GEOPHYSICAL AND CHEMICAL INVESTIGATIONS OF GROUND WATER AT FIVE INDUSTRIAL OR WASTE-DISPOSAL SITES IN LOGAN TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY, 1983-87

By Jane Kozinski, Pierre J. Lacombe, Joseph J. Hochreiter, Jr., and Jean C. Lewis

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CONVERSION OF INCH-POUND UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

Multiply inch-pound unit	By	To obtain SI unit
	Length	
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.59	square kilometer (km^2)
	Velocity	
foot per second (ft/sec)	0.3048	meter per second (m/sec)
	Temperature	
degree Fahrenheit (°F)	$°C = \frac{5}{9} \times (°F-32)$	degree Celsius (°C)

GEOPHYSICAL AND CHEMICAL INVESTIGATIONS OF GROUND WATER AT FIVE INDUSTRIAL OR WASTE-DISPOSAL SITES IN LOGAN TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY, 1983-87

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ABSTRACT

Five former or active industrial or waste-disposal sites in Logan Township were identified by the Federal government and by the State of New Jersey as potential threats to the quality of ground water there. The sites are (1) Air Products and Chemicals, Inc. waste-disposal site, (2) Bridgeport Rental and Oil Services, Inc., (3) Chemical Leaman Tank Lines, Inc., (4) Monsanto Company, and (5) Rollins Environmental Services, Inc.

Logan Township is underlain by unconsolidated sediments of the Atlantic Coastal Plain province. The principal source of drinking water for the township is the Potomac-Raritan-Magothy aquifer system, a part of the Atlantic Coastal Plain. The five industrial or waste-disposal sites are located on the outcrop area of this aquifer system. Unless altered by pumping, ground-water flow in the unconfined parts of the aquifer system is toward areas of lower altitude. Regional ground-water flow in the confined parts of the aquifer system is toward cones of depression in Camden and Salem Counties, New Jersey, but is influenced also by local pumpage.

Shallow (less than 50 feet below land surface) ionic ground-water contamination at the waste-disposal sites was delineated by electromagnetic conductivity. Quality of ground water was determined by chemical analysis of samples from wells at four of the five sites and elsewhere in the township.

Ground water in the lower aquifer of the Potomac-Raritan-Magothy aquifer system in Logan Township and surrounding areas is dominated by sodium and chloride ions and is slightly saline (1,000 to 3,000 mg/L (milligrams per liter) dissolved solids). Calcium, sodium, and bicarbonate are the predominant ions in the upper and middle aquifers; the concentration of dissolved solids is low (less than 1,000 mg/L). Concentrations of iron and manganese in the ground water range from 6 to 73,000 µg/L (micrograms per liter) and from 33 to 1,100 µg/L, respectively. Concentrations of organic carbon range from 0.60 to 4.2 mg/L.

No electromagnetic anomalies are attributable to ground-water contamination at the Air Products and Chemicals, Inc., waste-disposal site. No wells from which to collect water samples are present at the site.

Areas of high apparent conductivity (greater than 15 millisiemens per meter) were detected east of the waste-oil lagoon at the Bridgeport Rental and Oil Services, Inc. site. Inorganic ground-water contamination at the site is characterized by concentrations of cadmium and lead that exceed Federal and State primary drinking-water regulations (10 and 15 µg/L).

Electromagnetic anomalies were found near the former aeration lagoons and near the former settling lagoons at the Chemical Leaman site. Ground water at the Chemical Leaman site also is characterized by elevated concentrations of organic nitrogen, and concentrations of arsenic, chromium, lead, and mercury that exceed Federal primary drinking-water regulations. Organic contamination at the Chemical Leaman site is present as deep as 95 feet below land surface. Chlorinated aliphatic hydrocarbons are common in ground water at the Chemical Leaman site.

Areas of anomalously high apparent conductivity (greater than 35 millisiemens per meter) were detected around the former and active landfills and east of the manufacturing plant at the Monsanto Company site. Concentrations of dissolved solids ranged from 339 to 3,530 mg/L at the Monsanto site and typically are much higher than background levels, but the cause is unclear. Concentrations of silica, alkalinity, and ammonia also are typically higher than background levels. The most frequently detected organic compounds at the Monsanto site include bis (2-ethyl hexyl) phthalate, benzene, and methylene chloride, but the concentration of none of these exceeded 20 μg/L. Concentrations of benzene in water samples from two wells and of methylene chloride in samples from three wells exceeded proposed State drinking-water regulations.

An area of high apparent conductivity (more than 20 millisiemens per meter) was detected near Raccoon Creek, adjacent to the Rollins property, but the cause of the high apparent conductivity is unknown. Electromagnetic surveys were not done on Rollins property. Reducing and oxidizing zones in the ground water at the Rollins site are delineated by the distribution of nitrogen species. Concentrations of arsenic, chromium, lead, and mercury in the ground water exceed Federal and State primary drinking-water regulations. Organic contamination at the Rollins site is severe in the unconfined aquifer system in the central part of the plant site, but also was detected in the deep confined system. Both aromatic and aliphatic hydrocarbons have been detected in ground water at Rollins. Nitrogen-containing organic compounds such as benzenamine are commonly detected in ground-water samples from wells at Rollins.

INTRODUCTION

Five industrial or waste-disposal sites were identified by the Committee on Interstate and Foreign Commerce, 96th Congress (1979) and by the New Jersey Department of Environmental Protection (Miller and others, 1982) as potential sources of contamination to the ground water in Logan Township, Gloucester County, New Jersey. These included: (1) Air Products and Chemicals, Inc.[1] waste-disposal site; (2) Bridgeport Rental and Oil Services, Inc. (BROS); (3) Chemical Leaman Tank Lines, Inc. (Chemical Leaman); (4) Monsanto Company, Inc. (Monsanto); and (5) Rollins Environmental Services, Inc. (Rollins).

[1] Use of company names in this report is for identification only and does not impute responsibility for any present or potential effects on the natural resources.

The U.S. Geological Survey, in cooperation with Logan Township, studied the township's ground-water resources from 1983-87. The objective of the geophysical and chemical investigations was to document the types and extent of ground-water contamination.

Purpose and Scope

This report describes the use of electromagnetic-conductivity (EM) and ground-water-quality data at available wells to determine the presence of contaminant plumes at the five industrial or waste-disposal sites, to delineate the lateral and vertical extent of any plumes in the aquifer system, and to document the inorganic and organic constituents present in the plumes.

EM surveys were used to locate probable shallow ground-water-contamination plumes (less than 30 ft (feet) below land surface). Ground-water samples were collected to identify the inorganic and organic constituents present in plumes delineated by geophysical methods and in ground water elsewhere at each site, and to test the reliability of the geophysical methods in detecting plumes of contaminated ground water.

EM data were collected at 850 stations from September 1983 through January 1984 at the Air Products and Chemicals, Inc., waste-disposal site; BROS; Chemical Leaman; Monsanto; and property north of Rollins. The Rollins property was not accessible for conducting EM surveys. Ambient ground-water quality was determined by analyzing samples from 20 wells in Logan Township that are not in areas of ground-water contamination; results of these analyses are summarized in this report. Analyses of ground-water-quality samples collected from May through October 1984 for 8 wells at BROS, 6 at Chemical Leaman, 13 at Monsanto, and 27 at Rollins also are presented. Samples were collected from previously installed wells; no new wells were installed at any of the sites for this study.

Well-Numbering System

The well-numbering system used in this report is that developed and used by the Geological Survey since 1978. The well number consists of a county code and a sequence number for the well in that county. Each well in the data base has a unique number. All wells in this report are in Gloucester County (county code 15). As an example, well 150549 is the 549th well inventoried in Gloucester County. Wells listed in the tables of this report are arranged by the waste-disposal site or the well owner, then by unique number.

Previous Investigations

Regional surface-geophysical surveys done in southern New Jersey include data collected in Logan Township. Ewing and others (1940) used seismic-refraction techniques to determine the depth to bedrock along a traverse from Bridgeport, N.J., to the southeastern coast of New Jersey. Bonini (1965) compiled gravimetric data for the whole state. These data are used to delineate regional gravity variations. Marine seismic-reflection data were collected in the Delaware River to delineate the near-surface sediment types (Moody and VanReenan, 1967). Aeroradiometric data were collected in a

reconnaissance of the New Jersey Coastal Plain, including Logan Township (U.S. Geological Survey, 1979). Marine EM data were collected on the Delaware River to distinguish clay-rich from sand-rich river-bottom sediments (Duran, 1986).

A resistivity survey done at BROS in 1982 (Fred C. Hart Associates, Inc., 1982) consisted of vertical electric sounding and point measurements collected in the peach orchard west of the oil lagoon. The data probably represent a ground-water contaminant plume emanating from the west side of the lagoon. The New Jersey Department of Environmental Protection made an EM survey along the north side of the oil lagoon where buried waste was suspected (Andres, 1982). Additional EM data were collected east and southeast of the oil lagoon where drums were reported to have been buried. Areas of high apparent conductivity north of the lagoon probably represent liquid contaminants observed on the ground surface. Magnetic, electromagnetic, and electric-resistivity surveys were done in 1984 (NUS Corporation, 1984b) to locate ferromagnetic material in the subsurface and to delineate ground-water contaminant plumes. The results probably represent buried ferromagnetic materials east of the lagoon and ground-water contaminant plumes migrating radially outward from the lagoon.

Electric-resistivity surveys were done at Rollins from 1972 to 1983 (Geraghty and Miller, Inc., 1972; 1976; 1978; 1980; 1981a; 1983a). The results of these studies probably indicate an area of low resistivity at the center of the plant.

A compilation of water-quality analyses for the Potomac-Raritan-Magothy aquifer system in southwestern New Jersey (including Logan Township) from 1923-83 was prepared by Fusillo and others (1984). Fusillo and others (1985) studied the distribution of volatile organic compounds in the aquifer system in New Jersey, including Gloucester County. The quality of surface-water and streambed material in Logan Township was reported by Hochreiter and Kozinski (1985).

No hydrologic investigations have been done at the Air Products site. Reports on ground-water quality at the BROS site were prepared by NUS Corporation (1983, 1984a, 1984b, 1984c) and Camp, Dresser & McKee, Inc. (1983). Ground-water quality at Chemical Leaman was investigated by Environmental Resources Management, Inc. (1981, 1986, 1988). Data on ground-water quality at the Monsanto site are presented in Geraghty and Miller (1965, 1981c, 1983a, 1983c, 1984b, 1986). Data on and interpretations of the hydrology and ground-water quality at the Rollins site are presented by Batelle Columbus Division (1983), Geraghty and Miller, Inc. (1972, 1976, 1978, 1979, 1980, 1981a, 1981b, 1982a, 1982b, 1983b, 1984a, 1987), Johe and Stotler (1981), Malcolm Pirnie, Inc. (1984, 1985), New Jersey Department of Environmental Protection (1983), and Roy F. Weston, Inc. (1981).

Acknowledgments

The cooperation of Chemical Leaman Tank Lines, Inc.; Environmental Resources Management; Monsanto Company, Inc.; the Pureland Industrial Complex; Rollins Environmental Services, Inc.; Geraghty and Miller, Inc.; and Kenneth DiMuzio of Hoffman, DiMuzio, Hoffman, and Marcus is gratefully

acknowledged for providing information and assistance. The authors thank the U.S. Army Corps of Engineers for helping to develop medical-monitoring programs for field personnel, and the U.S. Environmental Protection Agency, Region II, and NUS Corporation for their assistance at BROS. Special thanks is extended to the residents of Logan Township who cooperated in this study. We also acknowledge the staff at the New Jersey Geological Survey, the Gloucester County Planning and Health Departments, Logan Township Environmental Commission, and Kupper Associates for providing data from previous investigations.

DESCRIPTION OF STUDY AREA

Location and Historical Development

Logan Township is the westernmost township in Gloucester County. It is bounded on the northwest by the Delaware River, on the northeast by Repaupo Creek, on the southwest by Oldmans Creek, and on the southeast by county roads (fig. 1). The township is approximately 24 mi^2 (square miles) and has little topographic relief. It consists primarily of farmland and undeveloped marshland. Residential areas include the villages of Bridgeport and Repaupo and new housing developments along the southern border of the township.

Although much of Logan Township is agriculturally developed, the township has experienced considerable industrial growth since the mid 1960s. The township is intersected by three major highways (Interstate 295, the New Jersey Turnpike, and State Highway 130) that provide access to the township. They have been helpful in the township's industrial development in the past 20 years. Each of the five industrial or waste-disposal sites considered in this study is near these major highways (fig. 1). The township's proximity to Philadelphia, Pa.; Wilmington, Del.; and New York, N.Y., and the availability of inexpensive undeveloped land make Logan Township a desirable location for industries (R.E. Dixon, Gloucester County Planning Department, oral commun., 1986).

Air Products and Chemicals, Inc., owned a small parcel of land on High Hill Road (fig. 1) from 1962-70. An unknown quantity of dried chrome sludge was buried at the site (Committee on Interstate and Foreign Commerce, 96th Congress, 1979). The site currently is not used for waste disposal.

The BROS former waste-oil recovery site operated from the early 1960's until its closure in 1979 (R.E. Dixon, Gloucester County Planning Department, written commun., 1980). Past or present potential sources of contamination there include 90 above-ground storage tanks, drums, and an 11.8-acre, unlined waste-oil lagoon (fig. 2). The above-ground tanks were removed in 1987 by the U.S. Environmental Protection Agency. The lagoon consists of a bottom layer of sludge, a layer of contaminated water, and an overlying layer of oil and loose debris (NUS Corporation, 1984b, p. 3-6).

Chemical Leaman Tank Lines is a chemicals shipping business that has operated in Logan Township since 1960. At the terminal in Logan Township, chemical-transport trucks are cleaned with water, detergents, steam, solvents, and kerosene (Environmental Resources Management, Inc., 1981, p. 1-4). Until 1975, washwater was discharged into open settling lagoons on

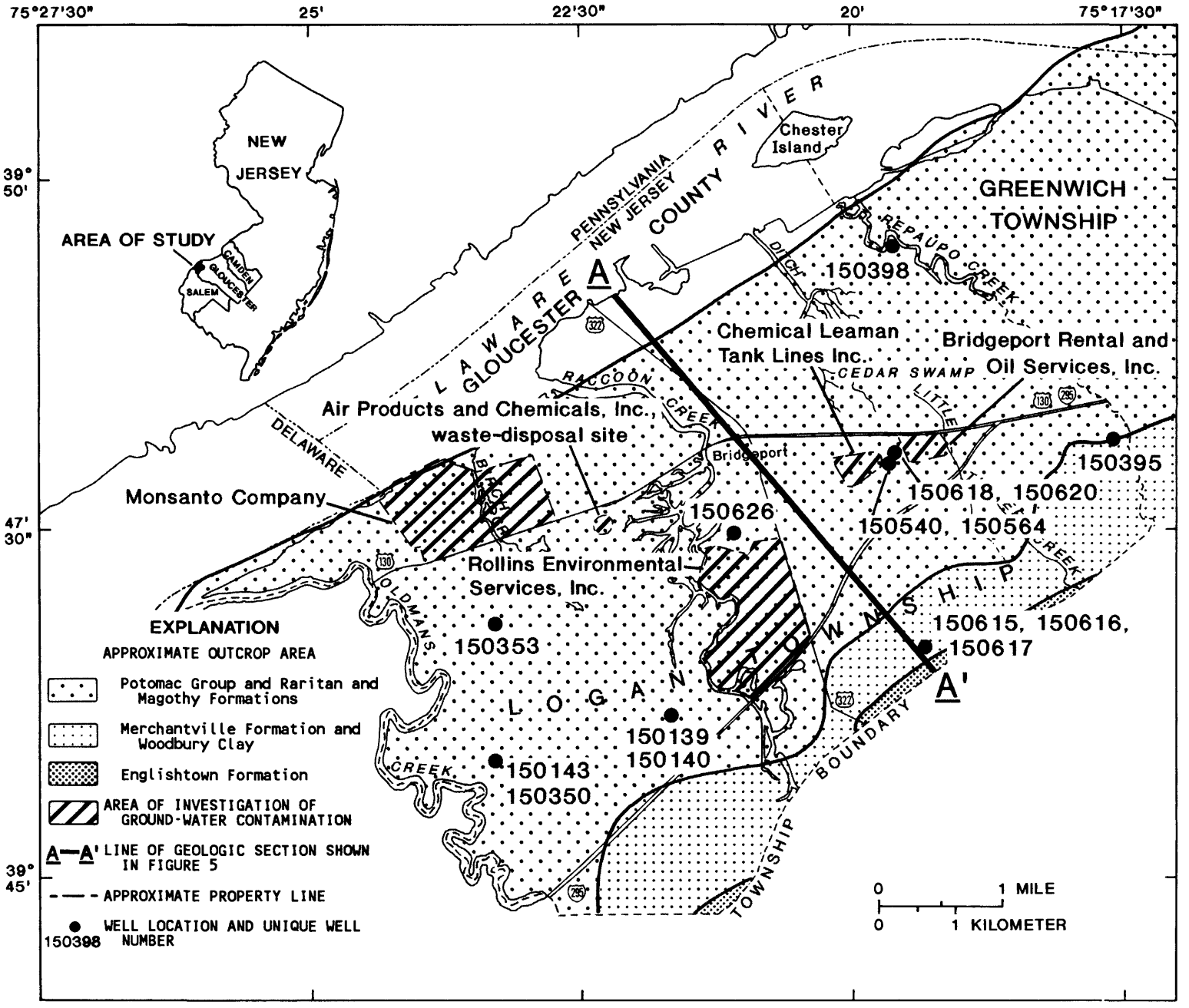


Figure 1.--Logan Township, Gloucester County, N.J., locations of the five industrial or waste-disposal sites, approximate outcrop areas of selected geologic units, and locations of selected wells sampled as part of the study. (Outcrop areas from Zapecza, 1984.)

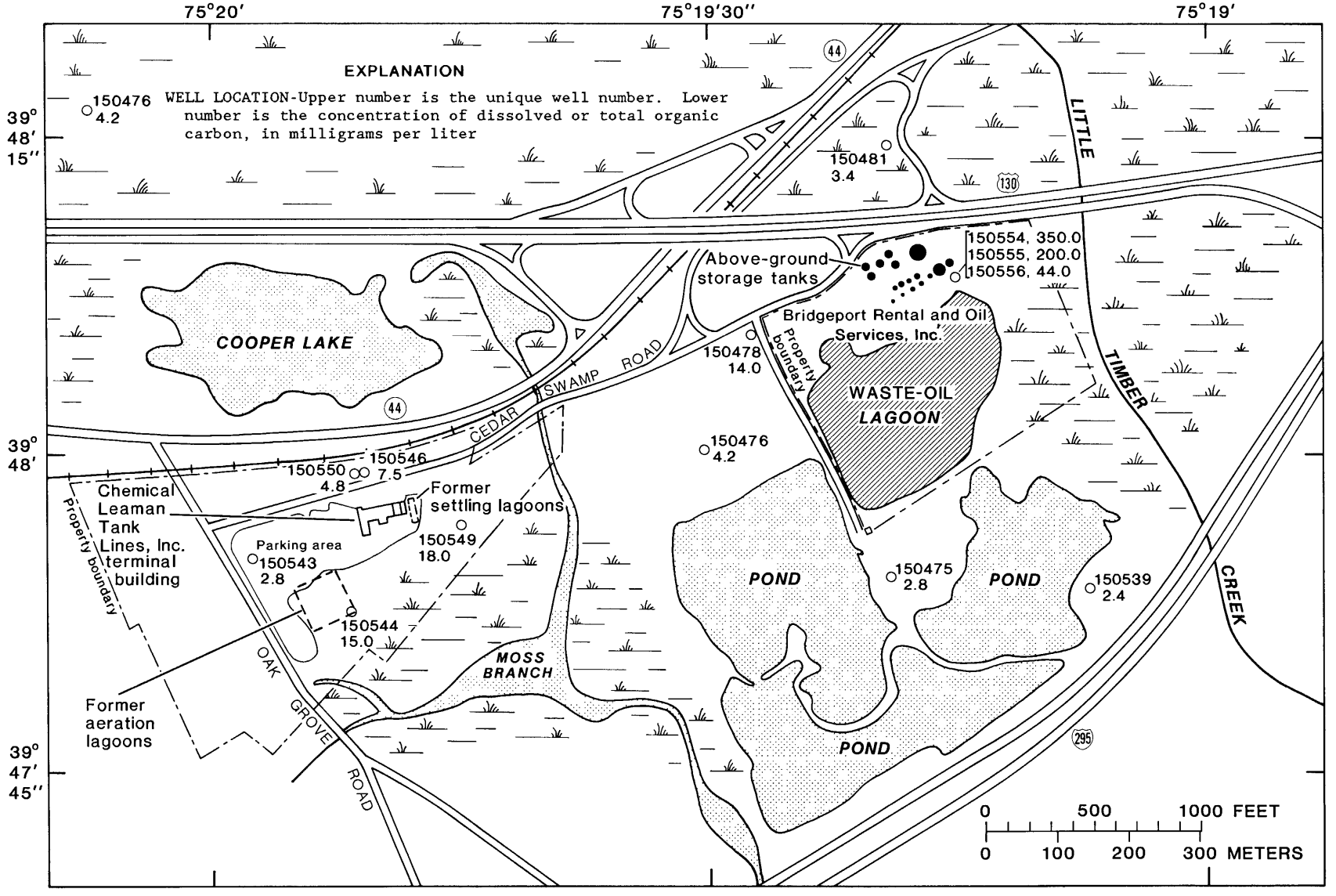


Figure 2.--Locations of wells sampled for chemical analysis of ground water, and distribution of organic carbon in ground water, at Bridgeport Rental and Oil Services, Inc., and Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984.

the premises and allowed to settle (fig. 2). Material floating on the surface of the lagoons was pumped to aeration lagoons. The aeration lagoons are reported to have overflowed frequently, the effluent draining onto surrounding soil and nearby wetlands (Environmental Resources Management, Inc., 1988, p. 1-5). The settling and aeration lagoons were emptied and were backfilled in 1975 (NUS Corporation, 1985, p. 2-9). Wastewater currently is hauled and disposed of offsite.

