5.7
Silt, dark-gray; micaceous, organic matter present.	20.0	4.3
Clay, dark-gray; silty on top, trace of mica, shell material present but not in abundance.	24.3	8.7
Clay, dark-gray; friable, trace of mica, abundant shell material in the last 0.3 ft of core--small fragments.	33.0	1.3
Clay, dark-gray; abundant shell material, mostly small fragments in the top changing to larger fragments and some whole shells in the bottom.	34.3	10.1
Clay, same as above with no shell fragments.	44.4	9.1
Well I22A--Continued		
Gravel, dark-gray mud matrix; very poorly sorted, some clay balls, pebbles subrounded and quartz; largest cobble was about 2 inches.	53.5	4.5
Sand, running, brownish-gray; mostly fL-mU, poorly sorted, very micaceous.	58.0	7.0
No sample collected from 65.0 to 67.0 ft.		
Well I22B		
Fill material and soil zone; fill is gravelly, soil is a silt matrix; abundant plant material.	0	1.0
Silt, gray with light-orange and orange mottling.	1.0	3.7
Sand, silty, gray with orange mottling.	4.7	2.4
Sand, orange brown and bright-orange; thin lens of silty sand at bottom. Abrupt contact with next bed.	7.1	2.1
Silt, dark-gray.	9.2	.5
Clay, silty, dark-gray; micaceous, organic material.	9.7	4.1
Sand, silty, gray.	13.8	.9
Sand, silty, medium-gray; micaceous, organic material.	14.7	5.0
Silt, sandy to clayey, dark-gray; micaceous. Most of the clay occurred at the middle of the core.	19.7	5.0
No sample collected from 24.7 to 27.0 ft.		
Well I22C		
Undifferentiated fill material.	0	0.5
Soil zone, silt matrix.	.5	.7
Silt, sand, and clay mixture; mostly silt, mottled gray, light-orange, dark-orange, and light-brown.	1.2	4.2
Sand, silty at the top grading to a coarse, fairly clean, light-brown (with some orange) sand at the bottom.	5.4	2.6
Silt, orange and gray; a 0.1-ft clay lens separates the orange silt at the top from the gray silt.	8.0	1.0
Clay, silty, dark-gray.	9.0	4.3
Sand, silty, medium-gray; fine-grained.	13.3	.7
No sample collected from 14.0 to 15.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I23		
Soil zone, silt, brown; roots present.	0	1.2
Silt, light grayish-white with orange mottling; grades to sandy silt with depth.	1.2	4.5
Sand, grayish-white with orange mottling; fU-mL, subrounded. Abrupt contact with next bed.	5.7	1.3
Silt, gray (orange at top contact); trace of mica. Gradational contact with next bed.	7.0	6.0
Sand, silty, gray; fL-fU, trace of mica.	13.0	1.5
Sand, dark-gray; fL-fU, subrounded to rounded, micaceous, some organic material; grades siltier with depth. Gradational contact with next bed.	14.5	4.5
Silt, sandy, dark-gray; fL-fU, subrounded, micaceous some organic matter. Gradational contact with next bed.	19.0	1.5
Silt, dark-gray; micaceous, abundant organic matter.	20.5	4.0
Clay, dark-gray; some organic matter, micaceous.	24.5	5.0
No sample collected from 29.5 to 31.0 ft.		
Well I24		
Soil zone, silt, medium-brown; roots present.	0	0.7
Silt, light-brown to gray with light-orange; some mica, roots throughout, some lignite or organic matter present.	.7	3.8
Silt, gray and light-brown with light-orange; some mica, roots throughout, some lignite or organic matter present; some sediment structure (soft sediment deformation).	4.5	1.3
Sand, tan with some orange and rust mottling; fL-cL, subangular to subrounded, poorly sorted, lignite and mica present, some rounded gravel (up to 0.5 inches) and a few clay balls. Bands of black and red-brown stain, horizontal to bedding. Some interbedded clay lenses below 9.1 ft.	5.8	3.7
Clay and sand interbedded; clay is brown, some lignite; sand is same as above. Some cobbles. Abrupt contact with next bed.	9.5	1.0
Silt, dark-gray; micaceous, some lignite.	10.5	4.0
No sample collected from 14.5 to 15.0 ft.		

Description	Depth (feet)	Thickness (feet)
Well I25		
Soil zone, clay, medium-brown; abundant roots.	0	1.2
Silt, beige.	1.2	.3
Sand, beige, light-gray, light-brown, and orange; mU-cL, subrounded, color grades to grayish-brown at bottom.	1.5	7.8
Clay, silty, dark-gray; micaceous, some lignite.	9.3	2.9
Sand, silty, medium-gray; fL-mL, subrounded, micaceous (mica content increases with depth), black flecks present.	12.2	6.8
Sand, dark-gray; fL-fU, micaceous, black particles present.	19.0	3.0
Silt, dark-gray; very micaceous, organic material present.	22.0	2.0
Clay, dark-gray; micaceous, shell material present below 28.3 ft.	24.0	7.0
Well I26A		
Soil horizon, silt, brown; some mica and roots present.	0	0.6
Silt, light orange brown with some orange mottling; grades gray and orange, some roots, organic matter, and pebbles (0.3 inches) throughout. Two small sand lenses (tan, mU-mL, subrounded) are present at 3 to 3.2 ft. Abrupt contact with next bed.	.6	3.6
Sand, brown; mU-cU, subrounded, some larger gravels present.	4.2	.4
Silt, gray with orange mottling (mottling does not follow bedding); micaceous, some thin lenses of iron oxide at top of sample. Abrupt contact with next bed.	4.6	1.7
Sand, tan with some orange to rust mottling; some silt and clay lenses, mica and organic material. Sand in top layers is mL-mU, and changes to mU-cL with some pebbles (0.5 inches) at the bottom.	6.3	3.8
Clay, gray to orange; some lignite with small sand lenses (cL-cU) near bottom. Gradational contact with next bed.	10.1	1.0

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I26A--Continued		
Sand, silty, tan; mL-cL, subrounded, some mica and lignite. Gravel (up to 1 inch, rounded) at top of core.	11.1	3.5
Silt, clayey, dark-gray; micaceous, organic matter present.	14.6	5.0
Sand, gray; mU-cL, subrounded, micaceous, organic material present. Partial recovery; abrupt contact with next bed.	19.6	3.0
Silt, sandy, dark-gray; some mica and organic matter present.	22.6	1.5
Sand, silty, dark-gray; micaceous and some organic matter.	24.1	.5
Sand, dark-gray; fU-cL, subangular to subrounded, micaceous.	24.6	5.0
Sand, silty, dark-gray; fU-cL, subangular to subrounded, mica and organic matter present. Some of the organic matter has iron-oxide coating. Gradational contact with next bed.	29.6	4.0
Silt, sandy, dark-gray; organic material and mica present; sand is fL-fU.	33.6	1.0
Silt, dark-gray; micaceous, abundant organic matter.	34.6	5.0
Clay, dark-gray.	39.6	4.0
Clay, dark-gray; shells present.	43.6	1.0
No sample collected from 44.6 to 45 ft.		
Well I26B		
Soil zone.	0	0.6
Silt .	.6	3.2
Sand.	3.8	1.2
Silt.	5.0	2.0
Clay, some sand lenses.	7.0	1.9
Sand.	8.9	2.1
Clay, gray.	11.0	1.0
Sand.	12.0	2.0
Clay, silty, gray.	14.0	1.0

Description	Depth (feet)	Thickness (feet)
Well I27A		
Soil zone, silt, dark-brown; micaceous.	0	0.6
Silt, light-orange; grades to clayey silt (light-orange with gray mottling), micaceous, some roots.	.6	2.0
Sand, silty, orange with gray mottling grading to gray and orange banding; micaceous, abundant organic material.	2.6	1.9
Sand, gray, orange, and light-brown; fU, grades to gravelly sand, orange, with some lignite. Gravelly sand is mU size, cobbles are up to 3 inches in diameter, and there is a thin layer of gray clay near the bottom.	4.5	2.7
Silt, sandy and clayey, dark-gray; micaceous.	7.2	2.3
Clay, silty, dark-gray; grades to clayey silt.	9.5	5.0
Sand, silty, dark-gray; fL-fU, subrounded, micaceous. Gradational contact with next bed.	14.5	1.6
Clay, sandy, dark-gray; micaceous, organic material present.	16.1	3.4
Clay, dark-gray; some sand lenses, micaceous, some lignite, plant material, and shell material.	19.5	5.0
Clay, dark-gray; micaceous, some lignite and shell material at the bottom.	24.5	5.0
Clay, dark-gray; micaceous, abundant shells.	29.5	10.5
Clay, dark-gray; micaceous, fewer shell fragments -- grades to no shells, some organic material toward the bottom.	40.0	11.5
Sand, silty, dark-gray; fU-cL, some gravel, some mica.	51.5	3.0
No sample collected from 54.5 to 65.0 ft.		
Well I27B		
Soil zone.	0	0.8
Silt, clayey, orange and gray mottling; some mica, sand grains, and organic matter, roots near top.	.8	2.1
Sand, orange and gray mottling; fL-cL, poorly sorted, subangular to subrounded, some mica, trace of silt.	2.9	3.5

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I27B--Continued		
Clay with interbedded sand lenses. Clay is gray with some orange mottling at sand contacts. Sand is fU-cL, rounded, some subrounded pebbles (up to 1 inch in diameter). Gradational contact with next bed.	6.4	1.2
Silt, dark-gray; some organic matter, micaceous, woody material at bottom.	7.6	6.6
No sample collected from 14.2 to 17.0 ft.		
Well I28		
Soil zone, gravelly fill on top; silt, brown, micaceous, roots and some older organic material beneath the fill.	0	1.0
Silt, light orange brown with gray mottling; grades to sandy silt, micaceous, lignitic roots.	1.0	1.8
Sand, silty, same color as above; fL-cL, poorly sorted, micaceous.	2.8	1.2
Silt, gray and orange mottled; very micaceous, found one small quartz pebble. Abrupt contact with next bed.	4.0	2.2
Silt, gray; micaceous, some organic material.	6.2	3.9
Sand, silty, gray; grading to sandy silt, micaceous, sand is fL-fU. Gradational contact with next bed.	10.1	2.2
Clay, silty, dark-gray; micaceous, trace of organic material.	12.3	1.7
No sample collected from 14.0 to 17.0 ft.		
Well I29		
Soil zone, silt, dark-brown; micaceous.	0	0.7
Silt, light-gray with orange and light-brown; grades to silty sand, micaceous, some pebbles found near the top. Sand is mL-mU.	.7	3.0
Sand, orange brown and light-gray; mL-mU, subangular.	3.7	3.5
Clay, gray; micaceous.	7.2	.3
Sand, orange; fL, subrounded.	7.5	.4

Description	Depth (feet)	Thickness (feet)
Well I29--Continued		
Clay, silty, gray, orange, and light-brown; some mica. Abrupt contact with next bed.	7.9	1.8
Clay, silty, dark-gray; micaceous.	9.7	10.0
Clay, silty, dark-gray; some organics, lithified material.	19.7	5.0
Sand, silty, dark-gray; fL-fU, subrounded, orange and black particles present.	24.7	.7
Clay, dark-gray; some shell fragments (increasing with depth).	25.4	5.0
Well I30		
Soil zone, silt, brown; organic matter and roots present.	0	0.9
Clay, silty, gray to orange; mottled, (mottling does not follow bedding), micaceous.	.9	2.1
Silt, gray with orange mottling; micaceous, some interbedded sand lenses (fU-mL), some organic matter and mica.	3.0	2.6
Sand, gray with orange mottling; mL-mU, subrounded, some mica. Gradational contact with next bed.	5.6	2.0
Silt, clayey, dark-gray; micaceous, trace of organic material.	7.6	5.6
Sand, silty, gray; fL-fU, subangular, micaceous, organic matter.	13.2	1.4
Silt, clayey, dark-gray; micaceous, trace of organic material.	14.6	.4
Sand, silty, dark-gray; fL-fU, grades to sandy silt, micaceous, some lignite. Gradational contact with next bed.	15.0	1.1
Silt and sandy silt, dark-gray; micaceous, large pieces of lignite at the bottom.	16.1	3.6
Sand, silty, dark-gray; fU-mL, subrounded, micaceous, lignitic.	19.7	.3
Silt, dark-gray; micaceous.	20.0	5.0

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I31A		
Soil zone, silt; pebbles present.	0	1.0
Silt, clayey, tan with light-orange mottling; abundant organic material, roots, small pebbles, micaceous.	1.0	1.8
Sand, dark-orange and gray; fU-mU, subangular, some organic matter, some pebbles, one cobble.	2.8	1.2
Silt, sandy, gray and orange bands; micaceous, some organic material; sand is mU, subrounded.	4.0	.5
Sand, clay, and silt interbedded, gray, orange and some red. Sand sizes vary between beds; silty clay at bottom is bright-orange.	4.5	3.1
Silt, clayey, dark-gray; micaceous.	7.6	1.4
Silt, clayey grading to sandy, gray; micaceous.	9.0	2.8
Sand, light-gray to light orange brown; fL-mU, micaceous, some lignite. Gradational contact with next bed.	11.8	2.2
Sand, silty, dark-gray; fU-mL, subrounded, very micaceous, abundant organic material.	14.0	3.5
Silt, sandy, dark-gray; very micaceous, abundant organic material.	17.5	2.5
Silt, clayey, dark-gray.	20.0	2.0
Clay, dark-gray; micaceous, lignite present.	22.0	3.0
No sample collected from 25.0 to 27.0 ft.		
Well I32		
Soil zone, silt, dark-brown; some iron-oxide cement, roots, trace of mica, trace of sand present.	0	1.0
Silt, clayey, light-gray with orange mottling; organic material and mica present, abundant roots.	1.0	1.5
Sand, silty, whitish-tan with orange mottling; mL-cL, subrounded, abundant roots throughout, organic material abundant near 4 ft, one cobble (4 cm).	2.5	1.5
Silt, clayey, light- to medium-gray with orange mottling; grades to silty clay. Some sand stringers (mL-cL, subangular), several cobbles, traces of iron oxide.	4.0	5.5
Clay, silty, dark-gray; micaceous, one large cobble (4 inches diameter). Gradational contact with next bed.	9.5	3.0
Sand, dark-gray; mL-mU, subrounded, micaceous.	12.5	2.0
Silt, sandy, dark-gray; micaceous, abundant organic material.	14.5	5.0
Silt, clayey, dark-gray; grades to clay, micaceous, organic material present at top but decreases with depth.	19.5	5.0
No sample collected from 24.5 to 25.0 ft.		
Well I33		
Soil zone, sandy silt, brown; abundant roots, trace of mica.	0	0.8
Silt, sandy, light-gray with some orange mottling; roots still present. Gradational contact with next bed.	.8	.7
Sand, grayish-white and tan with some orange mottling. Sand is silty at the top, fU-mU, grades cleaner and coarser (mL-mU), subrounded.	1.5	3.0
Sand, clay, silt, and gravel interbedded, orange, gray, and tan; sand layers vary in size and sorting. Bed thicknesses range from 2 inches to 1 foot.	4.5	2.5
Sand, silty, tan; fL-fU, subrounded, lignitic, some mica, grades finer with depth. Abrupt color change.	7.0	1.2
Silt, sandy, dark-gray; micaceous, lignitic, grades to silt.	8.2	6.3
Silt, dark-gray; grades to sandy silt, micaceous, abundant organic material.	14.5	4.0
Sand, dark-gray; mL-mU, subrounded, micaceous, some organic material.	18.5	6.0
No sample collected from 24.5 to 25.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I34		
Soil zone, silt, brown; roots present, trace of mica.	0	0.9
Silt, gray with orange mottling; roots present, trace of mica.	.9	1.3
Sand, gray with orange mottling; mL-vcL, rounded, one large (4 inch diameter) quartz cobble at 2.7 ft. Gradational contact with next bed.	2.2	1.8
Silt, gray with orange mottling; some mica.	4.0	.5
Silt, clayey and sandy, mottled gray and orange; micaceous, sand lens from 6.5 to 7.0 ft. Sand is brown, fL-fU, rounded. The silt grades to sandy silt, and then to silty sand. Color changes abruptly to orange near the bottom of the bed.	4.5	5.0
Sand, clayey, grading to silt, dark- to medium-gray; micaceous, organic material (twig pieces) present.	9.5	5.0
Silt, dark-gray; abundant organic material and mica. Two cobbles were found (2 and 5 inches in diameter). A bed with small amounts of orange sand, mL-cL, some gray clay, and large cobbles at 18.7 to 19.4 ft.	14.5	5.0
Silt, sandy, dark-gray; similar to above, abundant mica and organic material.	19.5	1.2
Sand, gray, green, and yellowish; fU-mU, subangular, mica and organic material present.	20.7	3.8
No sample collected from 24.5 to 30.0 ft.		
Well I35		
Soil zone, silt, dark-brown; roots and organic material present.	0	1.0
Silt, sandy, light-gray with orange mottling; some old roots and mica present; sand is mL-mU, subrounded. Abrupt contact with next bed.	1.0	3.0
Sand and gravel, tan; iron-oxide staining. Sand is mU-vcU, subrounded to subangular, with gravel up to 1 inch. Some thin light-gray silt lenses (0.5 inches) interbedded, abundant organic matter, black hard grains present.	4.0	.5
Silt, clayey, light-gray with orange mottling; some mica and organic material present. Abrupt contact.	4.5	3.0
Sand, silty, tan to dark-gray; mL-mU, subangular, micaeous, organic material present.	7.5	5.0
Silt, dark-gray; micaceous, abundant organic material. Gradational contact with next bed.	12.5	6.0
Sand, silty, dark-gray with some green; mL-mU, subrounded, micaceous, some silt stringers.	18.5	6.0
No sample collected from 24.5 to 25.0 ft.		
Well I36		
Soil zone, silt, dark-brown; roots and organic matter present, trace of sand (mL-mU).	0	0.5
Silt, light-brown with some orange mottling; some roots, trace of sand. Abrupt contact with next bed.	.5	1.0
Silt and sand interbedded, light-gray and tan with orange mottling; some iron-oxide staining at the contacts. Beds are 1 to 6 inches thick, micaceous, some organic matter. Sand is fU-cL, subrounded with some pebbles (about 1 inch diameter). Abundant granular organic matter. Friable, black grains are present.	1.5	2.5
Sand, tan to orange; with few silt lenses near top. Sand is fU-mL, subrounded, with a few specks of concentrated organic material similar to above. Abrupt contact with next bed.	4.0	5.3
Silt, dark-gray; micaceous, some organic matter, sand content increases towards bottom.	9.3	.7
Sand, silty, dark-gray; mL-mU, subrounded, micaceous, some organic matter.	10.0	4.5
Silt, clayey, dark-gray; micaceous, trace of organic material. Silt is sandy at top.	14.5	5.0
Sand, dark-gray; fL-cL grading to fL-fU, subrounded, micaceous.	19.5	5.0
No samples after 24.5 ft (running sand); bottom of hole is 29 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I37A		
Soil zone, silt, dark-brown; some mica, organic matter, and roots.	0	0.8
Silt, sandy, light-brown with some orange mottling; some mica, organic matter, and roots.	.8	2.0
Silt, light-gray with orange mottling; some mica.	2.8	1.7
Sand with gravel and larger cobbles, orange; some iron-oxide staining. Sand is fL-vcU, subangular to subrounded, gravel and cobbles up to 6 inches; cobbles are rounded to well-rounded.	4.5	.3
Clay, light-gray with orange mottling; some mica, one sand stringer at 5.5 ft. (some iron-oxide cement). Abrupt contact with next bed.	4.8	2.7
Sand and clay interbedded. Clay is gray; sand is fL to pebbles (0.5 inches), subangular to subrounded, iron-oxide staining. Abrupt contact with next bed.	7.5	1.5
Clay, dark-gray; micaceous, trace of organic material, a few sand stringers.	9.0	3.5
Clay, silty, dark-gray; micaceous, abundant organic matter.	12.5	2.0
Silt, dark-gray; micaceous, abundant organic matter, some white specks, some sandy silt at base.	14.5	2.5
Silt, sandy, dark-gray; sand is fU-mU, subrounded, micaceous, some harder greenish chunks present, organic matter evident.	17.0	.5
Sand, dark-gray; fU-mU, subrounded to rounded, micaceous, abundant organic matter.	17.5	7.0
Silt, dark-gray; micaceous, organic material.	24.5	5.0
Sand, dark-gray; mL-mU, subrounded, micaceous, some organic matter. Abrupt contact with next bed.	29.5	2.7
Clay, silty, dark-gray; some mica and organic material.	32.2	1.8
Clay, silty, dark-gray; some mica and organic matter, abundant white shells, mostly in fragments.	34.0	5.5
Clay, black; same as above with fewer shells.	39.5	10.0
No samples after 49.5 ft; bottom of hole is 65 ft.		

Description	Depth (feet)	Thickness (feet)
Well I37B		
Soil zone, silt, brown; abundant roots, some fill material, trace of mica, some orange staining.	0	1.5
Silt, sandy, gray and orange mottled.	1.5	.7
Sand and silty sand, orange and light-tan; vfL-cL, poorly sorted, subrounded.	2.2	1.3
Silt, tan with orange mottling; hard, friable.	3.5	1.0
Sand, clay, and gravel, grayish-brown with orange and black layering; very poorly sorted, gravels up to 0.5 inches. Abrupt contact with next bed.	4.5	.5
Clay, light-gray; some sand stringers. Top contains some orange zones, one major zone of orange friable material from 6.0 to 6.5 ft.	5.0	3.8
Sand and clay interbedded, grades from light-gray to orange with depth. Sand is almost a gravel, with very small pebbles (0.2 inches) present, very poorly sorted.	8.8	.7
Clay, dark-gray; silt or fine sand stringers and an orange sand lens at the top; micaceous.	9.5	3.8
Clay, silty, dark-gray; very micaceous, more friable than above clay.	13.3	1.2
No samples after 14.5 ft; bottom of hole is 27 ft.		
Well I38A		
Soil zone, silt, dark-brown; roots present.	0	1.2
Silt, grading to clayey silt, gray with orange, some tan mottling (orange color increases with depth); organic material throughout.	1.2	3.1
Clay, light-gray with orange mottling, some purple, color change at 8 ft to light-gray; no mottling. Bright-orange at top contact, cobble-size gravel at bottom and orange color.	4.3	4.7
Silt, clayey, grading to sandy silt, dark-gray; some organic material.	9.0	5.0
Sand, dark-gray; micaceous with organic matter, some silty-sand lenses. Gradational contact with next bed.	14.0	4.0
Silt, dark-gray; micaceous, with abundant organic matter.	18.0	1.0
No sample collected from 19.0 to 20.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I39		
Soil zone, silt, dark-brown; roots, mica, organic matter present.	0	0.8
Silt, brown; trace of sand (mL-mU), some mica.	.8	2.0
Sand, tan to light-brown with some orange mottling; fL-mL, subrounded, trace of mica and organic matter. Abrupt contact with next bed.	2.8	1.6
Silt, light-gray to orange; some mica and organic matter.	4.4	.5
Silt, light-gray; mottled orange with some iron-oxide staining, grades to silty clay, same color, some sand stringers, mica, and organic matter present. Abrupt contact with next bed.	4.9	5.6
Clay, dark-gray; grades to clayey silt, mica and organic material present throughout.	10.5	4.4
Clay, dark-gray; micaceous, some organic material, sand stringers near bottom (some white material associated with stringers). Abrupt contact with next bed.	14.9	2.0
Silt, green-gray; micaceous, with abundant organic matter.	16.9	3.0
No samples after 19.9 ft; bottom of hole is 25 ft.		
Well I40		
Soil zone, silt, dark-brown; organic material and roots present.	0	0.7
Sand and silt, brown; roots and organic material present.	.7	1.7
Sand, silty, brown and tannish-brown; grades to sand, poorly sorted.	2.4	4.1
Silt and clay interbedded, gray with orange mottling; black and orange iron-oxide compounds present.	6.5	4.5
Clay, silty, medium-gray; some lignite and mica.	11.0	3.0
Sand, silty, dark-gray; mL-mU, subrounded, micaceous, organic matter present.	14.0	5.0
No sample collected from 19.0 to 20.0 ft.		
Well I41		
Soil zone, coarse silt, dark-brown; micaceous, abundant organic material.	0	1.5
Silt, sandy in places, brown changing to light-orange then to gray and back to brown; trace of mica throughout.	1.5	3.0
Silt, sandy, gray with orange mottling; some mica and organic material, similar to above.	4.5	3.0
Sand, beige; silty at the top, grades cleaner and coarser with depth, sizes grade from fL-fU to mL at the bottom, subrounded, well-sorted.	7.5	2.0
Sand, beige; mU-cL at top, grades to fU-mL at bottom, well-sorted, subrounded, trace of mica, similar to above.	9.5	4.5
Silt, sandy, grayish-brown with orange.	14.0	.5
No sample collected from 14.5 to 15.0 ft.		
Well I42		
Soil zone, silt, dark-brown; abundant organic material, trace of mica.	0	1.3
Silt, yellowish-brown at the top, gray with orange mottling on the bottom; coarse throughout, grades to a sandy silt at the very bottom.	1.3	3.2
Silt and silty sand interbedded, gray and light-brown. Sand is mU-mL, some mica, trace of lignite in material. Gradational contact with next bed.	4.5	3.0
Sand, silty, light grayish-brown; fL size grading to mU with depth, some mica, trace of lignite.	7.5	7.0
No sample collected from 14.5 to 15.0 ft.		
Well I43		
Soil zone, silt, dark-brown; trace of sand, some mica, abundant roots and organic matter. Gradational contact with next bed.	0	0.8
Silt, light-brown to light-orange; some mica, organic matter and roots. Gradational contact with next bed.	.8	2.2
Silt, sandy, light-gray with orange mottling; sand is fL-fU, sand content increases with depth, some mica in material.	3.0	1.5
Sand, tan; fU-cL, subrounded, some mica, organic matter, and clay stringers.	4.5	3.0

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I43--Continued		
Sand and sandy silt interbedded. Sand is tan and orange, fL-mL, subrounded, some mica and organic matter; silt is gray, (beds 1 to 2 inches thick), iron oxide present at sand-silt contact.	7.5	2.2
Silt, light-gray with orange mottling; some sand at base (mL-cL, subrounded). Abrupt contact with next bed.	9.7	.8
Silt, dark-gray; sand lens near top; silt is very micaceous, abundant organic matter present.	10.5	4.0
No sample collected from 14.5 to 15.0 ft.		
Well I44		
Soil zone, silt, brown with orange mottling; micaceous, roots and organic matter present.	0	1.0
Silt, sandy, light grayish-brown with orange mottling; some mica, organic matter, and roots.	1.0	1.8
Sand, silty, gray to light-brown with orange mottling; fL-fU, subrounded, some mica, roots, and organic matter, grades to silt at bottom.	2.8	1.7
Sand and silt interbedded, gray to tan with orange mottling. Sand is fU-mL, subrounded, some mica and organic matter; silt beds are 3 to 4 inches thick.	4.5	2.7
Sand, tan; mL-mU, subangular to subrounded, some mica.	7.2	1.5
Sand, tan with orange mottling; mL-mU, some clay stringers near the top, micaceous.	8.7	5.8
No sample collected from 14.5 to 15.0 ft.		
Well I45		
Sand, tan; probably dredge spoils, vfL-vcL, subrounded to rounded (dry).	0	4.0
Sand, gray; saturated, otherwise same as above.	4.0	3.3
Clay, dark-gray; micaceous, trace of organic material, sandy (greenish-brown) at bottom.	7.3	1.7
Silt, sandy, and silty sand interbedded, gray, orange, and brown mottled; some mica, some black crumbly material present at the top and the bottom of the section.	9.0	4.0
No sample collected from 13.0 to 20.0 ft.		
Well I46		
Sand, tan; probably dredge spoils, fL-vcU, subangular, very poorly sorted, some mica, pebbles (0.5 inches), and black and orange grains.	0	4.5
Sand, grayish; same as above only siltier and moist. Also may be better sorted.	4.5	1.0
Organic material, dark-brown. Composition is at least 80 percent organic material (roots and plant matter) and maybe 20 percent silt. Silt content increases with depth, micaceous.	5.5	3.0
Silt, sandy, grayish-brown; hard, abundant organic material and mica.	8.5	1.8
Sand and sandy silt interbedded, gray with mustard-colored mottling. Sand is fL-mU, poorly sorted, with some quartz pebbles (approx. 1 inch diam.).	10.3	4.2
Sand, tan; mL-cL, subangular, mica present.	14.5	1.0
Silt, dark-gray; some mica and organic matter present.	15.5	3.0
Sand, silty, dark-gray; fL-mL, subrounded, micaceous.	18.5	1.0
No sample collected from 19.5 to 20.0 ft.		
Well I47A		
Soil zone, silt, dark-brown; abundant organic material, some mica, trace of sand.	0	0.7
Silt, sandy, light orange brown; sand is fU-mU, subrounded, poorly sorted, some roots present. Gradational contact with next bed.	.7	2.2
Sand, silty at top grading coarser with depth, medium-orange with some beige mottling; mL-cU, subangular to subrounded, trace of lignite. Abrupt contact with next bed.	2.9	1.1
Silt and sand interbedded, orange and gray mottled; very thin layers (0.5 inches thick), very poorly sorted sand. Silt is coarse (size vcU), subrounded to subangular.	4.0	1.0
Sand, beige and orange; vfU-vcU, subrounded to subangular, poorly sorted, trace mica and lignite. Abrupt contact with next bed.	5.0	4.1
Silt, dark-gray; micaceous, some organic material. Sand lens (mL-cL, subrounded) found at 11 ft.	9.1	4.9
No sample collected from 14.0 to 15.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I47B		
Soil zone, silt, dark-brown; abundant organic material, some mica, trace of sand.	0	0.7
Silt, sandy, light orange brown; sand is fU-mU, subrounded, poorly sorted, some roots. Gradational contact with next bed.	.7	2.2
Sand, silty at top grading coarser, medium-orange with some beige mottling; mL-cU, subangular to subrounded, poorly sorted, some lignite. Abrupt contact with next bed.	2.9	1.1
Silt; vcU, subrounded to subangular. Same as corresponding bed in I47A.	4.0	1.0
Sand; vfU-vcL, very poorly sorted, coarse-grained. Same as corresponding bed in 47A.	5.0	4.0
Silt, dark-gray; sand lens at 12.3 ft.	9.0	5.0
Clay, silty, dark-gray; trace of mica, abundant organic material.	14.0	3.0
Silt, sandy, grades to silty sand, gray; fL-fU with a few cL grains at bottom, micaceous.	17.0	2.0
Sand, dark-gray; grades to silty sand, vfU-vfL, micaceous, some lignite, a couple of pebbles (less than 0.5 inch diameter).	19.0	10.0
Clay, silty at top, dark-gray; abundant shell fragments (to 43 ft).	29.0	32.0
Sand, silty, dark-gray; fU-mL with some 1.5-inch pebbles, rounded, some lignite.	61.0	.7
Sand, white; mL, well-sorted, well-rounded.	61.7	5.3
Clay, white or light-gray, some purple. Sample taken from the bottom of the solid auger.	67.0	--
Well I48		
Fill material, undifferentiated.	0	1.5
Silt, dark-brown; abundant organic matter, some sand and mica. Some of material has an iron-oxide coating. Abrupt contact with next bed.	1.5	2.5
Silt, sandy, light-gray; some mica, root fragments, and pieces of organic material (twigs). Gradational contact with next bed.	4.0	2.3
Well I48--Continued		
Sand, tan to orange; some interbedded silt at 9.0 to 9.5 ft, sand is mU-cL, subrounded, a large cobble (5 inches) was found at 8 ft.	6.3	3.7
Sand, tan to orange; fU-mU, subrounded, micaceous. Gradational contact with next bed.	10.0	4.0
Sand and gravel, tan to orange; size ranges from mU up to 0.5 inches. Sand is subangular to subrounded; gravel and cobbles are subrounded to rounded. Abrupt contact with next bed.	14.0	.5
Silt, sandy, dark-gray; micaceous, organic matter, has orange mottling parallel to bedding of contact with gravel.	14.5	.5
Well I49		
Soil zone, silt, dark-brown; roots and twigs present.	0	0.5
Silt, light-brown with some orange mottling; roots, organic matter, and mica present. Abrupt contact with next bed.	.5	2.0
Sand, tan to orange; mL-cL, subrounded, micaceous, trace of gravel at the bottom. Abrupt contact with next bed.	2.5	6.5
Silt, dark-gray (orange at top contact); micaceous, some organic matter. A 4-inch sand stringer is present at 11.0 feet; sand is dark-gray, fU-mL, micaceous, with a few cobbles. Several rounded cobbles were present in silt also.	9.0	5.0
No sample collected from 14.0 to 15.0 ft.		
Well I50A		
Soil zone, sand, dark-brown;, mL-mU, subrounded, abundant roots.	0	2.2
Sand, gray with orange mottling; mU-cL, subangular, fairly well-sorted, some mica and organic material. Gradational contact with next bed.	2.2	3.3
Silt, light-gray with tan grading to light-orange; micaceous, gets finer with depth. Gradational contact with next bed.	5.5	3.0
Silt, dark-gray; micaceous, grades to clay.	8.5	3.2
Sand, gray; fL-fU, very micaceous, lens of silty clay at a depth of 12.3 ft.	11.7	2.3
No sample collected from 14.0 to 20.0 ft.		

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I51		
Soil zone, silt, dark-brown; abundant organic matter and roots, traces of sand.	0	0.8
Silt, clayey grading to sandy clayey silt, dark-brown to tannish-orange; some organic material and mica. Gradational contact with next bed.	.8	3.4
Sand, orange to tannish-orange; mU-cL, subrounded, organic material and mica present, some silt lenses, large cobble at base (3 inches in diameter). Abrupt contact with next bed.	4.2	4.1
Silt, orange and gray mottled; abundant organic matter and mica, some sand.	8.3	1.4
Silt, sandy, light-gray; micaceous, some organic material, a 1 inch cobble at base.	9.7	1.7
Clay, medium-gray; micaceous.	11.4	2.6
Silt, gray to brown; with compacted clay balls (very hard, greenish) and organic material.	14.0	1.0
Well I52		
Soil zone, silt, dark-brown; some sand, abundant organic matter.	0	0.5
Silt, sandy, dark-brown; sand is fU-mU, subrounded, quartz, abundant organic material throughout.	.5	3.5
Clay, gray with some orange mottling; micaceous, some very thin sand lenses (fU-mL, subrounded) present throughout.	4.0	1.0
Sand, grayish-tan; mL-cL, subrounded, mostly quartz, some mica.	5.0	4.0
Sand, beige to gray-tan; mL-cL, subrounded, quartz.	9.0	5.0
No sample collected from 14.0 to 25.0 ft.		
Well I53		
Soil zone, silt, dark-brown; roots, organic matter.	0	0.5
Silt, sandy, brown mottled with dark-brown; roots, organic matter and mica present.	.5	1.5
Sand, tan-gray mottled with orange; mottling decreases with depth.	2.0	2.0
Sand, orange and tan.	4.0	5.0
Sand.	9.0	2.5
Clay, silty and sandy, orange-gray mottled. Abrupt contact with next bed.	11.5	2.3
Sand, silty.	13.8	.2
No sample collected from 14.0 to 15.0 ft.		
Well I54A		
Soil zone, silt, dark-brown with some brown-red mottling; some mica, roots, and organic material present.	0	1.5
Silt, sandy, light brown-gray with some orange brown rust mottling near base. Sand is in thin lenses (0.5 inches), mL-cL, subrounded, organic matter and some mica present. Gradational contact with next bed.	1.5	1.5
Sand, orange; with pebbles at the base; sand is fL-mU, subrounded, quartz, pebbles are 0.5 inches, well-rounded. Abrupt contact with next bed.	3.0	1.5
Silt, sandy, gray with orange mottling; some pebbles (1.5 inches, well-rounded), rootlets; sand is subangular, fL-cL. Abrupt contact with next bed.	4.5	.8
Sand, tan-orange; mL-cU, subrounded to subangular, quartz, trace mica. Gradational contact with next bed.	5.3	4.2
Silt, sandy, gray with orange-rust mottling; some mica and organic matter.	9.5	.5
Silt, sandy, gray-orange; mottled, very micaceous, some zones of horizontal orange bands.	10.0	2.5
Clay, orange-gray; with color change to dark-gray at 13.0 ft, micaceous.	12.5	2.0
Silt, orange; micaceous.	14.5	.5

Table 4.--Lithologic logs of observation wells--Continued

[Depth in ft (feet) from land surface datum]

Description	Depth (feet)	Thickness (feet)
Well I54B		
Soil zone; silt, dark-brown with some brown-red mottling; some mica, roots and organic material present.	0	1.5
Silt, sandy, light brown-gray with some orange-brown and rust mottling near base. Sand is in thin lenses (about 1 inch), mL-cL, subrounded, organic matter and some mica present. Gradational contact with next bed.	1.5	1.5
Sand, orange; with pebbles at the base; sand is fL-mU, subrounded, quartz, pebbles are 0.5 inches, well-rounded. Abrupt contact with next bed.	3.0	1.5
Silt, sandy, gray with orange mottling; some pebbles (1.5 inches, well-rounded), rootlets; sand is subangular, fL-cL. Abrupt contact with next bed.	4.5	.8
Sand, tan-orange; mL-cU, subrounded to subangular, quartz, trace mica. Gradational contact with next bed.	5.3	4.2
Silt, sandy, gray with orange-rust mottling; some mica and organic matter.	9.5	.5
Silt, sandy, gray-orange; mottled, very micaceous, some zones of horizontal orange bands.	10.0	2.5
Clay, orange-gray; with color change to dark-gray at 13.0 ft, micaceous.	12.5	2.0
Silt, sandy with iron-cemented nodules, bright-orange; micaceous. Sand is mL-mU, rounded. Some of the material is clayey, and some has smaller sand grains.	14.5	1.0
Silt, sandy, medium-brown with orange mottling; similar to above, micaceous, some lignite, some clay layering. Gradational contact with next bed.	15.5	1.6
Sand, silty, tan or light-brown with some orange staining; well-sorted, size mU-mL, micaceous, some cL size at the top.	17.1	2.4
Silt, sandy, brownish-gray; micaceous (very little recovery).	19.5	5.0
Sand, light-brown; cL-mU, micaceous, lignitic.	24.5	1.0
Well I54B--Continued		
Silt and silty sand interbedded, grayish-brown to gray; grades to sand. Sand is well-sorted, but grain sizes vary with depth from cL down to fL, very micaceous.	25.5	3.0
Clay, medium- to dark-gray; micaceous, some lignite.	28.5	18.6
Clay, silty, light brown-gray; grades to clayey silt, micaceous, some lignite present.	47.1	2.4
No samples below 49.5 ft; bottom of hole at 59 ft.		

Table 5.--Lithologic logs of test holes

[Depth in ft (feet) from land surface datum. Note: For location of test holes, see figure 6]

Grain sizes are as follows:

cobbles = 64.0	- 256.000 millimeters	mU = 0.350	- 0.500 millimeters
pebbles = 2.0	- 64.000 millimeters	mL = 0.250	- 0.350 millimeters
cU = 1.410	- 2.000 millimeters	fU = 0.177	- 0.250 millimeters
vcL = 1.000	- 1.140 millimeters	fL = 0.125	- 0.177 millimeters
cU = 0.710	- 1.000 millimeters	vfU = 0.088	- 0.125 millimeters
cL = 0.500	- 0.710 millimeters	vfL = 0.062	- 0.088 millimeters

Description	Sample interval (feet)
Test hole I20T	
Soil zone.	0 - 0.8
Sand, light-gray to orange; interbedded with sandy silt (bed thicknesses up to 0.5 ft).	.8 - 7.0
Sand, orange and gray layers.	7.0 - 9.0
Sand, color varies with depth from tan to orange to brown.	9.0 - 12.5
Silt, sandy, light-gray.	12.5 - 14.0
Began Split-spoon sampling at 19.1 ft.	
Sand, silty, dark-gray; fL-fU, subangular, fairly well-sorted, micaceous, some organic matter.	19.1 - 20.6
Clay, silty, dark-gray; some mica, abundant organic matter.	29.1 - 30.6
Clay, dark-gray; some mica, abundant organic matter, some well-preserved shells and shell fragments.	39.1 - 40.6
Clay, dark-gray; some mica, abundant organic matter, a few shell fragments.	49.1 - 50.6
Clay, dark-gray; micaceous, some organic matter and sand stringers, trace of gravel (up to 0.2 inches, rounded). Sand is mL-mU, subangular.	59.1 - 60.6
Clay, dark-gray, with gravelly sand; sand size is mU-vcU, subangular, poorly sorted, with rounded gravel (up to 0.5 inches).	69.1 - 70.6
Clay, variegated, red and maroon with gray stringers.	79.1 - 80.6
Clay, variegated, red and gray with some yellowish-brown; gray stringers are horizontal, very thin, and discontinuous; one flat, rounded piece of gravel (0.5 inches), similar to above.	89.1 - 90.6
Clay, variegated, similar to above, red-gray, yellow-brown; some mica, lignite, and sand.	97.5 - 99.0
Clay, red, with sand; sand is cL-cU, subangular, well-sorted (quartz), some mica.	107.0 - 107.5
Test hole I20T--Continued	
Clay, variegated, mostly gray with streaks of yellow and red (coloring does not follow bedding); trace of mica.	107.5 - 108.5
Clay, red and gray mottled.	117.5 - 119.0
Clay, silty, light-gray, mottled with red, yellow and brown (color changes do not follow bedding); traces of mica and organic matter.	127.5 - 128.5
Silt, clayey and sandy, light-gray to dark-brown; some mica; sand size fU.	137.5 - 138.5
Clay, purple.	147.0 - 148.1
Test hole I31T	
Soil zone.	0 - 0.5
Silt and silty sand, light-gray with orange mottling; trace of organic material. Sand is orange, mL-cL, some gravel (0.5 inch diameter), rounded to well rounded.	.5 - 4.0
Silt, light-gray with orange mottling; some interbedded sand lenses (1 to 6 inches thick, orange to rust colored), mL-cL, subrounded, gravels and pebbles (less than 0.5 inches) throughout; traces of organic material. Gradational contact.	4.0 - 8.0
Silt, clayey, dark-gray; trace of organic matter, some mica.	8.0 - 9.0
Clay, silty, dark-gray; trace of mica and organic matter.	9.0 - 11.7
Sand, dark-gray, changes to tan abruptly at 12.4 ft (orange at contact); fU-fL, subrounded, some mica.	11.7 - 14.0
Began split-spoon sampling at 20.7 ft.	

Table 5.--Lithologic logs of test holes--Continued

[Depth in ft (feet) from land surface datum]

Description	Sample interval (feet)
Test hole I31T--Continued	
Silt, brownish-gray; very micaceous, traces of larger grains present.	20.7 - 22.2
Clay, silty, dark-gray; micaceous, seashell fragments present.	30.7 - 32.2
Clay, same as above but with fewer shells.	40.7 - 42.2
Sand and gravel, gray; poorly sorted (all sand sizes present), subangular to subrounded, mostly quartz.	50.7 - 52.2
Clay, gray, with lenses of sand; sand is brownish-yellow, fU, very well-sorted, subrounded; one layer of small pellets (may be calcareous) present in clay; some mica throughout.	60.2 - 61.2
Sand, grayish-white; well-sorted, fL, subrounded, some black, orange, and pink grains present.	70.2 - 71.2
Sand, same as above except coarser grains, mL.	80.7 - 81.3
Sand, gray to tan, fU-cL, subrounded, poorly sorted, with gravel up to 1 inch in diameter.	90.7 - 91.2
Sand, same as above, some orange grains found.	100.7 - 101.2
Sand, grayish-white; well-sorted, fL-fU; black flecks, some mica and silt present.	110.7 - 111.2
Silt, and silty clay; purple, red, reddish-brown, and light gray mottled; colors do not follow bedding.	120.7 - 121.2
Silt, yellowish-brown, with some red clay; gray mottling in clay and gray banding in silt; a 1.5 inch pebble, subrounded, found in clay.	130.7 - 131.2
No sample at 140 ft.	
Silt, sandy, light-gray; sand grains fU, rounded; orange and black particles present.	150.7 - 151.3
Test hole I38T	
Soil zone; silt matrix, brownish-gray.	0 - 1.2
Silt, light-gray grading to light-gray with orange mottling; some iron-oxide cementation.	1.2 - 4.0
Silt, light-gray with orange mottling, grades finer with depth; iron-oxide band at contact with next bed.	4.0 - 7.2

Description	Sample interval (feet)
Test hole I38T--Continued	
Clay, silty, gray with some orange mottling; twigs and other organic material present; a 2-inch quartz cobble found at bottom.	7.2 - 8.3
Silt, gray with orange mottling; similar to the layer above the clay.	8.3 - 9.0
Silt, dark-gray; micaceous, some organic matter; small percentage of fine sand is present in upper portion.	9.0 - 14.0
Began split-spoon sampling at 20.0 ft.	
Silt, dark-gray; abundant mica, some organic material.	20.0 - 21.5
Clay, dark-gray; some organic matter, possible trace of shell fragments.	30.0 - 31.0
Silt, sandy, light-gray, interbedded with red clay; trace amounts of mica; sand size fL, subangular.	40.0 - 41.0
Silt, dark-gray; traces of very fine sand, traces of mica.	50.0 - 51.0
Silt, sandy, orange, yellow, light-gray, and dark-gray; sand sizes vfU-fU; color changes do not follow bedding.	60.0 - 61.0
Sand, light-gray with some orange, yellow, red, and black grains; cL-cU, subrounded to rounded, well-sorted.	70.0 - 71.0
Sand, light-gray, with some orange and yellow grains; mL-mU, well-sorted, grading to a sandy clay or fine silt, and finally to a light-gray micaceous clay.	80.0 - 81.0
Sand, white to light-gray; quartz, mL-mU, well-sorted, subrounded, some orange and yellow grains.	90.0 - 90.5
Clay, silty, gray; micaceous, grades darker and finer with depth.	100.0 - 101.5
Clay and silty clay, gray; micaceous, similar to above.	110.0 - 111.5
Clay, sandy, light-gray; sand grains are vfU-fU, some mica, some bands of iron-oxide staining.	120.0 - 121.5
Sand, white, well-sorted, rounded, mL-mU, some orange, pink, yellow and dark particles.	130.0 - 130.7
Clay, light-gray, trace of mica (sampled from the end of bit).	150.0 - 151.0

Table 5.--Lithologic logs of test holes--Continued

[Depth in ft (feet) from land surface datum]

Description	Sample interval (feet)
Test hole I47T	
Fill material, undifferentiated.	0 - 4.6
Sand, clayey, light-brown and gray variegated with orange bands of iron-oxide; fU-mL, micaceous, some organic matter, one 2-inch rounded quartz pebble found.	4.6 - 6.4
Sand, brown, tan, and beige; well-sorted, rounded to subrounded, mU-cL, several small lenses of larger grain size, small amount of lignite, trace of silt.	6.4 - 9.0
Sand, same as above with some dark staining (maybe lignite), one large 3-inch cobble (iron oxide near cobble contact), increasing clay content with depth. Gradational contact.	9.0 - 10.0
Clay, sandy grading to silty, reddish-brown; micaceous; sand size mU-cL, poorly sorted, subangular, some lignite, color changes to orange at bottom. Abrupt contact.	10.0 - 11.0
Clay, silty, medium-gray; micaceous, traces of organic matter, trace of sand, one small quartz pebble found.	11.0 - 14.0
Began split-spoon sampling at 20.0 ft.	
Sand, silty, gray; fL-fU, well-sorted, subrounded, micaceous.	20.0 - 21.5
Clay, silty, dark-gray to black; micaceous, shells throughout, some organic material.	30.0 - 31.5
Clay, dark-gray to black; fewer shells.	40.0 - 41.5
Clay, dark-gray; no shells.	50.0 - 51.5
Clay, dark-gray; grading to a very fine silty sand, shells found, trace of organic matter and mica. Abrupt contact.	60.0 - 61.0
Sand, medium-gray; mL-mU, well-sorted, subrounded, grades to light-gray then to orange.	61.0 - 61.5
Silt, grayish-white; some mica, some orange iron-oxide staining.	70.0 - 71.5
Sand, silty, light-gray; fL-fU, subrounded, trace of mica.	80.0 - 81.5
Sand, white; mU-cL, well-sorted, subangular to subrounded, some individual orange and yellow grains.	90.0 - 91.5

Description	Sample interval (feet)
Test hole I47T--Continued	
Silt, light-gray to tan; mottled, some orange stringers at gray/white contacts, trace of organic matter.	100.0 - 100.5
Sand, tan to orange; mL-cU, subangular to subrounded.	100.5 - 101.5
Sand, tan to yellow; mU-cL, subangular to subrounded, well-sorted, some orange to brown iron-oxide staining.	110.0 - 110.8
Silt, gray; some discontinuous iron-oxide, reddish-brown, cement.	120.0 - 121.0
Sand, tan; mL-cL, subangular, trace of gravel, mica, and lignite.	130.0 - 131.0
Sand, tan to gray with some orange staining; fU, well-sorted, rounded.	140.0 - 141.0
Sand, red to gray; mL-mU, well-sorted, subrounded.	150.0 - 151.0
Cemented beds (hard drilling, no sample).	(approx. 163 ft)
Sands; some clay, red and green (sampled from the drill rod when it was removed).	164.0 - 171.0
Clay, red (sampled from the drill rod).	171.0 - 180.0
Test hole I50T	
Soil zone; sand, brown; abundant organic material.	0 - 0.8
Sand, medium-brown with some orange lenses; well-sorted, mU-cL, rounded to subrounded, trace of organic material, some lenses of clayey sand present.	.8 - 3.2
Sand, orange and orange-brown; mU-cU, trace of mica, fairly well-sorted, subrounded, some lignite.	3.2 - 4.0
Sand, tan to beige with orange streaks; cL-cU, subangular, grades to sandy silt. Abrupt contact.	4.0 - 6.0
Sand, orange grading to orange-brown; mL-cL, well-sorted, subrounded to rounded, trace of mica. Abrupt contact.	6.0 - 8.5
Silt, tan with orange banding; micaceous, some lignite. Abrupt contact.	8.5 - 9.6
Clay, silty, medium-gray; micaceous, trace of lignite.	9.6 - 14.0
Began split-spoon sampling at 20.0 ft.	

Table 5.--Lithologic logs of test holes--Continued

[Depth in ft (feet) from land surface datum]

Description	Sample interval (feet)
Test hole I50T--Continued	
Sand, silty, dark-gray; fU-mL, subangular, micaceous; grades to dark-gray silty clay, micaceous, trace of organic material.	20.0 - 21.5
Clay, dark-gray; micaceous.	30.0 - 31.5
Clay, dark-gray; micaceous, some organic material.	40.0 - 41.5
Clay, dark-gray; abundant organic matter, trace of mica; grades to gray and light-brown silty clay and then to sand (contact at 51.2 ft); sand is light-brown, fU-mL, well-sorted, subrounded, trace of mica.	50.0 - 51.5
Sand, silty, light-gray; fU-cL, poorly sorted, subangular, individual grains of orange, black, pink, and dark-gray.	60.0 - 61.5
Silt, clayey, light-gray; with grayish-white sand at 70.6 ft, mU-mL, subrounded, some grains of various colors.	70.0 - 71.5
Test hole I50T--Continued	
Sand, grayish-white with some orange grains; mL-cU, poorly sorted, subangular to subrounded; one 0.5-inch pebble (subrounded) found.	80.0 - 81.5
Sand, grayish-white with some orange grains; mU-mL, subrounded, some pebbles up to 0.5 inches found.	90.0 - 91.5
No sample at 100 ft.	
Silt, clayey, light-beige; sand, orange-yellow, fU-fL, subrounded.	110.0 - 111.5
No sample at 120 ft.	
No sample at 130 ft.	
Clay, silty, gray, red, and white (sampled from the end of bit).	143.0 -

Table 6.--Physical properties of sediment samples

[Data contained in this table represents the percentage passing sieve; sampling depth is feet below land surface; ft = feet; in. = inches; and --, no data. Note: For location of sample sites, see figure 6]

Well no.	Sample depth (ft)	Grain size distribution, in inches								
		0.500	0.375	0.187	0.079	0.033	0.017	0.010	0.006	0.003
I15	16.2- 18.0	--	--	--	100	99.9	99.6	97.3	79.9	33.4
I17	9.0- 14.0	--	--	--	100	99.9	99.5	86.8	13.2	5.5
I17	14.0- 19.0	--	--	--	100	99.9	99.4	95.1	76.5	30.7
I21	10.0- 10.6	--	--	100	99.9	99.1	94.3	68.4	38.4	18.7
I26A	6.4- 9.7	--	--	100	99.9	99.1	87.8	47.1	19.1	12.4
I30	15.0- 16.1	100	99.8	99.5	99.3	98.9	98.1	95.5	77.8	35.6
I31A	14.0- 17.5	--	--	--	100	99.9	99.6	97.5	83.3	28.7
I31T	90.7- 91.2	--	--	--	100	99.9	95.1	43.4	16.4	11.2
I32	12.5- 14.5	--	--	--	100	99.9	99.4	87.7	36.9	11.5
I33	18.5- 19.5	--	--	--	100	99.9	99.3	94.3	58.6	19.5
I34	20.7- 24.5	--	--	100	98.0	96.3	94.7	84.8	42.1	25.2
I35	19.5- 24.5	--	--	100	99.9	99.6	97.9	86.4	64.6	27.0
I36	19.5- 24.5	--	--	100	99.8	99.2	97.7	90.3	43.3	19.9
I37A	17.5- 19.5	--	--	--	100	99.9	99.6	94.6	57.0	18.0
I38A	14.5- 18.5	--	--	--	100	99.9	99.5	91.4	54.2	11.4
I41	9.5- 14.0	--	--	--	100	99.9	99.5	89.5	27.2	16.0
I44	9.5- 11.5	--	--	--	100	99.9	99.3	75.3	12.0	7.2
I47B	62.7- 65.0	--	--	100	99.9	99.8	98.0	66.0	10.5	4.1
I47T	130.0-131.0	--	100	97.1	92.5	91.5	80.8	42.4	20.3	13.6
I50A	11.9- 14.0	--	--	--	100	99.7	97.8	91.4	62.4	44.5
I54B	50.0- 50.5	--	--	100	99.6	99.2	93.4	65.0	30.8	12.4

Table 7.--Ground-water levels on Carroll Island

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I01

Lat: 39° 19' 28" long: 76° 20' 31"
Measuring point elevation: 8.659 feet
Highest water level: 4.47 feet on FEB 18, 1988
Lowest water level: -0.13 feet on SEP 01, 1987

Location: BZ test burn pit
Measuring point: floor of shelter
Screen interval: 4.0 - 19.0 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	4.18	JAN 15, 1988	3.41	JUL 18	0.30
SEP 01	- .13	FEB 18	4.57	AUG 19	.57
OCT 05	1.02	MAR 17	3.54	SEP 21	.53
NOV 17	2.04	APR 20	3.93	OCT 19	.32
DEC 18	4.00	MAY 23	4.17	NOV 21	3.28
		JUN 20	1.38	DEC 15	3.14

Well I02

Lat: 39° 19' 26" long: 76° 20' 28"
Measuring point elevation: 8.517 feet
Highest water level: 4.31 feet on FEB 18, 1988
Lowest water level: -0.89 feet on SEP 01, 1987

Location: Aerial spray grid
Measuring point: top of well casing
Screen interval: 4.0 - 19.0 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	3.51	JAN 15, 1988	3.31	JUL 18	-0.52
SEP 01	- .89	FEB 18	4.31	AUG 19	- .16
OCT 05	.04	MAR 17	3.47	SEP 21	- .25
NOV 17	1.33	APR 20	3.94	OCT 19	- .56
DEC 18	3.85	MAY 23	4.29	NOV 21	3.11
		JUN 20	.89	DEC 15	3.04

Well I03

Lat: 39° 19' 27" long: 76° 20' 22"
Measuring point elevation: 7.482 feet
Highest water level: 4.00 feet on JUL 08, 1987
Lowest water level: -0.73 feet on SEP 01, 1987

Location: Aerial spray grid
Measuring point: top of well casing
Screen interval: 2.5 - 17.5 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	4.00	JAN 15, 1988	2.59	JUL 18	-0.50
SEP 01	- .73	FEB 18	3.54	AUG 19	- .21
OCT 05	.03	MAR 17	--	SEP 21	- .32
NOV 17	.96	APR 20	3.39	OCT 19	- .61
DEC 18	2.75	MAY 23	3.75	NOV 21	1.65
		JUN 20	.76	DEC 15	2.31

Well I04

Lat: 39° 19' 17" long: 76° 20' 15"
Measuring point elevation: 10.932 feet
Highest water level: 7.57 feet on FEB 18, 1988
Lowest water level: 0.51 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 8.0 - 23.0 feet
Records available: SEP 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
SEP 01	1.49	JAN 15, 1988	3.89	JUL 18	1.71
OCT 05	1.41	FEB 18	7.57	AUG 19	1.38
NOV 17	1.54	MAR 17	5.44	SEP 21	.86
DEC 18	3.20	APR 20	--	OCT 19	.51
		MAY 23	6.29	NOV 21	.92
		JUN 20	4.08	DEC 15	2.52

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I05

Lat: 39° 19' 13" long: 76° 20' 10"
Measuring point elevation: 10.810 feet
Highest water level: 7.06 feet on FEB 18, 1988
Lowest water level: 0.31 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 4.3 - 19.3 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	6.44	JAN 15, 1988	4.04	JUL 18	1.59
SEP 01	.97	FEB 18	7.06	AUG 19	1.11
OCT 05	1.37	MAR 17	6.04	SEP 21	.59
NOV 17	1.45	APR 20	6.24	OCT 19	.31
DEC 18	3.04	MAY 23	6.81	NOV 21	.74
		JUN 20	3.49	DEC 15	2.66

Well I06

Lat: 39° 19' 10" long: 76° 20' 14"
Measuring point elevation: 12.761 feet
Highest water level: 7.96 feet on FEB 18, 1988
Lowest water level: 0.97 feet on NOV 21, 1988

Location: Test grid 1
Measuring point: floor of shelter
Screen interval: 8.0 - 23.0 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	6.98	JAN 15, 1988	5.22	JUL 18	2.77
SEP 01	2.18	FEB 18	7.96	AUG 19	2.25
OCT 05	2.04	MAR 17	6.74	SEP 21	1.59
NOV 17	2.27	APR 20	6.69	OCT 19	1.17
DEC 18	4.53	MAY 23	7.78	NOV 21	.97
		JUN 20	4.52	DEC 15	3.48

Well I07

Lat: 39° 19' 05" long: 76° 20' 13"
Measuring point elevation: 10.855 feet
Highest water level: 6.50 feet on FEB 18, 1988
Lowest water level: 0.01 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 8.0 - 23.0 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	6.17	JAN 15, 1988	4.45	JUL 18	1.30
SEP 01	.73	FEB 18	6.50	AUG 19	.87
OCT 05	1.09	MAR 17	5.44	SEP 21	.32
NOV 17	1.47	APR 20	5.62	OCT 19	.01
DEC 18	4.09	MAY 23	6.28	NOV 21	.56
		JUN 20	3.12	DEC 15	3.02

Well I08

Lat: 39° 19' 03" long: 76° 20' 17"
Measuring point elevation: 11.594 feet
Highest water level: 6.89 feet on MAY 23, 1988
Lowest water level: 0.55 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 8.3 - 23.3 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	6.13	JAN 15, 1988	3.64	JUL 18	1.90
SEP 01	1.40	FEB 18	6.88	AUG 19	1.41
OCT 05	1.39	MAR 17	5.61	SEP 21	.90
NOV 17	1.63	APR 20	5.73	OCT 19	.55
DEC 18	3.07	MAY 23	6.89	NOV 21	.78
		JUN 20	3.24	DEC 15	2.48

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I09

Lat: 39° 19' 09" long: 76° 20' 27"
Measuring point elevation: 6.677 feet
Highest water level: 3.45 feet on MAY 23, 1988
Lowest water level: -0.07 feet on JUL 18, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 8.3 - 23.3 feet
Records available: SEP 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
SEP 01, 1987	0.21	JAN 15, 1988	2.81	JUL 18	-0.07
OCT 05	1.48	FEB 18	3.37	AUG 19	.20
NOV 17	2.46	MAR 17	2.90	SEP 21	.43
DEC 18	2.93	APR 20	3.27	OCT 19	.32
		MAY 23	3.45	NOV 21	2.35
		JUN 20	1.01	DEC 15	2.56

Well I10

Lat: 39° 19' 11" long: 76° 20' 23"
Measuring point elevation: 7.874 feet
Highest water level: 5.11 feet on FEB 18, 1988
Lowest water level: 0.31 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 5.3 - 20.3 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	4.20	MAR 17	4.02	AUG 19	0.73
DEC 18	4.79	APR 20	4.49	SEP 21	.55
		MAY 23	4.83	OCT 19	.31
JAN 15, 1988	4.10	JUN 20	1.76	NOV 21	2.85
FEB 18	5.11	JUL 18	.60	DEC 15	2.46

Well I11

Lat: 39° 18' 37" long: 76° 20' 35"
Measuring point elevation: 7.723 feet
Highest water level: 3.82 feet on JUL 08, 1987
Lowest water level: -1.17 feet on SEP 01, 1987

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 6.2 - 21.2 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	3.82	JAN 15, 1988	2.27	JUL 18	-0.84
SEP 01	-1.17	FEB 18	--	AUG 19	- .83
OCT 05	.09	MAR 17	2.08	SEP 21	- .66
NOV 17	1.38	APR 20	2.56	OCT 19	- .90
DEC 18	2.90	MAY 23	2.93	NOV 21	1.64
		JUN 20	.59	DEC 15	2.02

Well I12

Lat: 39° 18' 38" long: 76° 20' 29"
Measuring point elevation: 6.150 feet
Highest water level: 4.16 feet on JUL 08, 1987
Lowest water level: -1.39 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 8.0 - 23.0 feet
Records available: JUL 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
JUL 08, 1987	4.16	JAN 15, 1988	2.06	JUL 18	-1.39
SEP 01	-1.08	FEB 18	2.41	AUG 19	- .91
OCT 05	1.46	MAR 17	1.94	SEP 21	.72
NOV 17	2.06	APR 20	2.39	OCT 19	- .58
DEC 18	2.26	MAY 23	2.48	NOV 21	2.14
		JUN 20	.40	DEC 15	2.11

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I13

Lat: 39° 18' 35" long: 76° 20' 32"
Measuring point elevation: 7.621 feet
Highest water level: 3.03 feet on DEC 18, 1987
Lowest water level: -1.37 feet on SEP 01, 1987

Location: Lower Island disposal site
Measuring point: floor of shelter
Screen interval: 5.7 - 20.2 feet
Records available: SEP 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
		JAN 15, 1988	2.47	JUL 18	-1.10
SEP 01	-1.37	FEB 18	--	AUG 19	-1.09
OCT 05	.30	MAR 17	2.52	SEP 21	- .91
NOV 17	1.59	APR 20	2.85	OCT 19	-1.16
DEC 18	3.03	MAY 23	3.01	NOV 21	.87
		JUN 20	.30	DEC 15	2.25