Monsanto Company, which manufactures industrial organic compounds, has been operating in Logan Township since 1961. Wastewater is treated onsite and is discharged into the Delaware River; solid sludge and liquid waste from the treatment process is disposed of in landfills on the property (fig. 3). Three of the landfills have been closed and have been covered, and a fourth was constructed in 1978.

Rollins Environmental Services, Inc., has been operating a hazardous-waste-treatment site in Logan Township since 1970. Sludge resulting from treatment processes was buried in basins on the premises (fig. 4), and wastewater was discharged into Raccoon Creek after treatment. A group of above-ground storage tanks in the central part of the site (fig. 4), was destroyed completely by fire in December 1977 (Johe and Stotler, 1981). Rollins accepts only wastes for high-temperature incineration. Waste and wastewater generated by incineration are discharged into lagoons (fig. 4) before treatment and discharge into Raccoon Creek (Miller and others, 1982, p. 15).

Geology and Geohydrologic Framework

The study area is in the Atlantic Coastal Plain, a regional terraine of unconsolidated marine, littoral, and nonmarine deposits of Early Cretaceous to Late Miocene age representing fluvial and deltaic environments (Owens and Sohl, 1969). The sediments of the Coastal Plain are gravel, sand, silt, and clay; they form a wedge that trends generally northeast-southwest and dips and thickens toward the southeast (fig. 5). The sediments unconformably overlie bedrock composed of Wissahickon Formation of Precambrian and early Paleozoic age (fig. 5).

In parts of the township, a veneer of Quaternary material overlies deposits of Cretaceous age. The geologic units underlying the township are, from youngest to oldest, the Englishtown Formation, the Woodbury Clay, Merchantville Formation, Magothy and Raritan Formations, and Potomac Group, all of Cretaceous age, and the Wissahickon Formation.

The thin Englishtown Formation in Logan Township consists of fine-grained sand. The formation is not used for water supply in the township.

The Merchantville-Woodbury confining unit, composed of the Woodbury Clay and the Merchantville Formation, crops out along the southeastern border of Logan Township (fig. 1). Locally, a sandy layer in the upper part of the Merchantville Formation is tapped for irrigation water. Underlying this confining unit is the Potomac-Raritan-Magothy aquifer system, which consists of the Magothy and Raritan Formations and the Potomac Group. The Magothy and Raritan Formations and the Potomac Group crop out in a northeast-southwest-trending area throughout most of Logan Township (fig. 1). Zapecza

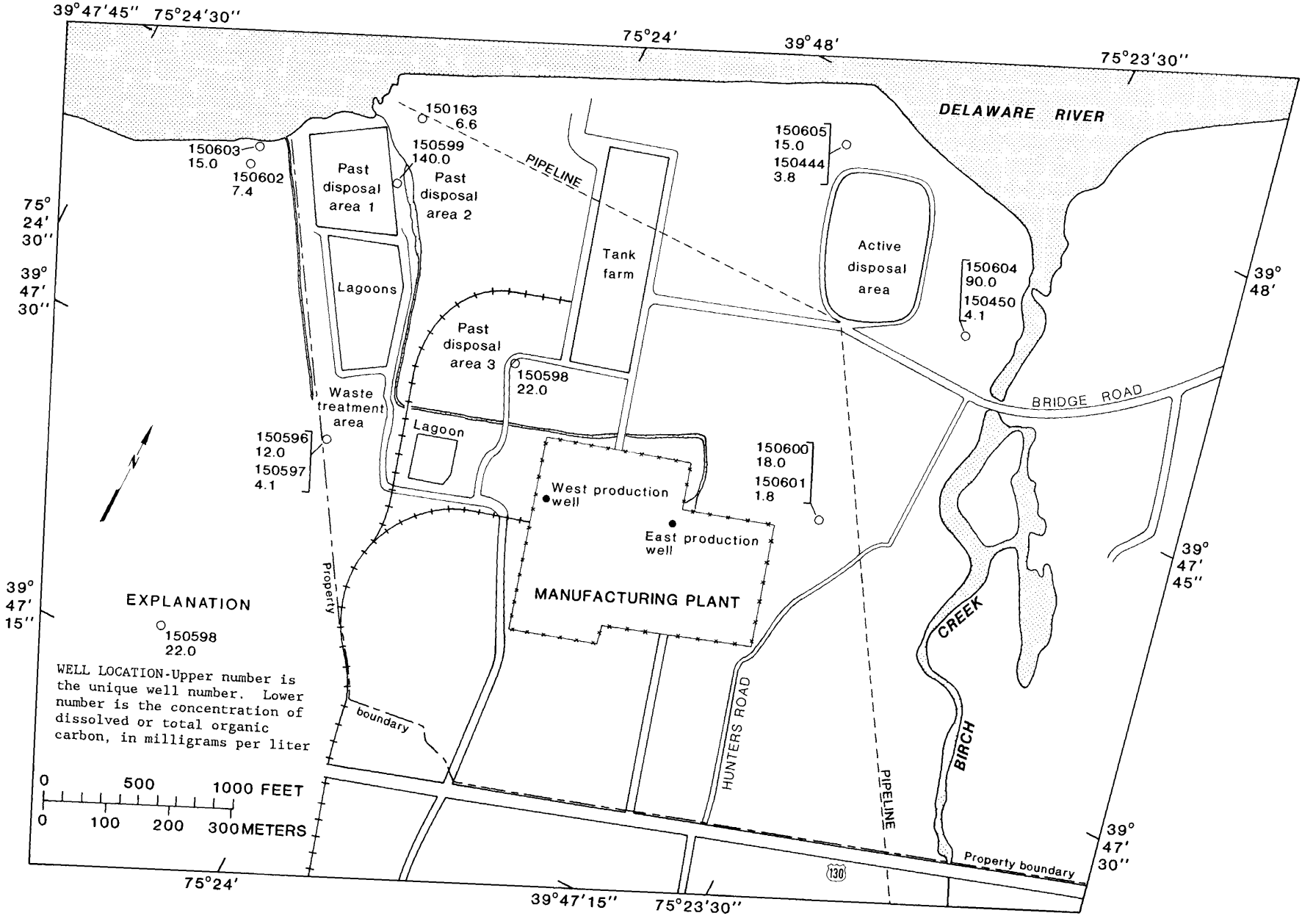


Figure 3.--Locations of wells sampled for chemical analysis of ground water, and distribution of organic carbon in ground water, at Monsanto Company, Logan Township, Gloucester County, N.J., 1984.

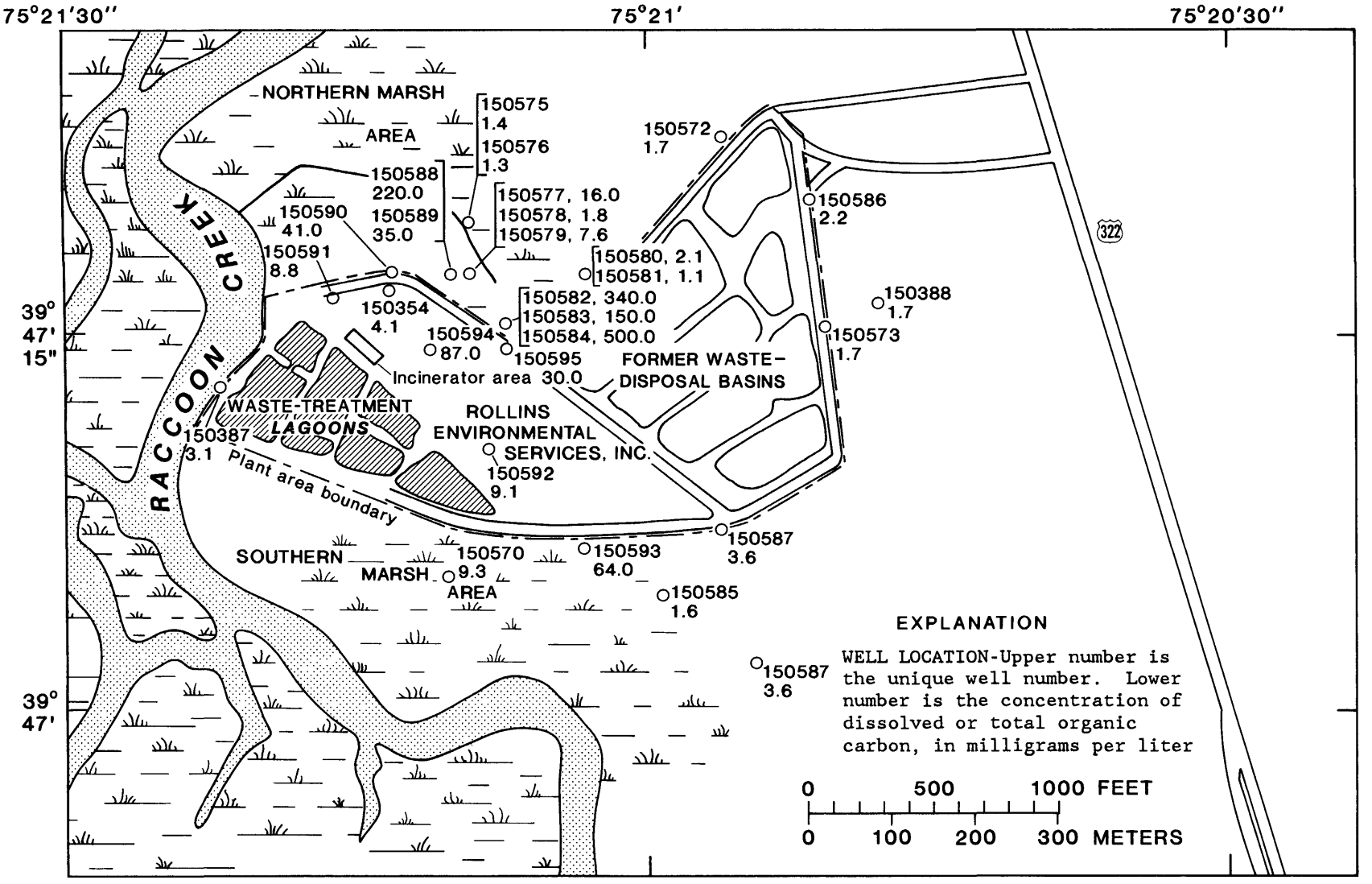


Figure 4.--Locations of wells sampled for chemical analysis of ground water, and distribution of organic carbon in ground water, at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984.

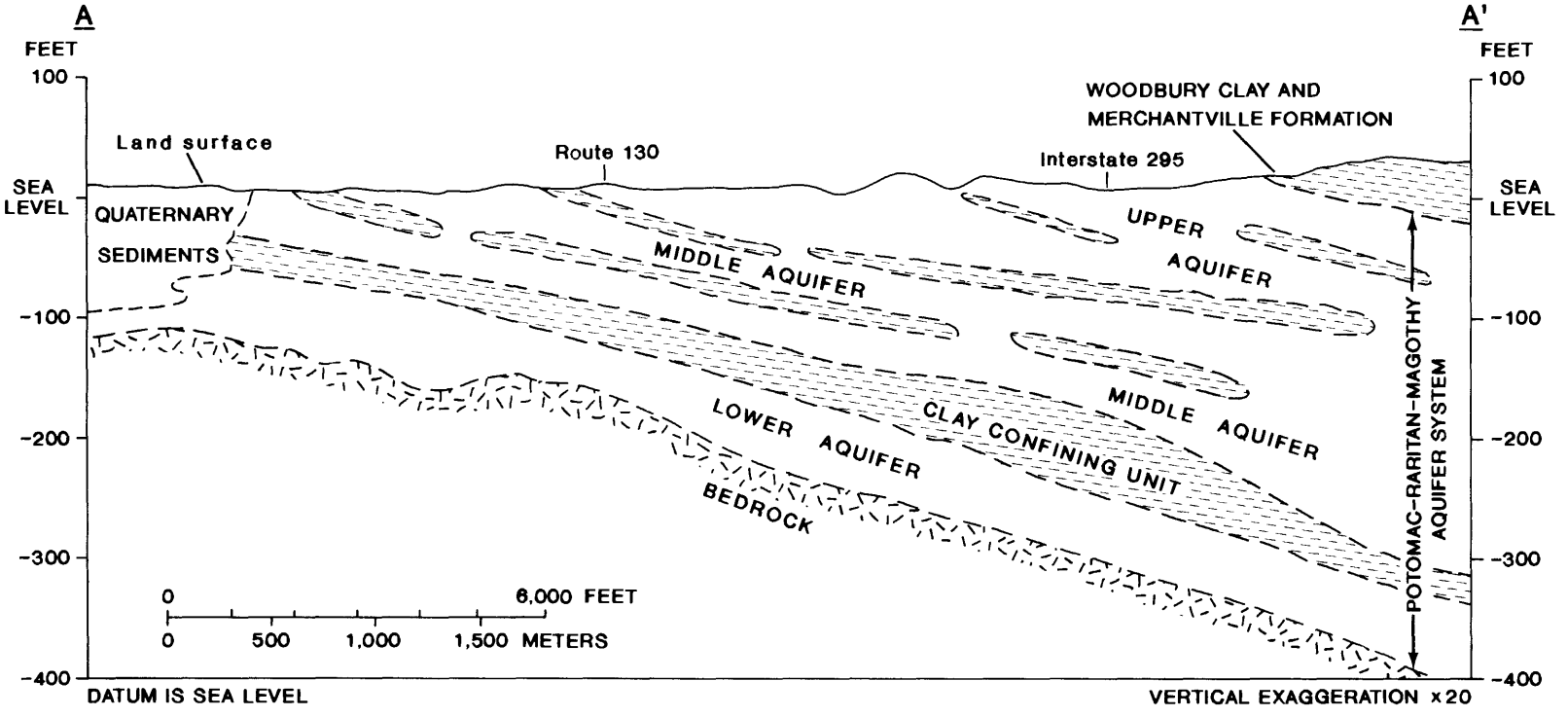


Figure 5.--Generalized hydrogeologic section of the eastern part of Logan Township, Gloucester County, N.J.

(1984) identified the upper, middle, and lower aquifers within the Potomac-Raritan-Magothy aquifer system that extend throughout most of the New Jersey Coastal Plain. In Logan Township, the upper and middle aquifers locally are undifferentiable because the clay confining unit that separates them elsewhere is absent (fig. 5). The middle aquifer is divided locally by a laterally discontinuous clay confining unit that can be as much as 60 ft thick (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988). The middle and lower aquifers are separated by a clay confining unit that is present throughout the township except in a small area bordering the Delaware River (J.C. Lewis, U.S. Geological Survey, written commun., 1989). Depth to the Wissahickon Formation ranges from 50 ft below land surface near the Delaware River to 400 ft below land surface in the southwestern part of the township.

The Air Products and Chemicals, Inc., waste-disposal site, BROS, Chemical Leaman, and Rollins are in the subcrop or outcrop area of the upper aquifer (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988). The Monsanto site is in the subcrop or outcrop area of the middle aquifer (J. Lewis, U.S. Geological Survey, written commun., 1988). Most of the upper 70 ft of sediment in the northern part of the Monsanto site is dredge spoils and fine-grained sediments younger than Cretaceous in age.

Ground-Water Flow

Ground-water levels in the Potomac-Raritan-Magothy aquifer system were investigated in Logan Township from 1983-85 and in the Greenwich Township region in 1986 (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988). In the shallow unconfined parts of the aquifer system, ground water flows from topographically high areas to nearby surface-water bodies. In the confined parts of the middle and upper aquifers, ground water flows east-southeast toward a regional cone of depression centered around Camden County, N.J. (Eckel and Walker, 1986). The cone of depression also causes ground water to move downward from the unconfined to the confined parts of the aquifer system. In the confined part of the lower aquifer, ground water flows south toward a local cone of depression in Salem County, N.J. (Eckel and Walker, 1986). Ground-water withdrawals in Logan Township can influence ground-water flow in the unconfined and confined systems.

There are no wells at the Air Products and Chemicals, Inc., waste-disposal site; data on local ground-water flow are unavailable. Ground water in the water-table aquifer there probably discharges to the swamp surrounding the site.

Natural ground-water flow in the unconfined system at the BROS site is not understood. Generally, however, flow is east-northeast toward Little Timber Creek (NUS Corp., 1984a, p. 6-3). A perched water table at the waste-oil lagoon at the site may cause ground water to flow radially from the lagoon (NUS Corp., 1984a, p. ES-3).

Ground water in the unconfined system at the Chemical Leaman site probably flows naturally toward the wetlands on the southern, eastern, northeastern, and possibly northern margin of the plant site. Ground water in the semiconfined and confined aquifers at the site flows regionally east-

southeast (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988), but intermittent pumping at the site at a depth of 85 to 95 ft below land surface may induce flow toward the center of the site. Ground-water levels at the site fluctuate daily as a result of tidal action. Water-level fluctuations in wells next to Cooper Lake are greater than fluctuations in wells screened in the same aquifer but farther from the lake (Environmental Resources Management Inc., 1986). The difference in the amplitude of tidal changes in water levels causes local reversals in the hydraulic gradient.

In the northern part of the Monsanto site, ground-water flow in the water-table aquifer generally is toward the Delaware River and Birch Creek (Geraghty and Miller, 1981c and 1983a). Flow in the water-table aquifer throughout the remainder of the plant is toward the stormwater ditch or toward Birch Creek (Geraghty and Miller, 1983a). Flow in the confined part of the middle aquifer is toward the east and west production wells located in the center of the plant (Geraghty and Miller, 1983a). Ground water also flows vertically downward through the aquifer system.

Natural ground-water flow in the water-table aquifer beneath Rollins was toward Raccoon Creek, but the flow direction has been altered by the operation of a pumping system designed to prevent contaminated water in the unconfined aquifer from moving to nearby marshes, the creek, and the underlying confined aquifers. Flow in the water table generally is toward the west-northwest, but locally is influenced by pumping or topographic highs (Geraghty and Miller, 1984a). The northern and southern marsh areas and Raccoon Creek probably are ground-water discharge zones (Geraghty and Miller, 1982b). Local ground-water flow in the shallow confined aquifer probably is toward Raccoon Creek (Geraghty and Miller, Inc., 1984a, app. A, pl. 2). Flow in the deep confined aquifers is toward the east-southeast (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988). Water levels at the Rollins site fluctuate daily as a result of tidal action. Gradient reversals caused by tides have not been reported in the literature.