Well I14

Lat: 39° 18' 37" long: 76° 20' 36"
Measuring point elevation: 5.799 feet
Highest water level: 2.86 feet on FEB 18, 1988
Lowest water level: -1.48 feet on AUG 19, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 6.0 - 11.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.42	MAR 17	2.21	AUG 19	-1.48
DEC 18	2.45	APR 20	2.48	SEP 21	-1.17
		MAY 23	2.70	OCT 19	-1.32
JAN 15, 1988	2.15	JUN 20	.34	NOV 21	1.61
FEB 18	2.86	JUL 18	-1.35	DEC 15	1.94

Well I15

Lat: 39° 18' 36" long: 76° 20' 34"
Measuring point elevation: 7.674 feet
Highest water level: 2.47 feet on MAY 23, 1988
Lowest water level: -0.55 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 17.0 - 22.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.31	MAR 17	1.63	AUG 19	-0.44
DEC 18	1.73	APR 20	2.28	SEP 21	- .16
		MAY 23	2.47	OCT 19	- .48
JAN 15, 1988	1.52	JUN 20	.66	NOV 21	1.04
FEB 18	2.30	JUL 18	- .55	DEC 15	1.90

Well I16A

Lat: 39° 18' 35" long: 76° 20' 30"
Measuring point elevation: 5.575 feet
Highest water level: 1.51 feet on APR 20, 1988
Lowest water level: -0.46 feet on DEC 18, 1987

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 43.0 - 53.0 feet
Records available: OCT 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
OCT 05, 1987	0.50	MAR 17	-0.13	AUG 19	1.00
NOV 17	.90	APR 20	1.51	SEP 21	1.09
DEC 18	- .46	MAY 23	1.25	OCT 19	.45
		JUN 20	1.12	NOV 21	.11
JAN 15, 1988	- .08	JUL 18	.80	DEC 15	1.37
FEB 18	.33				

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I16B

Lat: 39° 18' 35" long: 76° 20' 30"
Measuring point elevation: 5.624 feet
Highest water level: 2.79 feet on FEB 18, 1988
Lowest water level: -1.19 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 6.0 - 11.0 feet
Records available: OCT 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
OCT 05, 1987	0.74	MAR 17	2.04	AUG 19	-1.10
NOV 17	1.41	APR 20	2.44	SEP 21	- .56
DEC 18	2.33	MAY 23	2.59	OCT 19	- .80
		JUN 20	.33	NOV 21	1.35
JAN 15, 1988	1.95	JUL 18	-1.19	DEC 15	1.84
FEB 18	2.79				

Well I17

Lat: 39° 18' 37" long: 76° 20' 31"
Measuring point elevation: 5.860 feet
Highest water level: 2.91 feet on FEB 18, 1988
Lowest water level: -1.27 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 8.0 - 18.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.70	MAR 17	2.27	AUG 19	-1.20
DEC 18	2.59	APR 20	2.61	SEP 21	- .83
		MAY 23	2.80	OCT 19	-1.13
JAN 15, 1988	2.21	JUN 20	.34	NOV 21	1.43
FEB 18	2.91	JUL 18	-1.27	DEC 15	2.14

Well I18

Lat: 39° 18' 38" long: 76° 20' 31"
Measuring point elevation: 5.626 feet
Highest water level: 3.09 feet on FEB 18, 1988
Lowest water level: -1.47 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.11	MAR 17	2.45	AUG 19	-1.30
DEC 18	2.84	APR 20	2.74	SEP 21	- .96
		MAY 23	2.92	OCT 19	-1.29
JAN 15, 1988	2.42	JUN 20	.22	NOV 21	1.96
FEB 18	3.09	JUL 18	-1.47	DEC 15	1.32

Well I19

Lat: 39° 18' 35" long: 76° 20' 35"
Measuring point elevation: 5.735 feet
Highest water level: 2.17 feet on APR 20, 1988
Lowest water level: -0.27 feet on OCT 19, 1988

Location: Lower Island disposal site
Measuring point: floor of shelter
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.09	MAR 17	1.08	AUG 19	0.14
DEC 18	.78	APR 20	2.17	SEP 21	.19
		MAY 23	2.01	OCT 19	- .27
JAN 15, 1988	.90	JUN 20	.92	NOV 21	.45
FEB 18	--	JUL 18	- .05	DEC 15	1.75

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I20A

Lat: 39° 18' 40" long: 76° 20' 34"
Measuring point elevation: 7.127 feet
Highest water level: 3.11 feet on FEB 18, 1988
Lowest water level: -0.82 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.08	MAR 17	2.19	AUG 19	-0.63
DEC 18	2.61	APR 20	2.71	SEP 21	- .37
		MAY 23	3.08	OCT 19	- .51
JAN 15, 1988	2.09	JUN 20	.54	NOV 21	2.32
FEB 18	3.11	JUL 18	- .82	DEC 15	2.28

Well I21

Lat: 39° 18' 44" long: 76° 20' 36"
Measuring point elevation: 6.016 feet
Highest water level: 3.63 feet on DEC 15, 1988
Lowest water level: -1.11 feet on JUL 18, 1988

Location: Lower Island disposal site
Measuring point: top of well casing
Screen interval: 10.0 - 15.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.60	MAR 17	2.30	AUG 19	-0.82
DEC 18	3.05	APR 20	2.86	SEP 21	- .29
		MAY 23	3.12	OCT 19	- .31
JAN 15, 1988	2.45	JUN 20	.24	NOV 21	3.11
FEB 18	3.21	JUL 18	-1.11	DEC 15	2.39

Well I22A

Lat: 39° 18' 46" long: 76° 20' 29"
Measuring point elevation: 6.434 feet
Highest water level: 1.42 feet on APR 20, 1988
Lowest water level: -0.36 feet on DEC 18, 1987

Location: Test grid 2
Measuring point: floor of shelter
Screen interval: 55.0 - 65.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.77	MAR 17	0.03	AUG 19	0.89
DEC 18	- .36	APR 20	1.42	SEP 21	.03
		MAY 23	1.31	OCT 19	.58
JAN 15, 1988	.07	JUN 20	1.11	NOV 21	.22
FEB 18	.44	JUL 18	.87	DEC 15	1.23

Well I22B

Lat: 39° 18' 46" long: 76° 20' 29"
Measuring point elevation: 6.290 feet
Highest water level: 2.73 feet on MAY 23, 1988
Lowest water level: -1.04 feet on JUL 18, 1988

Location: Test grid 2
Measuring point: floor of shelter
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.29	MAR 17	2.11	AUG 19	-0.68
DEC 18	2.44	APR 20	2.57	SEP 21	.78
		MAY 23	2.73	OCT 19	- .08
JAN 15, 1988	2.28	JUN 20	.32	NOV 21	2.29
FEB 18	2.70	JUL 18	-1.04	DEC 15	2.20

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I22C

Lat: 39° 18' 46" long: 76° 20' 29"
Measuring point elevation: 6.402 feet
Highest water level: 2.90 feet on FEB 18, 1988
Lowest water level: -1.69 feet on JUL 18, 1988

Location: Test grid 2
Measuring point: floor of shelter
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.80	MAR 17	1.77	AUG 19	-1.09
DEC 18	2.55	APR 20	2.40	SEP 21	- .44
		MAY 23	2.70	OCT 19	- .65
JAN 15, 1988	2.34	JUN 20	- .17	NOV 21	2.79
FEB 18	2.90	JUL 18	-1.69	DEC 15	2.32

Well I23

Lat: 39° 18' 43" long: 76° 20' 28"
Measuring point elevation: 4.753 feet
Highest water level: 2.56 feet on MAY 23, 1988
Lowest water level: -1.16 feet on JUL 18, 1988

Location: Test grid 2
Measuring point: top of well casing
Screen interval: 15.0 - 20.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.19	MAR 17	1.94	AUG 19	-0.76
DEC 18	2.30	APR 20	2.45	SEP 21	- .11
		MAY 23	2.56	OCT 19	- .32
JAN 15, 1988	2.12	JUN 20	.26	NOV 21	2.30
FEB 18	2.54	JUL 18	-1.16	DEC 15	2.15

Well I24

Lat: 39° 18' 53" long: 76° 20' 21"
Measuring point elevation: 6.643 feet
Highest water level: 4.07 feet on FEB 18, 1988
Lowest water level: -1.81 feet on OCT 19, 1988

Location: Test grid 2
Measuring point: top of well casing
Screen interval: 4.0 - 9.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.45	MAR 17	3.00	AUG 19	-0.35
DEC 18	--	APR 20	--	SEP 21	- .55
		MAY 23	3.64	OCT 19	-1.81
JAN 15, 1988	2.85	JUN 20	1.12	NOV 21	1.34
FEB 18	4.07	JUL 18	- .22	DEC 15	1.73

Well I25

Lat: 39° 18' 47" long: 76° 20' 30"
Measuring point elevation: 4.809 feet
Highest water level: 2.69 feet on MAY 23, 1988
Lowest water level: -1.13 feet on JUL 18, 1988

Location: Test grid 2
Measuring point: top of well casing
Screen interval: 13.0 - 18.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.22	MAR 17	2.08	AUG 19	-0.70
DEC 18	2.38	APR 20	2.55	SEP 21	.00
		MAY 23	2.69	OCT 19	.17
JAN 15, 1988	2.24	JUN 20	.35	NOV 21	2.21
FEB 18	2.63	JUL 18	-1.13	DEC 15	2.17

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I26A

Lat: 39° 18' 57" long: 76° 20' 23"
Measuring point elevation: 8.077 feet
Highest water level: 3.45 feet on MAY 23, 1988
Lowest water level: -0.15 feet on OCT 19, 1988

Location: HD test area
Measuring point: top of well casing
Screen interval: 25.0 - 30.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.14	MAR 17	2.82	AUG 19	-0.08
DEC 18	2.03	APR 20	3.18	SEP 21	.00
		MAY 23	3.45	OCT 19	- .15
JAN 15, 1988	--	JUN 20	1.20	NOV 21	.78
FEB 18	3.38	JUL 18	.09	DEC 15	1.55

Well I26B

Lat: 39° 18' 57" long: 76° 20' 23"
Measuring point elevation: 8.141 feet
Highest water level: 4.92 feet on FEB 18, 1988
Lowest water level: -0.68 feet on OCT 19, 1988

Location: HD test area
Measuring point: top of well casing
Screen interval: 9.0 - 14.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.61	MAR 17	3.97	AUG 19	-0.13
DEC 18	2.25	APR 20	4.43	SEP 21	- .46
		MAY 23	4.77	OCT 19	- .68
JAN 15, 1988	2.30	JUN 20	1.41	NOV 21	- .05
FEB 18	4.92	JUL 18	.22	DEC 15	1.06

Well I27A

Lat: 39° 18' 55" long: 76° 19' 59"
Measuring point elevation: 6.291 feet
Highest water level: 1.42 feet on APR 20, 1988
Lowest water level: -0.58 feet on DEC 18, 1987

Location: Wind tunnel
Measuring point: floor of shelter
Screen interval: 52.7 - 62.7 feet
Records available: DEC 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
DEC 18, 1987	-0.58	MAR 17	0.15	AUG 19	1.02
		APR 20	1.42	SEP 21	1.00
		MAY 23	1.17	OCT 19	.58
JAN 15, 1988	--	JUN 20	1.14	NOV 21	.31
FEB 18	.38	JUL 18	1.27	DEC 15	1.35

Well I27B

Lat: 39° 18' 55" long: 76° 19' 59"
Measuring point elevation: 6.210 feet
Highest water level: 3.28 feet on FEB 18, 1988
Lowest water level: -0.80 feet on JUL 18, 1988

Location: Wind tunnel
Measuring point: floor of shelter
Screen interval: 3.0 - 8.0 feet
Records available: DEC 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
DEC 18, 1987	2.97	MAR 17	1.94	AUG 19	-0.51
		APR 20	2.84	SEP 21	.10
		MAY 23	3.05	OCT 19	.02
JAN 15, 1988	2.12	JUN 20	.37	NOV 21	3.23
FEB 18	3.28	JUL 18	- .80	DEC 15	2.17

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I28

Lat: 39° 18' 55" long: 76° 19' 56"
Measuring point elevation: 5.908 feet
Highest water level: 2.63 feet on APR 20, 1988
Lowest water level: -1.67 feet on JUL 18, 1988

Location: Wind tunnel
Measuring point: top of well casing
Screen interval: 6.0 - 11.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.62	MAR 17	2.12	AUG 19	-1.18
DEC 18	2.51	APR 20	2.63	SEP 21	- .29
		MAY 23	2.58	OCT 19	.44
JAN 15, 1988	2.33	JUN 20	-0.15	NOV 21	2.41
FEB 18	2.60	JUL 18	-1.67	DEC 15	2.24

Well I29

Lat: 39° 18' 56" long: 76° 19' 58"
Measuring point elevation: 6.522 feet
Highest water level: 3.84 feet on FEB 18, 1988
Lowest water level: -0.76 feet on JUL 18, 1988

Location: Wind tunnel
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: DEC 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
DEC 18, 1987	3.61	MAR 17	2.73	AUG 19	-0.65
		APR 20	3.46	SEP 21	- .54
		MAY 23	3.50	OCT 19	- .75
JAN 15, 1988	3.05	JUN 20	.51	NOV 21	3.79
FEB 18	3.84	JUL 18	- .76	DEC 15	2.78

Well I30

Lat: 39° 18' 59" long: 76° 19' 57"
Measuring point elevation: 5.135 feet
Highest water level: 2.79 feet on MAY 23, 1988
Lowest water level: -0.62 feet on AUG & OCT 1988

Location: CS test area
Measuring point: top of well casing
Screen interval: 10.0 - 15.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.55	MAR 17	2.11	AUG 19	-0.62
DEC 18	2.00	APR 20	2.69	SEP 21	- .36
		MAY 23	2.79	OCT 19	- .62
JAN 15, 1988	1.90	JUN 20	.67	NOV 21	1.27
FEB 18	2.61	JUL 18	- .59	DEC 15	1.84

Well I31A

Lat: 39° 19' 19" long: 76° 20' 07"
Measuring point elevation: 6.342 feet
Highest water level: 3.30 feet on MAY 23, 1988
Lowest water level: -0.53 feet on JUL 18, 1988

Location: Magazine Area
Measuring point: top of well casing
Screen interval: 10.0 - 15.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.45	MAR 17	2.82	AUG 19	-0.44
DEC 18	1.86	APR 20	3.24	SEP 21	- .03
		MAY 23	3.30	OCT 19	- .04
JAN 15, 1988	2.06	JUN 20	.71	NOV 21	1.31
FEB 18	3.20	JUL 18	- .53	DEC 15	1.62

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I32

Lat: 39° 19' 22" long: 76° 20' 27"
Measuring point elevation: 8.128 feet
Highest water level: 5.10 feet on MAY 23, 1988
Lowest water level: 0.49 feet on OCT 19, 1988

Location: Aerial spray grid
Measuring point: top of well casing
Screen interval: 11.0 - 16.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.68	MAR 17	4.33	AUG 19	1.06
DEC 18	4.63	APR 20	4.76	SEP 21	--
		MAY 23	5.10	OCT 19	.49
JAN 15, 1988	4.36	JUN 20	2.99	NOV 21	--
FEB 18	4.99	JUL 18	.72	DEC 15	4.03

Well I33

Lat: 39° 19' 12" long: 76° 20' 35"
Measuring point elevation: 5.508 feet
Highest water level: 3.01 feet on MAY 23, 1988
Lowest water level: -0.41 feet on JUL 18, 1988

Location: Aerial spray grid
Measuring point: floor of shelter
Screen interval: 19.5 - 24.5 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.14	MAR 17	2.43	AUG 19	-0.12
DEC 18	2.67	APR 20	2.83	SEP 21	.43
		MAY 23	3.01	OCT 19	.42
JAN 15, 1988	2.54	JUN 20	.66	NOV 21	2.43
FEB 18	2.89	JUL 18	- .41	DEC 15	2.49

Well I34

Lat: 39° 19' 17" long: 76° 20' 35"
Measuring point elevation: 7.812 feet
Highest water level: 3.79 feet on MAY 23, 1988
Lowest water level: -0.03 feet on JUL 18, 1988

Location: Decontamination pit
Measuring point: top of well casing
Screen interval: 21.0 - 26.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.60	MAR 17	3.13	AUG 19	0.33
DEC 18	3.37	APR 20	3.51	SEP 21	.54
		MAY 23	3.79	OCT 19	.36
JAN 15, 1988	3.18	JUN 20	1.14	NOV 21	2.78
FEB 18	3.67	JUL 18	- .03	DEC 15	2.99

Well I35

Lat: 39° 19' 17" long: 76° 20' 36"
Measuring point elevation: 7.070 feet
Highest water level: 3.75 feet on MAY 23, 1988
Lowest water level: -0.02 feet on JUL 18, 1988

Location: Decontamination pit
Measuring point: top of well casing
Screen interval: 20.0 - 25.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.83	MAR 17	3.09	AUG 19	0.32
DEC 18	3.35	APR 20	3.45	SEP 21	.53
		MAY 23	3.75	OCT 19	.36
JAN 15, 1988	3.16	JUN 20	1.15	NOV 21	2.72
FEB 18	3.66	JUL 18	- .02	DEC 15	2.97

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I36

Lat: 39° 19' 19" long: 76° 20' 35"
Measuring point elevation: 7.505 feet
Highest water level: 3.99 feet on MAY 23, 1988
Lowest water level: 0.11 feet on JUL 18, 1988

Location: Decontamination pit
Measuring point: top of well casing
Screen interval: 22.0 - 27.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.11	MAR 17	3.31	AUG 19	0.43
DEC 18	3.51	APR 20	3.67	SEP 21	.60
		MAY 23	3.99	OCT 19	.40
JAN 15, 1988	3.49	JUN 20	1.31	NOV 21	2.78
FEB 18	3.88	JUL 18	.11	DEC 15	3.10

Well I37A

Lat: 39° 19' 12" long: 76° 20' 21"
Measuring point elevation: 9.728 feet
Highest water level: 1.41 feet on MAY 23, 1988
Lowest water level: -0.11 feet on DEC 18, 1987

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 59.5 - 64.5 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	-0.04	MAR 17	0.49	AUG 19	0.53
DEC 18	- .11	APR 20	1.27	SEP 21	--
		MAY 23	1.41	OCT 19	.78
JAN 15, 1988	.08	JUN 20	1.10	NOV 21	.79
FEB 18	.84	JUL 18	.82	DEC 15	1.10

Well I37B

Lat: 39° 19' 12" long:. 76° 20' 21"
Measuring point elevation: 9.509 feet
Highest water level: 5.01 feet on MAY 23, 1988
Lowest water level: 0.42 feet on OCT 19, 1988

Location: Test grid 1
Measuring point: top of well casing
Screen interval: 16.0 - 21.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.78	MAR 17	4.29	AUG 19	0.97
DEC 18	3.81	APR 20	4.53	SEP 21	--
		MAY 23	5.01	OCT 19	.42
JAN 15, 1988	3.80	JUN 20	2.12	NOV 21	1.94
FEB 18	4.89	JUL 18	.92	DEC 15	3.13

Well I38A

Lat: 39° 19' 28" long: 76° 20' 33"
Measuring point elevation: 8.891 feet
Highest water level: 4.61 feet on FEB 18, 1988
Lowest water level: 0.24 feet on OCT 19, 1988

Location: BZ test burn pit
Measuring point: top of well casing
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.40	MAR 17	3.78	AUG 19	0.48
DEC 18	3.52	APR 20	4.17	SEP 21	.44
		MAY 23	4.37	OCT 19	.24
JAN 15, 1988	3.39	JUN 20	1.76	NOV 21	1.95
FEB 18	4.61	JUL 18	.38	DEC 15	2.84

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I39

Lat: 39° 19' 29" long: 76° 20' 32"
Measuring point elevation: 8.661 feet
Highest water level: 4.49 feet on MAY 23, 1988
Lowest water level: 0.27 feet on OCT 19, 1988

Location: BZ test burn pit
Measuring point: top of well casing
Screen interval: 11.0 - 21.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.37	MAR 17	3.60	AUG 19	0.50
DEC 18	3.30	APR 20	3.99	SEP 21	.47
		MAY 23	4.49	OCT 19	.27
JAN 15, 1988	3.17	JUN 20	1.72	NOV 21	1.92
FEB 18	4.33	JUL 18	.40	DEC 15	2.74

Well I40

Lat: 39° 19' 29" long: 76° 20' 33"
Measuring point elevation: 10.080 feet
Highest water level: 4.60 feet on MAY 23, 1988
Lowest water level: 0.20 feet on OCT 19, 1988

Location: BZ test burn pit
Measuring point: top of well casing
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.28	MAR 17	3.74	AUG 19	0.46
DEC 18	3.34	APR 20	4.11	SEP 21	.40
		MAY 23	4.60	OCT 19	.20
JAN 15, 1988	3.24	JUN 20	1.77	NOV 21	1.83
FEB 18	4.50	JUL 18	.38	DEC 15	2.55

Well I41

Lat: 39° 19' 34" long: 76° 20' 50"
Measuring point elevation: 5.160 feet
Highest water level: 2.16 feet on APR 20, 1988
Lowest water level: -1.17 feet on NOV 17, 1987

Location: EPG[1] dump site
Measuring point: top of well casing
Screen interval: 7.0 - 12.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	-1.17	MAR 17	1.39	AUG 19	-0.27
DEC 18	1.51	APR 20	2.16	SEP 21	.76
		MAY 23	1.95	OCT 19	.73
JAN 15, 1988	1.29	JUN 20	.24	NOV 21	1.92
FEB 18	1.91	JUL 18	- .52	DEC 15	1.73

1/ Edgewood Proving Ground

Well I42

Lat: 39° 19' 34" long: 76° 20' 51"
Measuring point elevation: 5.748 feet
Highest water level: 1.92 feet on APR 20, 1988
Lowest water level: 0.05 feet on SEP 21, 1988

Location: EPG dump site
Measuring point: top of well casing
Screen interval: 8.0 - 13.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.53	MAR 17	0.85	AUG 19	0.28
DEC 18	.67	APR 20	1.92	SEP 21	.05
		MAY 23	1.57	OCT 19	.65
JAN 15, 1988	.41	JUN 20	.64	NOV 21	1.27
FEB 18	1.26	JUL 18	.13	DEC 15	1.70

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I43

Lat: 39° 19' 34" long: 76° 20' 51"
Measuring point elevation: 6.352 feet
Highest water level: 2.04 feet on APR 20, 1988
Lowest water level: -0.26 feet on JUL 18, 1988

Location: EPG dump site
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.30	MAR 17	1.07	AUG 19	-0.01
DEC 18	1.14	APR 20	2.04	SEP 21	.81
		MAY 23	1.77	OCT 19	.60
JAN 15, 1988	1.02	JUN 20	.41	NOV 21	1.61
FEB 18	1.63	JUL 18	- .26	DEC 15	1.67

Well I44

Lat: 39° 18' 45" long: 76° 20' 35"
Measuring point elevation: 4.890 feet
Highest water level: 2.81 feet on FEB 18, 1988
Lowest water level: -1.22 feet on JUL 18, 1988

Location: VX test area
Measuring point: top of well casing
Screen interval: 9.0 - 14.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.43	MAR 17	2.24	AUG 19	-0.92
DEC 18	2.65	APR 20	2.67	SEP 21	- .12
		MAY 23	2.79	OCT 19	- .01
JAN 15, 1988	2.29	JUN 20	.16	NOV 21	2.80
FEB 18	2.81	JUL 18	-1.22	DEC 15	2.29

Well I45

Lat: 39° 19' 08" long: 76° 21' 14"
Measuring point elevation: 10.441 feet
Highest water level: 3.02 feet on MAY 23, 1988
Lowest water level: -0.37 feet on JUL 18, 1988

Location: Dredge spoil site
Measuring point: top of well casing
Screen interval: 9.0 - 14.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.23	MAR 17	2.64	AUG 19	-0.04
DEC 18	2.48	APR 20	2.86	SEP 21	1.09
		MAY 23	3.02	OCT 19	1.31
JAN 15, 1988	2.47	JUN 20	1.64	NOV 21	2.44
FEB 18	2.93	JUL 18	- .37	DEC 15	2.48

Well I46

Lat: 39° 19' 10" long: 76° 21' 18"
Measuring point elevation: 10.907 feet
Highest water level: 3.58 feet on MAY 23, 1988
Lowest water level: 0.01 feet on JUL 18, 1988

Location: Dredge spoil site
Measuring point: top of well casing
Screen interval: 12.0 - 17.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.50	MAR 17	3.02	AUG 19	0.27
DEC 18	2.75	APR 20	3.28	SEP 21	1.08
		MAY 23	3.58	OCT 19	1.20
JAN 15, 1988	2.65	JUN 20	2.05	NOV 21	2.57
FEB 18	3.35	JUL 18	.01	DEC 15	2.68

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I47A

Lat: 39° 19' 12" long: 76° 21' 16"
Measuring point elevation: 5.993 feet
Highest water level: 2.80 feet on NOV 21, 1988
Lowest water level: -1.23 feet on JUL 18, 1988

Location: Service area
Measuring point: floor of shelter
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.33	MAR 17	2.39	AUG 19	-0.72
DEC 18	2.55	APR 20	2.63	SEP 21	.27
		MAY 23	2.62	OCT 19	.66
JAN 15, 1988	2.39	JUN 20	.64	NOV 21	2.80
FEB 18	2.75	JUL 18	-1.23	DEC 15	2.27

Well I47B

Lat: 39° 19' 12" long: 76° 21' 15"
Measuring point elevation: 5.582 feet
Highest water level: 1.48 feet on MAY 23, 1988
Lowest water level: -0.48 feet on AUG 19, 1988

Location: Service area
Measuring point: floor of shelter
Screen interval: 60.6 - 65.6 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.76	MAR 17	1.47	AUG 19	-0.48
DEC 18	- .03	APR 20	1.25	SEP 21	1.04
		MAY 23	1.48	OCT 19	.74
JAN 15, 1988	.14	JUN 20	1.06	NOV 21	.76
FEB 18	.86	JUL 18	.69	DEC 15	1.17

Well I48

Lat: 39° 19' 14" long: 76° 21' 15"
Measuring point elevation: 7.050 feet
Highest water level: 2.92 feet on NOV 21, 1988
Lowest water level: -1.02 feet on JUL 18, 1988

Location: Service area
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.44	MAR 17	2.42	AUG 19	-0.52
DEC 18	2.74	APR 20	2.69	SEP 21	.31
		MAY 23	2.86	OCT 19	--
JAN 15, 1988	2.52	JUN 20	.67	NOV 21	2.92
FEB 18	2.88	JUL 18	-1.02	DEC 15	2.32

Well I49

Lat: 39° 19' 14" long: 76° 21' 17"
Measuring point elevation: 6.658 feet
Highest water level: 3.38 feet on FEB 18, 1988
Lowest water level: -1.19 feet on JUL 18, 1988

Location: Service area
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	2.51	MAR 17	2.86	AUG 19	-0.86
DEC 18	3.11	APR 20	3.12	SEP 21	- .54
		MAY 23	3.22	OCT 19	- .67
JAN 15, 1988	2.88	JUN 20	.31	NOV 21	3.27
FEB 18	3.38	JUL 18	-1.19	DEC 15	2.69

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I50A

Lat: 39° 19' 35" long: 76° 21' 27"
Measuring point elevation: 6.165 feet
Highest water level: 2.88 feet on MAY 23, 1988
Lowest water level: -0.48 feet on OCT 19, 1988

Location: Bengies Point Road dump site
Measuring point: top of well casing
Screen interval: 14.0 - 19.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.44	MAR 17	2.60	AUG 19	-0.15
DEC 18	2.20	APR 20	2.75	SEP 21	- .09
		MAY 23	2.88	OCT 19	- .48
JAN 15, 1988	2.26	JUN 20	1.71	NOV 21	1.92
FEB 18	2.81	JUL 18	.75	DEC 15	2.00

Well I51

Lat: 39° 19' 37" long: 76° 21' 29"
Measuring point elevation: 4.917 feet
Highest water level: 2.66 feet on MAY 23, 1988
Lowest water level: -0.88 feet on OCT 19, 1988

Location: Bengies Point Road dump site
Measuring point: top of well casing
Screen interval: 4.0 - 9.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.55	MAR 17	2.44	AUG 19	-0.38
DEC 18	2.11	APR 20	2.53	SEP 21	- .33
		MAY 23	2.66	OCT 19	- .88
JAN 15, 1988	2.22	JUN 20	1.93	NOV 21	1.94
FEB 18	2.55	JUL 18	- .45	DEC 15	--

Well I52

Lat: 39° 19' 36" long: 76° 21' 26"
Measuring point elevation: 6.604 feet
Highest water level: 3.12 feet on MAY 23, 1988
Lowest water level: -0.39 feet on OCT 19, 1988

Location: Bengies Point Road dump site
Measuring point: top of well casing
Screen interval: 6.0 - 11.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	1.21	MAR 17	2.82	AUG 19	0.27
DEC 18	2.05	APR 20	2.90	SEP 21	.08
		MAY 23	3.12	OCT 19	- .39
JAN 15, 1988	2.25	JUN 20	2.11	NOV 21	1.62
FEB 18	2.93	JUL 18	.32	DEC 15	1.98

Well I53

Lat: 39° 19' 38" long: 76° 21' 25"
Measuring point elevation: 5.867 feet
Highest water level: 3.72 feet on MAR 17, 1988
Lowest water level: -1.09 feet on OCT 19, 1988

Location: Bengies Point Road dump site
Measuring point: top of well casing
Screen interval: 5.0 - 10.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.97	MAR 17	3.72	AUG 19	-0.62
DEC 18	2.51	APR 20	2.88	SEP 21	- .68
		MAY 23	2.93	OCT 19	-1.09
JAN 15, 1988	2.53	JUN 20	.99	NOV 21	1.94
FEB 18	2.95	JUL 18	- .85	DEC 15	2.31

Table 7.--Ground-water levels on Carroll Island--Continued

[Measuring point elevation is from sea level. Screen interval from land surface datum. Water levels, in ft (feet) above or below (-) sea level. Latitude and longitude: degrees (o), minutes ('), and seconds ("). lat = latitude; long = longitude. --, no data. Note: For location of observation wells, see figure 6 and for hydrographs of selected wells, see figures 12-25]

Well I54A

Lat: 39° 19' 38" long: 76° 21' 27"
Measuring point elevation: 6.207 feet
Highest water level: 3.15 feet on FEB 18, 1988
Lowest water level: -1.54 feet on OCT 19, 1988

Location: Bengies Point Road dump site
Measuring point: floor of shelter
Screen interval: 4.0 - 9.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.36	MAR 17	2.61	AUG 19	-1.03
DEC 18	2.09	APR 20	2.92	SEP 21	-1.09
		MAY 23	2.95	OCT 19	-1.54
JAN 15, 1988	2.24	JUN 20	.80	NOV 21	.91
FEB 18	3.15	JUL 18	-1.21	DEC 15	1.94

Well I54B

Lat: 39° 19' 38" long: 76° 21' 27"
Measuring point elevation: 5.952 feet
Highest water level: 1.70 feet on MAY 23, 1988
Lowest water level: -1.47 feet on AUG 19, 1988

Location: Bengies Point Road dump site
Measuring point: floor of shelter
Screen interval: 49.0 - 59.0 feet
Records available: NOV 1987 - DEC 1988

Date	Water level	Date	Water level	Date	Water level
NOV 17, 1987	0.76	MAR 17	0.63	AUG 19	-1.47
DEC 18	.18	APR 20	1.33	SEP 21	1.16
		MAY 23	1.70	OCT 19	.81
JAN 15, 1988	.29	JUN 20	1.16	NOV 21	.94
FEB 18	1.14	JUL 18	.74	DEC 15	1.31

Table 8.--Pumpage data for 1988 from production wells located near Carroll Island

[GAP no. = Ground-water Appropriation Permit. Screen interval is from depth below land surface. Use of water: AG = Agriculture (farming), AQ = Aquaculture, CO = Commercial, IN = Industrial, IR = Irrigation. gal/d = gallons per day; -- = no data. Note: For location of production well, see figures 7, 8, and 9].

USGS well no.	State permit no.	GAP no.	Owner	Screen interval (feet)	Use of water	Aquifer	Status	Pumpage reported (gal/d)	Pumpage appropriated (gal/d)
BA Eg 144	BA-72-0354	BA72G007	U.S. Army	166-186	IN	Patapsco	Inactive	--	5,300
BA Eg 146	BA-73-7660	BA79G001	Gunpowder State Park	200-210	CO	Patuxent	Active (APR-OCT)	800	5,000
BA Eg 150	BA-73-1990	BA75G012	Marshy Pt. Nursery	245-255	IR	Patapsco	Active (APR-OCT)	11,000	25,000
BA Eg 188	BA-81-2838	BA84G026	T&A Excavation	90-100	CO	Patapsco	Active	--	150
BA Eg 198	BA-81-7396	BA87G064	Moore Pre-cast Concrete	213-220	CO	Patuxent	Active	--	200
BA Fg 153	--	BA87G014	Baltimore Gas & Elec.	70-105	AQ	Patapsco	Active (AUG)	[1]167,225	36,000
BA Fg 164	BA-81-6866	--	C. Ritter	237-250	AG	Patuxent?	Active	--	--

[1] The reported pumping value is misleading because it is based on a constant withdrawal rate of 150 gallons per minute; however, the well is pumped only long enough to fill holding tanks, so the value is probably lower than reported.

Table 9.--Slug-test data, May through September 1988

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I15
Equilibrium water level: 8.13 ft
Date: May 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.38	31.0	6.48
0.4	6.38	41.0	6.50
0.6	6.39	51.0	6.52
0.8	6.39	61.0	6.54
1.0	6.40	71.0	6.56
1.2	6.41	81.0	6.58
1.4	6.40	91.0	6.60
1.6	6.40	101.0	6.62
1.8	6.40	111.0	6.64
2.0	6.40	121.0	6.65
3.0	6.41	131.0	6.67
4.0	6.41	141.0	6.69
5.0	6.42	151.0	6.70
6.0	6.42	161.0	6.72
7.0	6.42	171.0	6.74
8.0	6.42	181.0	6.75
9.0	6.43	281.0	6.90
10.0	6.43	381.0	7.03
11.0	6.43	481.0	7.13
12.0	6.44	581.0	7.23
13.0	6.44	681.0	7.32
14.0	6.44	781.0	7.40
15.0	6.44	881.0	7.46
16.0	6.45	981.0	7.52
17.0	6.45		
18.0	6.45		
19.0	6.45		
20.0	6.45		
21.0	6.46		
22.0	6.46		
23.0	6.46		
24.0	6.46		
25.0	6.47		
26.0	6.47		
27.0	6.47		
28.0	6.47		
29.0	6.47		
30.0	6.48		

Well I16A
Equilibrium water level: 7.79 ft
Date: May 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	5.99	16.0	6.46
0.4	6.01	17.0	6.48
0.6	6.01	18.0	6.51
0.8	6.02	19.0	6.53
1.0	6.03	20.0	6.55
1.2	6.04	21.0	6.58
1.4	6.05	22.0	6.60
1.6	6.06	23.0	6.62
1.8	6.06	24.0	6.64
2.0	6.07	25.0	6.66
2.2	6.08	26.0	6.68
2.4	6.08	27.0	6.70
2.6	6.09	28.0	6.72
2.8	6.10	29.0	6.74
3.0	6.11	30.0	6.76
3.2	6.11	31.0	6.77
3.4	6.12	41.0	6.94
3.6	6.13	51.0	7.07
3.8	6.14	61.0	7.18
4.0	6.14	71.0	7.27
4.2	6.15	81.0	7.35
4.4	6.15	91.0	7.41
4.6	6.16	101.0	7.46
4.8	6.17	111.0	7.51
5.0	6.18	121.0	7.55
5.2	6.18	131.0	7.58
5.4	6.19	141.0	7.61
5.6	6.19	151.0	7.63
5.8	6.20	161.0	7.65
6.0	6.21	171.0	7.67
7.0	6.22	181.0	7.68
8.0	6.24	281.0	7.75
9.0	6.28	381.0	7.77
10.0	6.30	481.0	7.78
11.0	6.33	581.0	7.79
12.0	6.36	681.0	7.79
13.0	6.38	781.0	7.79
14.0	6.41	881.0	7.79
15.0	6.44	981.0	7.79

Well I19
Equilibrium water level: 8.48 ft
Date: June 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	6.67	27.0	6.74
2.0	6.67	28.0	6.74
3.0	6.68	29.0	6.74
4.0	6.68	30.0	6.74
5.0	6.69	40.0	6.76
6.0	6.69	50.0	6.78
7.0	6.69	60.0	6.80
8.0	6.69	70.0	6.82
9.0	6.70	80.0	6.84
10.0	6.70	90.0	6.86
11.0	6.70	100.0	6.88
12.0	6.70	110.0	6.89
13.0	6.71	120.0	6.91
14.0	6.71	130.0	6.93
15.0	6.71	140.0	6.95
16.0	6.71	150.0	6.96
17.0	6.72	160.0	6.98
18.0	6.72	170.0	7.00
19.0	6.72	180.0	7.01
20.0	6.72	280.0	7.16
21.0	6.72	380.0	7.30
22.0	6.72	480.0	7.42
23.0	6.73	580.0	7.52
24.0	6.73	680.0	7.61
25.0	6.73	780.0	7.68
26.0	6.73	880.0	7.74
27.0	6.74	980.0	7.79

Well I20A
Equilibrium water level: 8.57 ft
Date: June 23, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	6.98	90.0	7.11
2.0	6.99	100.0	7.12
3.0	7.00	110.0	7.13
4.0	7.00	120.0	7.14
5.0	7.01	130.0	7.14
6.0	7.01	140.0	7.15
7.0	7.01	150.0	7.16
8.0	7.02	160.0	7.17
9.0	7.02	170.0	7.17
10.0	7.02	180.0	7.18
15.0	7.03	280.0	7.24
20.0	7.04	380.0	7.29
25.0	7.05	480.0	7.35
30.0	7.06	580.0	7.41
40.0	7.07	680.0	7.45
50.0	7.08	780.0	7.50
60.0	7.09	880.0	7.54
70.0	7.10	980.0	7.59
80.0	7.11		

Table 9.--Slug-test data, May through September 1988--Continued

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I21
Equilibrium water level: 8.43 ft
Date: June 22, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.49	15.0	7.19
0.4	6.51	16.0	7.22
0.6	6.51	17.0	7.25
0.8	6.53	18.0	7.28
1.0	6.55	19.0	7.31
1.2	6.57	20.0	7.33
1.4	6.58	21.0	7.36
1.6	6.59	22.0	7.39
1.8	6.61	23.0	7.41
2.0	6.63	24.0	7.43
2.2	6.64	25.0	7.46
2.4	6.66	26.0	7.48
2.6	6.67	27.0	7.50
2.8	6.67	28.0	7.52
3.0	6.69	29.0	7.54
3.2	6.70	30.0	7.56
3.4	6.71	40.0	7.73
3.6	6.73	50.0	7.84
3.8	6.74	60.0	7.93
4.0	6.75	70.0	7.98
4.2	6.76	80.0	8.03
4.4	6.77	90.0	8.07
4.6	6.79	100.0	8.10
4.8	6.80	110.0	8.12
5.0	6.81	120.0	8.14
5.2	6.82	130.0	8.15
5.4	6.82	140.0	8.16
5.6	6.83	150.0	8.17
5.8	6.84	160.0	8.18
6.0	6.86	170.0	8.18
7.0	6.87	180.0	8.19
8.0	6.91	280.0	8.22
9.0	6.96	380.0	8.23
10.0	7.00	480.0	8.23
11.0	7.04	580.0	8.24
12.0	7.08	680.0	8.23
13.0	7.12	780.0	8.24
14.0	7.15		

Well I22A
Equilibrium water level: 8.23 ft
Date: June 22, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.69	16.0	7.40
0.4	6.70	17.0	7.44
0.6	6.71	18.0	7.47
0.8	6.72	19.0	7.50
1.0	6.73	20.0	7.53
1.2	6.75	21.0	7.57
1.4	6.77	22.0	7.59
1.6	6.78	23.0	7.62
1.8	6.79	24.0	7.65
2.0	6.80	25.0	7.68
2.2	6.82	26.0	7.70
2.4	6.83	27.0	7.73
2.6	6.84	28.0	7.75
2.8	6.85	29.0	7.78
3.0	6.86	30.0	7.80
3.2	6.87	40.0	7.99
3.4	6.88	50.0	8.21
3.6	6.89	60.0	8.22
3.8	6.90	70.0	8.29
4.0	6.91	80.0	8.33
4.2	6.93	90.0	8.36
4.4	6.94	100.0	8.38
4.6	6.95	110.0	8.39
4.8	6.96	120.0	8.41
5.0	6.97	130.0	8.41
5.2	6.98	140.0	8.42
5.4	6.99	150.0	8.42
5.6	7.00	160.0	8.42
5.8	7.01	170.0	8.42
6.0	7.02	180.0	8.42
7.0	7.04	280.0	8.42
8.0	7.08	380.0	8.43
9.0	7.13	480.0	8.43
10.0	7.17	580.0	8.43
11.0	7.21	680.0	8.44
12.0	7.25	780.0	8.44
13.0	7.29	880.0	8.44
14.0	7.33	980.0	8.43
15.0	7.37		

Well I22B
Equilibrium water level: 8.72 ft
Date: September 9, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.85	24.0	6.97
0.4	6.83	25.0	6.98
0.6	6.84	26.0	6.98
0.8	6.84	27.0	6.98
1.0	6.82	28.0	6.99
1.2	6.82	29.0	6.99
1.4	6.83	30.0	7.00
1.6	6.84	40.0	7.05
1.8	6.85	50.0	7.10
2.0	6.85	60.0	7.15
3.0	6.85	70.0	7.19
4.0	6.86	80.0	7.23
5.0	6.87	90.0	7.26
6.0	6.87	100.0	7.30
7.0	6.87	110.0	7.33
8.0	6.88	120.0	7.36
9.0	6.89	130.0	7.39
10.0	6.89	140.0	7.42
11.0	6.90	150.0	7.45
12.0	6.90	160.0	7.48
13.0	6.91	170.0	7.51
14.0	6.91	180.0	7.54
15.0	6.92	280.0	7.78
16.0	6.93	380.0	7.96
17.0	6.93	480.0	8.11
18.0	6.94	580.0	8.22
19.0	6.94	680.0	8.30
20.0	6.95	780.0	8.37
21.0	6.96	880.0	8.41
22.0	6.96	980.0	8.46
23.0	6.96		

Well I23
Equilibrium water level: 8.77 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.93	27.0	7.06
0.4	6.94	28.0	7.06
0.6	6.94	29.0	7.06
0.8	6.94	30.0	7.07
1.0	6.94	31.0	7.07
2.0	6.95	41.0	7.11
3.0	6.96	51.0	7.14
4.0	6.96	61.0	7.18
5.0	6.97	71.0	7.21
6.0	6.97	81.0	7.25
7.0	6.97	91.0	7.28
8.0	6.98	101.0	7.31
9.0	6.98	111.0	7.33
10.0	6.99	121.0	7.36
11.0	6.99	131.0	7.39
12.0	6.99	141.0	7.42
13.0	7.00	151.0	7.45
14.0	7.00	161.0	7.47
15.0	7.01	171.0	7.50
16.0	7.01	181.0	7.52
17.0	7.02	281.0	7.73
18.0	7.02	381.0	7.91
19.0	7.03	481.0	8.04
20.0	7.03	581.0	8.15
21.0	7.03	681.0	8.22
22.0	7.04	781.0	8.29
23.0	7.04	881.0	8.34
24.0	7.04	981.0	8.38
25.0	7.05		
26.0	7.05		

Table 9.--Slug-test data, May through September 1988--Continued

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I25
Equilibrium water level: 8.61 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.77	23.0	6.86
0.4	6.78	24.0	6.87
0.6	6.78	25.0	6.87
0.8	6.79	26.0	6.87
1.0	6.79	27.0	6.88
1.2	6.78	28.0	6.88
1.4	6.78	29.0	6.88
1.6	6.79	30.0	6.89
1.8	6.79	31.0	6.89
2.0	6.79	41.0	6.91
2.2	6.79	51.0	6.95
2.4	6.79	61.0	6.98
2.6	6.79	71.0	7.00
2.8	6.79	81.0	7.03
3.0	6.80	91.0	7.05
4.0	6.80	101.0	7.08
5.0	6.80	111.0	7.10
6.0	6.81	121.0	7.12
7.0	6.81	131.0	7.15
8.0	6.82	141.0	7.17
9.0	6.82	151.0	7.19
10.0	6.82	161.0	7.21
11.0	6.83	171.0	7.23
12.0	6.83	181.0	7.25
13.0	6.83	281.0	7.44
14.0	6.84	381.0	7.60
15.0	6.84	481.0	7.73
16.0	6.84	581.0	7.83
17.0	6.84	681.0	7.93
18.0	6.85	781.0	8.00
19.0	6.85	881.1	8.06
20.0	6.86	981.0	8.12
21.0	6.86		
22.0	6.86		

Well I26A
Equilibrium water level: 8.43 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.55	22.0	6.67
0.4	6.56	23.0	6.67
0.6	6.56	24.0	6.68
0.8	6.55	25.0	6.68
1.0	6.57	26.0	6.69
1.2	6.56	27.0	6.69
1.4	6.56	28.0	6.70
1.6	6.57	29.0	6.70
1.8	6.57	30.0	6.70
2.0	6.57	31.0	6.71
3.0	6.58	41.0	6.74
4.0	6.58	51.0	6.78
5.0	6.59	61.0	6.82
6.0	6.60	71.0	6.85
7.0	6.60	81.0	6.89
8.0	6.60	91.0	6.92
9.0	6.61	101.0	6.95
10.0	6.61	111.0	6.98
11.0	6.62	121.0	7.01
12.0	6.62	131.0	7.04
13.0	6.63	141.0	7.07
14.0	6.63	151.0	7.10
15.0	6.64	161.0	7.12
16.0	6.64	171.0	7.15
17.0	6.65	181.0	7.17
18.0	6.65	281.0	7.39
19.0	6.66	381.0	7.54
20.0	6.66	981.0	8.07
21.0	6.67		

Well I27A
Equilibrium water level: 9.33 ft
Date: June 22, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.59	18.0	7.87
0.4	7.60	19.0	7.88
0.6	7.60	20.0	7.89
0.8	7.61	21.0	7.91
1.0	7.61	22.0	7.92
1.2	7.62	23.0	7.93
1.4	7.62	24.0	7.94
1.6	7.62	25.0	7.95
1.8	7.63	26.0	7.97
2.0	7.63	27.0	7.98
2.2	7.63	28.0	7.99
2.4	7.64	29.0	8.00
2.6	7.64	30.0	8.01
2.8	7.64	40.0	8.12
3.0	7.65	50.0	8.21
3.2	7.65	60.0	8.30
3.4	7.66	70.0	8.37
3.6	7.66	80.0	8.44
3.8	7.66	90.0	8.51
4.0	7.67	100.0	8.57
4.2	7.67	110.0	8.62
4.4	7.67	120.0	8.67
4.6	7.68	130.0	8.72
4.8	7.68	140.0	8.76
5.0	7.69	150.0	8.80
6.0	7.70	160.0	8.84
7.0	7.71	170.0	8.87
8.0	7.72	180.0	8.90
9.0	7.74	280.0	9.11
10.0	7.75	380.0	9.21
11.0	7.77	480.0	9.26
12.0	7.79	580.0	9.29
13.0	7.80	680.0	9.31
14.0	7.81	780.0	9.32
15.0	7.83	880.0	9.33
16.0	7.84	980.0	9.33
17.0	7.86		

Well I30
Equilibrium water level: 8.43 ft
Date: June 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.01	10.0	7.16
0.4	7.04	11.0	7.16
0.6	7.03	12.0	7.17
0.8	7.05	20.0	7.18
1.0	7.05	30.0	7.20
1.2	7.06	40.0	7.22
1.4	7.07	50.0	7.24
1.6	7.08	60.0	7.27
1.8	7.08	70.0	7.29
2.0	7.08	80.0	7.31
2.2	7.08	90.0	7.32
2.4	7.09	100.0	7.34
2.6	7.09	110.0	7.35
2.8	7.10	120.0	7.37
3.0	7.10	130.0	7.38
3.2	7.10	140.0	7.40
3.4	7.10	150.0	7.40
3.6	7.11	160.0	7.41
3.8	7.11	170.0	7.42
4.0	7.11	180.0	7.42
4.2	7.11	280.0	7.53
4.4	7.11	380.0	7.66
4.6	7.12	480.0	7.72
4.8	7.12	580.0	7.74
5.0	7.12	680.0	7.81
6.0	7.13	780.0	7.86
7.0	7.14	880.0	7.91
8.0	7.15	980.0	7.95
9.0	7.15		

Table 9.--Slug-test data, May through September 1988--Continued

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note for location of observation wells, see figure 6]

Well I31A
Equilibrium water level: 8.44 ft
Date: June 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	6.62	28.0	6.73
2.0	6.65	29.0	6.74
3.0	6.65	30.0	6.74
4.0	6.65	40.0	6.77
5.0	6.66	50.0	6.79
6.0	6.66	60.0	6.81
7.0	6.67	70.0	6.84
8.0	6.67	80.0	6.86
9.0	6.67	90.0	6.89
10.0	6.68	100.0	6.91
11.0	6.68	110.0	6.93
12.0	6.68	120.0	6.95
13.0	6.69	130.0	6.97
14.0	6.69	140.0	6.99
15.0	6.70	150.0	7.01
16.0	6.70	160.0	7.02
17.0	6.70	170.0	7.04
18.0	6.70	180.0	7.06
19.0	6.71	280.0	7.22
20.0	6.71	380.0	7.37
21.0	6.71	480.0	7.49
22.0	6.72	580.0	7.59
23.0	6.72	680.0	7.68
24.0	6.72	780.0	7.77
25.0	6.72	880.0	7.86
26.0	6.73	980.0	7.93
27.0	6.73		

Well I32
Equilibrium water level: 8.65 ft
Date: June 27, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.84	24.0	6.97
0.4	6.84	25.0	6.97
0.6	6.84	26.0	6.98
0.8	6.84	27.0	6.98
1.0	6.84	28.0	6.98
1.2	6.85	29.0	6.99
1.4	6.85	30.0	6.99
1.6	6.84	40.0	7.03
1.8	6.85	50.0	7.06
2.0	6.86	60.0	7.10
3.0	6.86	70.0	7.13
4.0	6.87	80.0	7.16
5.0	6.88	90.0	7.18
6.0	6.88	100.0	7.21
7.0	6.89	110.0	7.23
8.0	6.89	120.0	7.26
9.0	6.90	130.0	7.28
10.0	6.90	140.0	7.30
11.0	6.91	150.0	7.33
12.0	6.91	160.0	7.35
13.0	6.92	170.0	7.37
14.0	6.92	180.0	7.40
15.0	6.93	280.0	7.59
16.0	6.93	380.0	7.76
17.0	6.94	480.0	7.88
18.0	6.94	580.0	7.97
19.0	6.95	680.0	8.06
20.0	6.95	780.0	8.12
21.0	6.96	880.0	8.18
22.0	6.96	980.0	8.23
23.0	6.96		

Well I33
Equilibrium water level: 8.97 ft
Date: June 22, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.14	16.0	7.42
0.4	7.16	17.0	7.43
0.6	7.16	18.0	7.45
0.8	7.17	19.0	7.46
1.0	7.18	20.0	7.47
1.2	7.18	21.0	7.49
1.4	7.20	22.0	7.50
1.6	7.20	23.0	7.51
1.8	7.20	24.0	7.53
2.0	7.20	25.0	7.54
2.2	7.20	26.0	7.55
2.4	7.21	27.0	7.57
2.6	7.22	28.0	7.58
2.8	7.22	29.0	7.59
3.0	7.22	30.0	7.60
3.2	7.22	40.0	7.72
3.4	7.23	50.0	7.82
3.6	7.23	60.0	7.91
3.8	7.24	70.0	7.99
4.0	7.24	80.0	8.07
4.2	7.24	90.0	8.14
4.4	7.25	100.0	8.21
4.6	7.25	110.0	8.27
4.8	7.25	120.0	8.33
5.0	7.26	130.0	8.38
5.2	7.26	140.0	8.42
5.4	7.26	150.0	8.47
5.6	7.27	160.0	8.51
5.8	7.27	170.0	8.54
6.0	7.28	180.0	8.57
7.0	7.28	280.0	8.77
8.0	7.30	380.0	8.86
9.0	7.31	480.0	8.91
10.0	7.33	580.0	8.94
11.0	7.34	680.0	8.95
12.0	7.36	780.0	8.96
13.0	7.37	880.0	8.97
14.0	7.39	980.0	8.97
15.0	7.40		

Well I34
Equilibrium water level: 8.41 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.58	25.0	6.78
0.4	6.59	26.0	6.79
0.6	6.59	27.0	6.80
0.8	6.59	28.0	6.81
1.0	6.60	29.0	6.81
2.0	6.60	30.0	6.82
3.0	6.62	31.0	6.83
4.0	6.62	41.0	6.89
5.0	6.63	51.0	6.96
6.0	6.64	61.0	7.01
7.0	6.65	71.0	7.07
8.0	6.65	81.0	7.13
9.0	6.66	91.0	7.18
10.0	6.67	101.0	7.23
11.0	6.68	111.0	7.27
12.0	6.69	121.0	7.32
13.0	6.70	131.0	7.36
14.0	6.70	141.0	7.40
15.0	6.71	151.0	7.44
16.0	6.72	161.0	7.47
17.0	6.73	171.0	7.51
18.0	6.73	181.0	7.54
19.0	6.74	281.0	7.80
20.0	6.75	381.0	7.97
21.0	6.75	481.0	8.07
22.0	6.76	981.0	8.31
23.0	6.77		
24.0	6.78		

Table 9.--Slug-test data, May through September 1988--Continued
[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I35
Equilibrium water level: 8.57 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	7.74	100.0	7.77
2.0	7.74	110.0	7.78
3.0	7.74	120.0	7.78
4.0	7.74	130.0	7.78
5.0	7.74	140.0	7.78
6.0	7.75	150.0	7.78
7.0	7.75	160.0	7.79
8.0	7.74	170.0	7.79
9.0	7.75	180.0	7.79
10.0	7.75	280.0	7.81
20.0	7.76	380.0	7.83
30.0	7.76	480.0	7.85
40.0	7.76	580.0	7.87
50.0	7.76	680.0	7.88
60.0	7.77	780.0	7.89
70.0	7.77	880.0	7.91
80.0	7.77	980.0	7.92
90.0	7.77		

Well I36
Equilibrium water level: 8.36 ft
Date: June 2, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.62	14.0	7.03
0.4	6.63	15.0	7.06
0.6	6.64	16.0	7.08
0.8	6.65	17.0	7.11
1.0	6.66	18.0	7.13
1.2	6.67	19.0	7.15
1.4	6.67	20.0	7.18
1.6	6.68	21.0	7.20
1.8	6.69	22.0	7.22
2.0	6.70	23.0	7.24
2.2	6.70	24.0	7.26
2.4	6.71	25.0	7.28
2.6	6.72	26.0	7.30
2.8	6.72	27.0	7.32
3.0	6.73	28.0	7.34
3.2	6.74	29.0	7.35
3.4	6.74	30.0	7.37
3.6	6.75	31.0	7.39
3.8	6.76	41.0	7.54
4.0	6.77	51.0	7.67
4.2	6.77	61.0	7.78
4.4	6.78	71.0	7.88
4.6	6.79	81.0	7.95
4.8	6.79	91.0	8.01
5.0	6.80	101.0	8.07
5.2	6.81	111.0	8.11
5.4	6.81	121.0	8.15
5.6	6.82	131.0	8.17
5.8	6.82	141.0	8.20
6.0	6.83	151.0	8.22
7.0	6.84	161.0	8.25
8.0	6.87	171.0	8.26
9.0	6.90	181.0	8.28
10.0	6.93	281.0	8.34
11.0	6.96	381.0	8.36
12.0	6.98	481.0	8.36
13.0	7.01		

Well I37A
Equilibrium water level: 7.88 ft
Date: May 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.10	16.0	6.29
0.4	6.10	17.0	6.30
0.6	6.10	18.0	6.31
0.8	6.09	19.0	6.32
1.0	6.11	20.0	6.32
1.2	6.11	21.0	6.33
1.4	6.13	22.0	6.34
1.6	6.13	23.0	6.35
1.8	6.13	24.0	6.36
2.0	6.13	25.0	6.37
2.2	6.14	26.0	6.38
2.4	6.14	27.0	6.38
2.6	6.14	28.0	6.39
2.8	6.15	29.0	6.40
3.0	6.15	30.0	6.41
3.2	6.15	31.0	6.42
3.4	6.15	41.0	6.49
3.6	6.16	51.0	6.56
3.8	6.16	61.0	6.63
4.0	6.16	71.0	6.69
4.2	6.16	81.0	6.75
4.4	6.17	91.0	6.80
4.6	6.17	101.0	6.85
4.8	6.17	111.0	6.90
5.0	6.18	121.0	6.94
5.2	6.18	131.0	6.98
5.4	6.18	141.0	7.02
5.6	6.18	151.0	7.06
5.8	6.18	161.0	7.10
6.0	6.19	171.0	7.13
7.0	6.19	181.0	7.16
8.0	6.20	281.0	7.42
9.0	6.21	381.0	7.59
10.0	6.23	481.0	7.70
11.0	6.24	581.0	7.76
12.0	6.25	681.0	7.81
13.0	6.26	781.0	7.84
14.0	6.27	881.0	7.86
15.0	6.28	981.0	7.88

Well I37B
Equilibrium water level: 8.34 ft
Date: June 30, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	7.93	100.0	7.97
2.0	7.93	110.0	7.97
3.0	7.93	120.0	7.97
4.0	7.94	130.0	7.97
5.0	7.94	140.0	7.97
6.0	7.94	150.0	7.97
7.0	7.94	160.0	7.98
8.0	7.94	170.0	7.98
9.0	7.95	180.0	7.98
10.0	7.95	280.0	7.98
20.0	7.95	380.0	7.98
30.0	7.95	480.0	7.99
40.0	7.96	580.0	8.00
50.0	7.96	680.0	8.00
60.0	7.96	780.0	8.00
70.0	7.96	880.0	8.01
80.0	7.96	980.0	8.01
90.0	7.97		

Table 9.--Slug-test data, May through September 1988--Continued

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I38A
Equilibrium water level: 8.60 ft
Data: June 27, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.45	30.0	7.53
0.4	7.47	40.0	7.54
0.6	7.45	50.0	7.55
0.8	7.45	60.0	7.56
1.0	7.46	70.0	7.57
2.0	7.46	80.0	7.58
3.0	7.47	90.0	7.60
4.0	7.47	100.0	7.61
5.0	7.48	110.0	7.62
6.0	7.48	120.0	7.63
7.0	7.48	130.0	7.64
8.0	7.49	140.0	7.65
9.0	7.49	150.0	7.66
10.0	7.49	160.0	7.67
11.0	7.49	170.0	7.69
12.0	7.49	180.0	7.70
13.0	7.50	280.0	7.78
14.0	7.50	380.0	7.84
15.0	7.50	480.0	7.92
16.0	7.50	580.0	7.99
17.0	7.51	680.0	8.04
18.0	7.51	780.0	8.09
19.0	7.51	880.0	8.14
20.0	7.51	980.0	8.18

Well I39
Equilibrium water level: 8.90 ft
Date: June 27, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.26	15.0	7.33
0.4	7.41	16.0	7.33
0.6	7.18	17.0	7.33
0.8	7.36	18.0	7.34
1.0	7.23	19.0	7.34
1.2	7.33	20.0	7.34
1.4	7.26	30.0	7.36
1.6	7.31	40.0	7.38
1.8	7.28	50.0	7.40
2.0	7.30	60.0	7.41
2.2	7.28	70.0	7.43
2.4	7.30	80.0	7.45
2.6	7.29	90.0	7.46
2.8	7.30	100.0	7.48
3.0	7.29	110.0	7.49
3.2	7.30	120.0	7.50
3.4	7.30	130.0	7.52
3.6	7.30	140.0	7.53
3.8	7.30	150.0	7.54
4.0	7.30	160.0	7.56
5.0	7.30	170.0	7.57
6.0	7.31	180.0	7.58
7.0	7.31	280.0	7.69
8.0	7.31	380.0	7.79
9.0	7.31	480.0	7.88
10.0	7.32	580.0	7.94
11.0	7.32	680.0	8.02
12.0	7.32	780.0	8.08
13.0	7.33	880.0	8.12
14.0	7.33	980.0	8.16

Well I40
Equilibrium water level: 8.54 ft
Date: June 27, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
1.0	8.10	60.0	8.11
2.0	8.10	70.0	8.11
3.0	8.10	80.0	8.11
4.0	8.10	90.0	8.11
5.0	8.10	100.0	8.11
6.0	8.10	180.0	8.12
7.0	8.10	280.0	8.14
8.0	8.10	380.0	8.14
9.0	8.11	480.0	8.15
10.0	8.10	580.0	8.15
20.0	8.11	680.0	8.16
30.0	8.11	780.0	8.17
40.0	8.11	880.0	8.17
50.0	8.11	980.0	8.17

Well I44
Equilibrium water level: 8.40 ft
Date: June 30, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	7.66	80.0	7.74
0.4	7.68	90.0	7.75
0.6	7.67	100.0	7.75
0.8	7.67	110.0	7.75
1.0	7.68	120.0	7.75
2.0	7.68	130.0	7.76
3.0	7.69	140.0	7.76
4.0	7.69	150.0	7.76
5.0	7.69	160.0	7.76
6.0	7.69	170.0	7.76
7.0	7.69	180.0	7.76
8.0	7.70	280.0	7.78
9.0	7.70	380.0	7.79
10.0	7.70	480.0	7.81
20.0	7.71	580.0	7.82
30.0	7.72	680.0	7.83
40.0	7.73	780.0	7.84
50.0	7.73	880.0	7.84
60.0	7.73	980.0	7.85
70.0	7.74		

[Water levels measured in feet above the transducer; ft = feet; s = seconds from start of test
Note: For location of observation wells, see figure 6]

Well I47B
Equilibrium water level: 8.29 ft
Date: May 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.51	15.0	6.83
0.4	6.53	16.0	6.85
0.6	6.55	17.0	6.87
0.8	6.55	18.0	6.88
1.0	6.55	19.0	6.90
1.2	6.55	20.0	6.91
1.4	6.56	21.0	6.93
1.6	6.57	22.0	6.94
1.8	6.57	23.0	6.96
2.0	6.57	24.0	6.97
2.2	6.58	25.0	6.99
2.4	6.59	26.0	7.00
2.6	6.59	27.0	7.01
2.8	6.60	28.0	7.03
3.0	6.60	29.0	7.04
3.2	6.61	30.0	7.06
3.4	6.61	31.0	7.07
3.6	6.62	41.0	7.18
3.8	6.62	51.0	7.28
4.0	6.63	61.0	7.37
4.2	6.63	71.0	7.44
4.4	6.64	81.0	7.51
4.6	6.64	91.0	7.57
4.8	6.64	101.0	7.63
5.0	6.65	111.0	7.68
5.2	6.65	121.0	7.72
5.4	6.66	131.0	7.76
5.6	6.67	141.0	7.80
5.8	6.67	151.0	7.83
6.0	6.67	161.0	7.87
7.0	6.68	171.0	7.90
8.0	6.70	181.0	7.92
9.0	6.72	281.0	8.10
10.0	6.74	381.0	8.19
11.0	6.76	481.0	8.24
12.0	6.78	581.0	8.27
13.0	6.80	681.0	8.29
14.0	6.82		