METHODS OF INVESTIGATION

Geophysical Investigation

Electromagnetic conductivity is a surface-geophysical technique in which electromagnetic energy is used to measure the apparent conductivity of sediments and ground water. This method commonly is used to delineate ionic ground-water contaminant plumes. Contaminant plumes that contain ionic components can affect the earth's ability to conduct an electric current. EM-conductivity surveys were done at the five industrial or waste-disposal sites to determine the electrical variations of the near-surface environment to a depth of about 45 ft. The variations are caused by changes in type of sediment, degree of saturation by ground water, ions in the ground water, and (or) metal objects in the subsurface and above.

Theory

An electromagnetic transmitter and receiver are used with the EM technique. A primary electromagnetic field is created by passing alternating current through a coil of wire, an antenna of the transmitter. The electromagnetic field passes through the subsurface and induces a flow of electric current proportional to the combined conductivity of ground water, sediment, and rock. The current flow induces a secondary electromagnetic field of the same frequency as the primary field but of different phase and direction. The primary and secondary electromagnetic fields are measured as a change in the potential induced in the receiver coil. The apparent conductivity of the subsurface is calculated within the receiver unit and is reported in millisiemens per meter (mS/m).

Changing the separation between and the orientation of the coils alters the effective depth of measuring the subsurface apparent conductivity. The coil separation for this investigation was kept constant at 32.8 ft. The two coil orientations used were the horizontal-dipole and vertical-dipole configurations. A horizontal dipole is a pair of magnetic poles that are parallel with the earth's surface. In the horizontal-dipole configuration, the two coils are placed on edge, perpendicular to the earth's surface and coplanar. The electrical nature of the shallow subsurface is measured by use of this configuration. The effective depth of measurement typically is three-fourths of the coil-separation distance. A vertical dipole is a pair of magnetic poles that are perpendicular to the earth's surface. In the vertical-dipole configuration, the two coils are placed flat on the ground and coplanar. The deep subsurface, about 1 to 1-1/2 times the coil-separation distance, is measured by use of the vertical-dipole configuration.

Field Procedure

A [2]Geonics EM 34-3 transmitter and receiver were used. The data were collected on and adjacent to the five industrial or waste-disposal sites. Two base lines were surveyed for each waste-disposal site. Data typically were collected at stations every 100 ft in lines spaced about 200 ft apart and perpendicular to the baselines. Data were collected at each station for the horizontal- and vertical-dipole configurations. Station locations were determined by pace and compass methods.

Data were not collected in areas of apparent interference from buildings, pipelines, overhead or underground wires, railroad tracks, or metal guard rails, or where the station was inaccessible. Interferences such as these adversely affect electromagnetic measurements. Comments were recorded where sources of interference may have been affecting the instruments. Local geology, depth to the water table, soil type, land use, and any other local features that could influence the apparent-conductivity readings were noted during data collection to aid in interpreting the data. At stations where the authors suspected interference, the conductivity

[2] Use of brand, firm, or trade names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

values were double-checked by rotating the coils 90 degrees from the first measurement and recording the apparent conductivity. Where the values were inconsistent the authors assumed that the difference was the result of an isolated, highly-conductive material or object not representative of the area.

Interpretation of apparent-conductivity data is based on a comparison between values from presumably contaminated areas and those from presumably uncontaminated areas. In order to obtain the most accurate representation of background apparent conductivity possible, data were collected in a large area surrounding each site, including areas that were known to be uncontaminated according to previous water-quality investigations. Because of differences in soil type, land use, depth to water table, and geology, background apparent conductivity can vary at each site and can be different for each site.

Chemical Investigation

Ground-Water-Sampling Network

Because no new wells were installed at the waste-disposal sites for the study, the areal and vertical distributions of ground-water samples were limited by the well networks at each site. Wells were selected for sampling so that ground water would be obtained from unconfined and semiconfined or confined aquifers and from areas on all sides of known or suspected sources of contamination. Construction data for the wells sampled in this study are listed in table 1. Well locations are shown in figures 2, 3, and 4.

The sampling networks selected for each site generally are adequate for use in determining the inorganic and organic contamination in the ground water at each site. At some sites, however, the networks are inadequate for determining the lateral and vertical extents of ground-water contamination, on- or offsite. Geophysical data collected in 1984, and water-quality data for water samples collected from wells during other investigations but not sampled in 1984, are used in the discussion of water chemistry and some of the inadequacies of the well networks.

Types of Analysis and Analytical Methods

The types of analysis done on ground-water samples and the constituents or compounds determined in each type of analysis are listed in table 2.

Alkalinity (by incremental titration), dissolved oxygen, specific conductance, pH, and temperature of water were determined in the field at the time of sampling. Nutrients were determined by colorimetric methods. Dissolved solids and total solids were determined in the laboratory by gravimetric methods. Sulfate, inorganic phosphorous, and the nitrogen species were determined by colorimetric methods. The common ions (table 2, analysis 1c), calcium, iron, magnesium, manganese, silica, and sodium were determined by atomic-emission spectroscopy. Chloride was determined by colorimetry; flouride by electrometric methods; and potassium, by atomic-absorption spectroscopy. Arsenic, chromium, hexavalent chromium, and

Table 1.--Records of wells sampled for chemical analysis, and codes for types of chemical analysis of water samples from each well, Logan Township, Gloucester County, N.J.

[--, data are not available; HPPM undifferentiable Holocene, Pleistocene, Pliocene, and Miocene deposits; MRPAU, upper aquifer of the Potomac-Raritan-Magothy aquifer system (MRPA); MRPAM, middle aquifer of the MRPA; MRPAL lower aquifer of the MRPA; B, brass; G, galvanized steel; P, PVC or other plastic; Q, quality-assurance or quality-control analyses available; R, stainless steel; S, steel.]

Unique well number	Station number	Local well name or number	Altitude of land surface (feet)	Screened interval: Depth to first opening (feet below land surface)	Screened interval: Depth to last opening (feet below land surface)	Screen diameter (inches)	Casing material	Screen material	Aquifer code	Codes for types of chemical analyses done (See table 2)
			BRIDGEPORT RENTAL AND OIL SERVICES INC. (OWNER U.S. ENVIRONMENTAL PROTECTION AGENCY)							
150475	394754075192001	101	8.57	35.0	37.0	2.0	S	R	MRPAU	1,2,3,4,6
150476	394800075192901	102	15.05	36.0	38.0	2.0	S	R	MRPAU	1,3,5
150478	394806075192901	104	10.05	19.0	21.0	2.0	S	R	MRPAU	1,2,3,4,6
150481	394814075192001	107	9.30	36.0	38.0	2.0	S	R	MRPAM	1,3,5
150539	394752075190701	S-6	6.00	60.0	70.0	4.0	G	R	MRPAM	1,3,5
150554	394809075191401	S-2A	9.00	4.0	14.0	4.0	G	R	MRPAU	1,2,3,4,6
150555	394809075191402	S-2B	10.89	40.0	50.0	4.0	G	R	MRPAM	1(Q),2,3,4(Q),6
150556	394809075191403	S-2C	11.13	98.0	108.0	4.0	G	R	MRPAM	1(Q),2,3(Q),4(Q),6(Q)
			CHEMICAL LEAMAN TANK LINES, INC.							
150543	394750075195801	CL1	13.82	15.0	30.0	2.0	P	P	MRPAU	1,3,5
150544	394752075195201	CL4	8.20	41.0	46.0	2.0	P	P	MRPAU	1,2,3,4,6
150546	394800075195001	CL2	10.17	20.0	30.0	2.0	P	P	MRPAU	1,2,3,4,6
150549	394757075194202	DW1	7.04	94.5	97.0	4.0	S	R	MRPAM	1(Q),2(Q),3(Q),4(Q),6(Q)
150550	394800075195002	DW2	10.17	99.5	102.0	4.0	S	R	MRPAM	1,3,5
			MONSANTO COMPANY							
150163	394747075241001	OB3	10.1	95.0	100.0	6.0	S	R	MRPA	1,2,3,4,6
150444	394737075224301	7D	15.70	65.0	70.0	4.0	S	R	MRPA	1,2,3,4,6
150450	394726075231801	10D	12.90	60.3	65.3	4.0	S	R	MRPAM	1,2,3,4,6
150596	394730075240602	28S	8.00	2.0	12.0	1.2	P	P	HPPM	1,3,5
150597	394730075240601	28D	8.00	63.0	68.0	1.2	S	R	MRPA	1,3,5
150598	394738075235701	1S	12.50	3.7	13.7	4.0	P	--	HPPM	1,2,3,4,6
150599	394743075240501	50-1A	6.00	3.0	13.0	4.0	P	--	HPPM	1(Q),2(Q),3(Q),4(Q),6(Q)
150600	394738075233402	35S	17.30	3.0	13.0	1.2	P	--	HPPM	1,3,5
150601	394738075233401	35D	17.30	70.0	75.0	4.0	S	R	MRPAM	1,3,5
150602	394741075241701	5D	10.00	84.0	89.0	4.0	S	R	MRPA	1,3,5
150603	394742075241901	52-1	8.00	3.0	13.0	1.5	P	P	HPPM	1,2,3,4,6
150604	394726075231802	10S	12.90	3.5	13.5	4.0	P	--	HPPM	1(Q),2,3,4,6
150605	394737075224302	7S	15.70	10.3	20.3	4.0	P	--	HPPM	1(Q),2(Q),3(Q),4(Q),6(Q)
			ROLLINS ENVIRONMENTAL SERVICES, INC.							
150354	394717075211701	DP2	13.30	81.0	91.0	4.0	P	P	MRPAM	1,3,5
150387	394713075212101	DP1	10.20	80.0	90.0	4.0	P	P	MRPAM	1,3,5
150388	394716075204701	DP3	22.30	75.0	85.0	4.0	P	P	MRPA	1,3,5
150570	394705075210901	W23	0.47	8.50	13.50	2.0	G	S	MRPAU	1,3,5
150572	394721075205601	W18	12.95	10.1	20.1	--	--	--	MRPAU	1,3,5
150573	394715075205001	U	22.11	19.7	22.2	--	--	--	MRPAU	1,3,5
150575	394719075210802	MA-11D	1.31	45.0	55.0	1.2	P	P	MRPAM	1,3,5
150576	394719075210801	MA-11I	1.22	19.0	29.0	1.2	P	P	MRPAU	1,3,5
150577	394717075210803	MA-8D	1.89	39.0	49.0	1.2	P	P	MRPAM	1,2,3,4,6
150578	394717075210802	MA-8I	1.89	25.0	35.0	1.2	P	P	MRPAU	1,2,3,4,6
150579	394717075210801	MA-8S	1.84	8.5	13.5	1.2	P	P	MRPAU	1,2,3,4,6
150580	394718075210202	MA-5D	2.45	50.0	60.0	1.2	P	P	MRPAM	1,3,5
150581	394718075210201	MA-5I	2.48	27.0	37.0	1.2	P	P	MRPAU	1,3,5
150582	394715075210603	MA-1D	1.64	57.0	67.0	1.2	P	P	MRPA	1,2,3,4,6
150583	394715075210602	MA-1I	1.67	25.0	35.0	2.0	P	P	MRPAU	1,2,3,4,6
150584	394715075210601	MA-1S	1.68	5.0	10.0	1.2	P	P	MRPAU	1,2,3,4,6,7
150585	394704075205801	DP5	7.50	79.0	89.0	6.0	P	P	MRPAM	1,3,5
150586	394720075205201	DP4	11.60	95.0	125.0	6.0	--	--	MRPAM	1,3,5
150587	394707075205501	C	9.60	30.0	35.0	--	--	--	MRPAU	1,3,5
150588	394717075210902	31D	5.60	40.0	70.0	--	--	--	MRPAM	1,3,5,6

Table 1.--Records of wells sampled for chemical analysis, and codes for types of chemical analysis of water samples from each well, Logan Township, Gloucester County, N.J.--Continued

Unique well number	Station number	Local well name or number	Altitude of land surface (feet)	Screened interval: Depth to first opening (feet below land surface)	Screened interval: Depth to last opening (feet below land surface)	Screen diameter (inches)	Casing material	Screen material	Aquifer code	Codes for types of chemical analyses done (See table 2)
			ROLLINS ENVIRONMENTAL SERVICES, INC.--Continued							
150589	394717075210201	31S	5.60	10.0	40.0	--	--	--	MRPAU	1,3,5,6
150590	394704075211401	26	7.50	15.0	25.0	--	--	--	MRPAU	1,3,5
150591	394714075211601	25	3.40	9.7	19.7	4.0	--	P	MRPAU	1,3,5,7
150592	394710075210701	22	5.60	9.7	19.7	4.0	P	P	MRPAU	1(Q),2(Q),(Q),4(Q),6,7
150593	394707075210201	20B	4.20	15.0	25.0	--	--	--	MRPAU	1,2,3,4,6
150594	394714075211001	15	9.10	12.0	26.0	--	--	--	MRPAU	1(Q),2(Q),3(Q),4(Q),6(Q),7
150595	394714075210601	4	5.52	14.0	18.5	--	--	--	MRPAU	1,2,3,4,6, 7
				LOGAN TOWNSHIP						
150626	394729075210101	MW102S	11.8	9	19	4.0	P	P	MRPAU	1,2
				PETTIT, LOUIS						
150398	394928075194101	419	1.00	50	60	4.0	S	B	MRPAL	1,2
				PURELAND WATER COMPANY						
150139	394606075213301	Test Well 3	7.0	301	345	6.0	--	--	MRPAL	1,2
150140	394606075213302	Test Well 4	6.1	132	184	6.0	--	--	MRPAM	1,2
150143	394607075223802	Landtect TW-6C	19.4	102	152	4.0	S	R	MRPAM	1,2
150350	394550075231301	Landtect 1	20.4	234	284	6.0	S	R	MRPAL	1,2
150353	394649075231601	Landtect 3	6	7.5	17.5	6.0	S	R	MRPAU	1,2
				REPAUPO FIRE COMPANY						
150395	394807075172701	30-1972	20	93	113	6.0	P	P	MRPAM	1,2
				U.S. ENVIRONMENTAL PROTECTION AGENCY						
150540	394800075193601	EPA 108	7.1	87	97	4.0	P	P	MRPAM	1,2
150564	394802075193301	S-9	6.8	42	52	4.0	G	R	MRPAU	1,2
				U.S. GEOLOGICAL SURVEY						
150615	394637075191601	Shiveler Lower	29.3	378	388	4.0	S	R	MRPAL	1,2
150616	394637075191602	Shiveler Middle	30.6	230	240	4.0	S	R	MRPAM	1,2
150617	394637075191603	Shiveler Upper	30.6	60	70	4.0	S	R	MRPAU	1,2
150618	394804075193301	Gaventa Deep	7.0	230	240	4.0	S	R	MRPAL	1,2
150620	394804075193302	Gaventa Mid. 1	7.0	131	141	4.0	S	R	MRPAM	1,2

Table 2.--Field and laboratory measurements of, and inorganic and organic constituents analyzed in, ground-water samples

[PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes.]

1. a. Field and laboratory measurements

Alkalinity (as $CaCO_3$)
Dissolved oxygen
pH
Specific conductance
Temperature of water

b. Nutrients (dissolved or total)

Nitrogen, ammonia, as N
Nitrogen, ammonia plus organic, as N
Nitrogen, nitrate plus nitrite, as N
Nitrogen, nitrite, as N
Phosphorous, orthophosphate, as P

c. Common ions, iron, manganese, and solids, dissolved or total

Calcium
Chloride
Fluoride
Iron
Magnesium

Manganese
Potassium
Silica
Sodium
Sulfate

Dissolved solids

d. Trace elements (dissolved or total)

Arsenic
Cadmium
Chromium
Hexavalent chromium
Lead
Mercury
Zinc

e. Organic carbon

Dissolved organic carbon
Total organic carbon

2. Purgeable organic compounds

Benzene
Bromoform
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane

Chloroethane
2-Chloro-ethyl vinyl ether
Chloroform
Dichlorobromomethane
Dichlorodifluoromethane

1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichlorethylene
1,2-Dichloropropane
1,3-Dichloropropane

Ethyl benzene
Methyl bromide
Methylene chloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene

Toluene
1,2-Dichloroethylene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene

Trichlorofluoromethane
Vinyl chloride

3. Acid- and base/neutral-extractable organic compounds

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene

Benzo(b)fluoranthene

Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Benzidene
bis-2-Chloroethoxy methane

bis-2-Chloroethyl ether
bis-2-Chloroisopropyl ether
bis-2-Ethyl hexyl phthalate
4-Bromophenyl phenyl ether
n-Butyl benzyl phthalate

4-Chloro-3-methyl phenol
2-Chloronaphthalene
2-Chlorophenol
4-Chlorophenyl phenyl ether
Chrysene
1,2,5,6-Dibenzanthracene

1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidene
2,4-Dichlorophenol

Diethyl phthalate
2,4-Dimethyl phenol
Dimethyl phthalate
Di-n-butyl phthalate
Dinitromethyl phenol

4,6-Dinitro-ortho-cresol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octylphthalate

Fluoranthrene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene

Hexachloroethane
Indeno (1,2,3-CD) pyrene
Isophorone
Naphthalene
Nitrobenzene

2-Nitrophenol
4-Nitrophenol
n-Nitrosodimethylamine
n-Nitrosodiphenylamine
n-Nitrosodi-n-propylamine

Pentachlorophenol
Phenanthrene
Phenol
Pyrene
2,3,7,8-Tetrachlorodibenzo-p-dioxide

1,2,4-Trichlorobenzene
2,4,6-Trichlorophenol

Table 2.--Field and laboratory measurements of, and inorganic and organic constituents analyzed in, ground-water samples--Continued

4. Pesticides, gross PCB's, gross PCN's, and methoxychlor

Aldrin	Lindane
Chlordane	Malathion
DDD	Methoxychlor
DDE	Methylparathion
DDT	Methyltrithion
Diazinon	Mirex
Dieldrin	gross PCB's
Endosulfan	gross PCN's
Endrin	Parathion
Ethion	Perthane
Heptachlor	Trithion
Heptachlor epoxide	Toxaphene

5. Organic compounds determined by gas chromatography with a flame-ionization detector.

6. Organic compounds determined by semiquantitative gas chromatography-mass spectroscopy.

7. Aroclors

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

Table 3.--Physical or chemical properties and proposed or suggested limits of concentration in water for selected trace elements and organic compounds

Compound or element	[1]Proposed or suggested concentration limits in water (in micrograms per liter)	Physical or chemical properties and common uses of compound or element
Arsenic	C,D = 50	Arsenic is used in pesticides as an oil additive, and in the manufacture of pharmaceuticals, paints, and metal finishes (Sittig, 1985)
Benzene	A = 0 B = 6.6 C = 1	A clear, colorless, volatile liquid with an aromatic odor. An important fractional component of fuel oil (Zurcher and Thuer, 1978); a constitutent of motor fuels, and an intermediate in the manufacture of sytrene, cyclohexane, detergents, and pesticides (National Academy of Sciences, 1977). Benzene is a carcinogen and a cumulative toxin.
bis (2-Chloro-ethyl) ether	A = 0 B = 0.3	A colorless liquid with a fruity odor. Used primarily as a solvent for organic compounds (Sittig, 1985). Also used in the textile, pharmaceutical, and dry-cleaning industries (Sittig, 1985; Verschueren, 1983).
bis (2-Ethyl hexyl) phthalate	A = 15,000	A liquid used in vacuum pumps (Hawley, 1981), and as a plasticizer (Sittig, 1985).
Cadmium	C,D = 10	Cadmium insoluble in water, is used in metal plating and in alloys (Sittig, 1985). Also found in some pesticides, paints, and batteries (Sittig, 1985).
Carbon tetra-chloride	A = 0 B = 4.0 C = 2	A colorless, nonflammable liquid, carbon tetrachloride is a known carcinogen in rats and mice (Sittig, 1985). It is used in fire extinguishing, and in dry cleaning agents, and in the manufacture of aerosols, propellants, and refrigerants.
Chlorobenzene	B = 20 C = 4	Chlorobenzene a clear, volatile liquid is used as an intermediate in the manufacture of dyes, drugs, phenol, and pesticides (Sittig, 1985; Hawley, 1981).
Chloroform	A = 0 B = 1.9	Chlororoform, a clear liquid with a characteristic order, is used primarily as a solvent in industry and in the manufacture of pharmaceuticals (Sittig, 1985).
Chromium (hexavalent and trivalent)	Hexavalent; trivalent A = 50; 170 C = 50	Chromium occurs in valences +3 and +6 , but the hexavalent (+6) form is more toxic than the trivalent (+3). Chromium is used in metal plating, and in the production of chromium chemicals. Chromium compounds are used as pigments and as chemical oxidants, and in electroplating (Moore and Ramamoorthy, 1984).
1,2-Dichlorobenzene	A = 400 C = 600	An isomer of dichlorobenzene, this colorless liquid with a pleasant odor (Hawley, 1981) is used in the manufacture of toluene diisocyanate and dyes, and as a fumigant and insecticide (Sittig, 1985).
1,2-Dicholoroethane	A = 0 B = 9.4 C = 2	This colorless, oily, flammable liquid is used as a solvent for resins, rubber, paint and varnish; as a degreasing agent; in dry cleaning; and in gasolines (Sittig, 1985; Hawley, 1981).
1,2-Dichloroethylene	C = 10	A colorless liquid with a faint, unpleasant odor. It is used as a solvent for fats and waxes, and in the manufacture of drugs and perfumes (Sittig, 1985). The transisomer is twice as toxic as the cisisomer (Verschueren, 1983).
2,4-Dichlorophenol	--	White, crystalline solid used in the manufacture of pesticides and many organic industrial products (Sittig, 1985).
Ethylbenzene	A = 1,400	A colorless, aromatic liquid used as an industrial solvent and in the manufacture of styrene (Hawley, 1981); it is a constituent of asphalt and naphthalene (Verschueren, 1983).
PCB's (poly-chlorinated biphenyls)	A = 0 B = 0.00079 C = 0.5	PCB's (Aroclors) are joined by the chlorination of diphenyl rings. Although 209 possible substitutions of chlorine for hydrogen are possible, the industrially significant products are those containing 21-, 42-, 48-, 54-, and 60-percent chlorine by weight (Sax, 1974). PCB's are known to be almost chemically inert (Sittig, 1985). Their principal vehicle for movement in the environment is water (Sax, 1974), and they tend to accumulate in food chains (Sittig, 1985). PCB's are useful as electrical insulating media and as a heat-transfer fluid. PCB's may undergo microbial degradation under ambient conditions (Derra, 1985).