Well I50A
Equilibrium water level: 8.01 ft
Date: June 13, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.21	16.0	6.53
0.4	6.21	17.0	6.54
0.6	6.22	18.0	6.56
0.8	6.23	19.0	6.57
1.0	6.23	20.0	6.59
1.2	6.23	21.0	6.61
1.4	6.24	22.0	6.62
1.6	6.25	23.0	6.64
1.8	6.27	24.0	6.65
2.0	6.26	25.0	6.66
2.2	6.27	26.0	6.67
2.4	6.27	27.0	6.69
2.6	6.28	28.0	6.70
2.8	6.28	29.0	6.72
3.0	6.29	30.0	6.73
3.2	6.29	40.0	6.86
3.4	6.30	50.0	6.97
3.6	6.30	60.0	7.06
3.8	6.31	70.0	7.16
4.0	6.31	80.0	7.23
4.2	6.31	90.0	7.30
4.4	6.32	100.0	7.36
4.6	6.33	110.0	7.43
4.8	6.33	120.0	7.48
5.0	6.33	130.0	7.54
5.2	6.34	140.0	7.56
5.4	6.34	150.0	7.60
5.6	6.35	160.0	7.64
5.8	6.35	170.0	7.67
6.0	6.36	180.0	7.70
7.0	6.36	280.0	7.87
8.0	6.38	380.0	7.91
9.0	6.39	480.0	7.93
10.0	6.42	580.0	7.96
11.0	6.44	680.0	7.99
12.0	6.46	780.0	8.00
13.0	6.47	880.0	8.00
14.0	6.49	980.0	8.01
15.0	6.51		

Well I54B
Equilibrium water level: 8.36 ft
Date: June 22, 1988

Time (s)	Water level (ft)	Time (s)	Water level (ft)
0.2	6.52	20.0	6.72
0.4	6.49	21.0	6.73
0.6	6.51	22.0	6.74
0.8	6.50	23.0	6.74
1.0	6.51	24.0	6.75
1.2	6.52	25.0	6.76
1.4	6.53	26.0	6.77
1.6	6.52	27.0	6.78
1.8	6.53	28.0	6.79
2.0	6.53	29.0	6.80
2.2	6.53	30.0	6.81
2.4	6.53	40.0	6.89
2.6	6.54	50.0	6.96
2.8	6.54	60.0	7.02
3.0	6.55	70.0	7.08
3.2	6.55	80.0	7.14
3.4	6.55	90.0	7.19
3.6	6.55	100.0	7.24
3.8	6.56	110.0	7.29
4.0	6.56	120.0	7.33
5.0	6.57	130.0	7.37
6.0	6.58	140.0	7.42
7.0	6.59	150.0	7.46
8.0	6.60	160.0	7.49
9.0	6.61	170.0	7.53
10.0	6.62	180.0	7.57
11.0	6.63	280.0	7.80
12.0	6.64	380.0	7.95
13.0	6.65	480.0	8.04
14.0	6.66	580.0	8.11
15.0	6.67	680.0	8.15
16.0	6.68	780.0	8.18
17.0	6.69	880.0	8.19
18.0	6.70	980.0	8.21
19.0	6.71		

(p. 77 follows)

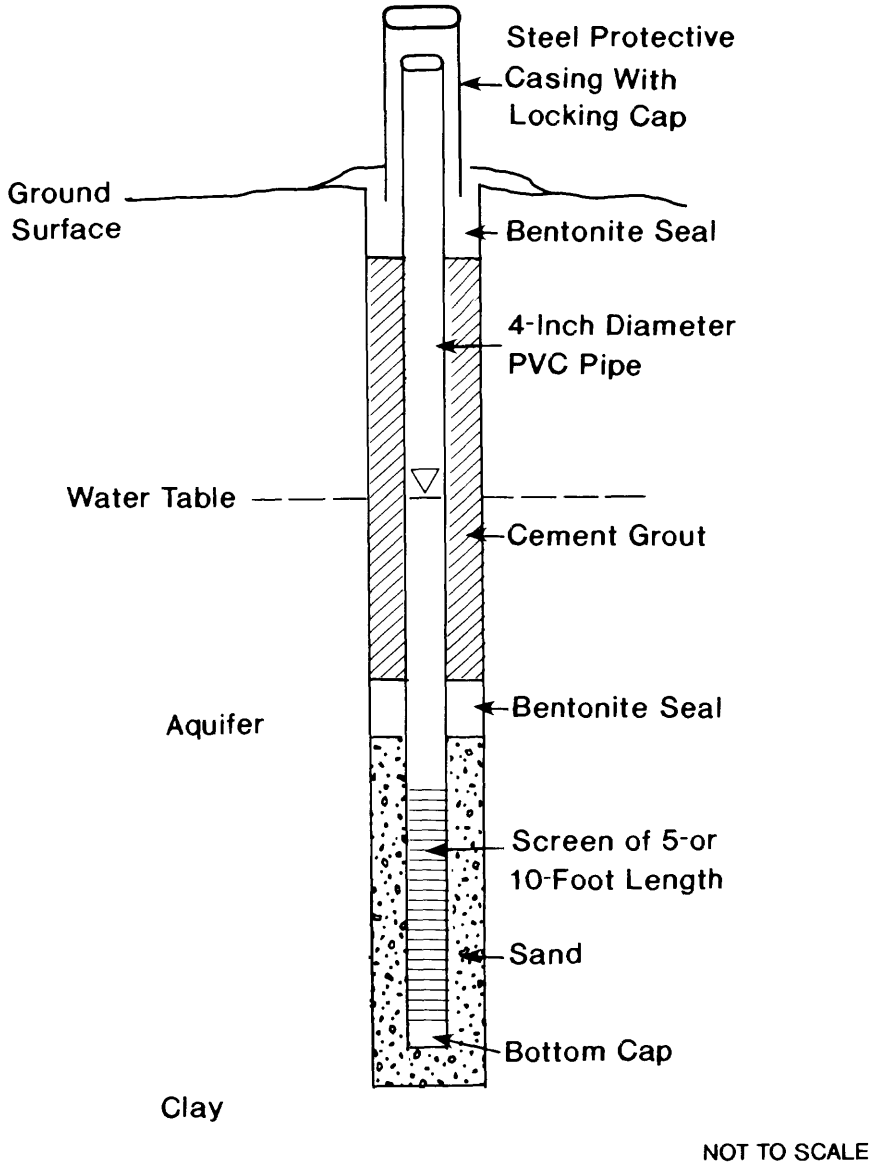

Figure 4.--Well construction

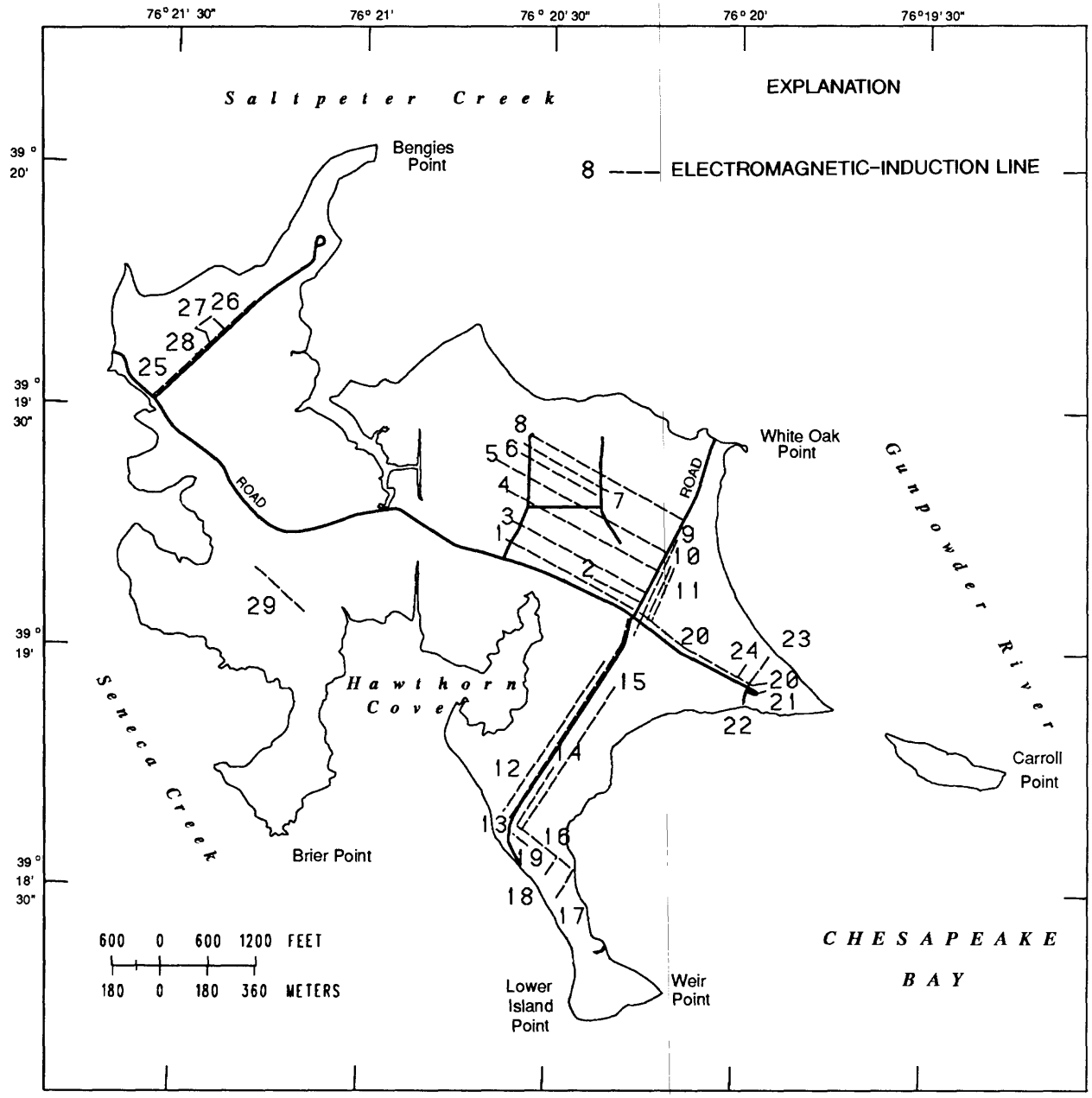

Figure 5.--Location of electromagnetic-induction lines for the survey conducted May through October 1987.

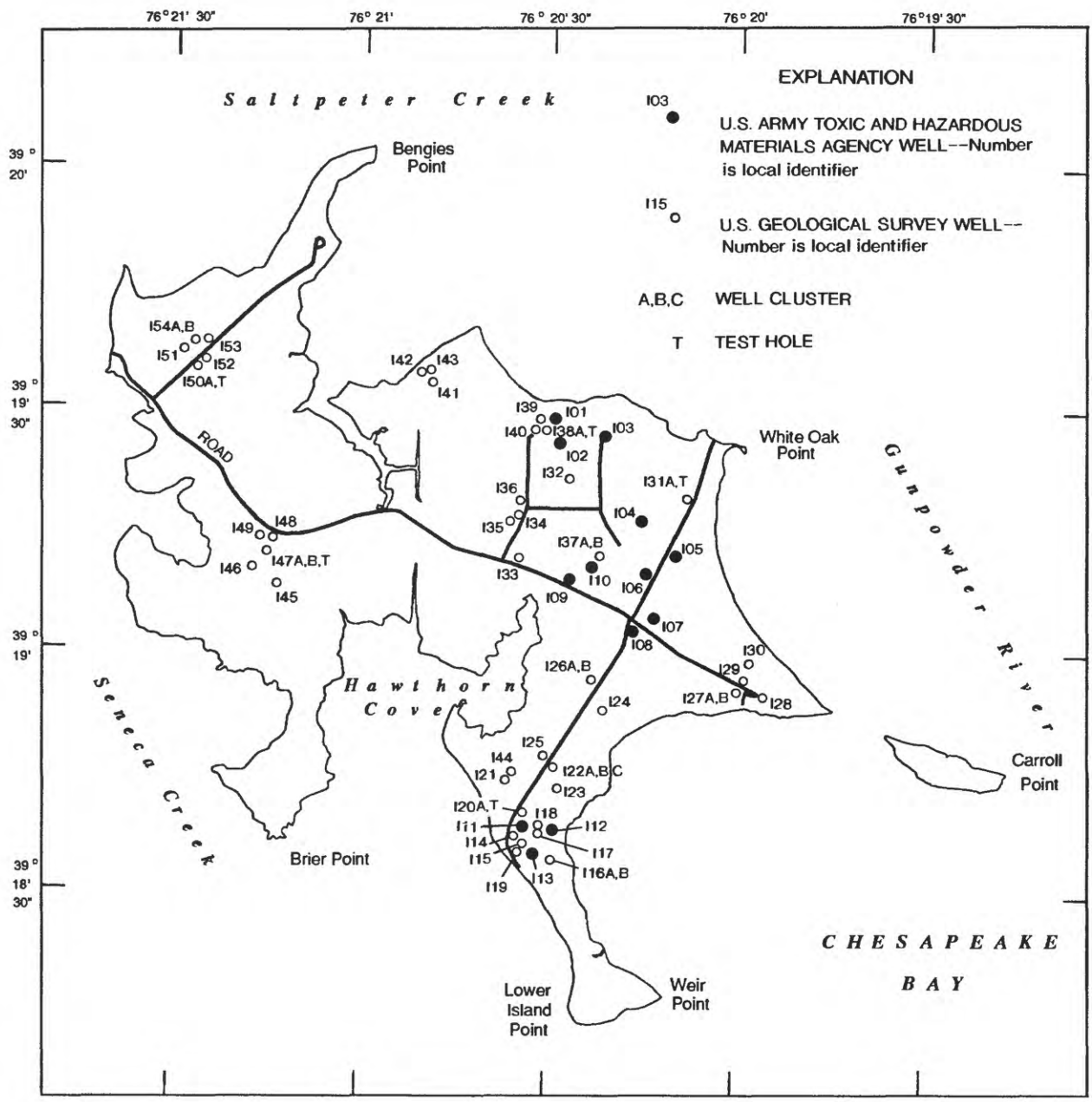

Figure 6.--Location of observation wells and test holes.

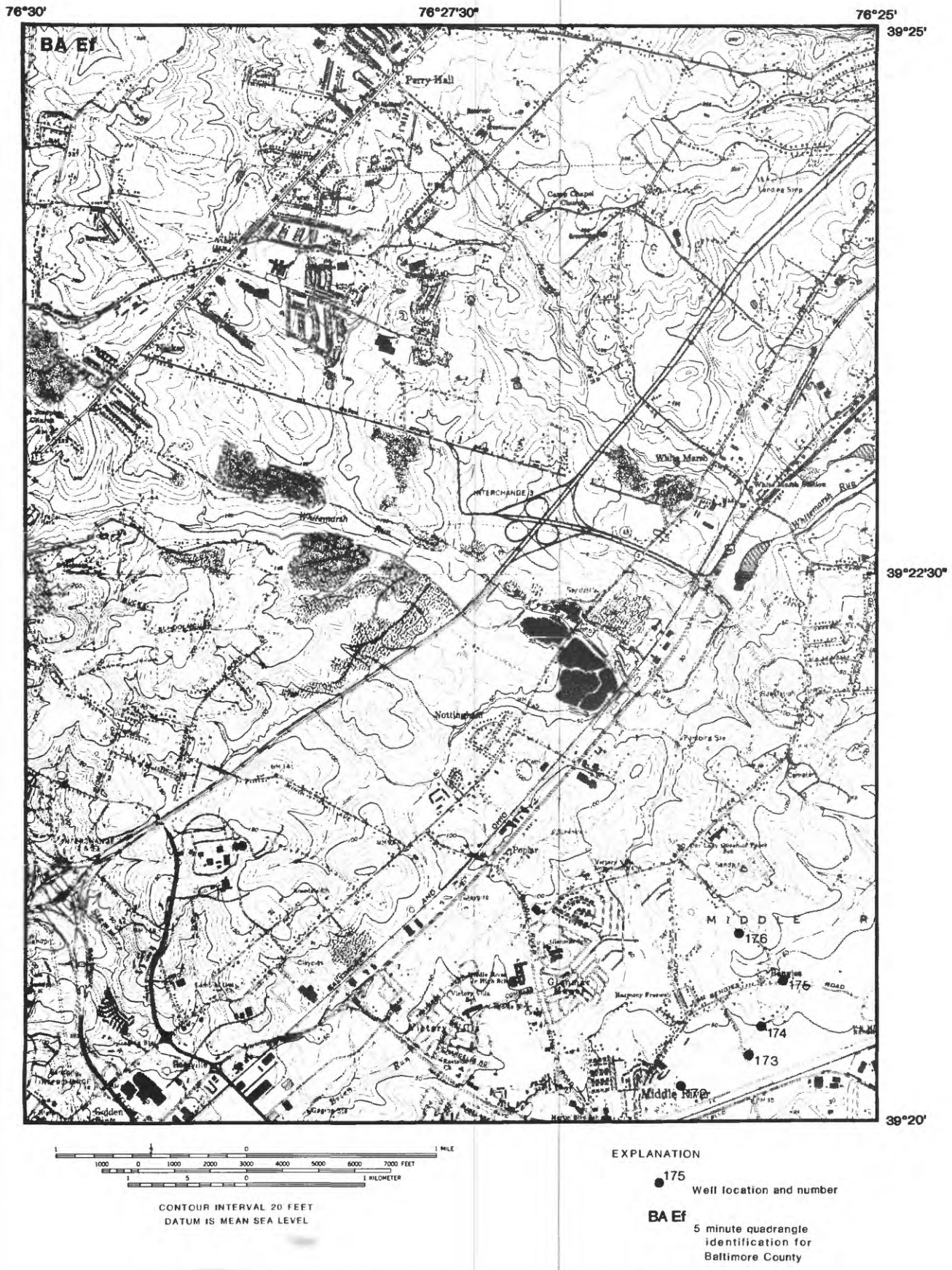

Figure 7.--Location of offsite wells in quadrangle Ef.

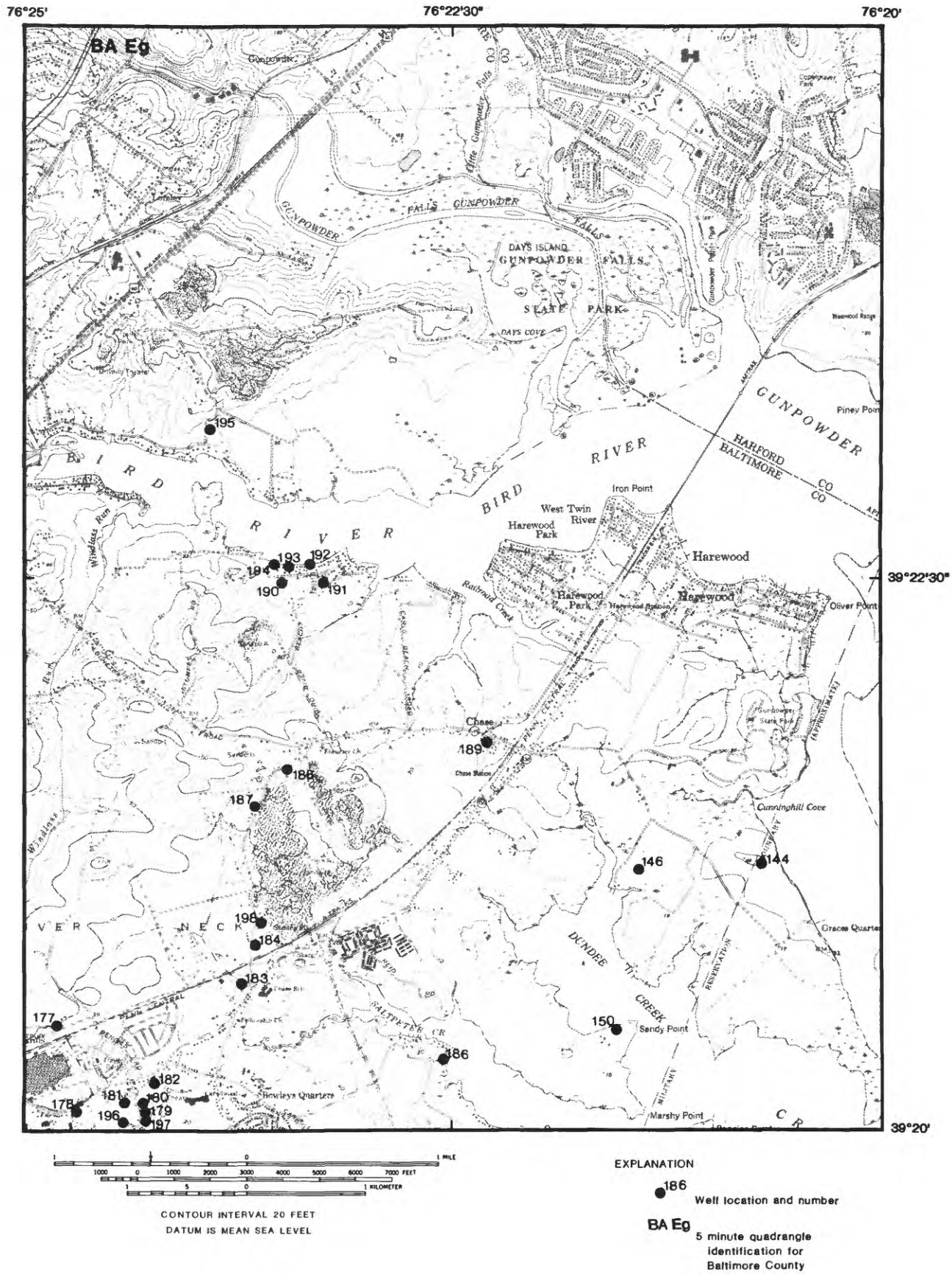

Figure 8.--Location of offsite wells in quadrangle Eg.

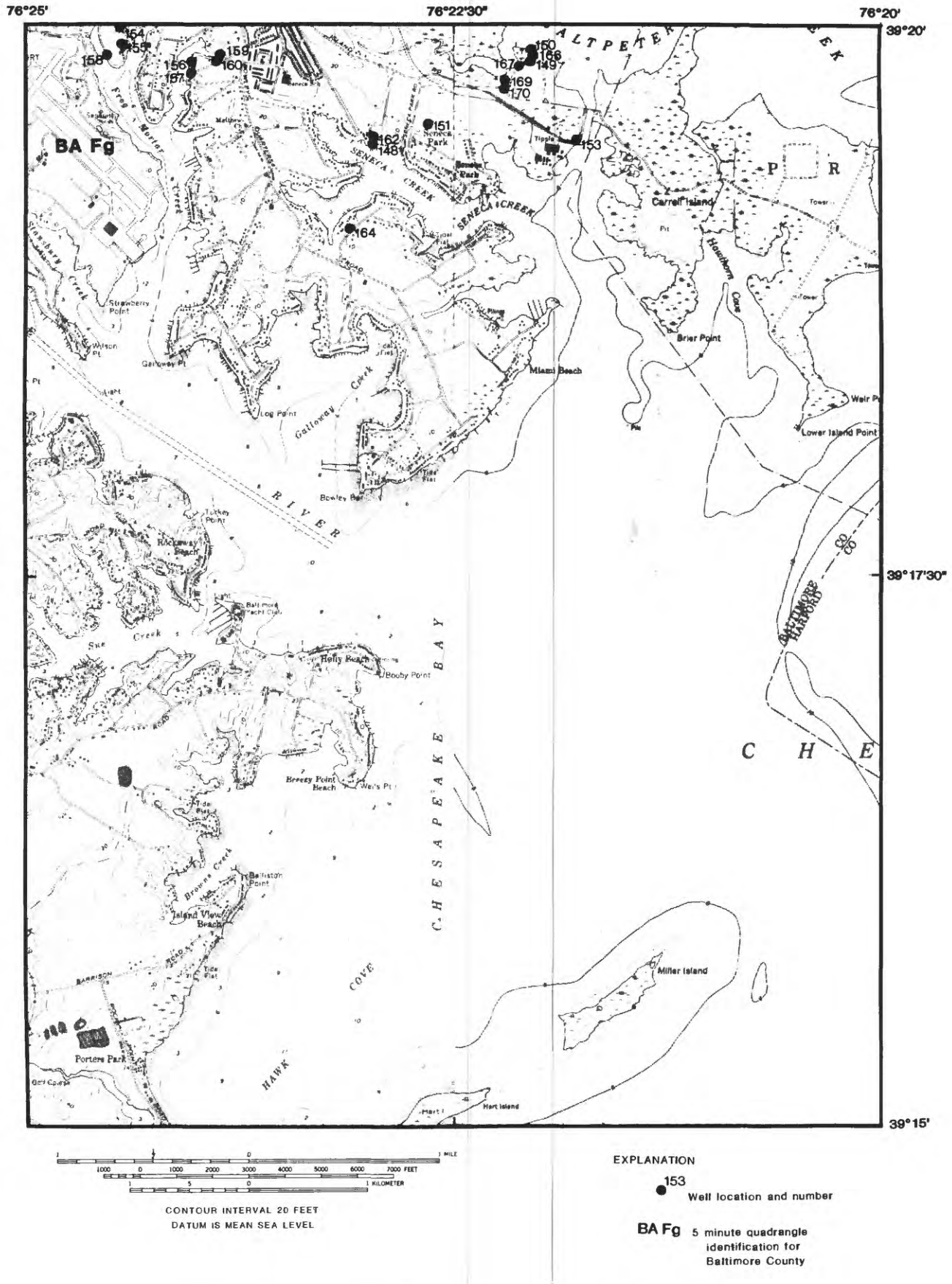

Figure 9.--Location of offsite wells in quadrangle Fg.

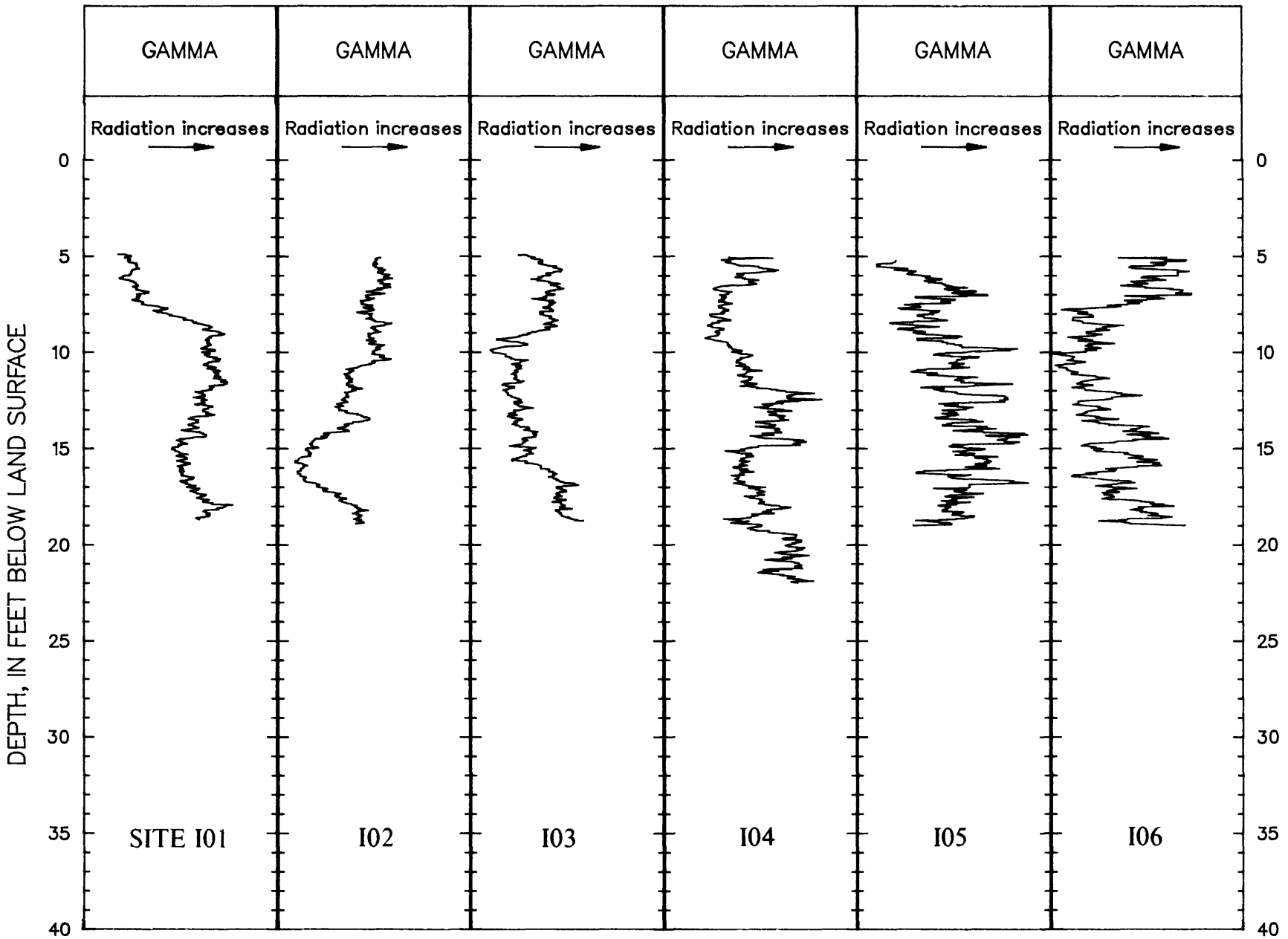

Figure 10.--Geophysical logs of selected wells

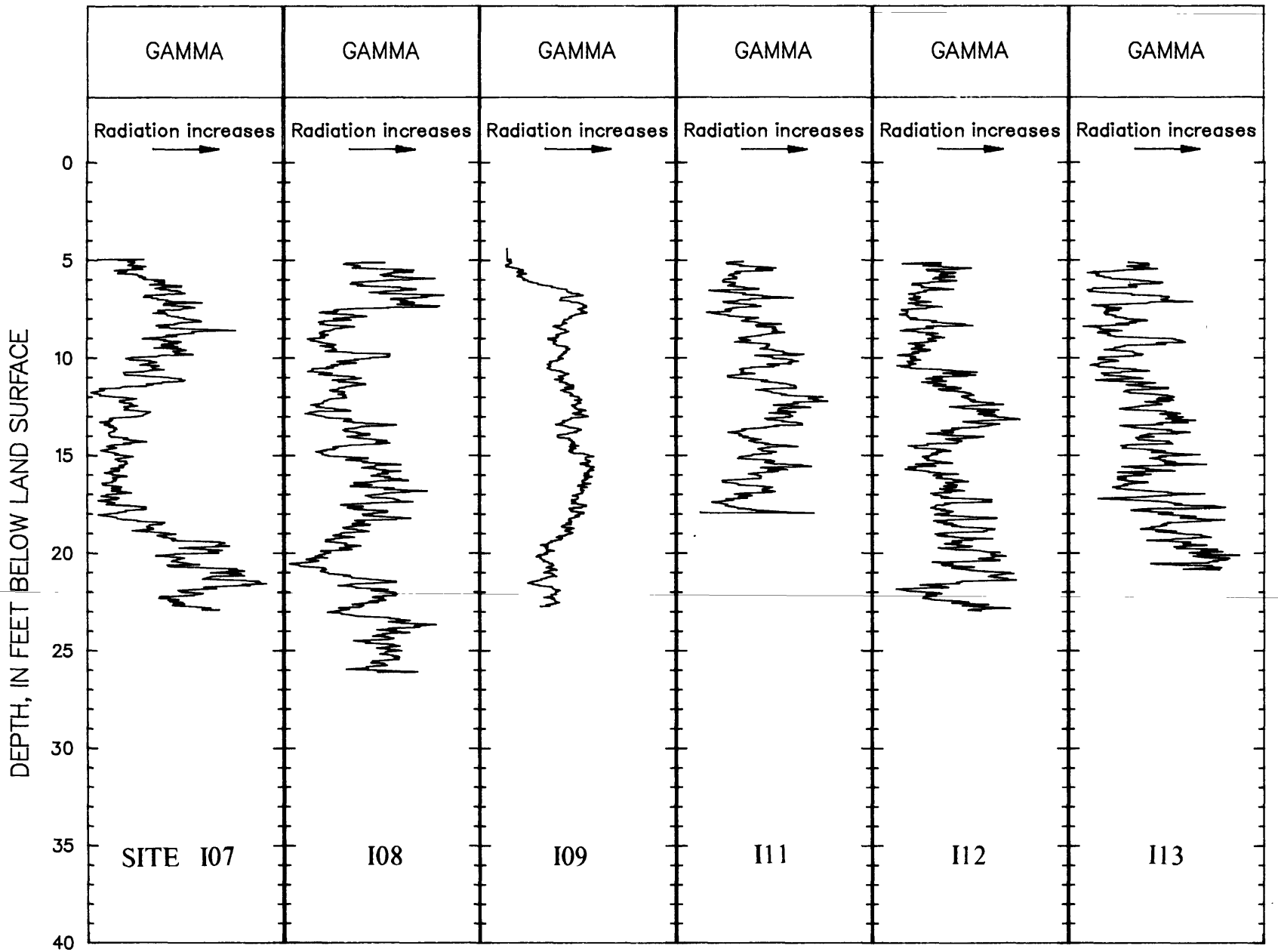

Figure 10.--Geophysical logs of selected wells--Continued.

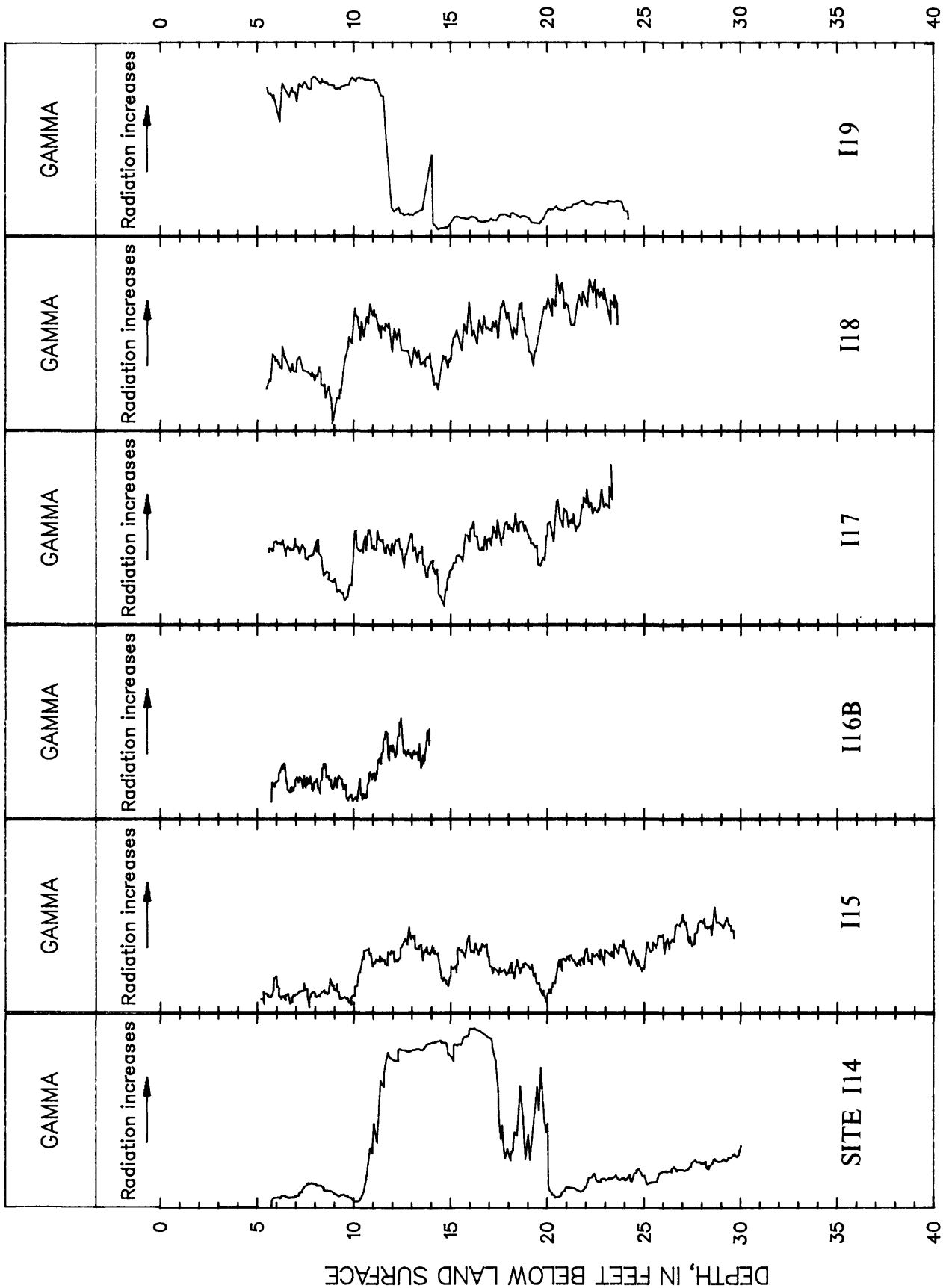

Figure 10.--Geophysical logs of selected wells--Continued.

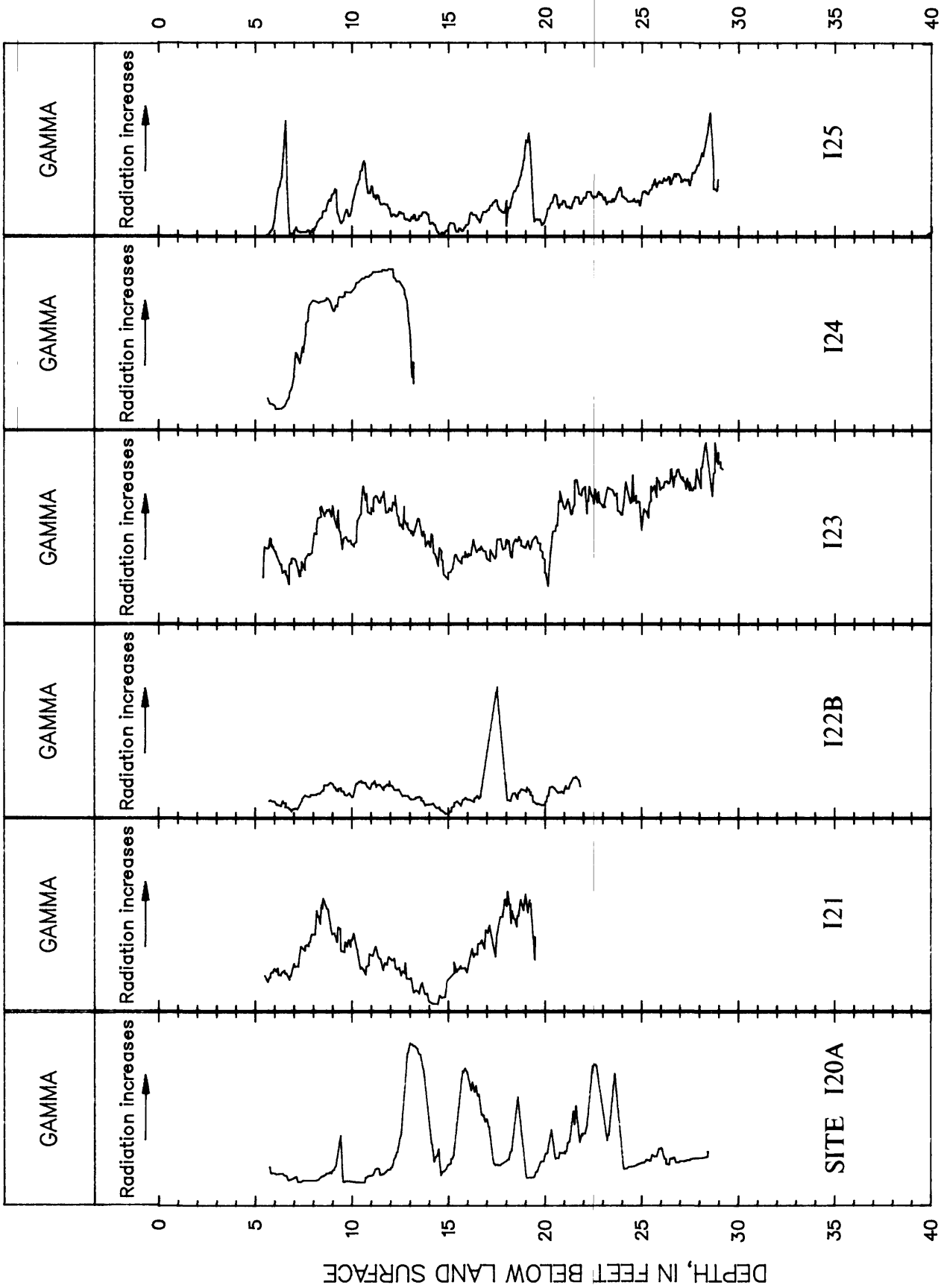

Figure 10.--Geophysical logs of selected wells--Continued.

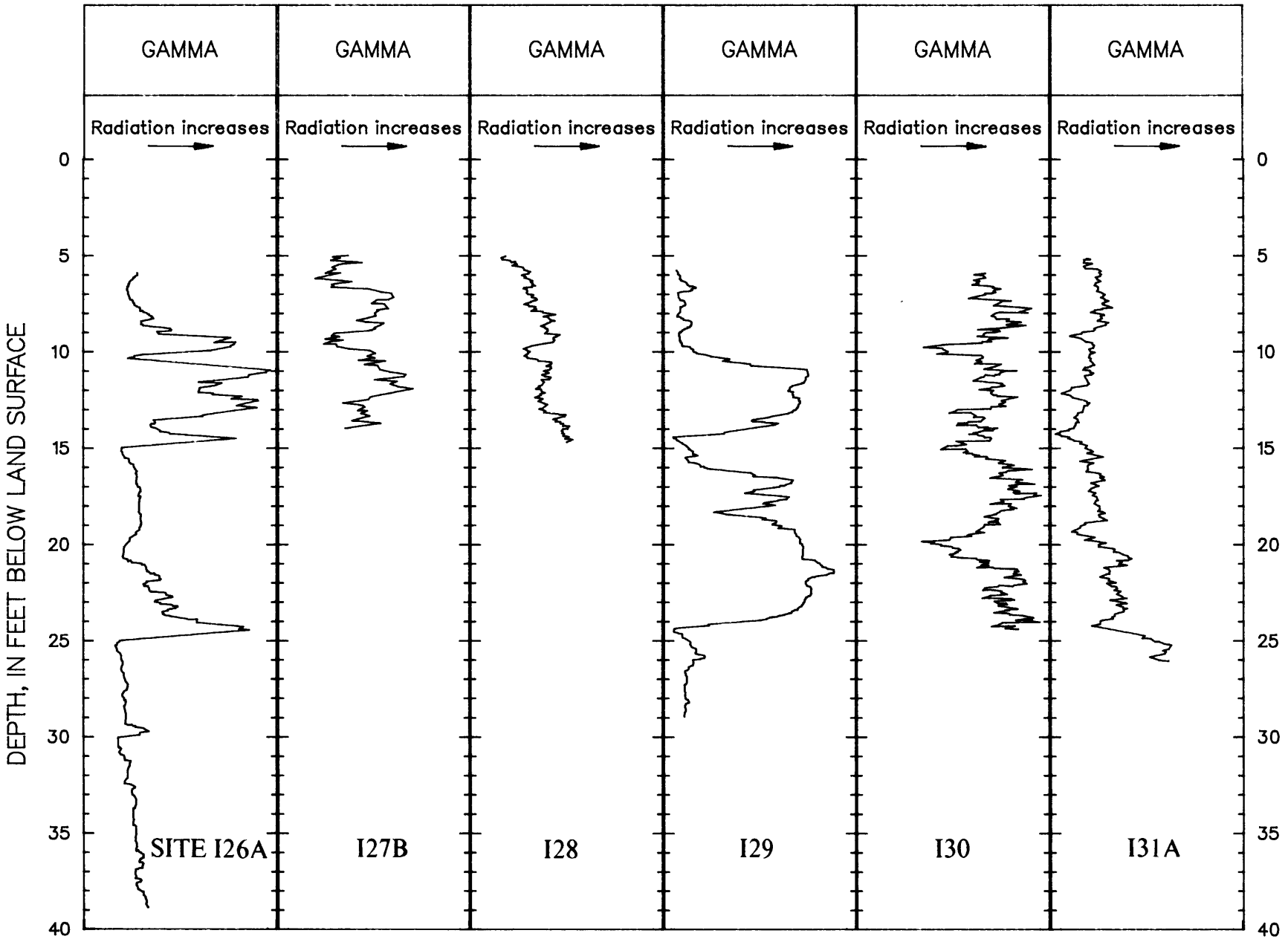

Figure 10.--Geophysical logs of selected wells--Continued.

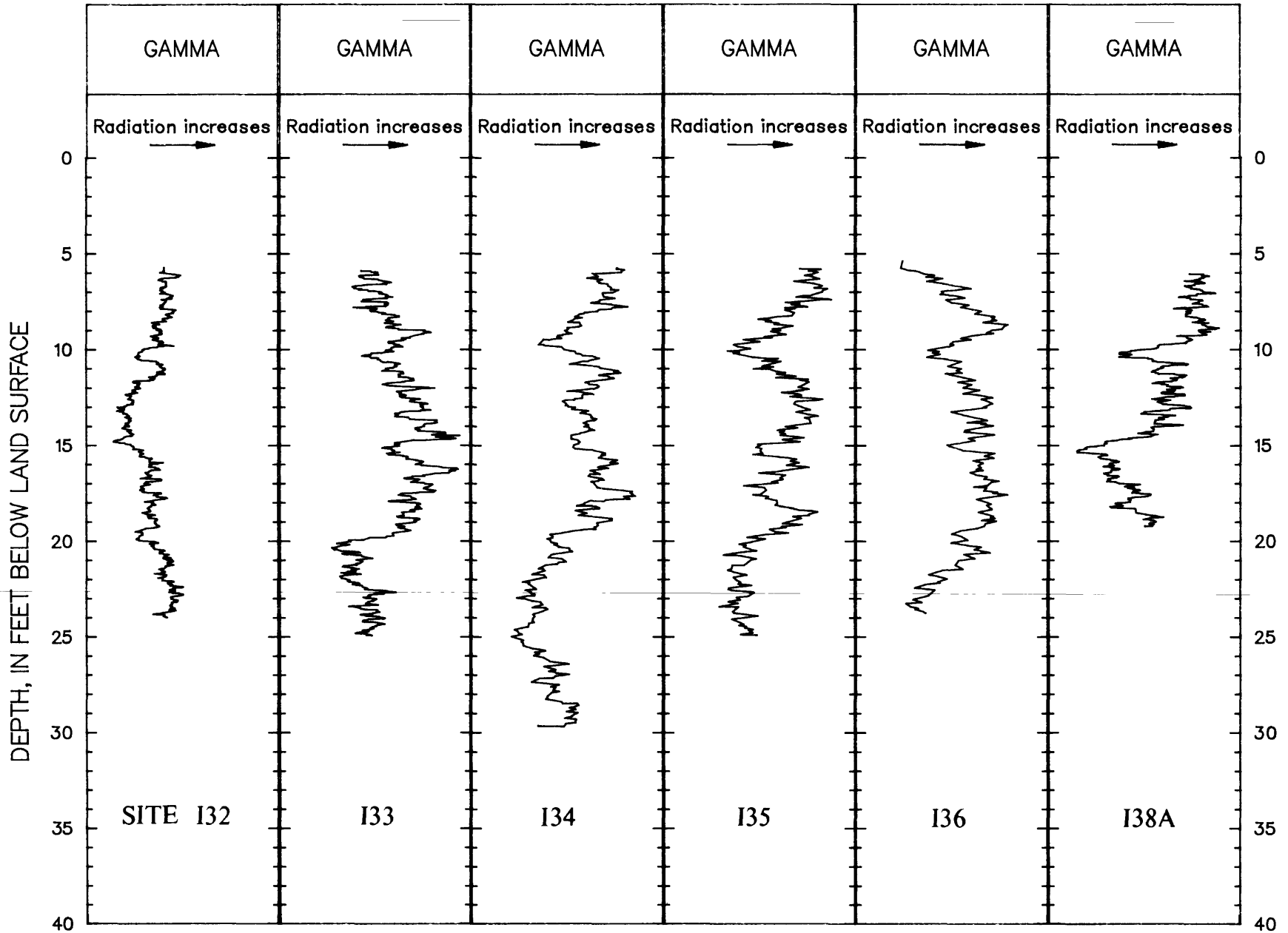

Figure 10.--Geophysical logs of selected wells--Continued.

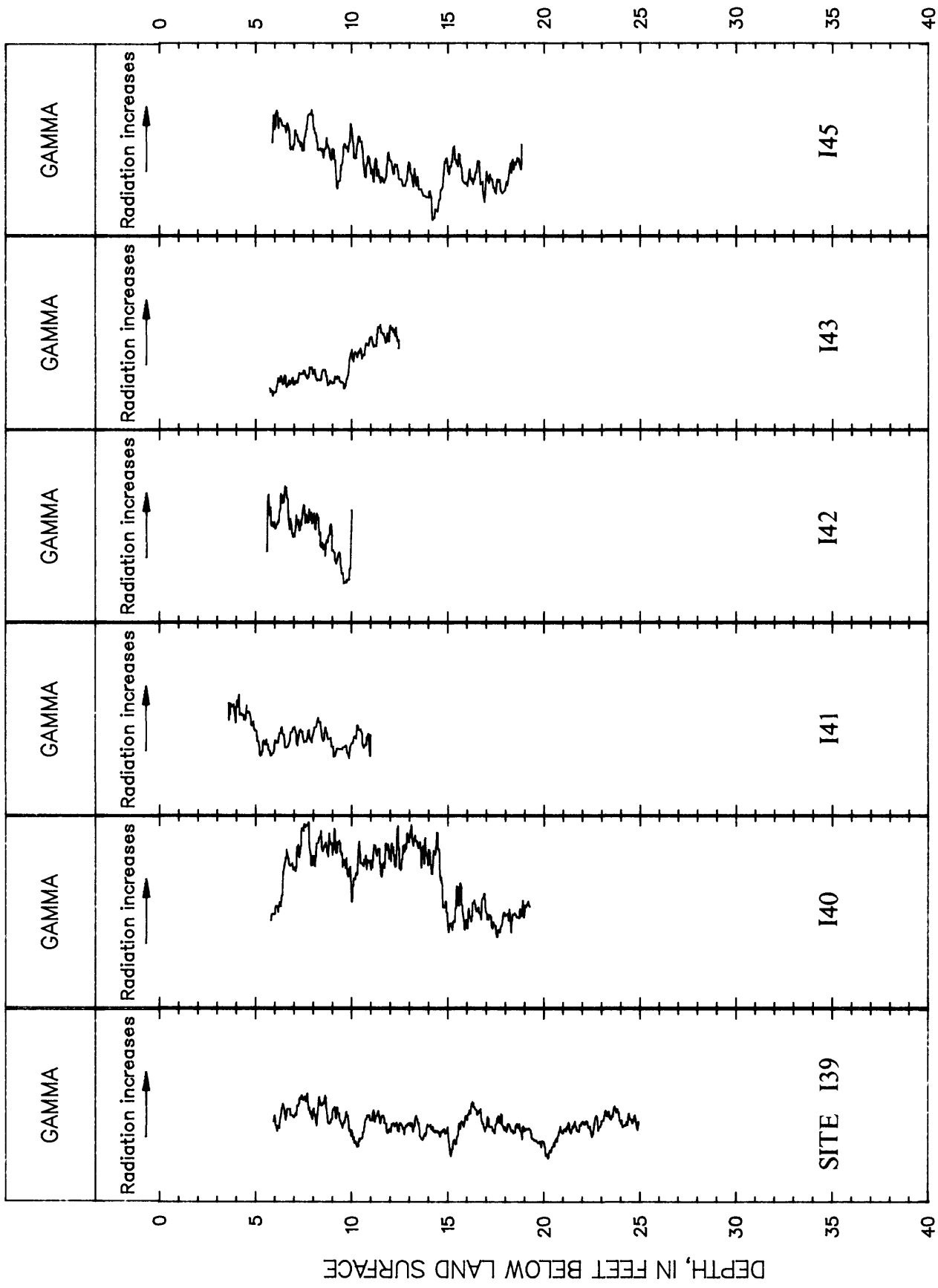

Figure 10.--Geophysical logs of selected wells--Continued.

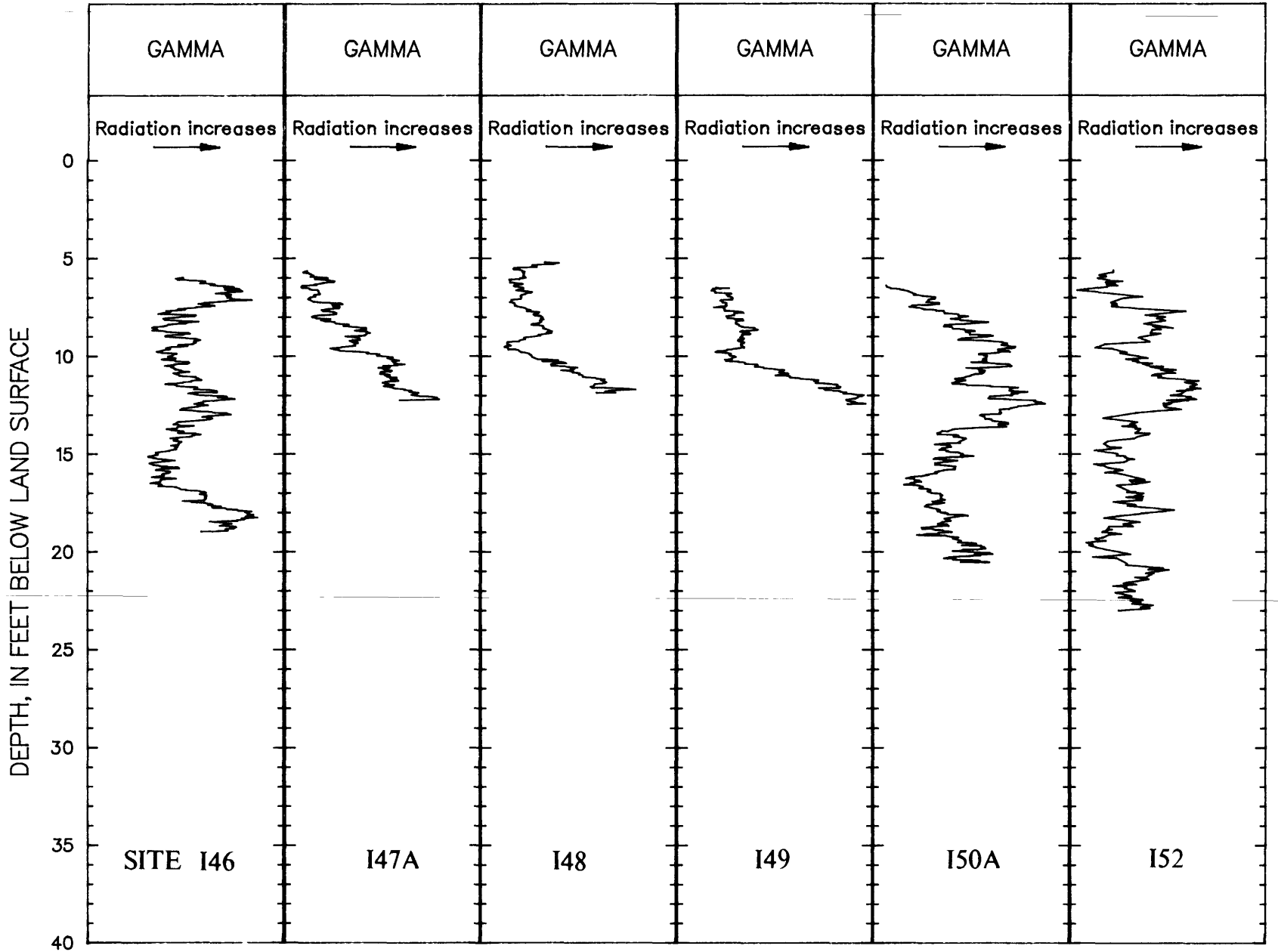

Figure 10.--Geophysical logs of selected wells--Continued.

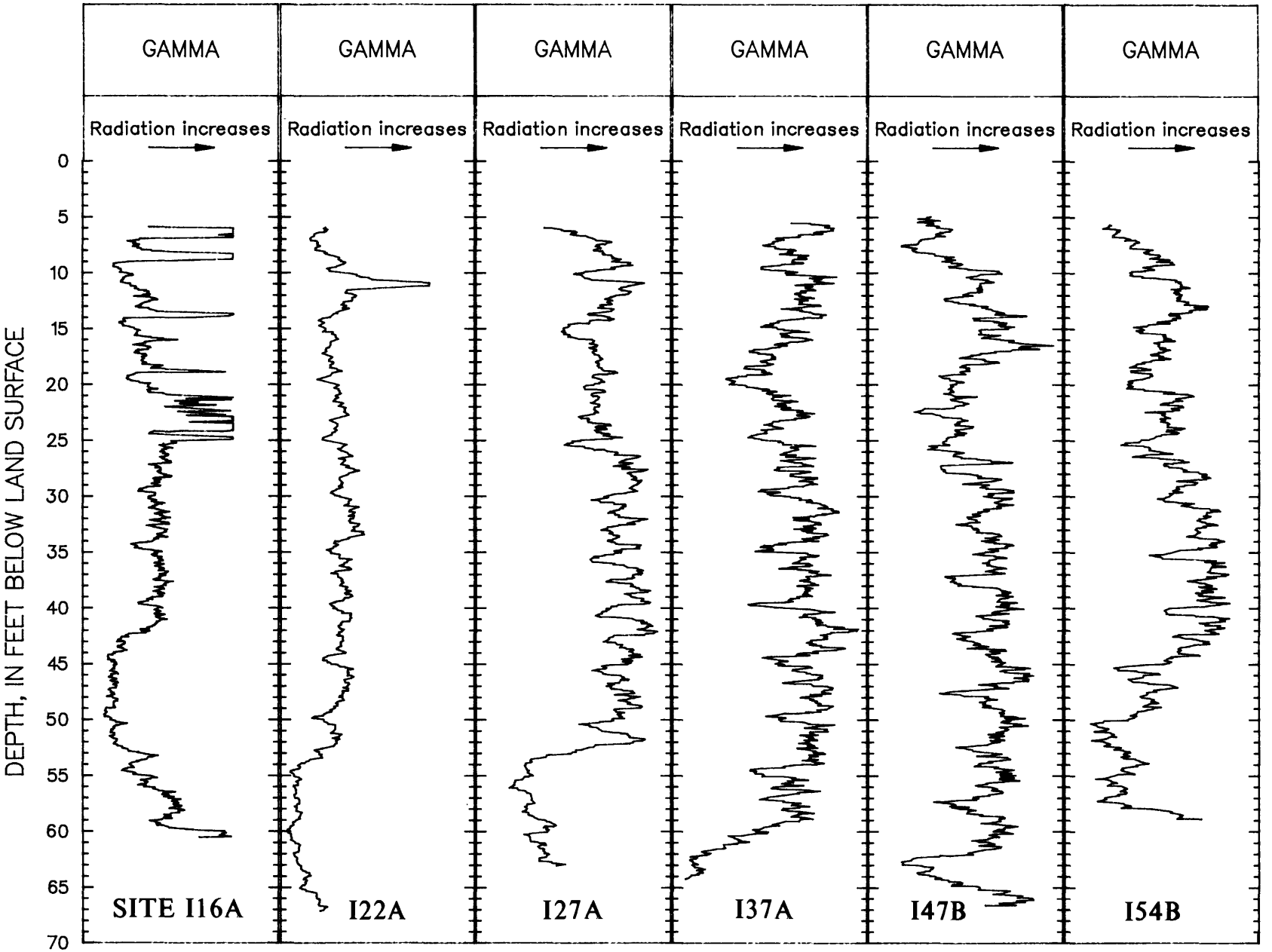

Figure 10.--Geophysical logs of selected wells--Continued.

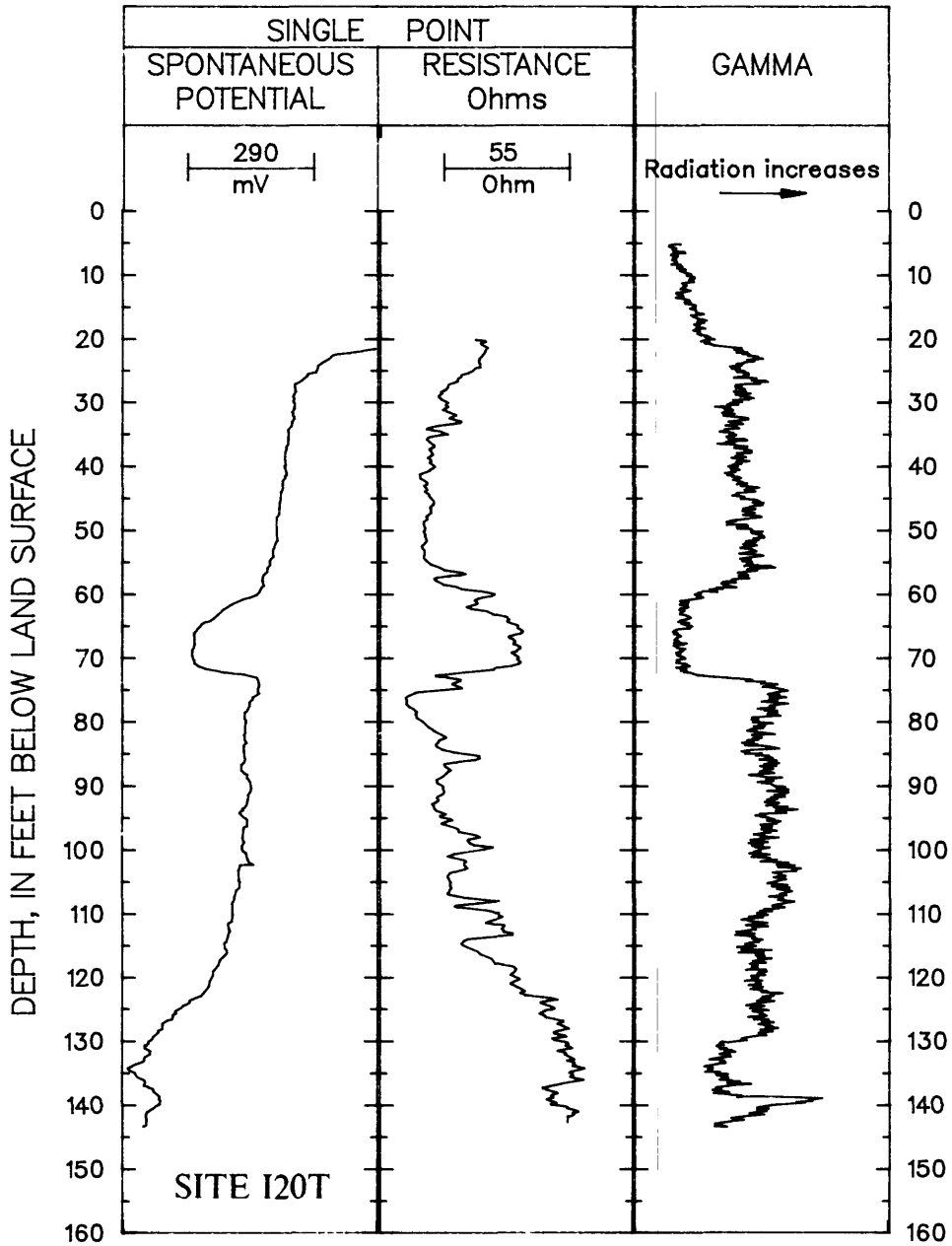

Figure 10.--Geophysical logs of selected wells--Continued.