Table 3.--Physical or chemical properties and proposed or suggested limits of concentration in water for selected trace elements and organic compounds--Continued

Compound or element	[1]Proposed or suggested concentration limits in water (in micrograms per liter)	Physical or chemical properties and common uses of compound or element
Isophorone	A = 5,200	A colorless liquid with a camphor odor (Sittig, 1985; Hawley, 1981). Used as an industrial solvent.
Lead	C,D = 50	A soft metal of low solubility in water (Sittig, 1985). Lead has a wide variety of industrial uses. It is used as solder in plumbing, and as additives in paint, batteries, petroleum products, and other metals (Sittig, 1985; Moore and Ramamoorthy, 1984).
Methylene Chloride	A = 0 B = 1.9 C = 2	A colorless liquid used as a solvent for oil, fats, waxes, bitumen, cellulose acetate and esters; also used in paint stripping and solvent degreasing (Sittig, 1985; Hawley, 1981)
Naphthalene	--	Naphthalene is a white, crystalline solid with a mothball odor (Sittig, 1985); is soluble in benzene, alcohol, and ether, but insoluble in water; and is used in the manufacture of pesticides, fungicides, dyes, solvents, mothballs, and detergents (Sittig, 1985; Hawley, 1981).
Phenol	A = 3,500	Phenol is a white, crystalline solid used in the manufacture of explosives, coke, and fertilizer; and as an industrial disinfectant (Sittig, 1985).
Toluene	A = 14,300	Colorless liquid with a sweet odor (Sittig, 1985). Used in the manufacture of benzene, and in the processing of numerous chemicals. Toluene is an important fractional component of fuel oil (Zurcher and Thuer, 1978).
Trichloroethylene (TCE)	A = 0 B = 27.0 C = 1	TCE is a dense colorless liquid that is used principally as a degreasing solvent. It also is used as a dry cleaning agent (Sittig, 1985).
Vinyl chloride	F = 20 C = 2	A highly flammable gas or liquid used in the manufacture of polyvinylchloride and as a solvent (Sittig, 1985; Hawley, 1981).

[1] A = preferred limit to protect human health (U.S. Environmental Protection Agency, 1986)
B = this concentration poses an additional lifetime cancer risk of 1 in 100,000 (U.S. Environmental Protection Agency, 1986)
C = proposed maximum concentration allowed by the New Jersey Department of Environmental Protection in drinking water in New Jersey (New Jersey Register, 1987)
D = primary drinking-water regulation (U.S. Environmental Protection Agency, 1986)
-- = no data available

Table 4.--Summary of results of GC-FID scans of ground-water samples from industrial or waste-disposal sites, Logan Township, Gloucester County, N.J., 1984

Unique well number	Local well name or number	Sample-collection date (1984)	Results
			Bridgeport Rental and Oil Services, Inc.
150476	102	5-17	No unknown compounds in sample.
150481	107	5-16	Four unknown compounds with retention times from 8.75 to 71.38 minutes. Concentrations estimated to be insufficient for confirmation by gas chromatography-mass spectrometry (GC-MS).
150539	S-6	5-17	No unknown compounds in sample.
			Chemical Leaman Tank Lines, Inc.
150543	CL1	6-20	More than 20 unknown compounds that represent concentrations estimated to be sufficient for confirmation by GC-MS.
150550	DW2	6-19	One unknown compound, retention time 11.47 minutes, at a concentration estimated to be sufficient for confirmation by GC-MS.
			Monsanto Company
150596	28S	5-31	One unknown compound at retention time 64.48 minutes. Concentration insufficient for confirmation by GC-MS.
150597	28D	5-31	Do.
150600	35S	5-29	Eight unknown compounds with retention times from 7.7 to 40.10 minutes. Many compounds exceed 20 percent of detector response, which could be confirmed by GC-MS.
150601	35D	5-29	No unknown compounds in sample.
150602	5D	6-4	Do.
			Rollins Environmental Services, Inc.
150354	DP2	6-6	Four unknown compounds with retention times from 16.38 to 34.23 minutes. Concentrations estimated to be insufficient for confirmation by GC-MS.
150387	DP1	6-7	No unknown compounds in sample.
150388	DP3	6-7	Do.
150570	W23	6-8	Three unknown compounds at retention times 5.76, 20.85, and 64.43 minutes. At least one of these compounds is of sufficient magnitude for confirmation by GC-MS.
150572	W18	6-13	No unknown compounds in sample.
150573	U	6-7	Do.
150575	MA-11D	6-11	Do.
150576	MA-11I	6-11	Do.
150580	MA-5D	6-11	Do.
150581	MA-5I	6-11	Do.
150585	DP5	6-6	Do.
150586	DP4	6-6	Do.
150587	C	6-8	Do.
150588	31D	6-14	More than 70 unknown compounds, many of which represent concentrations sufficient for confirmation by GC-MS.
150589	31S	6-14	More than 90 unknown compounds, many of which represent concentrations sufficient for confirmation by GC-MS.
150590	26	6-14	More than 20 unknown compounds, many of which represent concentrations sufficient for confirmation by GS-MS. The chromatograms of water from wells 150589 and 150590 are similar, an indication that the same organic compounds are in both samples.
150591	25	6-13	Seven unknown compounds, at concentrations sufficient for confirmation by GC-MS. Compound retention times range from 28.89 to 63.42 minutes.

mercury were determined by atomic-absorption spectroscopy. The other metals were determined by atomic-emission spectroscopy. These methods are described by Fishman and Friedman (1985).

Concentrations of dissolved and total organic carbon were determined by wet-oxidation method (Goerlitz and Brown, 1972).

Concentrations of 27 purgeable organic compounds in all ground-water samples were determined by use of the gas chromatography-mass spectroscopy (GC-MS) method (table 2, analysis 2). Similarly, concentrations of 57 acid-extractable and base/neutral-extractable organic compounds in ground-water samples (table 2, analysis 3) were determined by use of the GC-MS method. Concentrations of 24 pesticides plus gross polychlorinated biphenyls (PCB's) and gross polychlorinated naphthalenes (PCN's) were determined in ground-water samples suspected by the authors to contain organic contamination (table 2, analysis 4). Pesticides, PCB's, and PCN's were determined by use of the gas-chromatography method with an electron-capture detector described by U.S. Environmental Protection Agency (USEPA) (1982).

The preceding inorganic and organic analyses include 7 of the 13 trace elements and 108 of the 116 organic compounds listed as "priority pollutants" by the U.S. Environmental Protection Agency (Keith and Telliard, 1979). Some of the trace elements and the organic compounds, their proposed or suggested maximum concentrations in water, and their typical uses are listed in table 3.

Methylene chloride extracts of water samples that the authors suspected contained no organic compounds were analyzed using gas chromatography with a flame ionization detector (GC-FID) to detect the presence or absence of a wide range of the organic compounds (table 2, analysis 5). These scans were done by use of procedures established by Cardinali and others (1985). Although this method has a lower limit of detection for many compounds than the GC-MS method, the GC-FID method cannot be used for quantitative analysis. The GC-FID method detects most of the acid- and base/neutral-extractable compounds, pesticides, and gross PCB's and PCN's shown in table 2, and many other compounds. The results of the GC-FID scans are summarized in table 4.

A semiquantitative GC-MS method was used to detect organic compounds in samples that the authors suspected were heavily contaminated. Identifications and concentrations determined by this method are semiquantitative because no standard-reference compounds are analyzed on the GC-MS to confirm the tentative identification. In addition, the GC-MS cannot be used to distinguish between some isomers. Not all the tentatively identified isomers are certain to be those isomers. The GC-MS can be used for tentative identification of the purgeable and the solvent-extractable organic compounds included in analyses 2, 3, 4, and 7 of table 2, and numerous additional compounds not listed. Data from this type of analysis are listed in appendix 5.

Compounds preceded by footnote 1 in appendix 5 are noted as potential laboratory-induced contaminants. The source of these substances may be the solvent(s) used during the extraction process in the laboratory, or they may be contaminants in the ground water.

The Geological Survey's laboratories in Doraville, Ga. (analyzing agency code 80010, app. 1, 2, 3, and 4), and Denver, Colo. (analyzing agency code 80020, app. 1, 2, 3, and 4), analyzed all samples except some of the quality-assurance sequential samples which were analyzed by Environmental Testing and Certification Laboratory in Edison, N.J., hereafter referred to as the contract laboratory (analyzing agency code 99001, app. 1, 2, 3, and 4).

Results of all quantitative analyses are stored in the Geological Survey's WATSTORE data base. Results of the nonquantitative and semiquantitative analyses are stored in computer files at the Geological Survey office in West Trenton, N.J.

Sampling and Processing Methods

The following sampling procedures were used for collecting ground-water samples from observation wells that are 4 in. (inches) or more in diameter. Wells were first developed with a standard, 4-in., submersible electric pump whose pumping capacity is approximately 10 gallons per minute. During development of the well, specific conductance, pH, temperature, and concentration of dissolved oxygen were monitored at 5-minute intervals. When these variables remained stable within a range of $\pm$ 5 percent and a minimum of three-casing volumes of water had been removed, the 4-in. pump was removed. Then one of the following sampling devices was placed at or near the well screen to collect the water samples: a 2-in. diameter Johnson-Keck submersible electric pump, a 2-in. diameter Fultz submersible electric pump, a 2-in. diameter Timco double-check-valve (point-source), or a single-check-valve bailer.

At observation wells ranging in diameter from 2 to 4 in., one of the 2-in. diameter pumps or bailers was used to develop the well and to collect samples. The 2-in. submersible electric pumps were used in the same manner as the 4-in. pump was used for wells whose diameters were 4 in. or more. When a bailer was used for sampling, grab samples for determination of specific conductance, pH, temperature, and concentration of dissolved oxygen had to be obtained during the development of the well. A peristaltic (suction-lift) pump with silicon tubing was used to develop and to sample observation wells of less than 2-in. diameter. The peristaltic pump was flushed with deionized water after each sampling.

Each of the samplers is constructed of Teflon and (or) stainless steel in critical areas of sample-fluid contact and is acceptable for collection of representative ground-water samples (Imbrigiotta and others, 1988). These devices and other sampling equipment were flushed once with a minimum of 5 gallons of deionized water after each use to ensure that the equipment was clean for each sampling. Some samples of the rinse water were analyzed to determine whether there was carryover of contaminants after rinsing. At each industrial or waste-disposal site, water samples were collected first at wells that the authors suspected were least contaminated and then at progressively more contaminated wells to minimize the carryover of any residual contamination from previously sampled wells.

Samples for inorganic analyses that the authors suspected contained little or no contamination were filtered through a 0.45-micron-membrane filter so that analytical results represent "dissolved" constituents. However, some samples were contaminated; for example, the water contained a visible nonaqueous phase and (or) a heavy odor, or data from previous studies indicated contamination. These samples were not filtered to avoid irreversible contamination of the filtering equipment. The resulting analyses represent "total" constituents in the sample.

Concentrations of both dissolved (samples filtered through a 0.45-micron silver filter) and total organic carbon were determined in samples of ground water at BROS. Only concentrations of total organic carbon were determined for samples collected at the other sites.

RESULTS OF QUALITY-CONTROL AND QUALITY-ASSURANCE PROGRAMS IN CHEMICAL INVESTIGATION

The quality-control (QC) and quality-assurance (QA) programs in the chemical investigation consisted of analysis of internal QC and QA samples. The QA and QC procedures used by laboratories of the Geological Survey are published in Friedman and Erdmann (1982), Peart and Thomas (1983), and Wershaw and others (1982). In addition to the Denver laboratory's usual QC procedures, the authors submitted two sequential samples each from wells 150556, 150599, and 150605 to the laboratory for development of precision limits based on sample matrices. These samples are referred to as quality-control samples. All QA and QC analyses are listed in appendixes 1, 2, 3, and 4.

Three samples from each of five wells (150554, 150549, 150604, 150592, and 150594) were collected for QA analysis. A sample set consisted of two samples, collected in sequence, which were disguised and forwarded to the Doraville laboratory for independent analyses, and a third sample, collected in sequence, which was forwarded to the contract laboratory for analysis. The authors suspected that water in wells selected for QA sampling was highly contaminated. The purpose of collecting three sequential samples from these wells was to determine the ability of the laboratories to measure with precision high concentrations of inorganic constituents and organic compounds.

Measurements of the properties and constituents listed in table 2, analysis 1, for QC and QA analyses made by the Doraville laboratory were compared with limits of precision established by Skougstad and others (1979) or Feltz and Anthony (1984). Where the observed concentrations exceeded the applicable range for a given estimate of precision, the estimate from the applicable range of concentration closest to the observed values was used. Guidelines of the USEPA (1982) were used to evaluate precision among the QA and QC analyses for organic compounds (table 2, analyses 2 and 3). Some concentrations exceeded the applicable range of concentration, from 10 to 1,000 μg/L (micrograms per liter), used for establishment of precision guidelines for the organic analyses (U.S. Environmental Protection Agency, 1982).

Quality-Control Analyses

Two sequential samples of ground water from wells 150599 and 150605 were analyzed for nutrients, common ions, trace elements, purgeable organic compounds, acid- and base/neutral-extractable organic compounds, and pesticides. Sequential samples from well 150556 were analyzed for all the preceding constituents except the acid- and base/neutral-extractable organic compounds. Those QC analyses whose concentrations exceed limits of precision suggested by Skougstad and others (1979), Feltz and Anthony (1984), and USEPA (1982) are summarized in table 5. For all other analyses, results are within suggested precision limits or limits are not available. In general, agreement between analyses is acceptable for the purposes of this study.

Quality-Assurance Analyses

Although well 150594 was pumped at a rate and for a length of time necessary to evacuate the equivalent of three casing-volumes of water, the difference between the laboratory-determined and the field-determined specific conductance (4,240 μS/cm (microsiemens per centimeter at 25 degrees Celsius) and 2,440 μS/cm) for the two samples collected from this well, and differences in concentrations of sodium, chloride, sulfate, and manganese in the two analyses, may suggest that the water chemistry in the aquifer at this site is not homogeneous. Samples collected successively at well 150594, therefore, are not appropriate for determining laboratory precision and (or) accuracy.

Successive QA samples were collected from wells 150549, 150555, 150592 and 150604. Samples from wells 150549, 150555 and 150592 were analyzed for common ions, nutrients, trace metals, purgeable organic compounds, and acid- and base/neutral-extractable organic compounds. Successive samples from well 150604 were analyzed for all the preceding constituents except the common ions. Analyses of successive samples for which concentrations exceed the suggested precision limits of Skougstad and others (1979), Feltz and Anthony (1984), and the USEPA (1982) are presented in table 5. Analyses not listed in the table were within preceding limits of precision or limits are not established. Agreement between samples is adequate for the study. However, four QA analyses for acid- and base/neutral-extractable organic compounds and for pesticides were made by the Doraville laboratory. There are some discrepancies among the four concentrations of phenol, napthalene, bis (2-ethyl hexyl) phthalate, diazinon, and dieldrin. Nevertheless, in most sets, the concentrations in question are close to the minimum detection limits and are less than the applicable concentration ranges used to establish precision limits.

The contract laboratory analyzed ground-water samples from wells 150549, 150555, 150592, 150594, and 150604 for arsenic, cadmium, chromium, iron, lead, mercury, and zinc. Concentrations of arsenic were determined by atomic-absorption spectrometry; concentrations of the other metals were determined by atomic-emission spectroscopy. The contract laboratory's minimum detection limits for cadmium, chromium, lead, and zinc were lower than those reported by both the Denver and Doraville laboratories of the Geological Survey. Because only one sample from each well was analyzed by

Table 5.--Summary of analyses of quality-control and quality-assurance samples with differences in concentrations of constituents that exceed suggested precision limits of Feltz and Anthony (1984)

[mg/L, milligrams per liter; µ/L, micrograms per liter; PCB's, polychlorinated biphenyls]

Unique well number	Constituent	Concentration of constituent determined in first sample	Concentration of constituent determined in second sample
	QUALITY-CONTROL ANALYSES		
	Nutrients (mg/L)		
150556	nitrogen, nitrate plus nitrite, (total)	5.70	<0.100
150599	nitrogen, ammonia plus organic, (total)	8.5	5.4
	Common ions (mg/L)		
150556	calcium (total)	45	55
	Trace elements (µg/L)		
150556	arsenic (total)	<1	1
	zinc (total)	34,000	38,000
150599	arsenic (dissolved)	38	18
	zinc (dissolved)	40	230
150605	mercury (dissolved)	0.4	.1
	zinc (dissolved)	150	30
	Purgeable organic compounds (µg/L)		
150556	ethyl benzene	5.2	4.4
150599	methylene chloride	8.5	<3.0
	Pesticides (µg/L)		
150556	gross PCB's	1.3	<.1
	Organic carbon (mg/L)		
150556	total organic carbon	44	190
150605	total organic carbon	15	8.1
	QUALITY-ASSURANCE ANALYSES		
	Common ions (mg/L)		
150555	sulfate (total)	2.8	36 mg/L
	Trace elements (µg/L)		
150549	arsenic (dissolved)	30	<10
	lead (dissolved)	<1,000	2,000
	zinc (dissolved)	<300	800
150555	cadmium (total)	22	10
	lead (total)	140	<100
150592	mercury (total)	.80	.30
	zinc (total)	80	410
150604	zinc (dissolved)	17	<10
	Purgeable organic compounds (µg/L)		
150549	methylene chloride	210	500
150594	tetrachloroethylene	16	33

the contract laboratory, no conclusions can be drawn about the accuracy of its analyses compared with those of either the Denver or Doraville laboratory. Agreement between the contract laboratory and the laboratories of the Geological Survey is acceptable, however.