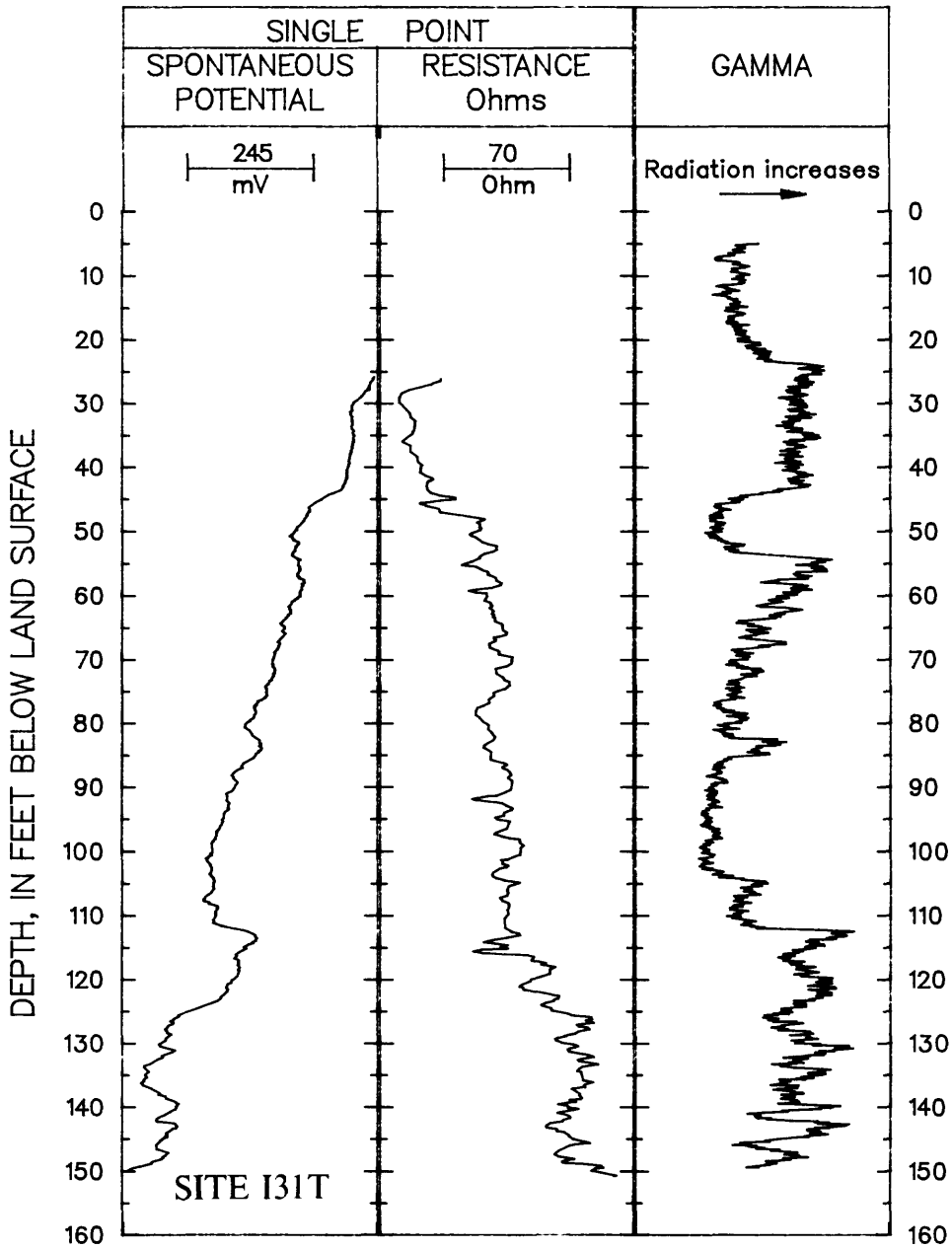

Figure 10.--Geophysical logs of selected wells--Continued.

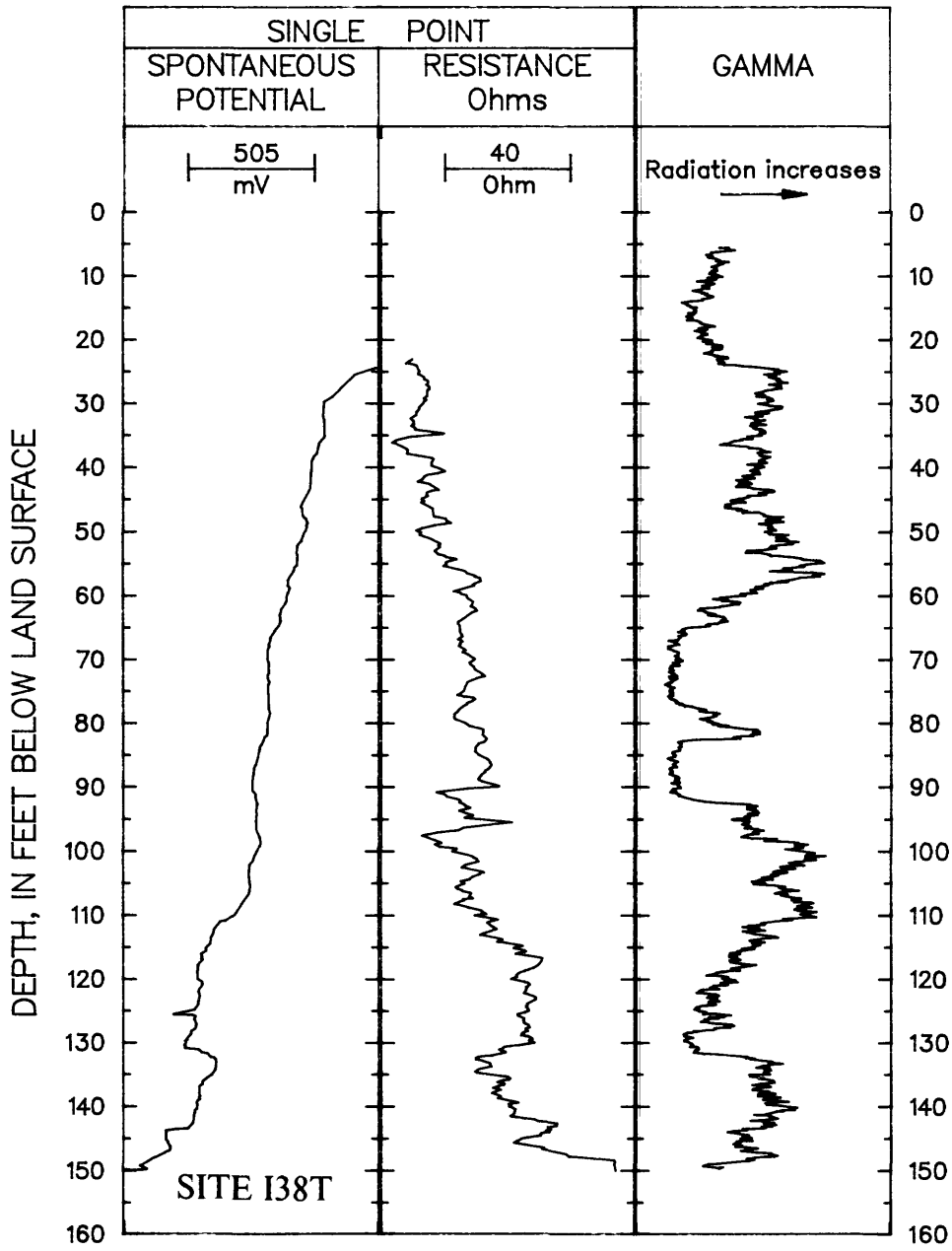

Figure 10.--Geophysical logs of selected wells--Continued.

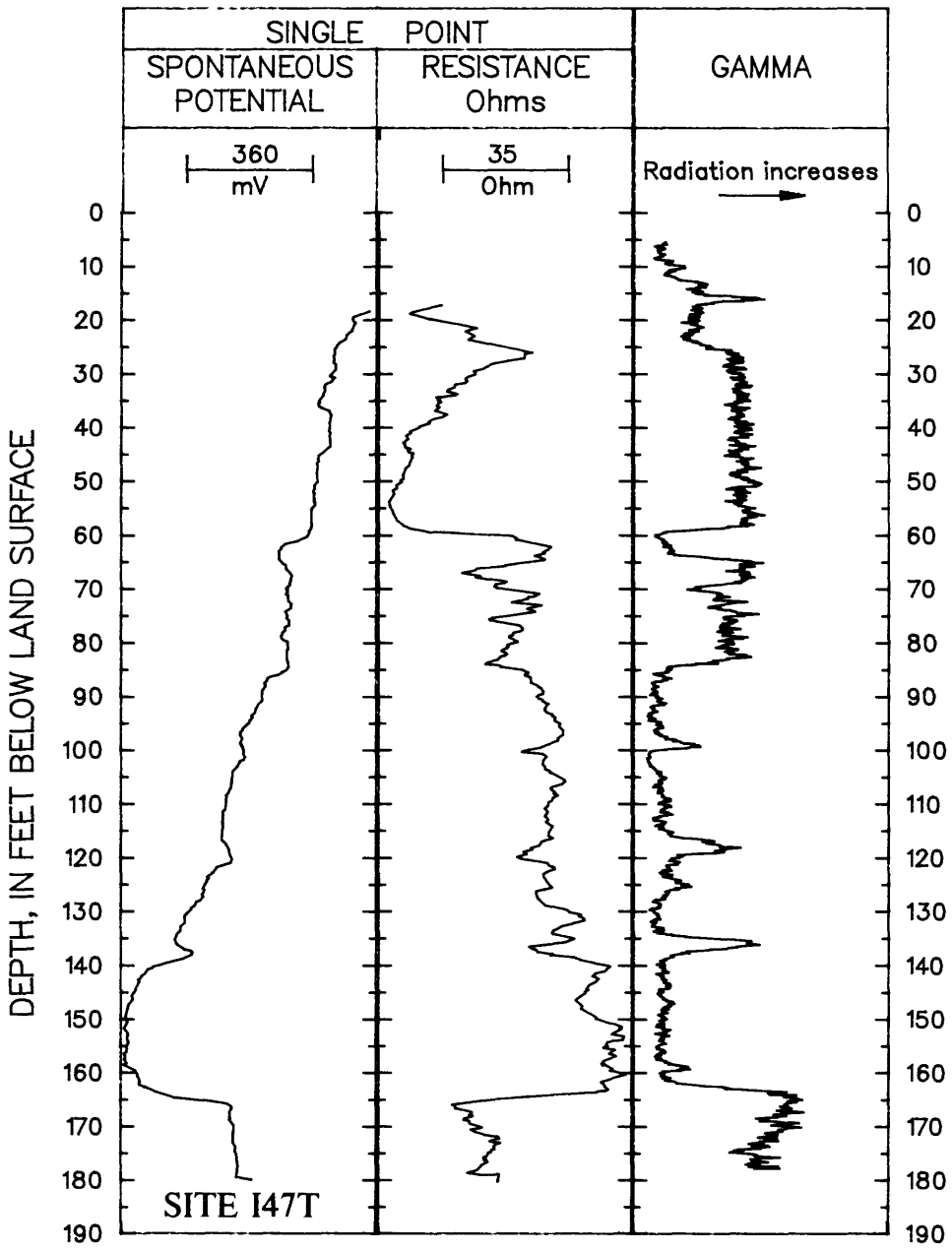

Figure 10.--Geophysical logs of selected wells --Continued.

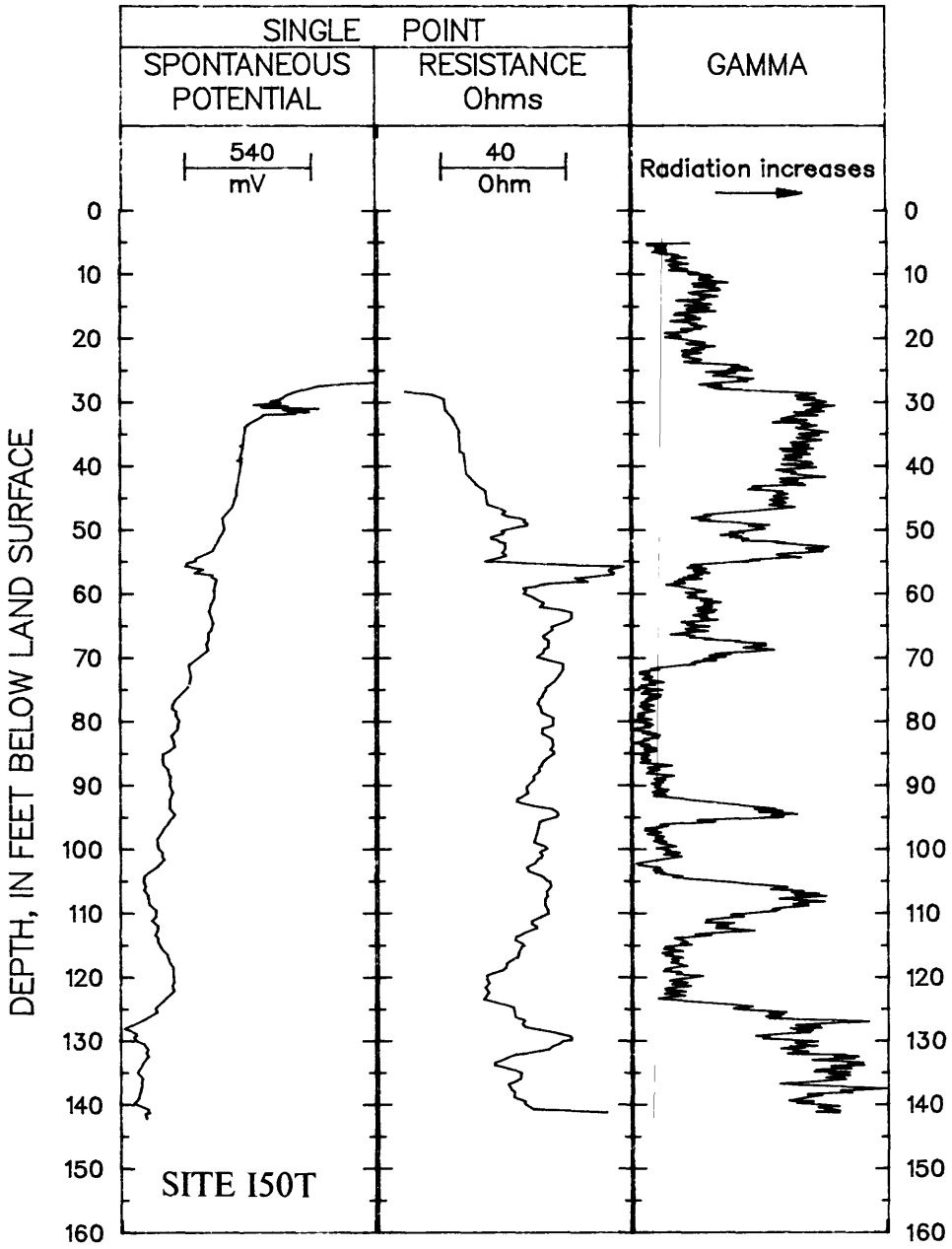

Figure 10.--Geophysical logs of selected wells--Continued.

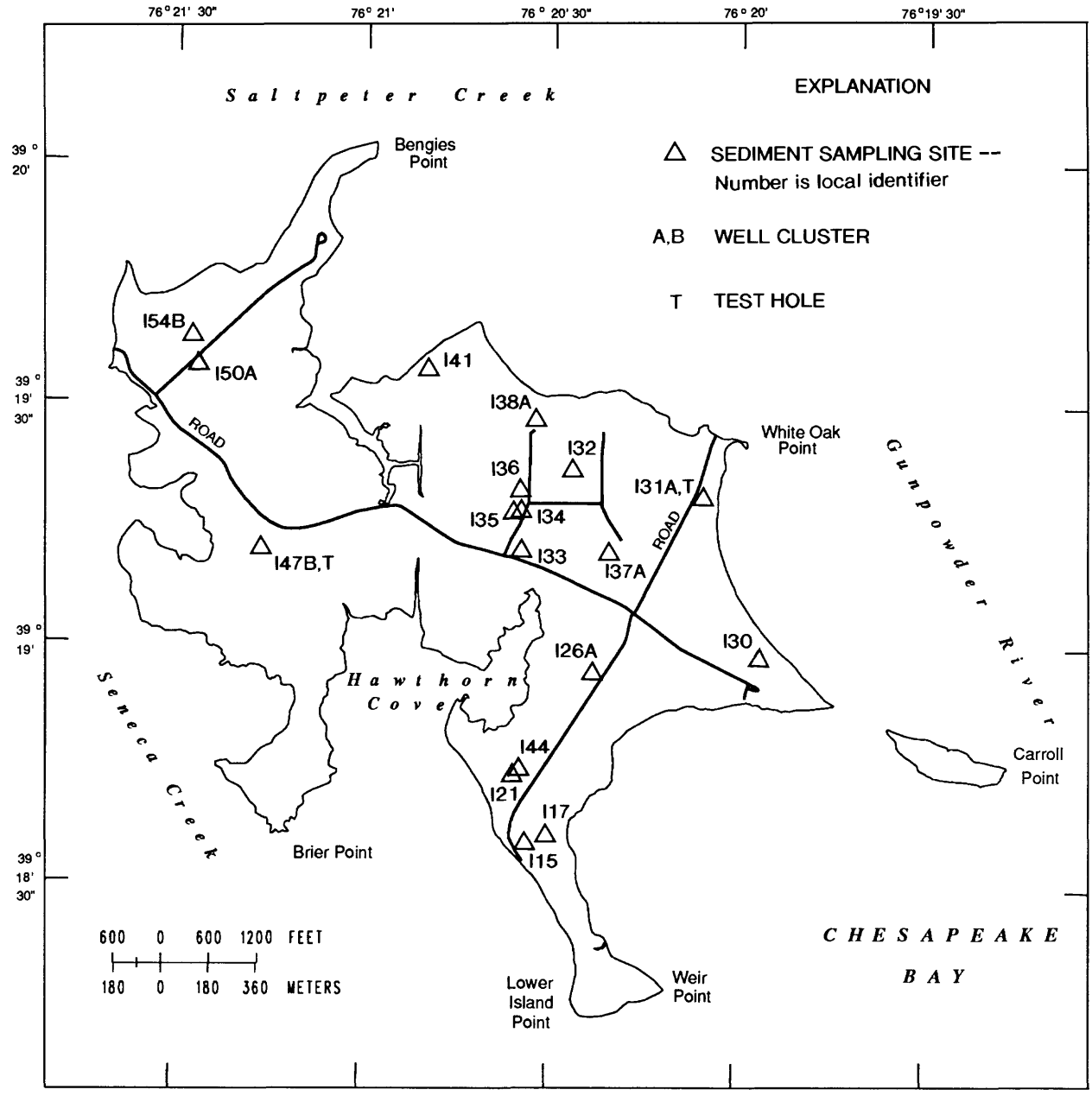

Figure 11.--Location of sediment sampling sites for physical property analyses.

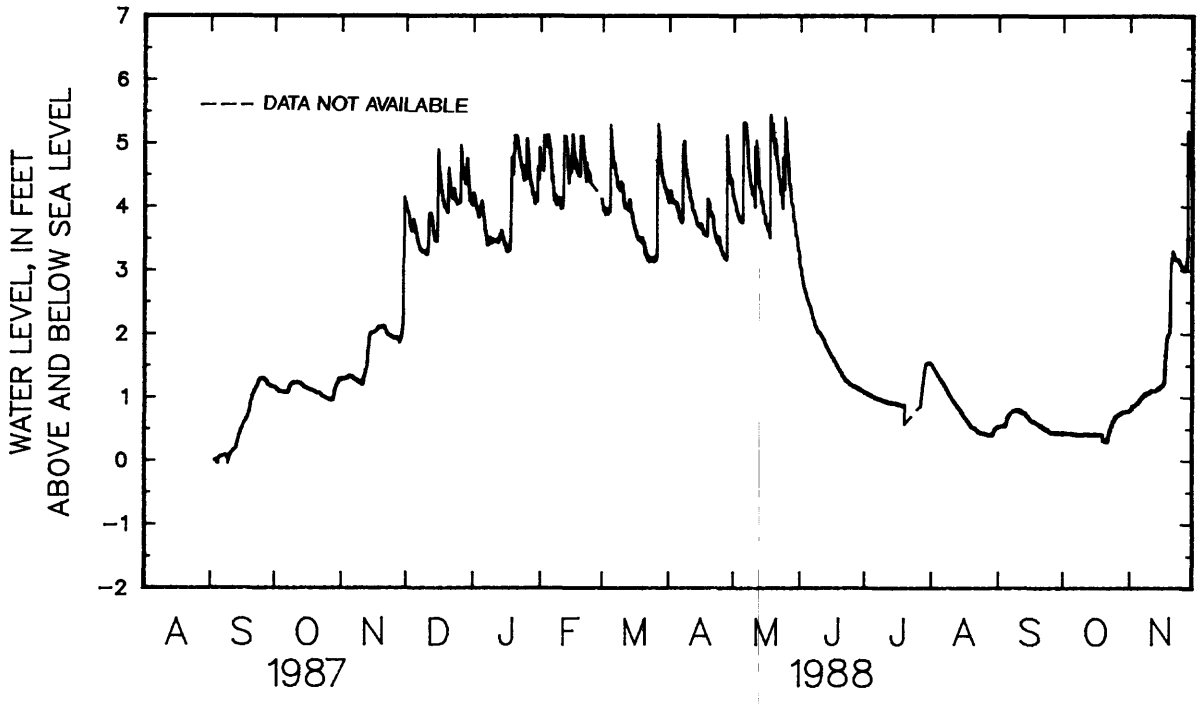

Figure 12.--Water level for well I01, August 1987 through November 1988.

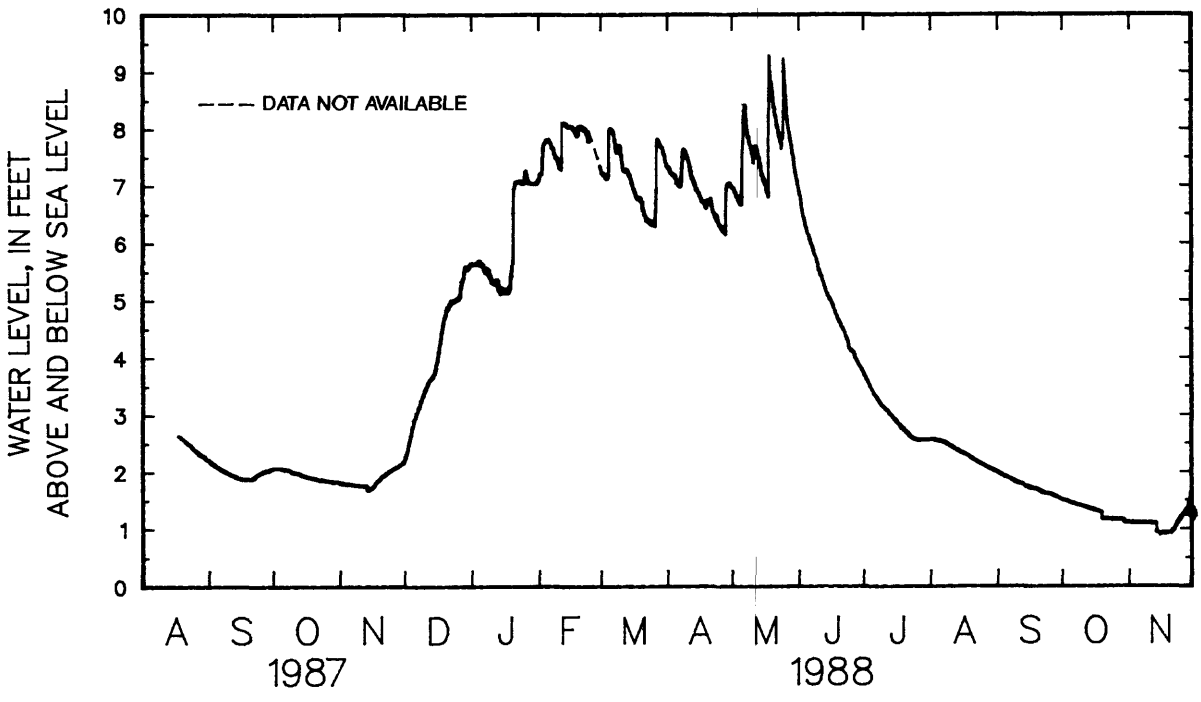

Figure 13.--Water level for well 106, August 1987 through November 1988.

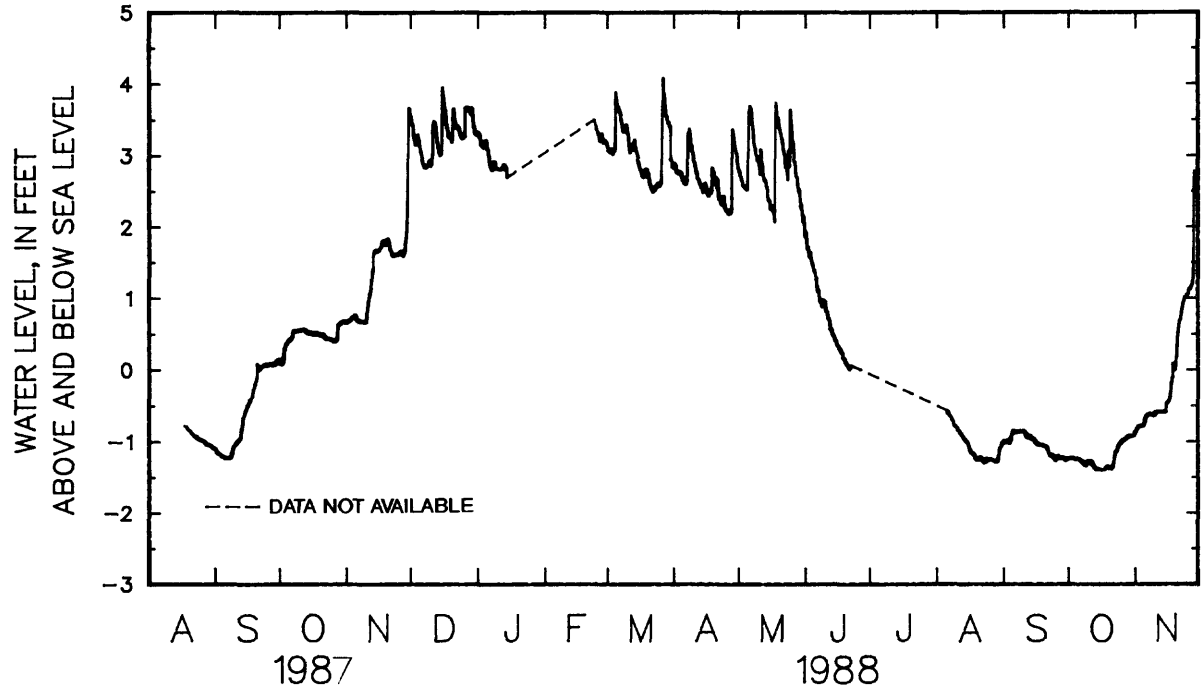

Figure 14.--Water level for well 113, August 1987 through November 1988.

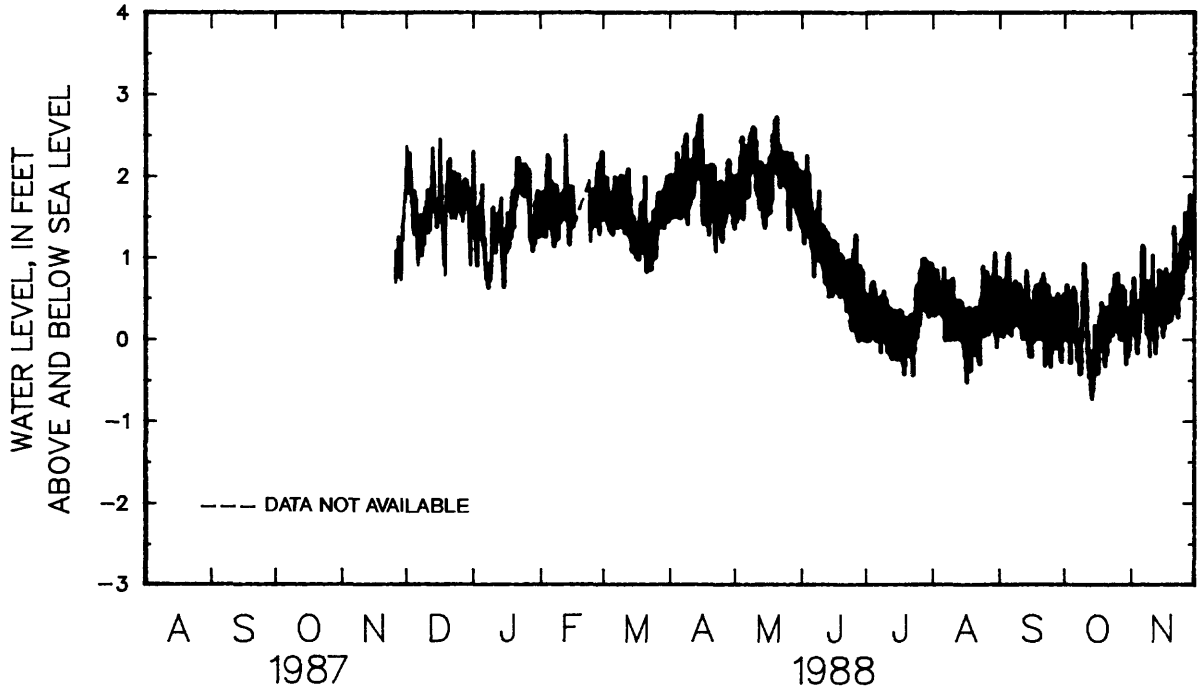

Figure 15.--Water level for well 119, November 1987 through November 1988.