Concentrations of arsenic measured in samples from wells 150549, 150555, and 150592 by the contract laboratory compared to those measured by the laboratories of the Geological Survey exceeded an approximate precision limit of 5 percent (Feltz and Anthony, 1984). Concentrations of cadmium determined by the contract and Geological Survey laboratories exceeded suggested precision limits for only one sample (from well 150555). Concentrations of chromium determined by the contract laboratory and those determined by the Geological Survey laboratories all were within the suggested precision limit. Agreement between the contract laboratory and the Geological Survey laboratories for measurements of iron concentration exceeded suggested precision limits for samples from wells 150592, 150594, and 150604; most of these concentrations (8,100 - 56,000 μg/L), however, are outside the applicable concentration range (3 - 10,000 μg/L) for this level of precision.

Concentrations of lead determined by the contract and Geological Survey laboratories exceeded the suggested precision limit for samples from wells 150555 and 150549, and concentrations of mercury determined in samples from wells 150555 and 150604 exceeded suggested precision limits. The poorest agreement between the contract laboratory and the laboratories of the Geological Survey was in measurements of zinc concentrations; agreement between the laboratories exceeded the suggested precision limit in all samples but one (from well 150555).

Purgeable organic compounds determined by the contract laboratory and the Denver and Doraville laboratories of the Geological Survey whose concentrations exceeded limits of precision include benzene, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, methylene chloride, tetrachloroethylene, 1,2-cis/trans-dichloroethylene, toluene, and vinyl chloride. The greatest number of discrepancies between the contract laboratory and those of the Geological Survey are for methylene chloride and benzene. Concentrations of other compounds are either below detection limits or within precision limits.

Most discrepancies between the contract laboratory and the laboratories of the Geological Survey are found at low (<5 μg/L) concentrations and are near minimum detection limits. Although differences are found between analyses done by the contract laboratory and those by the Geological Survey laboratories, selection of the most accurate analyses is difficult because only one sample per well was analyzed by the contract laboratory.

Wash-Blank Analyses

Four wash blanks, samples of the the last deionized water flushed through the sampling apparatus, were analyzed to determine the effectiveness of the flushing procedure. Results of these analyses are presented in table 6. Quantitative analyses for purgeable organic compounds (table 2, analysis

Table 6.--Results of quantitative, semiquantitative, and nonquantitative chemical analyses of wash-blank samples

[Concentrations in micrograms per liter; --, analysis was not done]

RESULTS OF QUANTITATIVE ANALYSES

Wash-blank sample	Sample-collection date	Code of agency analyzing sample	Arsenic, dissolved as As)	Cadmium dissolved as Cd)	Chromium, dissolved as Cr)	Chromium, hexavalent, dissolved as Cl)	Iron, dissolved as Fe)	Lead, dissolved as Pb)	Mercury, dissolved as As)	Zinc, dissolved as Cd)
1	05-18-84	80010	<1	<10	10	<1	110	<100	<0.1	30
2	05-31-84	80010	1	<10	30	1	26,000	<100	1.7	10
3	06-04-84	80010	--	--	--	--	--	--	--	--
4	06-12-84	80010	--	--	--	--	--	--	--	--

Wash-blank sample	Dichlorobromomethane, total	Carbontetrachloride, total	1,2-Dichloroethane, total	Bromoform, total	Chlorodibromomethane, total	Chloroform, total	Toulene, total	Benzene, total	Chlorobenzene, total
1	<3.0	<3.0	<3.0	<3.0	<3.0	8.6	490.0	<3.0	<3.0
2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
3	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
4	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Wash-blank sample	Chloroethane, total	Ethylbenzene, total	Methylbromide, total	Methylene Chloride, total	Tetrachloroethylene, total	Trichlorofluoromethane, total	1,1-Dichloroethane, total	1,1-Dichloroethylene, total	1,1,1-Trichloroethane, total
1	<3.0	35	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
3	--	<3.0	--	11	3.9	<3.0	<3.0	<3.0	<3.0
4	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Wash-blank sample	1,1,2-Trichloroethane, total	1,1,2,2 Tetrachloroethane, total	1,2-Dichloropropane, total	1,2-Dichloroethylene total	1,3-Dichloropropane, total	2-Chloroethylvinylether, total	Dichlorodifluoromethane, total	Vinyl chloride, total	Trichloroethylene, total
1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
2	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
3	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
4	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

RESULTS OF SEMIQUANTITATIVE ANALYSIS

Wash-blank sample	Sample-collection date	Estimate of concentration	Tentatively-identified compound
1	05-18-84	800	Acetone
		3	Dichlorodifluoromethane

RESULTS OF NONQUANTITATIVE ANALYSES

Wash-blank sample	Sample-collection date	Results
1	05-18-84	Numerous peaks between retention times 4 to 52 minutes at concentrations sufficient for confirmation by gas chromatography-mass spectrometry (GC-MS).
2	05-31-84	More than 10 unknown compounds with retention times from 9.6 to 64.5 minutes. Concentrations estimated to be insufficient for confirmation by GC-MS.
3	06-04-84	Twelve unknown compounds with retention times from 5.2 to 64.5 minutes. Concentrations estimated to be insufficient for confirmation by GC-MS.
4	06-12-84	Four unknown compounds with retention times from 8.9 to 40.8 minutes. Concentrations estimated to be insufficient for confirmation by GC-MS.

2) and nonquantitative analyses for methylene chloride-extractable organic compounds (table 2, analysis 5) were made for all four wash blank samples. Wash-blank samples 1 and 2 also were analyzed for trace elements.

Of the four wash-blank samples, wash blank 1, collected after the sampling of well 150554, had the highest concentration and the greatest number of purgeable organic compounds of any of the four samples (table 6). In addition, the GC-FID scan of wash blank 1 contains numerous unknown peaks between retention times of 4 and 52 minutes. Two organic compounds (table 6) were detected by use of the semiquantitative GC-MS scan. The organic compounds in wash blank 1 could be from one or more sources, including (1) the sampling apparatus, (2) the washing apparatus, (3) the laboratory, or, perhaps, (4) the cooler in which the sample was shipped to the laboratory. Because no duplicates of wash blank 1 were collected, isolating the source of contamination is impossible.

The concentration of mercury in wash blank 2 was 1.7 μg/L. The concentrations of mercury in samples from wells sampled before wash blank 2 and with the same pump (150597, 150596, 150605, and 150444) were less than 0.5 μg/L, an indication that cross-contamination was not a problem. The concentration of chromium in wash blank 2 (30 μg/L) was higher than the concentration in the two samples collected previously (10-20 μg/L), but poor precision for chromium at these concentrations may account for the difference (Feltz and Anthony, 1984). The concentration of iron in wash blank 2 was high (26,000 μg/L), and also was high in the two wells sampled previously (33,000 and 130,000 μg/L). Although the concentration of iron in wash blank 2 was an order of magnitude less than that in the sample from the previously sampled well, the high concentration probably means that the washing procedure is inefficient in eliminating carryover of some contaminants between sample sites.

No quantifiable purgeable organic compounds were detected in wash blank 2. Results of the GC-FID scan are an indication that some organic compounds were present in the sample, but at concentrations too low for confirmation by GC-MS (table 6).

Concentrations of methylene chloride and tetrachloroethylene in wash blank 3 were 11 and 3.9 μg/L. The concentration of methylene chloride in water samples from well 150603, sampled before wash blank 3, was 6.3 μg/L, but water in wells 150602 and 150163, sampled after well 150603, contained neither of the two compounds. The source of this contamination is unknown.

No quantifiable purgeable organic compounds were detected in wash blank 4. Results of the GC-FID scan are an indication that some organic compounds were present in the sample, but at concentrations too low for confirmation by GC-MS. Wells sampled before collection of wash blank 4 (150577, 150578, and 150579) contained some tentatively identified organic compounds (app. 2), and trichloroethylene (6.7 μg/L in well 150579).

Trip-blank Analyses

Also included in the QA program were two trip blanks, pure water samples that were placed in the coolers with samples shipped to the laboratory. These samples were analyzed for trace metals, purgeable organic compounds,

and solvent-extractable organic compounds by use of the nonquantitative GC-FID scan; the results for these analyses are listed in table 7. Results of the two analyses indicate that trace elements in the samples generally were at or below the detection limit, and that both samples contain organic compounds. The source of the organic compounds in the two samples probably is contamination of samples during shipment or contamination in the laboratory. The absence of bromoform, detected in trip blank 1, in any ground-water sample probably means that this contaminant was acquired in the laboratory.

Spike-Blank Analyses

As a simple check on GC-MS accuracy, an additional sample was submitted to the Doraville laboratory. The sample consisted of reagent-grade deionized water spiked with USEPA ampuled concentrates of selected purgeable organic compounds. The purgeable organic compounds were chosen because they probably are the least stable of the constituents analyzed. The results of this analysis are listed in table 7. One compound detected by the laboratory (1,2-transdichloroethylene) was not included in the spiked sample; the source of this compound may be contamination in the laboratory. The laboratory also detected a chloroform concentration of 57 μg/L, whereas the concentration of chloroform in the spiked sample was 45.6 μg/L. This discrepancy may be explained by the 10- to 20-μg/L concentration of chloroform in the deionized water from the Geological Survey New Jersey District laboratory (J. Gibs, U.S. Geological Survey, oral commun., 1988).

AMBIENT WATER QUALITY

Field measurements of alkalinity, pH, and specific conductance, and concentrations of inorganic constituents and organic carbon for the upper, middle, and lower aquifers of the Potomac-Raritan-Magothy aquifer system in Logan Township are summarized in table 8. These data represent results of analyses of water samples from wells in Logan Township collected from 1984-87. Concentrations of organic compounds, "priority" trace elements, and nitrate in these samples were less than Federal primary drinking-water regulations (U.S. Environmental Protection Agency, 1986) and proposed maximum concentrations allowed in drinking water by the New Jersey Department of Environmental Protection (New Jersey Register, 1987). (New Jersey has proposed adopting the primary drinking-water standards established by the USEPA.) Uncontaminated water was studied to provide a comparison with water in which inorganic and (or) organic contamination is present.

Results of analyses of water from wells 150481 and 150539 (fig. 2) and 150387, 150572, and 150586 (fig. 4) are included in a summary of ambient water quality and the results are listed in appendixes 1, 2, 3, and 4. Results of analyses of water from wells 150139, 150140, 150143, 150350, 150353, 150395, 150398, 150540, 150615, 150616, 150617, 150618, and 150620 (fig. 1) are stored in the Geological Survey's National Water Information System computer data base.

In the upper and middle aquifers, calcium and sodium are the predominant cations and bicarbonate is the predominant anion (G. Barton, U.S. Geological

Table 7.--Results of quantitative and nonquanitative chemical analyses of trip- and spike-blank samples

[Concentrations in micrograms per liter; --, indicates no data]

Trip blanks: Results of quantitative analysis

Compound or element	Trip blank 1	Trip blank 2
Arsenic	1	<1
Cadmium	<10	<10
Hexavalent chromium	<1	<1
Chromium	20	10
Iron	10	20
Lead	<100	<100
Mercury	<.1	<.1
Zinc	10	<10
Bromoform	5.6	<3

Trip blanks: Results of nonquantitative analysis

Sample	Remarks
1	No unknown compounds.
2	One unknown compound at retention time 21.1 minutes. Concentration estimated to be sufficient for confirmation by gas chromatography-mass spectrometry (GC-MS).

Spike blank: Results of quantitative analysis

Compound	Spiked concentration	Determined concentration
Bromodichloromethane	8.6	9.1
Bromoform	10.4	7.2
Carbon tetrachloride	9.4	9.9
Chloroform	45.6	57
Dibromochloromethane	12.0	10.0
1,2-Dichloroethane	20	20
1,2-Dichloroethylene	--[1]	3.6
Tetrachloroethylene	5.6	7.6
1,1,1-Trichloroethane	14.0	14.0

[1] Compound not part of the spiked sample

Table 8.--Summary of results of field measurements of alkalinity, pH, and specific conductance; inorganic constituents; and organic carbon in uncontaminated ground water from the upper, middle, and lower aquifers of the Potomac-Raritan-Magothy aquifer system, Logan Township, Gloucester County, N.J., 1984-87

[Concentrations are in milligrams per liter of dissolved constituent except for pH and as noted; --, no data were collected; µg/L, micrograms per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius]

Constituent or property	Number of wells	Number of measurements below detection limit	Concentration		
			Minimum	Median	Maximum
UPPER AQUIFER OF THE POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM					
pH, field	13	0	4.70	6.10	6.20
Specific conductance, field (µS/cm)	13	0	238	280	325
Dissolved solids (residual on evaporation at 180°C)	13	0	136	180	227
Alkalinity, field (as $CaCO_3$)	13	0	3	31	32
Nitrogen, ammonia, as N	13	1	<.07	.08	.15
Nitrogen, ammonia + organic, as N	13	1	<.20	.20	1.6
Nitrogen, NO_2 + NO_3, as N	13	1	<.100	2.6	6.10
Phosphorous, orthophosphate, as P	13	2	<.010	<.010	.080
Calcium	13	0	12	16	27
Chloride	13	0	14	32	67
Fluoride	13	1	<.10	.10	.30
Magnesium	13	0	4.7	6.1	6.4
Manganese (µg/L)	13	0	78	150	340
Potassium	13	0	3.5	3.7	5.6
Silica (as SiO_2)	13	0	3.4	7.5	18.0
Sodium	13	0	3.2	16	26
Sulfate	13	0	31	50	61
Arsenic (µg/L)	11	0	1	--	--
Cadmium (µg/L)	11	1	<1	--	--
Chromium (µg/L)	11	0	10	--	--
Iron (µg/L)	13	0	6.0	690	20,000
Lead (µg/L)	11	0	20	--	--
Mercury (µg/L)	11	0	.1	--	--
Zinc (µg/L)	13	0	13	24	26
Dissolved organic carbon	1	0	--	--	--
Total organic carbon	11	0	1.7	--	--

Table 8.--Summary of results of field measurements of alkalinity, pH, and specific conductance; inorganic constituents; and organic carbon in uncontaminated ground water from the upper, middle, and lower aquifers of the Potomac-Raritan-Magothy aquifer system, Logan Township, Gloucester County, N.J., 1984-87--Continued

[Concentrations are in milligrams per liter of dissolved constituent except for pH and as noted; --, no data were collected; µg/L, micrograms per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius]

Constituent or property	Number of wells	Number of measurements below detection limit	Concentration		
			Minimum	Median	Maximum
MIDDLE AQUIFER OF THE POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM					
pH, field	10	0	4.52	5.58	7.00
Specific conductance, field (µS/m)	10	0	49	146	398
Dissolved solids (residual on evaporation at 180°C)	10	0	34	96	233
Alkalinity, field (as $CaCO_3$)	8	0	2	10	41
Nitrogen, ammonia, as N	9	0	.01	.05	.35
Nitrogen, ammonia + organic, as N	9	1	<.20	.40	.6
Nitrogen, NO_2 + NO_3, as N	9	5	<.10	<.10	6.2
Phosphorous, orthophosphate, as P	8	5	<.010	<.010	.190
Calcium	10	0	1.5	5.4	23
Chloride	10	0	4.3	11.7	90
Fluoride	7	4	<.10	<.10	.10
Magnesium	10	0	.58	2.5	22
Manganese (µg/L)	10	0	33	87	360
Potassium	10	0	1.4	2.2	3.9
Silica (as SiO_2)	10	0	4	7.6	15
Sodium	10	0	2.4	4	54
Sulfate	10	0	1.7	10	62
Arsenic (µg/L)	7	2	<1	1	7
Cadmium (µg/L)	7	7	<1	<1	<3
Chromium (µg/L)	7	4	<10	<10	10
Iron (µg/L)	10	0	21	1,740	21,000
Lead (µg/L)	7	5	<10	<10	20
Mercury (µg/L)	[1]4	2	<.1	.1	.7
Zinc (µg/L)	9	1	<3	46	17,000
Dissolved organic carbon	5	0	.4	1.3	3.4
Total organic carbon	[1]2	0	2.2	--	3.1

Table 8.--Summary of results of field measurements of alkalinity, pH, and specific conductance; inorganic constituents; and organic carbon in uncontaminated ground water from the upper, middle, and lower aquifers of the Potomac-Raritan-Magothy aquifer system, Logan Township, Gloucester County, N.J., 1984-87--Continued

[Concentrations are in milligrams per liter of dissolved constituent except for pH and as noted; --, no data were collected; µg/L, micrograms per liter; °C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius]

Constituent or property	Number of wells	Number of measurements below detection limit	Concentration		
			Minimum	Median	Maximum
LOWER AQUIFER OF THE POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM					
pH, field	5	0	6.50	6.70	7.49
Specific conductance, field (µS/m)	5	0	769	1,420	2,680
Dissolved solids (residual on evaporation at 180°C)	5	0	389	802	1,490
Alkalinity, field (as $CaCO_3$)	5	0	81	165	192
Nitrogen, ammonia, as N	[1]4	0	.37	.76	15.00
Nitrogen, ammonia + organic, as N	[1]4	0	.80	1.05	20.0
Nitrogen, NO_2 + NO_3, as N	[1]4	4	<.10	<.10	<.10
Phosphorous, orthophosphate, as P	[1]4	4	<.01	<.01	<.01
Calcium	5	0	14	21	38
Chloride	5	0	140	400	820
Fluoride	[1]1	0	.90	.90	.90
Magnesium	5	0	4.1	9.5	12
Manganese (µg/L)	5	0	42	120	1,100
Potassium	5	0	2.5	6.8	13
Silica (as SiO_2)	5	0	8.5	9.0	31
Sodium	5	0	52	280	530
Sulfate	5	0	4.6	10	12
Arsenic (µg/L)	[1]4	2	<1	<1	36
Cadmium (µg/L)	[1]4	2	<1	4	6
Chromium (µg/L)	[1]4	4	<10	<10	<10
Iron (µg/L)	5	0	3,000	8,300	73,000
Lead (µg/L)	[1]4	2	<10	25	30
Mercury (µg/L)	[1]0	--	--	--	--
Zinc (µg/L)	[1]4	2	<3	11	26
Dissolved organic carbon	[1]4	0	.80	1.1	4.2
Total organic carbon	[1]0	0	--	--	--

[1] Number of wells is less than 5.

Survey, written commun., 1989). Sodium and chloride are the predominant ions in the lower aquifer in Logan Township (G. Barton, U.S. Geological Survey, written commun., 1988).

Median concentrations of dissolved solids in ground water in the upper and middle aquifers in Logan Township were low (180 and 96 mg/L) compared to that in the lower aquifer, which tends to be slightly saline (more than 1,000 mg/L), according to Heath (1983, p. 65). Median specific conductance and median concentrations of chloride and sodium also were much lower in the upper and the middle aquifers than in the lower aquifer (280, 146, and 1,420 μS/cm, specific conductance; 32, 11.7, and 400 mg/L chloride; and 16, 4, and 280 mg/L sodium for the upper, middle, and lower aquifers). The median concentration of chloride in the lower aquifer was 400 mg/L, which exceeds the Federal secondary drinking-water recommended limit of 250 mg/L (USEPA, 1979). The slightly saline water in the lower aquifer is attributable to the intrusion of saltwater from the Delaware River estuary or from sources downdip in the aquifer system (Hardt and Hilton, 1969, p. 13; Barksdale and others, 1958, p. 100).

The median concentrations of manganese and iron in all three aquifers exceed the secondary drinking-water recommended limits of 50 and 300 μg/L. Iron- and manganese-bearing minerals are part of the aquifer materials and are sources of iron and manganese in the ground water (Langmuir, 1969).

The median concentration of sulfate was highest in the upper aquifer (50 mg/L), but concentrations as high as 62 mg/L were measured in the ground water of the middle aquifer. Although the median sulfate concentration in the upper aquifer does not exceed the secondary drinking-water recommended limit (250 mg/L), it is considerably higher than the median (17 mg/L) determined for the whole aquifer system in southwestern New Jersey (Fusillo and others, 1984, p. 11). Concentrations of sulfate greater than background concentrations have been detected in ground water from the unconfined part of the upper aquifer near the Camden area (Farlekas and others, 1976; E. M. Ervin, U.S. Geological Survey, written commun., 1988). In the Camden area, the average concentration of sulfate in ground water from the outcrop area of Potomac-Raritan-Magothy aquifer (42 mg/L) is higher than that (9.8 mg/L) from the confined part of the aquifer system (Farlekas and others, 1976, table 8). Sources of sulfate in ground water in Logan Township may be the oxidation of naturally occurring iron sulfide minerals in the aquifer material, anthropogenic contamination, or precipitation containing sulfate from the burning of fossil fuels.

Concentrations of nitrogen also tend to be higher in the upper aquifer than in the middle and the lower. Likely sources of nitrogen in ground water in Logan Township include fertilizer applied to farmland, drainage from septic tanks, and disposal of organic wastes (Hem, 1985, p. 125). Phosphate in ground water in Logan Township is most likely derived from application of fertilizers to farmland, livestock, sewage, or organic compounds in the ground water (Hem, 1985, p. 127).

Concentrations of dissolved or total organic carbon, which ranged from 0.4 to 4.2 mg/L, are well within the range for natural waters reported by Thurman (1985, p. 14). Concentrations of dissolved organic carbon for each of the three aquifers also are similar to that (1.4 mg/L) reported by

Fusillo and others (1984, p. 11) for the Potomac-Raritan-Magothy aquifer system as a whole in southwestern New Jersey. Sources of organic carbon in ground water are natural and anthropogenic organic matter at the surface and fossilized debris in the aquifer material (Thurman, 1985, p. 15). Lignitic wood and other carbonaceous matter are found in sands and clays of the Potomac-Raritan-Magothy aquifer system (Owens and others, 1977).

RESULTS OF GEOPHYSICAL AND CHEMICAL INVESTIGATIONS

Air Products and Chemicals, Inc. Waste-Disposal Site

Geophysical Investigation

Locations of the stations and the apparent-conductivity values for horizontal- and vertical-dipole configurations are shown in figures 6 and 7. There are no EM anomalies attributable to degradation of water quality at this site. The elevated apparent conductivities in one small area probably are caused by the near-surface water table in this area and a pile of metallic debris.

Chemical Investigation

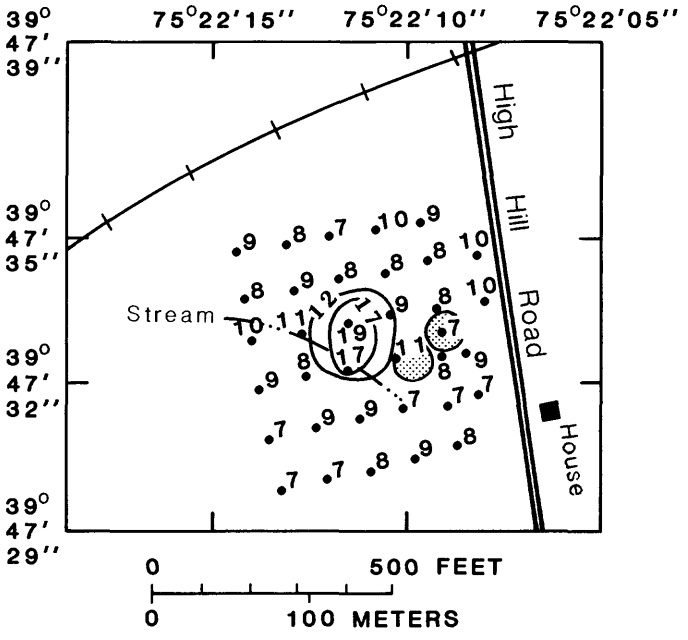
Because there are no wells at the Air Products and Chemicals, Inc., waste-disposal site, no ground-water samples were collected there.

Bridgeport Rental and Oil Services, Inc. (BROS)

Geophysical Investigation

Locations of the EM stations and their apparent conductivities for the horizontal- and vertical-dipole configurations are shown in figures 8 and 9. At the BROS site, apparent conductivity ranged from 3 to 48 and 3 to 35 mS/m (millisiemens per meter) for the horizontal- and vertical-dipole configurations. According to the data and current knowledge of the natural factors influencing the apparent conductivity, background conductivities for the site range from 5 to 15 mS/m. Areas with apparent conductivities greater than 15 mS/m probably are anomalous. The anomalies east and southeast of the oil lagoon probably are caused by ionic contaminants that flowed or were leached from the lagoon, buried metal drums, or other metallic debris. When BROS was in operation, a break on the eastern side of the dike surrounding the oil lagoon allowed effluent to flow from the lagoon into Little Timber Creek. What seem to be polychromatic oil slicks cover the ground and the stagnant water in the swampland east of the oil lagoon. The slicks are not indigenous to the swamp.

Oil slicks also are on the pond southwest of the oil lagoon. However, overhead power lines and a chain-link fence between the lagoon and the pond precluded the collection of meaningful data in that area. No anomalous apparent conductivities were detected in the orchard west of the site. No data were collected north of the oil lagoon because of interference from the metal buildings, tanks, steel drums, service lines, and other metallic objects at the site.



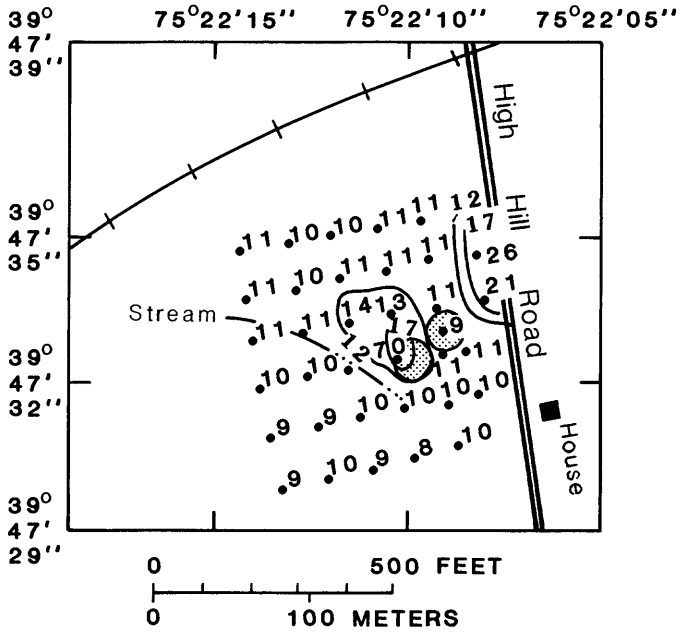
EXPLANATION

—12— LINE OF EQUAL APPARENT CONDUCTIVITY-Interval, in millisiemens per meter, is variable

•8 MEASURING STATION-Number is apparent conductivity, in millisiemens per meter

HILL

Figure 6.--Distribution of apparent-conductivity data at the Air Products and Chemicals, Inc., waste-disposal site, Logan Township, Gloucester County, N.J., collected in the horizontal-dipole configuration with 32.8 feet between coils, 1984.



EXPLANATION

—12— LINE OF EQUAL APPARENT CONDUCTIVITY-Interval, in millisiemens per meter, is variable

•8 MEASURING STATION-Number is apparent conductivity, in millisiemens per meter

HILL

Figure 7.--Distribution of apparent-conductivity data at the Air Products and Chemicals, Inc., waste-disposal site, Logan Township, Gloucester County, N.J., collected in the vertical-dipole configuration with 32.8 feet between coils, 1984.

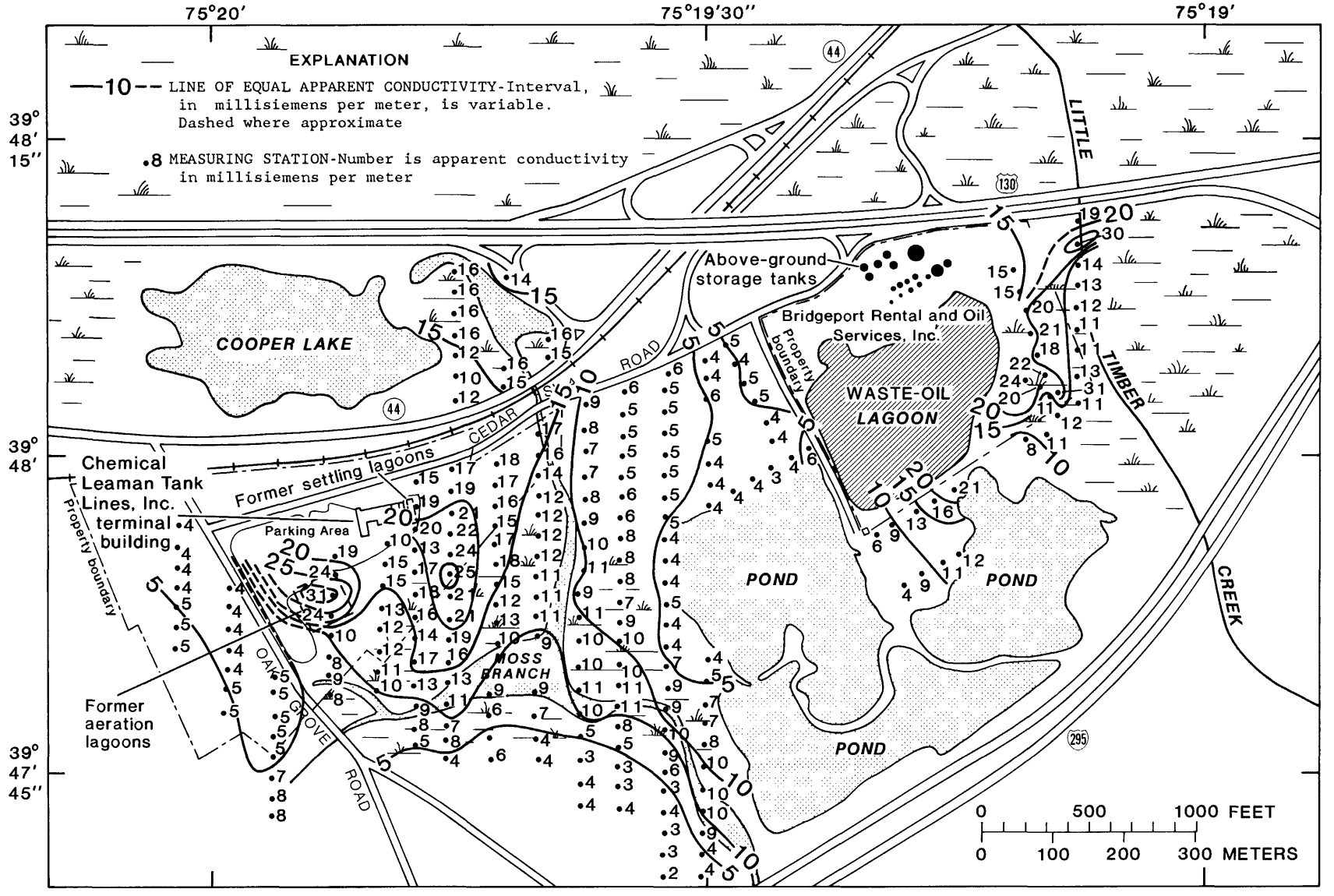


Figure 8.--Distribution of apparent-conductivity data at Bridgeport Rental and Oil Services, Inc. and Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., collected in the horizontal-dipole configuration with 32.8 feet between coils, 1984.

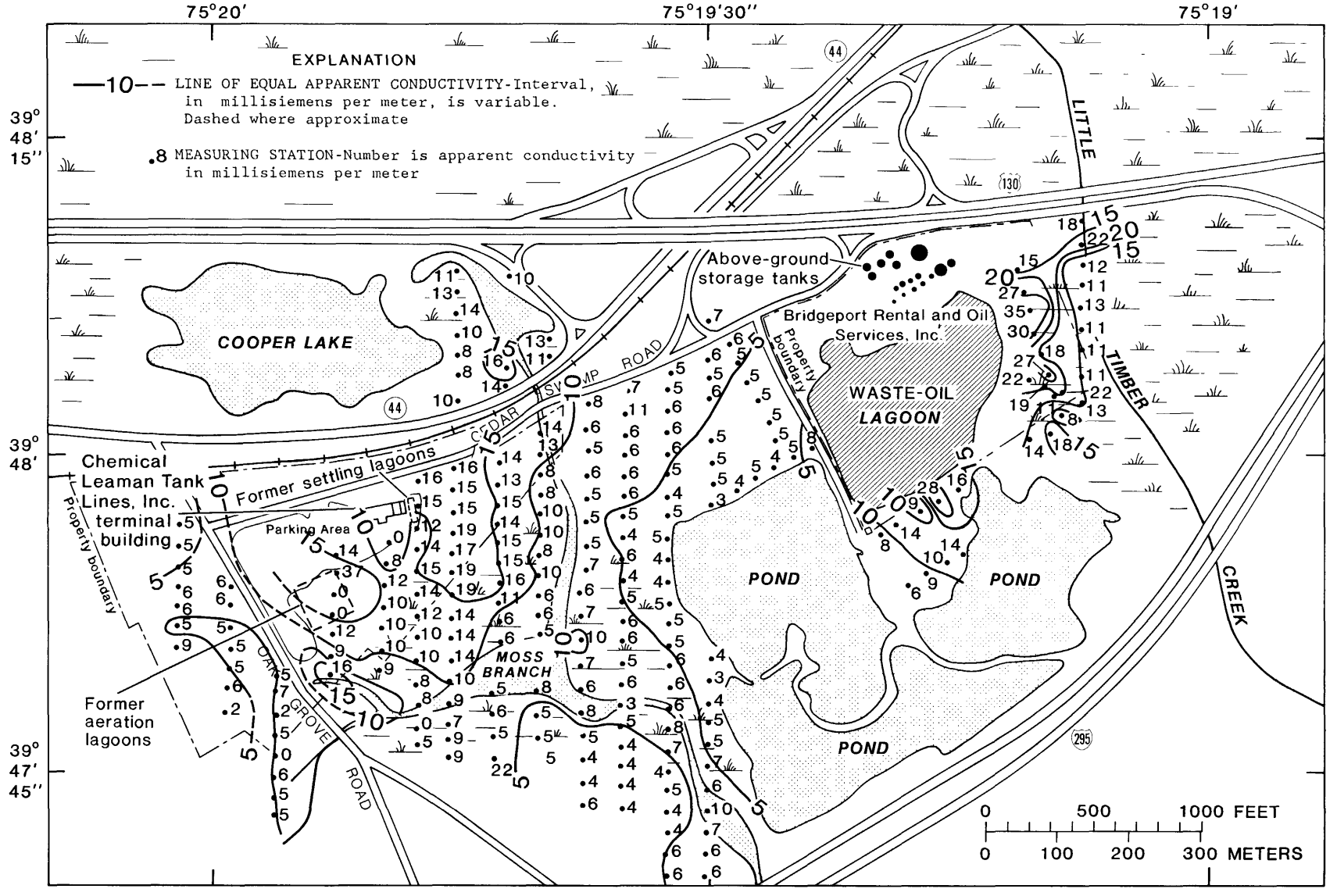


Figure 9.--Distribution of apparent-conductivity data at Bridgeport Rental and Oil Services, Inc. and Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., collected in the vertical-dipole configuration with 32.8 feet between coils, 1984.

Ground-water-sampling network

Ground-water samples were collected from eight wells at the BROS site (fig. 2 and table 1). The deepest well is screened from 98 to 108 ft below land surface (well 150556); this well and wells 150481, 150539, and 150555 are screened in the middle aquifer of the Potomac-Raritan-Magothy aquifer system (J. Lewis, U.S. Geological Survey, written commun., 1989). The remaining wells are screened in the upper aquifer. Because of a ground-water mound caused by the lagoon, wells screened in the upper aquifer at the BROS site most likely are downgradient from the lagoon along flowpaths that extend radially from the lagoon (NUS Corporation, 1984a, pl. 1). The maximum depth of contamination could not be determined from the wells sampled or with data from previous investigations. Also not determined from chemical analyses of ground water from the wells sampled or from previous studies were the inorganic constituents and organic compounds in ground water east of Little Timber Creek.

Inorganic chemistry and contamination

Field measurements of alkalinity, pH, and specific conductance and concentrations of inorganic constituents as well as organic carbon in ground-water samples from wells at the BROS site are summarized in table 9. Ground-water samples from wells 150554, 150555, and 150556 in the well cluster northeast of the waste-oil lagoon (fig. 2) had the highest concentrations of inorganic constituents of the wells sampled at the BROS site. The concentration of dissolved solids was 1,010 mg/L in water samples from the shallowest well (150554) and ranged from 5,860 to 6,060 mg/L in the deepest well (150556). The concentration of sulfate ion also increased with depth at these wells, from 130 to 1,700 mg/L.

The concentrations of ammonia, ammonia plus organic nitrogen, and many of the common ions in samples from wells 150555 and 150556, screened in the middle aquifer, are far above the median concentrations for these constituents in ground water from the middle aquifer and also are above Federal and State primary drinking-water regulations and proposed State regulations. Clearly, the inorganic chemistry of the ground-water samples from the middle aquifer reflects the influence of anthropogenic contamination at the BROS site. Concentrations of dissolved solids and sulfate in ground-water samples from other wells on the east side of the lagoon in 1983 were even higher than those measured in water samples from wells 150554, 150555, and 150556 (NUS Corporation, 1984a, app. 2).