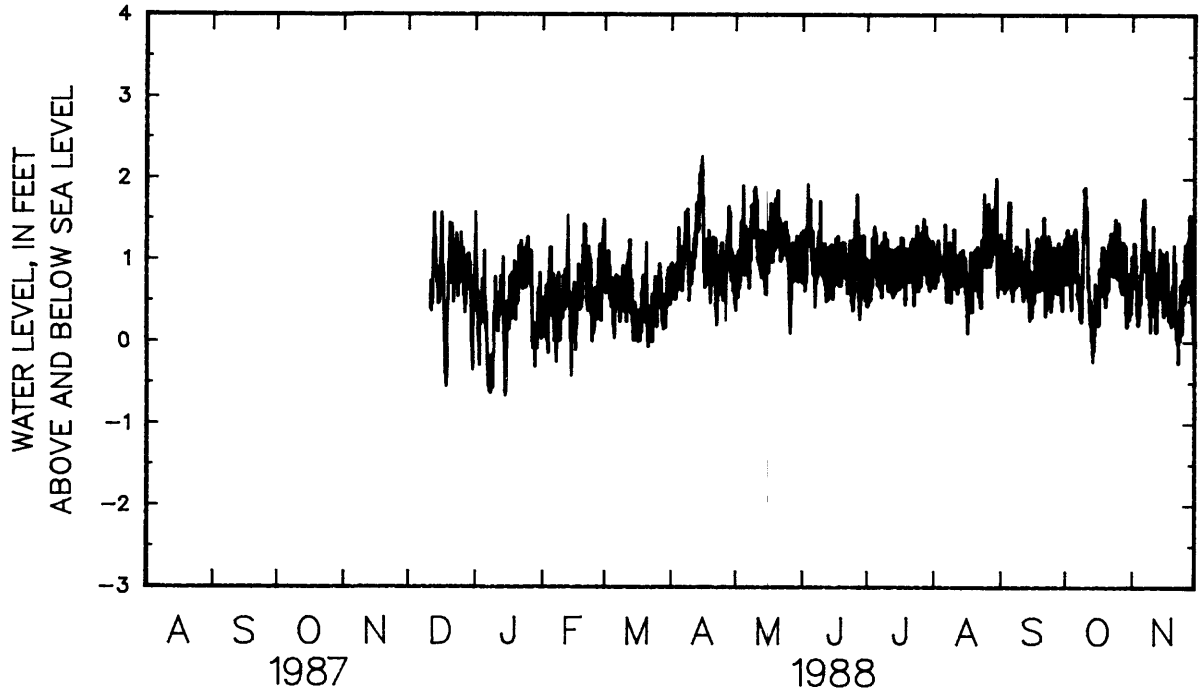

Figure 16.--Water level for well I22A, December 1987 through November 1988.

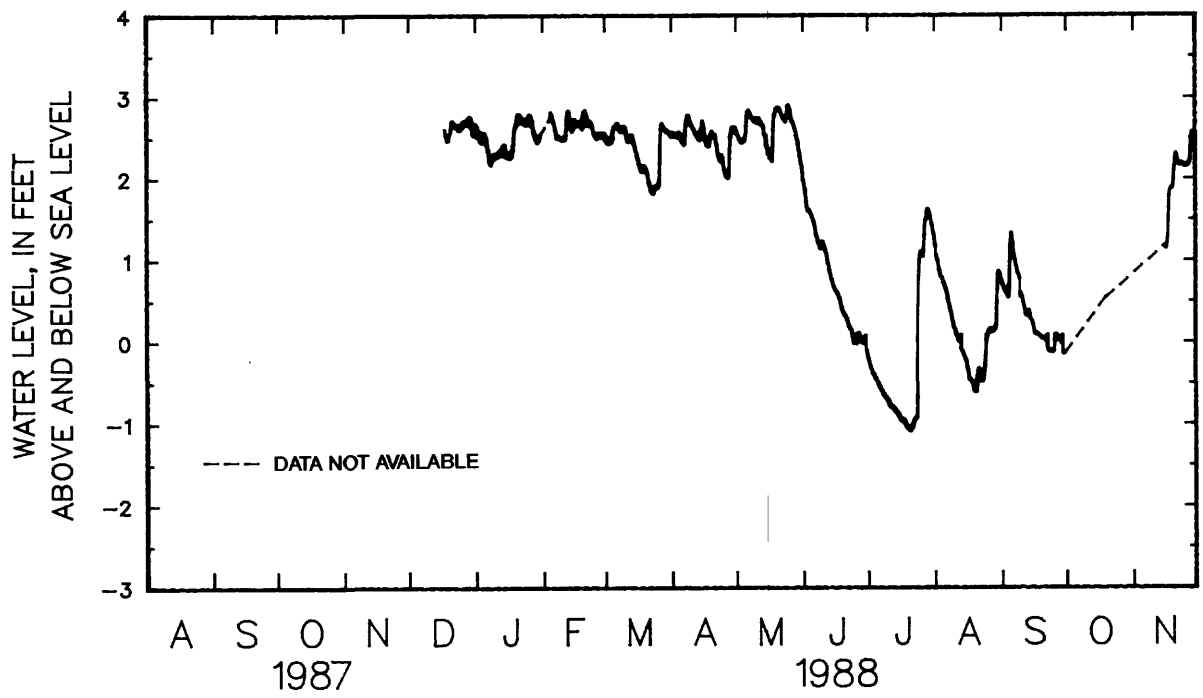

Figure 17.--Water level for well I22B, December 1987 through November 1988.

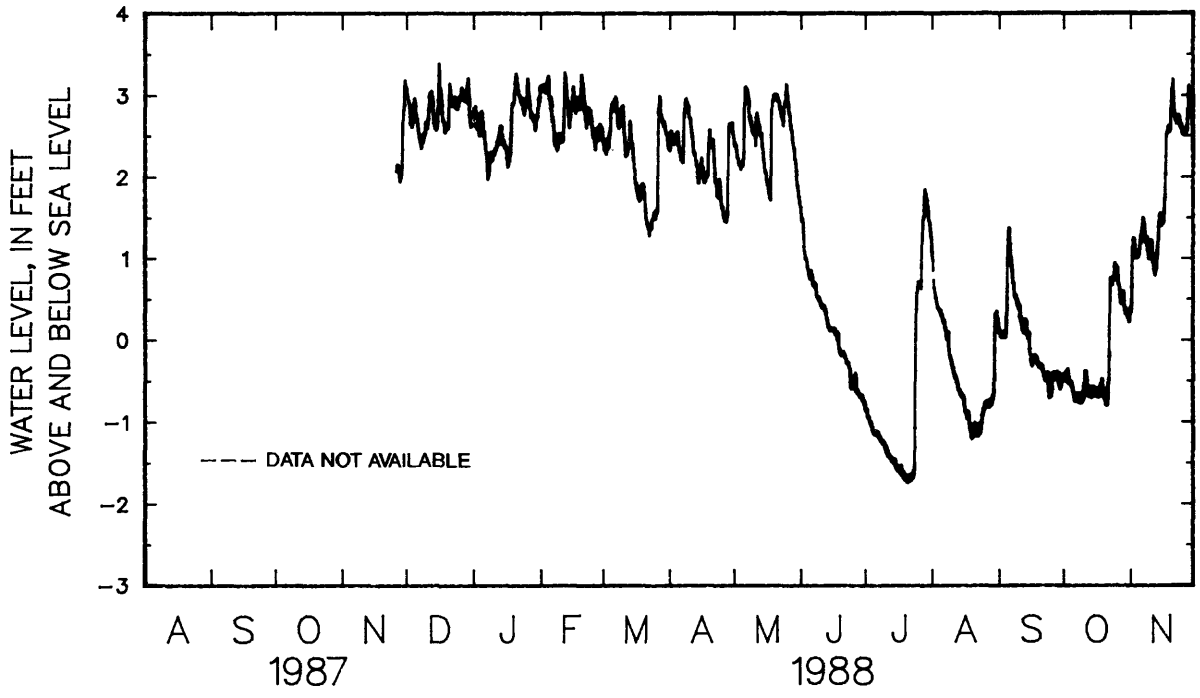

Figure 18.--Water level for well I22C, November 1987 through November 1988.

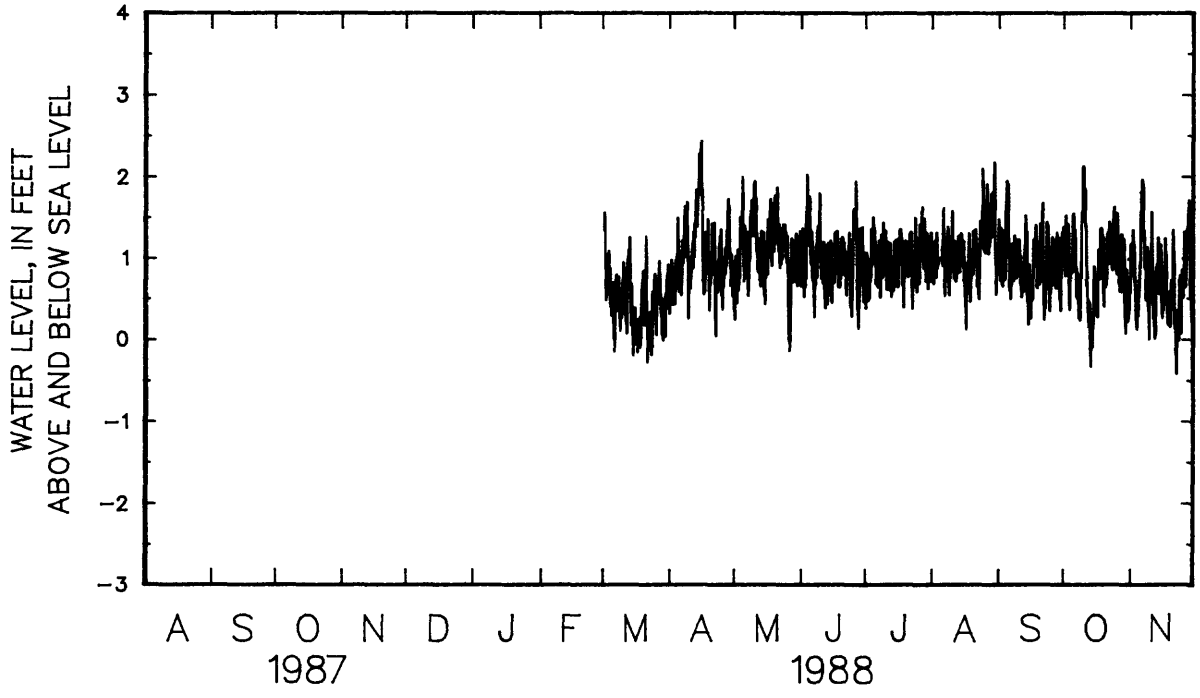

Figure 19.--Water level for well I27A, February through November 1988.

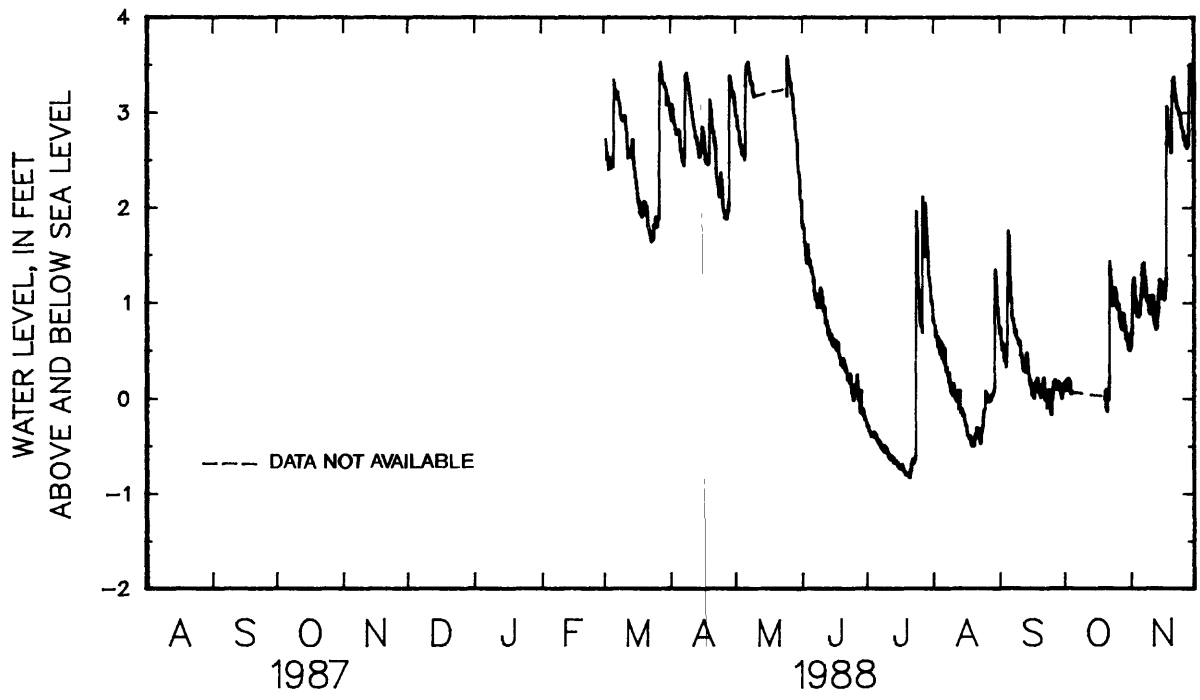

Figure 20.--Water level for well I27B, February through November 1988.

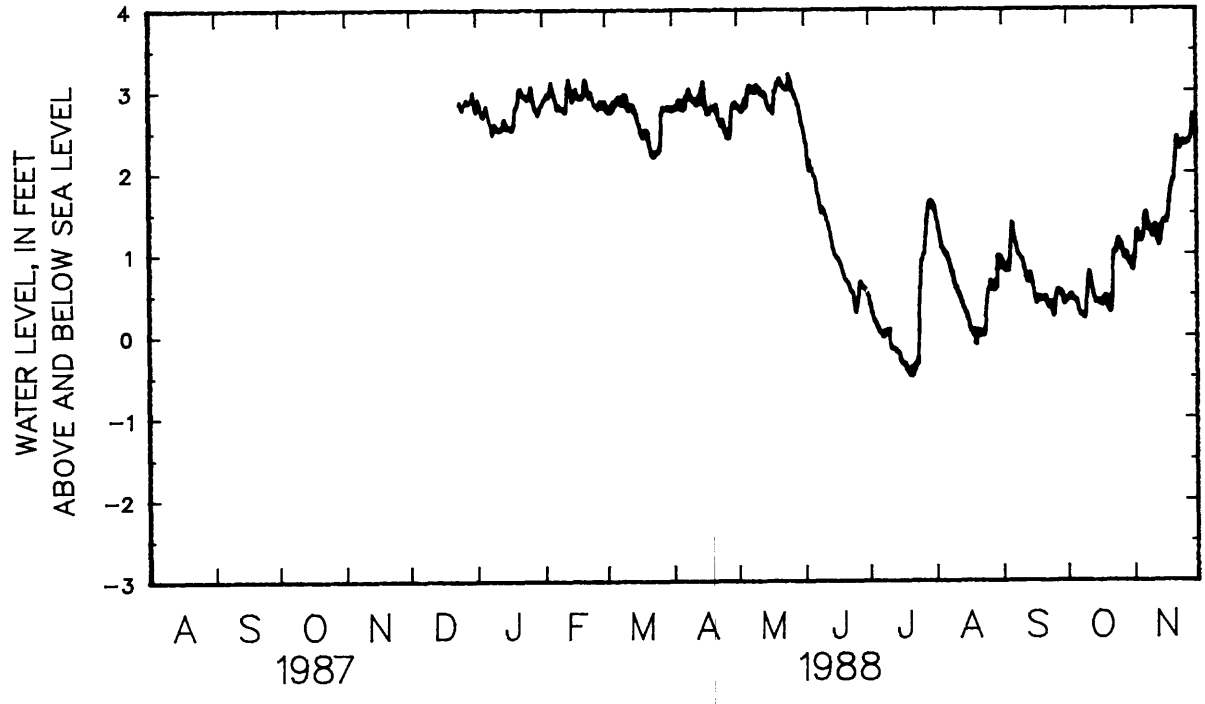

Figure 21.--Water level for well I33, December 1987 through November 1988.

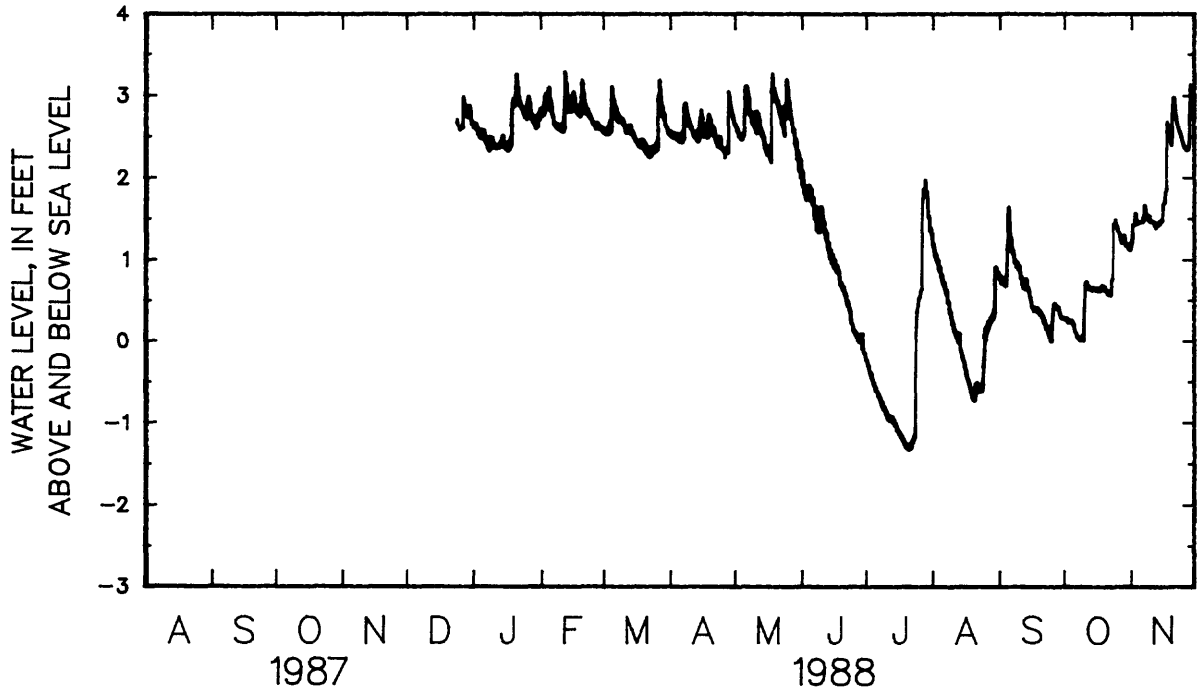

Figure 22.--Water level for well I47A, December 1987 through November 1988.

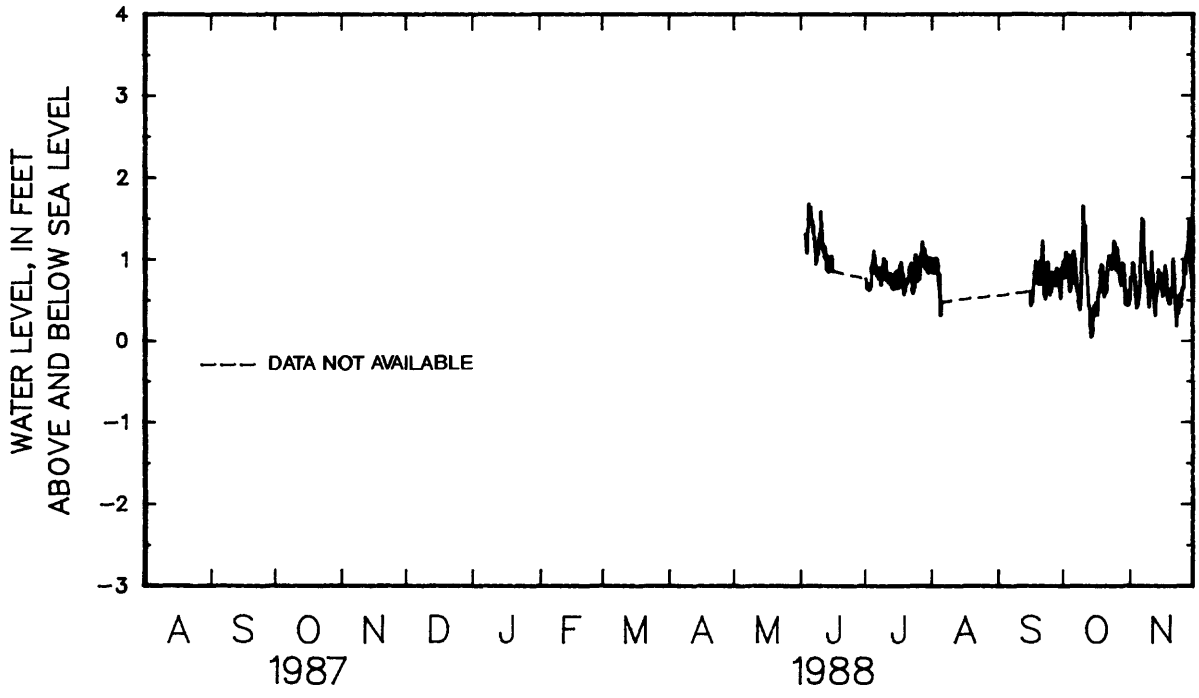

Figure 23.--Water level for well I47B, June through November 1988.

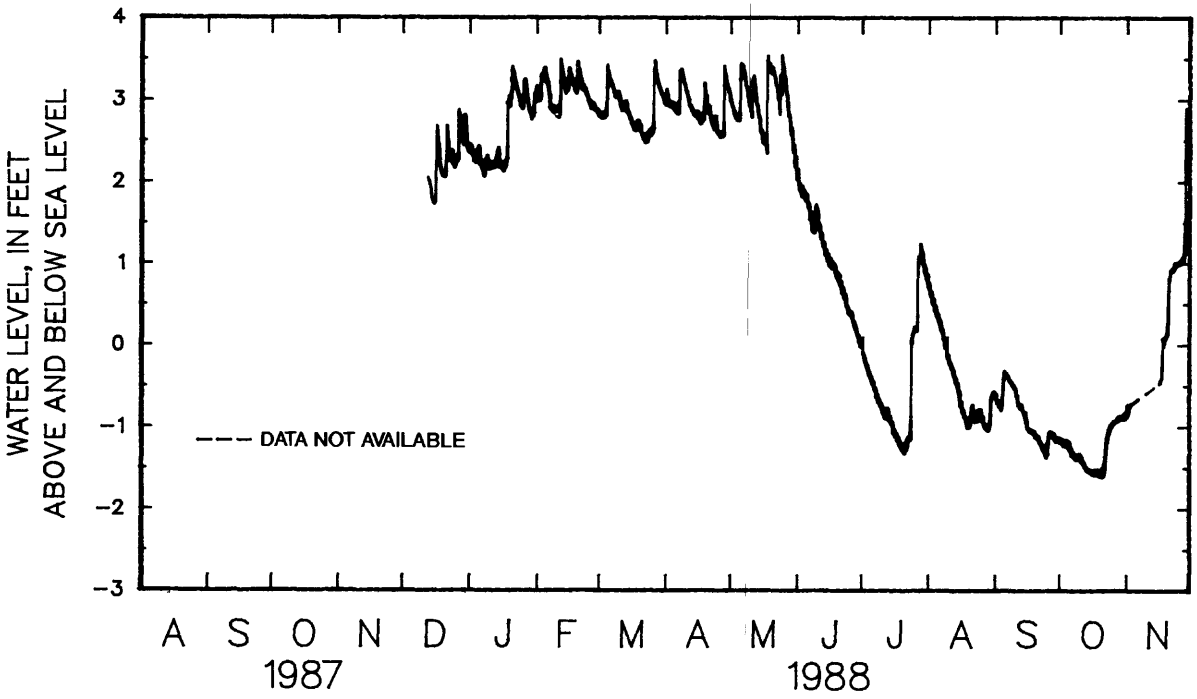

Figure 24.--Water level for well I54A, December 1987 through November 1988.

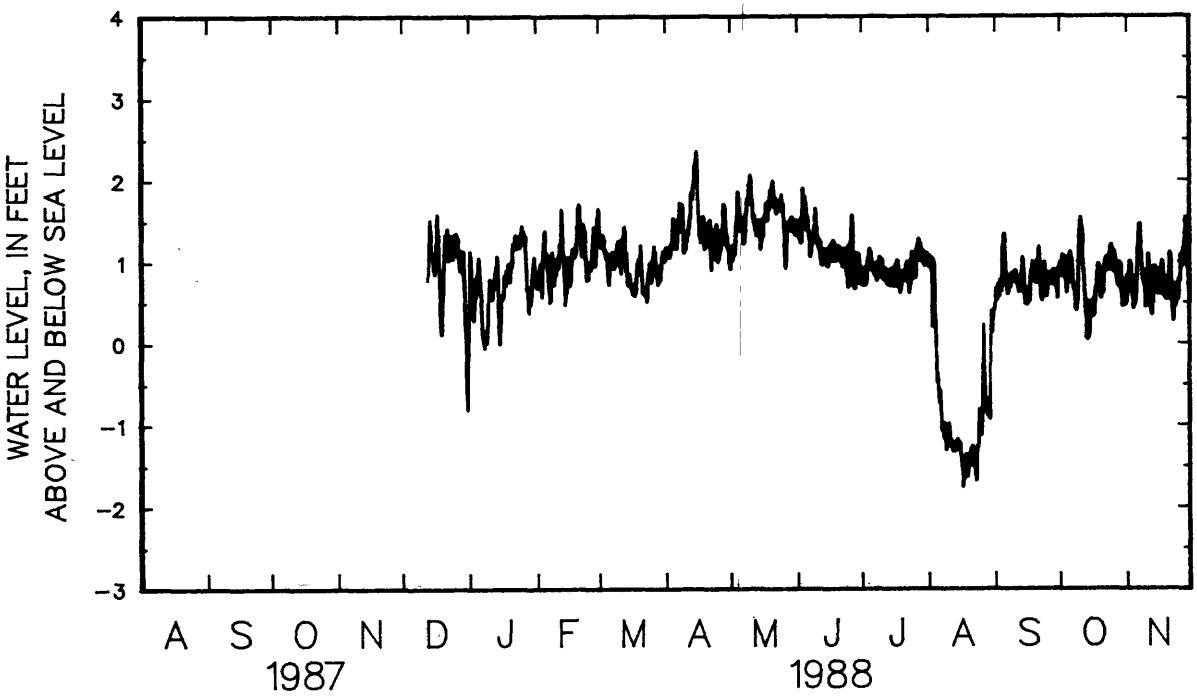

Figure 25.--Water level for well I54B, December 1987 through November 1988.

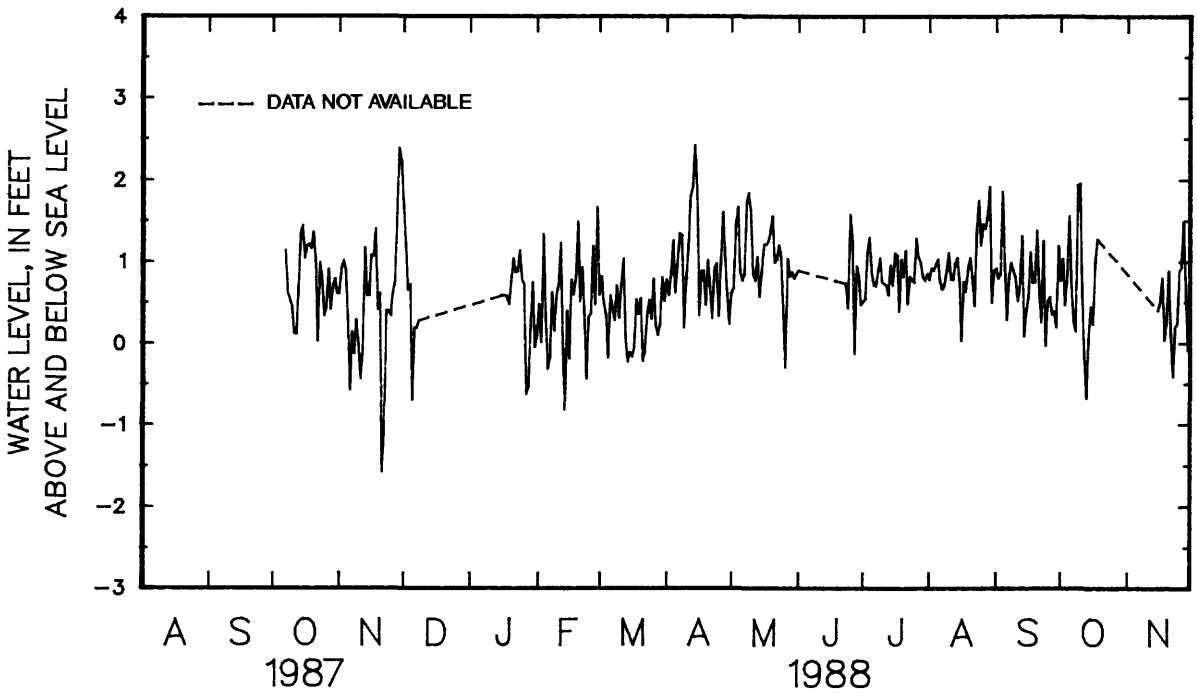

Figure 26.--Tidal data (mean daily fluctuations) from September 1987 through November 1988.

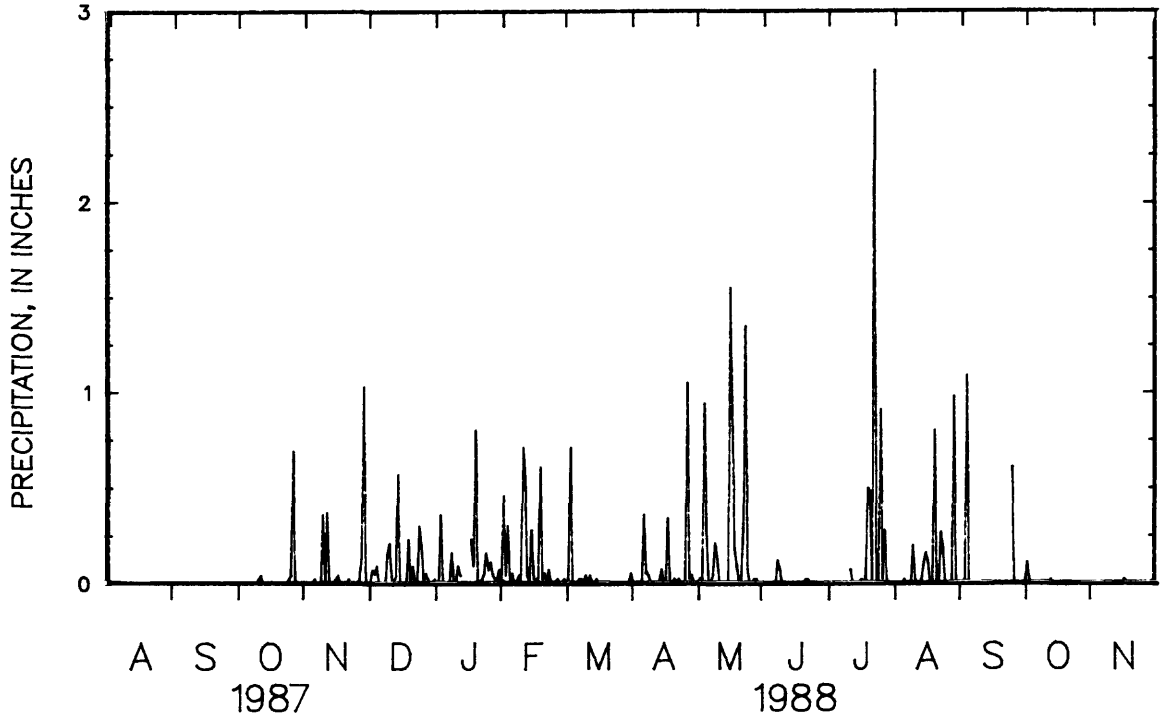

Figure 27.--Precipitation data (mean daily total) from October 1987 through October 1988.