Most of the nitrogen at the BROS site is organic nitrogen. The source of this organic nitrogen is unknown but probably is nitrogen-containing organic compounds which once were stored in the lagoon or in the above-ground-storage tanks. The highest concentration of organic nitrogen in ground water was 110 mg/L in a sample from well 150554 northeast of the lagoon; the concentration decreased with depth at this well cluster. Water

Table 9.--Drinking-water regulations for inorganic constituents; and statistical summary of field measurements of alkalinity, pH, and specific conductance; and inorganic constituents in ground water at four industrial or waste-disposal sites in Logan Township, Gloucester County, N.J., 1984

[Concentrations are in milligrams per liter of dissolved or total constituent except for pH and as noted; µS/cm, microsiemens per centimeter at 25 degrees Celcius; °C, degree Celsius; '--', no drinking-water regulation exists; µg/L, micrograms per liter]

Constituent	Drinking-water regulations	Number of measurements	Number of wells	Minimum	Maximum
BRIDGEPORT RENTAL AND OIL SERVICES, INC. (BROS)[1]					
Alkalinity, field (as $CaCO_3$)	--	7	7	9	454
pH, field	--	8	8	4.00	7.00
Specific conductance field (µS/cm)	--	10	8	151	2,280
Dissolved solids (residual on evaporation at 180°C)	[2]500	10	8	106	6,060
Nitrogen, ammonia, as N	--	10	8	<.010	2.60
Nitrogen, ammonia + organic, as N	--	10	8	<.10	93
Nitrogen, NO_2 + NO_3, as N	[3]10	10	8	<.100	6.20
Phosphorous, orthophosphate, as P	--	10	8	<.010	.080
Calcium	--	10	8	5.3	55
Chloride	[2]250	10	8	11	180
Fluoride	[3]2.0	10	8	<.10	.20
Magnesium	--	10	8	6.1	78
Manganese (µg/L)	[2]50	10	8	53	9,300
Potassium	--	10	8	2.2	10
Silica (as SiO_2)	--	10	8	4.0	38
Sodium	--	10	8	3.0	46
Sulfate	[2]250	10	8	2.8	1,700
Arsenic (µg/L)	[2]350	11	8	<1	46
Cadmium (µg/L)	[3]10	11	8	<1	22
Chromium (µg/L)	[3]50	11	8	<10	40
Hexavalent chromium (µg/L)	[2]50	11	8	<1	<5
Iron (µg/L)	[2]300	11	8	52	300,000
Lead (µg/L)	[3]50	11	8	<100	1,100
Mercury (µg/L)	[3]2	11	8	<.10	1.8
Zinc (µg/L)	[2]5,000	11	8	210	41,000

Table 9.--Drinking-water regulations for inorganic constituents; and statistical summary of field measurements of alkalinity, pH, and specific conductance; and inorganic constituents in ground water at four industrial or waste-disposal sites in Logan Township, Gloucester County, N.J., 1984--Continued

[Concentrations are in milligrams per liter of dissolved or total constituent except for pH and as noted; µS/cm, microsiemens per centimeter at 25 degrees Celcius; °C, degree Celsius; '--', no drinking-water regulation exists; µg/L, micrograms per liter]

Constituent	Drinking-water standards	Number of measurements	Number of wells	Minimum	Maximum
		CHEMICAL LEAMAN TANK LINES, INC.			
Alkalinity, field (as $CaCO_3$)	--	5	5	2	54
pH, field	--	10	5	5.20	5.90
Specific conductance, field (µS/cm)	--	10	5	118	1,310
Dissolved solids (residual on evaporation at 180°C)	[2]500	5	5	83	661
Nitrogen, ammonia as N	--	5	5	<.010	32
Nitrogen, ammonia + organic, as N	--	5	5	<20	40
Nitrogen, NO_2 + NO_3 as N	[3]10	5	5	<.100	41
Phosphorous, orthophosphate, as P	--	5	5	<.010	.030
Calcium	--	6	5	15	53
Chloride	[2]250	5	5	13	160
Fluoride	[3]2.0	5	5	<.10	27
Magnesium	--	6	5	8.6	35
Manganese (µg/L)	[2]50	6	5	<100	6,400
Potassium	--	5	5	<.10	27
Silica (as SiO_2)	--	6	5	13	22
Sodium	--	6	5	18	120
Sulfate	[2]250	5	5	7.2	340
Arsenic (µg/L)	[3]50	7	5	<10	50
Cadmium (µg/L)	[3]10	7	5	<7	<100
Chromium (µg/L)	[3]50	7	5	<20	2,000
Hexavalent chromium (µg/L)	[3]50	6	5	<1,000	<1,000
Iron (µg/L)	[2]300	7	5	1,100	47,000
Lead (µg/L)	[3]50	7	5	<1,000	2,000
Mercury (µg/L)	[3]2	7	5	<.3	35
Zinc (µg/L)	[2]5,000	7	5	<10	930

Table 9.--Drinking-water regulations for inorganic constituents; and statistical summary of field measurements of alkalinity, pH, and specific conductance; and inorganic constituents in ground water at four industrial or waste-disposal sites in Logan Township, Gloucester County, N.J., 1984--Continued

[Concentrations are in milligrams per liter of dissolved or total constituent except for pH and as noted; µS/cm, microsiemens per centimeter at 25 degrees Celcius; °C, degree Celsius; '--', no drinking-water regulation exists; µg/L, micrograms per liter]

Constituent	Drinking-water standards	Number of measurements	Number of wells	Minimum	Maximum
		MONSANTO COMPANY			
Alkalinity, field (as $CaCO_3$)	--	13	13	73	1,220
pH, field	--	14	13	6.10	6.70
Specific conductance field (µS/m)	--	12	11	370	3,750
Dissolved solids (residual on evaporation at 180°C)	[2]500	15	13	339	3,530
Nitrogen, ammonia (as N)	--	15	13	.050	41.0
Nitrogen, ammonia + organic (as N)	--	15	13	.30	33
Nitrogen, NO_2 + NO_3 (as N)	[3]10	15	13	.160	.280
Phosphorous, orthophosphate (as P)	--	15	13	<.010	.55
Calcium	--	15	13	11	260
Chloride	[2]250	15	13	6.4	650
Fluoride	[3]2.0	15	13	<.10	.70
Magnesium	--	15	13	5.3	120
Manganese (µg/L)	[2]50	15	13	160	4,200
Potassium	--	15	13	2.2	10
Silica (as SiO_2)	--	15	13	7.5	59
Sodium	--	15	13	4.6	210
Sulfate	[2]250	15	13	1.0	85
Arsenic (µg/L)	[3]50	17	13	1	39
Cadmium (µg/L)	[3]10	17	13	<1	8
Chromium (µg/L)	[3]50	17	13	<10	20
Hexavalent chromium (µg/L)	[3]50	16	13	<1	1
Iron (µg/L)	[2]300	17	13	58	130,000
Lead (µg/L)	[3]50	17	13	<10	70
Mercury (µg/L)	[3]2	17	13	<.3	.8
Zinc (µg/L)	[3]5,000	17	13	8	600

Table 9.--Drinking-water regulations for inorganic constituents; and statistical summary of field measurements of alkalinity, pH, and specific conductance; and inorganic constituents in ground water at four industrial or waste-disposal sites in Logan Township, Gloucester County, N.J., 1984--Continued

[Concentrations are in milligrams per liter of dissolved or total constituent except for pH and as noted; µS/cm, microsiemens per centimeter at 25 degrees Celcius; °C, degree Celsius; '--', no drinking-water regulation exists; µg/L, micrograms per liter]

Constituent	Drinking-water standards	Number of measurements	Number of wells	Minimum	Maximum
		ROLLINS ENVIRONMENTAL SERVICES, INC.[1]			
Alkalinity, field (as $CaCO_3$)	--	27	27	1	2,420
pH, field	--	40	27	4.40	7.00
Specific conductance field (µS/m)	--	40	27	150	8,300
Dissolved solids (residual on evaporation at 180°C)	[2]500	27	27	88	4,880
Nitrogen, ammonia, as N	--	29	27	<.010	86
Nitrogen, ammonia + organic, as N	--	29	27	<.10	150
Nitrogen, NO_2 + NO_3, as N	[3]10	29	27	<.100	14
Phosphorous, orthophosphate, as P	--	29	27	<.010	.410
Calcium	--	29	27	5.2	700
Chloride	[2]250	29	27	2.3	2,100
Fluoride	[3]2.0	29	27	<.10	4.2
Magnesium	--	29	27	1.9	340
Manganese (µg/L)	[2]50	29	27	16	3,800
Potassium	--	29	27	2.1	7.7
Silica (as SiO_2)	--	29	27	1.4	19.0
Sodium	--	29	27	1.6	1,400
Sulfate	[2]250	29	27	7.9	610
Arsenic (µg/L)	[3]50	31	27	<10	200
Cadmium (µg/L)	[3]10	31	27	<1	3
Chromium (µg/L)	[3]50	31	27	<1	4,700
Hexavalent chromium (µg/L)	[3]50	29	27	<1	6
Iron (µg/L)	[2]300	31	27	6	150,000
Lead (µg/L)	[3]50	31	27	<10	2,600
Mercury (µg/L)	[3]2	31	27	<.1	370
Zinc (µg/L)	[2]5,000	29	27	20	1,200

[1] Results of analyses of both filtered and unfiltered samples collected at this site are included in this summary. See Appendixes 1-4 for results of individual analyses.
[2] Secondary drinking-water recommended limit (U.S. Environmental Protection Agency, 1979).
[3] Primary drinking-water regulation (U.S. Environmental Protection Agency, 1977); proposed maximum concentration allowed by the New Jersey Department of Environmental Protection in drinking water in New Jersey (New Jersey Register, 1987).

samples from wells 150476 and 150556 had the highest concentrations of dissolved oxygen and thus represent the maximum oxidizing environment. These samples also had the highest concentrations of nitrate plus nitrite (6.2 and 5.7 mg/L). Concentrations of ammonia were highest in samples from wells that also had the lowest concentrations of dissolved oxygen (wells 150539, 150554, and 150555).

The high concentration of organic nitrogen in the ground water at the BROS site may result in long-term, ground-water- and surface-water-quality problems if the nitrogen is transformed by biochemical processes to more mobile and toxic species such as nitrate or ammonia. Previous investigators have suggested that shallow ground water at the BROS site discharges into Little Timber Creek and the surrounding wetlands (NUS Corporation, 1984a). Ammonia discharged to streams and other surface-water bodies has been determined to be toxic to aquatic organisms (USEPA, 1986), and ammonia in surface water consumes dissolved oxygen in surface water as it is converted to nitrate or nitrite. Results of analyses of nitrogen species in surface water in Little Timber Creek or other surface-water bodies surrounding the BROS site are unavailable.

Arsenic, cadmium, chromium, lead, and mercury concentrations were highest in ground-water samples collected from wells northeast of the lagoon; concentrations generally decreased with depth. Of the trace elements in the ground water at the BROS site, only the concentrations of cadmium and lead exceeded Federal and State primary drinking-water regulations. Cadmium is used in the manufacture of many organic compounds as well as in electroplating. Lead is a common additive in gasoline and fuel oil and is used in some pesticides. The sources of lead and the other trace elements detected in ground water at BROS most likely are inorganic and (or) organic compounds used, stored, processed, and disposed of at the site. Concentrations of cadmium exceeded Federal and State primary drinking-water regulations in the middle aquifer (wells 150555 and 150556), and lead concentrations were above Federal and State primary drinking-water regulations in both the upper and middle aquifers (wells 150554, 150555, and 150556).

Organic carbon and organic-compound contamination

Distribution of organic carbon in ground water at the BROS site is shown in figure 2. The high concentrations of organic carbon (44-350 mg/L) were in ground-water samples from wells 150554, 150555, and 150556, northeast of the lagoon and east of the storage tanks (fig. 2). A sample from well 150478 also had an organic-carbon concentration of 14.0 mg/L, considerably greater than the median for the upper aquifer of the Potomac-Raritan-Magothy aquifer system (1.7-2.4 mg/L). In general, samples with high concentrations of organic carbon had high concentrations of total organic compounds. However, the concentration of organic carbon in the sample from well 150475 was only 2.8 mg/L, whereas the total concentration of organic compounds was 13,844 μg/L (or 13.844 mg/L).

Ground-water samples collected in 1984 from all wells at the BROS site except wells 150481 and 150539 contained detectable concentrations of organic compounds. However, methylene chloride and other unspecified petroleum hydrocarbons were detected in water samples collected from wells 150481 and 150539 in 1983 (NUS Corporation, 1984c, app. 2). The data indicate that organic contamination probably is present in ground water on all sides of the lagoon, and that this contamination probably enters the ground-water system radially from the lagoon and, perhaps, from the area of the former above-ground storage tanks. Concentrations of organic compounds in ground water were greatest near the lagoon but decreased with distance and depth from the lagoon. Concentrations of benzene and toluene also were high (greater than 10 μg/L) in samples from wells within the geophysical anomaly east of the lagoon. This area was flooded with contents of the lagoon when the retaining dike surrounding the lagoon failed.

Organic contamination was detected in two water samples from the middle aquifer (well 150556). The concentration of benzene in these samples, 16 μg/L, exceeds the proposed drinking-water regulation of 1 μg/L (New Jersey Register, 1987), and three additional organic compounds were detected (app. 1). The middle aquifer at the BROS site is confined by a layer of clay that is less than 20 ft thick (J. Lewis, U.S. Geological Survey, written commun., 1989). Organic contamination in the upper aquifer has penetrated this confining clay layer to a depth of at least 108 ft in the area northeast of the lagoon. Whether ground water in the middle aquifer on other sides of the lagoon is contaminated is unknown.

It is evident from the classes and the types of organic compounds most frequently detected that the major sources of contamination at the BROS site are gasoline and other petroleum products. The volatile organic compounds most frequently detected at the BROS site and also detected at the highest concentrations are monocyclic aromatic hydrocarbons (toluene, benzene, and ethylbenzene). These compounds are weathering products of fuel oil and other petroleum products (Zurcher and Thuer, 1978). Other types of compounds detected at the site are aliphatic hydrocarbons such as the propanes, butanes, cyclohexanes, cyclopentanes, and methyl benzenes (app. 1 and 5).

Low concentrations (less than 10 μg/L) of the pesticides dieldrin, endosulfan, and heptachlor have been detected in many wells at the BROS site (NUS Corporation, 1984c, p. 4-31 to 4-33). Of the eight BROS wells sampled, dieldrin was detected only in water from well 150475. No pesticides were detected in any other well.

The concentration of PCB's in water from well 150556 was 1.3 μg/L. Similar concentrations of PCB's have been measured in ground-water samples from shallow wells on the east side of the lagoon; concentrations of PCB's in samples of the oil and sludge layers of the lagoon were high (17,700 to 850,000 micrograms per kilogram) (NUS Corporation, 1984c). The solubility of PCB's in water is low and ranges from 2 to 250 μg/L depending on the degree of chlorination (Sax, 1974; Verschueren, 1983); high concentrations of PCB's in water thus are rare.

Correlation of Geophysical and Chemical Data

Water samples from wells in areas on the northeast and the east sides of the lagoon, where geophysical anomalies were detected, generally have detectable organic and inorganic contamination. Specific conductance of water samples from wells 150554, 150555, and 150556 was high (620, 1,340, and 2,430 μS/cm), and organic and inorganic contamination were detected. However, the geophysical anomaly on the south side of the lagoon ends just north of well 150475 (37 ft deep). Ground water from well 150475 contained organic compounds, but had low specific conductance (152 μS/cm) and a low dissolved-solids content (173 mg/L). The low concentration of ionic constituents in the ground water probably is the reason for the absence of a geophysical anomaly around this well. Ground water from well 150478 (21 ft deep) contained organic compounds, and its specific conductance was 415 μS/cm, which is greater than the median of 280 μS/cm for this shallow aquifer. However, well 150478 is located in an area where apparent conductivities are at background levels. The reason for the absence of a detectable EM anomaly at this site is unknown.

Chemical Leaman Tank Lines, Inc.

Geophysical Investigation

Locations of the EM stations and the apparent conductivities for the horizontal- and vertical-dipole configurations are shown in figures 8 and 9. Apparent conductivity at the Chemical Leaman site ranged from 3 to 31 mS/m and 4 to 37 mS/m for the horizontal- and the vertical-dipole configurations. On the basis of these data and current knowledge about the factors influencing the apparent conductivity in the area, apparent conductivities in the range of 3 to 7 mS/m probably are normal for the dry farm field west and south of the plant, and measurements in the range of 5 to 11 mS/m probably are normal for the swamp surrounding Moss Branch south and east of the plant. Two areas in the vicinity of Chemical Leaman had apparent conductivities greater than 15 mS/m (figs. 8 and 9). The large anomaly between the main building and Moss Branch is in a swamp and may represent ionic contamination that has traveled with the local shallow-ground-water flow from the former settling lagoons east of the main building. The anomaly southwest of the main building is over the former aeration lagoon area that has been filled with broken slabs of reinforced concrete and other landfill material. This anomaly probably is caused by metal reinforcement bars in the cement slabs, ionic ground-water contamination, or both.

The apparent conductivities in the swampy area east of Cooper Lake ranged from 10 to 16 mS/m for the horizontal-dipole configuration. These high values probably are caused by ionic, shallow-ground-water contamination resulting from road salts draining from U.S. Highway 130, by contamination migrating from the Chemical Leaman site, or by contamination of unknown origin.

Chemical Investigation

Ground-water-sampling network

Ground-water samples were collected from five wells at the Chemical Leaman site--three in the upper aquifer, one in the middle aquifer, and one in the undifferentiated upper-middle aquifer. That well (150549) is located at a site where the confining unit between the upper and middle aquifers is missing (J. Lewis, U.S. Geological Survey, written commun., 1989). Wells 150543 and 150544 both are shallow (less than 50 ft deep) and are near the former aeration lagoons (fig. 2). The other shallow well (150546) is south of the former settling lagoons. One deep well (150550) is north of the plant site and the other (150549) is south of the plant site. Because the natural direction of ground-water flow may be altered by pumping and is known to reverse naturally as a result of tides and heavy precipitation, any of these wells may have been or may be downgradient from known contamination sources.

The distribution of wells sampled at the Chemical Leaman site is adequate for determining the types of inorganic and organic contamination in ground water at the site, but is insufficient for determining the lateral and vertical extents of ground-water contamination or trends in ground-water chemistry with depth and distance from the site. Geophysical data from 1984 and chemical data from previous investigations, which help to explain some of the inadequacies of the ground-water-sampling network, are referenced in the discussion of the water chemistry at the site.

Inorganic chemistry and contamination

The concentrations of solids in ground water at the Chemical Leaman site tend to exceed the regional median for the upper and middle aquifers and tend to increase with depth. The predominant cation in ground water at the site is sodium, whereas the predominant anions are sulfate and (or) chloride. Possible sources of sodium at the site include dissolution of sodium-containing feldspar minerals in the aquifer material and anthropogenic contamination such as road salt or industrial chemicals. Sulfur-containing minerals such as pyrite are natural in the aquifer material, but the concentrations of sulfate in wells 150544 and 150549, 300 and 340 mg/L, are greater than the Federal secondary drinking-water recommended limit of 250 mg/L, and suggest anthropogenic contamination. Sources of chloride probably include road salt and (or) industrial inorganic contamination.

Ground water at the Chemical Leaman site is similar to ground water at the BROS site in that it contains high concentrations of nitrogen as ammonia plus organic nitrogen; concentrations ranged from below the detection limit (less than 20 mg/L for wells 150544 and 150550) to 40 mg/L for wells 150543 and 150549. Ammonia concentrations were low (from 0.010 to 32 mg/L), an indication that most of the nitrogen is organic. In general, high concentrations of nitrogen corresponded to high concentrations of total organic carbon. Nitrate was detected in samples from wells north of the plant site (150546 and 150550) and west of the plant site (150543). The nitrate concentration was highest (41.0 mg/L) in a sample from well 150546 (41.0 mg/L), and was lowest (7.00 mg/L) in a sample from well 150550, the deepest

well sampled at the site. Although the latter concentration is below the primary drinking-water regulation for nitrate (10.0 mg/L), it is considerably greater than the median for this aquifer and may mean that the water chemistry at this depth has been altered by anthropogenic contamination.

Ground-water contamination by trace elements is widespread at Chemical Leaman. Concentrations of the priority-pollutant trace elements arsenic, chromium, lead, and mercury exceeded primary drinking-water regulations in water from at least one well. The concentration of arsenic in the sample from well 150543 (50 μg/L) exceeded Federal primary drinking-water regulations and proposed State regulations, and arsenic concentrations as high as 1,230 μg/L were detected in samples from a well near the former wastewater settling lagoons (Environmental Resources Management, Inc., 1988, table 4-5). In 1986, trace amounts of chromium were detected in shallow ground water (Environmental Resources Management, Inc., 1986, table 4-5), but in 1984 chromium concentrations were as high as 2,000 μg/L.

Concentrations of lead in samples from only one well (150549) exceeded 1,000 μg/L. Because of high concentrations of inorganic constituents, ground-water samples from Chemical Leaman had to be diluted in the Denver laboratory of the Geological Survey before analysis to avoid contaminating the analytical apparatus and disturbing the calibration of the instruments. As a result of the dilutions, minimum detection levels for cadmium and lead were 100 and 1,000 μg/L, which exceed the primary drinking-water regulations of 10 and 50 μg/L. Most of the ground-water data for cadmium and lead for the site are inadequate to determine whether concentrations exceeded primary drinking-water regulations. Results of analyses done in 1986 by Environmental Resources Management (1988, table 4-5) indicate that the concentration of lead did not exceed drinking-water regulations and the concentration of cadmium was less than the detection limit.

Mercury was detected in ground water from every well sampled at the site; its concentration exceeded the Federal and State primary drinking-water regulation in all samples but those from well 150549. The concentration of mercury was highest in samples from wells located near the former settling lagoons and the former aeration lagoons. Mercury was detected in samples from some wells in 1986 by Environmental Resources Management but at concentrations less than Federal and State primary drinking-water regulations (Environmental Resources Management, Inc., 1988, table 4-5). The source of mercury at Chemical Leaman is uncertain.

Whether inorganic contamination has migrated offsite from Chemical Leaman or BROS toward the peach orchard on the intervening property is uncertain. Concentrations of arsenic, chromium, and lead in ground-water samples collected from wells 150618 and 150620 (fig. 1) on the property between Chemical Leaman and BROS were below detection limits (C. Barton, U.S. Geological Survey, written commun., 1988). The concentration of arsenic in a sample from well 150564 (fig. 1), which also is between the two sites, was 1 μg/L, but chromium and lead were not detected (C. Barton and J. Kozinski, U.S. Geological Survey, written commun., 1988). The absence or near absence of the four trace elements in the ground-water samples probably means that trace elements in ground water are not moving from either the BROS or the Chemical Leaman site toward the intervening property; and it

also may mean that the trace elements in pesticides applied to the peach orchard in the past or present have not contaminated the ground water. However, because these elements generally have a low solubility in water, they probably have been removed from solution by adsorption onto sediment. Results of analyses of soil samples from this area have not been reported in the literature.

Organic carbon and organic-compound contamination

Concentrations of organic carbon at the Chemical Leaman site were highest near the former aeration and former settling lagoons and decreased with distance from the lagoons and with depth (fig. 2).

On the basis of the chemical and geophysical data, two main contaminant plumes probably are in the shallow (less than 60 ft below land surface) and unconfined part of the Potomac-Raritan-Magothy aquifer system at the Chemical Leaman site: one south and east of the former settling lagoons and the other around the former aeration lagoons (fig. 2). This conclusion is supported by water-quality studies done at the site in 1986 (Environmental Resources Management, Inc., 1988). However, because of a lack of data from wells that are screened between 0 and 60 ft below land surface and are located between wells 150544 and 150549, it is uncertain whether there is one continuous plume beneath the site or whether two distinct plumes emanate from like sources. Although no organic compounds were detected in water from well 150543 in 1984 by the U.S. Geological Survey (app. 2), some were detected in two wells screened between 0 and 60 ft that are north of the parking area, on the north side of Cedar Swamp Road (Environmental Resources Management, Inc., 1988). Low concentrations of organic compounds also were detected in a sample from a shallow well west of well 150543 (Environmental Resources Management, Inc., 1988). The presence of organic compounds in ground water from these wells probably means that contamination from the site is migrating to the edges of the Chemical Leaman property.

Organic compounds also were detected in samples from the deep (more than 60 ft deep) parts of the aquifer system. A sample from well 150549, more than 95 ft deep and in the center of the plant, contained volatile organic compounds as well as acid- and base/neutral-extractable organic compounds. This well is located at a site where the confining unit between the upper and middle aquifers is missing. Low (less than 1 μg/L) concentrations of organic compounds also were detected in samples from a well 156 ft deep northeast of the plant and in a well 144 ft deep west of the site (Environmental Resources Management, Inc., 1986, p. 4-38 and 4-41).

The organic compounds most commonly detected by quantitative analysis of water samples from the Chemical Leaman site are aliphatic hydrocarbons such as trichloroethlyene, 1,2 dichloroethylene, chloroform, methlyene chloride, and others. Several other chlorinated aliphatic compounds were tentatively identified by semiquantitative analysis (app. 5). These compounds are used as degreasing agents, solvents, and in numerous manufacturing applications, and most are believed to have been transported by Chemical Leaman (Environmental Resources Management, Inc., 1988, table 1-1). According to chemical analyses done in 1984 (app. 2) and 1986 (Environmental Resources

Management, Inc., 1986), 1,2 dichloroethylene and trichloroethylene increase in concentration with depth. These compounds are dense, nonaqueous-phase liquids (DNAPL's) that tend to sink in the ground-water system.

Aromatic hydrocarbons that also were detected frequently by quantitative analyses include 1,2-dichlorobenzene, naphthalene, and isophorone. Most of these compounds may have been transported by the company (Environmental Resources Management, Inc., 1988, table 1-1). Most of the compounds detected by the semiquantitative GC method are monocyclic aromatic hydrocarbons (app. 5).

No PCB's were detected in water from any wells sampled at the Chemical Leaman site. The concentration of toxaphene in a sample from one well (150549) was 10 µg/L, but no other pesticides were detected in samples from any of the other wells. Trace concentrations of endosulfan, endosulfan sulfate, alpha BHC, delta BHC, DDT, and DDE in water from some wells have been detected in recent investigations at the site (Environmental Resources Management, Inc., 1986, tables 4-4a and 4-4b).

Several nitrogen-containing organic compounds in ground-water samples were tentatively identified by semiquantitative analysis that would not have been detected by the other types of analysis. For example, benzenamine, n,n-dimethyl-formamide, and acetamide were detected in samples from wells 150544 and 150549 (fig. 2). Degradation of these nitrogen-containing organic compounds and others detected by quantitative methods (n-nitrosodiphenylamine, n-nitrosodimethylamine, nitrobenzene, and nitrophenol) may be the source of organic nitrogen in the ground water.

Correlation of Geophysical and Chemical Data

Well 150544 (fig. 2) is the only shallow well in the areas of anomalously high apparent conductivities at Chemical Leaman. A ground-water sample from this well had high specific conductance (810 µS/cm) and concentrations of inorganic and organic constituents that exceeded Federal primary drinking-water regulations, proposed State regulations, and Federal secondary drinking-water recommended limits. Because there were no wells in the Cedar Swamp area east and southeast of the former settling lagoons in 1984, ground-water contamination suggested by the results of the geophysical work there could not be confirmed. Chemical analyses of shallow ground-water samples east and southeast of the former setting lagoons tentatively confirms the presence of organic and inorganic contamination (Environmental Resources Management, Inc., 1988, app. F). There were no wells in the Moss Branch swamp area east of Cooper Lake to verify the accuracy of the EM method in detecting ground-water contamination.

Monsanto Company

Geophysical Investigation

Locations of EM stations and the apparent conductivities for the horizontal- and vertical-dipole configurations are shown in figures 10 and 11. Apparent conductivities at the site ranged from 5 to 95 mS/m for the horizontal-dipole configuration and from 3 to 76 mS/m for the vertical-dipole configurations. Apparent conductivities for the horizontal-dipole

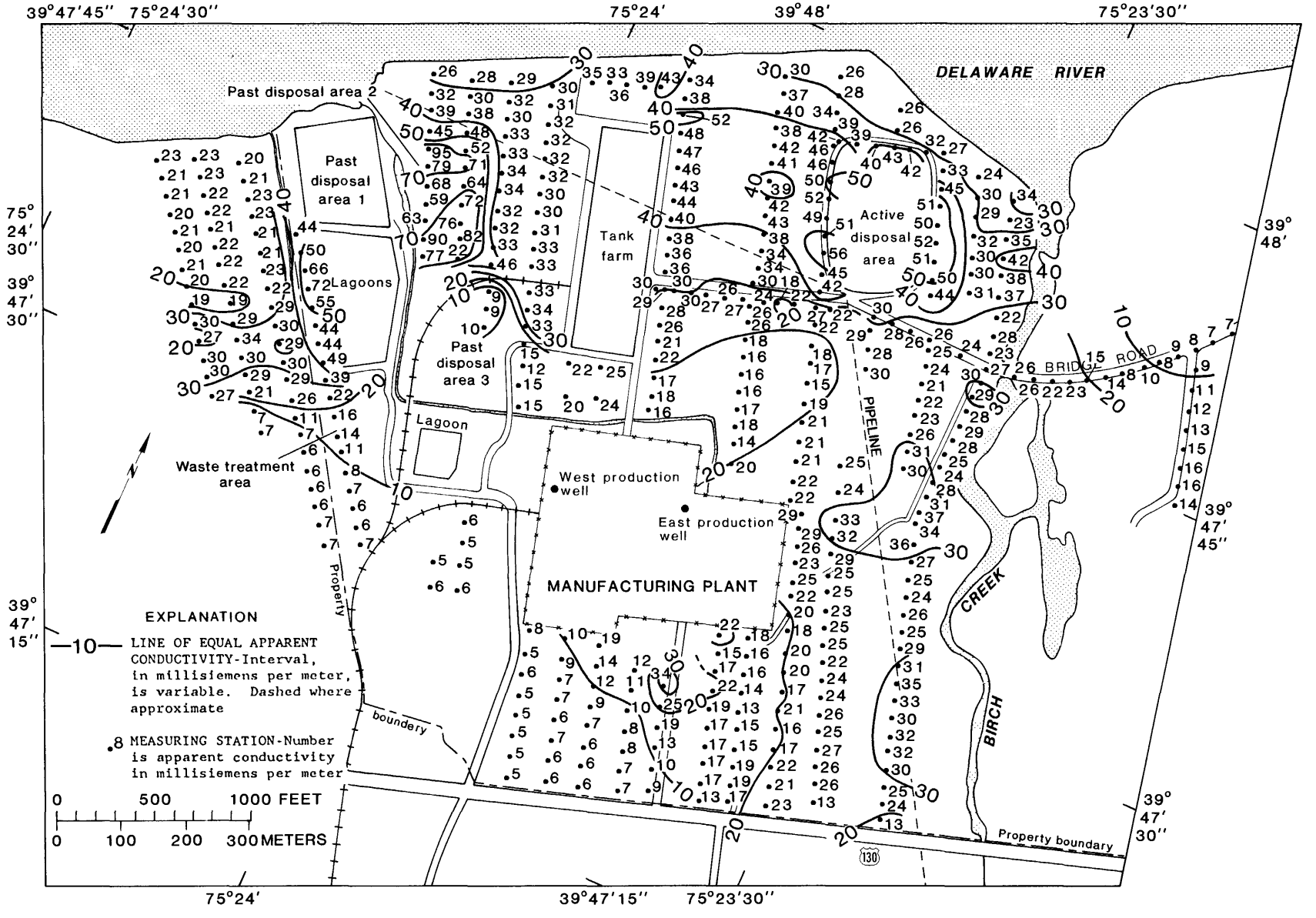


Figure 10.--Distribution of apparent-conductivity data at Monsanto Company, Logan Township, Gloucester County, N.J., collected in the horizontal-dipole configuration with 32.8 feet between coils, 1984.

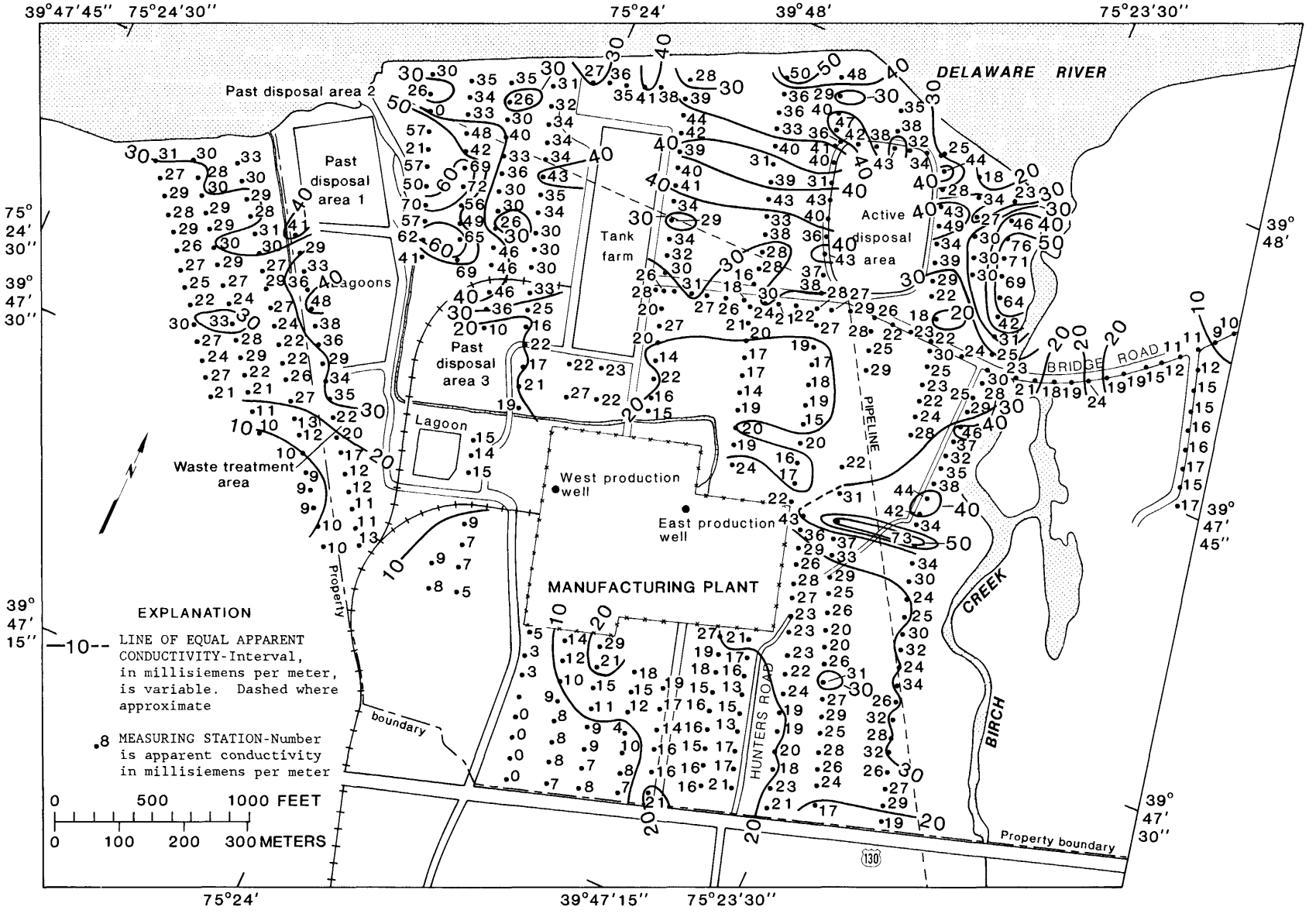


Figure 11.--Distribution of apparent-conductivity data at Monsanto Company, Logan Township, Gloucester County, N.J., collected in the vertical-dipole configuration with 32.8 feet between coils, 1984.

configuration collected over farmland west of Monsanto ranged from 6 to 30 mS/m. On the basis of these data, land use, locations of the drainage ditches, depth of the water table, and other factors that influence apparent conductivity, these ranges probably are normal for farmland in this river-edge environment. Apparent conductivities for the horizontal-dipole configuration for the land south of Monsanto and the land between Hunter's Road and Birch Creek ranges from 5 to 30 mS/m. Because it appears that fertilizers and other chemicals are not used in this part of Logan Township and because the shallow ground-water flow is from the Monsanto area toward Birch Creek, these values probably are normal for the locality. Areas in the center of and north of the plant site where apparent conductivity for the horizontal-dipole configuration was greater than 35 mS/m probably are anomalous and are interpreted to represent possible ground-water contamination.

Two apparent-conductivity anomalies were detected on the northwest and the east side of the active disposal area (figs. 10 and 11). The active disposal area is an elevated lagoon surrounded by 20-ft-high dikes. Shallow ground water is presumed to flow radially from the lagoon because of the artificially high water table caused by the lagoon dikes. The anomalies may represent areas where leachate from the lagoon is mixing with the ground water.

Anomalous apparent conductivities were detected at and around past waste-disposal area 2. The highest apparent conductivity at Monsanto is at past-waste-disposal area 2. A plastic cover, clay, and topsoil overlying parts of this area inhibit infiltration of precipitation to the landfill. However, the anomaly is evidence that contaminants from the disposal area either are mixing with or have mixed with the ground water.

A small area of anomalous apparent conductivity, west of the lagoons and past disposal area 1 (figs. 10 and 11), extends from the lagoons and disposal area to the drainage ditch. The drainage ditch may be receiving contaminated ground water from the lagoons and (or) past disposal area 1 and thus is preventing the spread of ground-water contamination to areas west of the ditch. A linear EM anomaly east of the manufacturing plant (figs. 10 and 11) is the only one at the site that is not associated with a past or active landfill. The cause of the high apparent conductivities is unknown. This anomaly is most pronounced in the vertical-dipole configuration, an indication that it is not a near-surface feature.

Chemical Investigation

Ground-water-sampling network

Thirteen wells were sampled at the Monsanto site: seven in the post-Cretaceous mixed sand and clay, four in undifferentiated parts of the Potomac-Raritan-Magothy aquifer system, and two in the middle aquifer of the aquifer system. Wells 150605 and 150604 at the Monsanto site are in unconfined aquifers and are downgradient from the active waste-disposal area in figure 3 (Geraghty and Miller, Inc., 1981c). Shallow well 150600 is in the middle of a suspected contaminant plume, and 150603 is near past

disposal area 1. Well 150596 is upgradient from past disposal area 1. Well 150598 is upgradient from past disposal area 2, and well 150599 is slightly downgradient from area 2. The deep wells at the site (150163, 150444, 150450, 150597, 150601, and 150602) are on the perimeter of the plant, upgradient from the active or inactive disposal sites.

The distribution of wells sampled at the site is adequate for describing the inorganic and the organic chemistry at the site but is inadequate for determining the lateral and vertical extent of ground-water contamination. The quality of water south of the manufacturing plant and east of Birch Creek was not determined with the ground-water-sampling network.

Inorganic chemistry and contamination

The concentration of dissolved solids in ground water at the Monsanto site ranged from 339 to 3530 mg/L and exceeds the median for water in the middle aquifer, 96 mg/L. If the confined part of the middle aquifer receives recharge from the Delaware River, the elevated cation and anion concentrations in the ground water may be caused by mixing of ground water with saline water from the river. Saline water in the Delaware River annually reaches as far upstream as Chester, Pa. (Anderson and others, 1972). Pumping from the middle aquifer at Monsanto also may induce recharge from the underlying lower aquifer (Geraghty and Miller, Inc., 1981c), and result in the high dissolved-solids concentrations in ground water at the site. However, the waste-disposal sites also are probable sources of dissolved solids. In addition, landfill leachate may be a source of cations and anions to the ground water. Also, decomposition of organic compounds results in reduced pH and hydrolysis of silicate minerals, a source of cations (Baedecker and Back, 1979).

Calcium and magnesium cations and bicarbonate and chloride anions tend to be the dominant ions in ground water from the wells screened in the post-Cretaceous sediments at the Monsanto site. However, sodium and chloride ions are the dominant ions in the middle aquifer at the site. This distinction may support the notion that saline water in the middle aquifer is the result of induced recharge from either the Delaware River or the lower aquifer.

Ground water at the Monsanto site also is distinguished from that at the other waste-disposal sites by high concentrations of dissolved silica (7.5-59 mg/L). The source of silica may be silicate-mineral dissolution induced by decomposition of organic compounds. The reaction, H_2O + silicate + CO_2= clay mineral + SiO_2(amorphous) + cation + HCO_3^-, represents the dissolution of silicate minerals in the presence of carbon dioxide gas. Typically, dissolution of silica is controlled by the pH of the water, the most favorable being pH values greater than 7.00. Water from all wells sampled is slightly acid (pH about 6.5). Lime (calcium or magnesium carbonate) often is added to wastewater at the plant as part of wastewater treatment (Miller and others, 1982, p. 13) and may be an additional source of alkalinity in ground water at the site.

Ground water at the Monsanto site has the highest phosphate concentrations of any of the industrial or waste-disposal sites. Concentrations ranged from less than detection limit (<0.020 mg/L) to 0.550

mg/L. Phosphate concentrations in water samples from 9 of the 13 wells sampled at the site were 0.020 mg/L or greater. Because Monsanto manufactures organophosphates and other organic compounds at the Logan Township site (Miller and others, 1982), plant activities may be the most likely sources of phosphate. However, other sources of phosphate in the ground water include fertilizers and detergents.

Ground water at the Monsanto site also differs from that at the other sites in that most of the nitrogen at the site is in the form of ammonia. Ammonia concentrations ranged from 0.050 to 41.0 mg/L. High ammonia concentrations (3.9 to 41 mg/L) were detected in samples from wells near the active disposal area and past disposal areas 1 and 2 (fig. 3). Concentrations of nitrate were low (0.160 and 0.280 mg/L) in samples from wells 150598 and 150600, and nitrate was not detected in samples from the other wells. The combination of ammonia and low concentrations of dissolved oxygen (less than 1 mg/L) probably means that ground-water contaminant plumes at the Monsanto site are reducing environments. As the contaminated ground water migrates from the site and is oxidized, nitrate concentrations may increase. Nitrate could be a threat to the potable-water quality and to surface-water ecosystems where shallow ground water discharges.

Arsenic, cadmium, chromium, mercury, and lead were detected in samples from most wells. Concentrations of lead in samples from wells 150444 and 150450 (fig. 3) were equal to or greater than primary drinking-water regulations. Concentrations of other trace elements were less than primary drinking-water regulations. The high frequency of detection of the trace elements probably means that there is either a single, widespread source of the trace elements or several distinct sources. Geraghty and Miller (1981, p. 5) speculated that sediment dredgings from the Delaware River that were landfilled on the Monsanto property are a source of trace elements. Inorganic and (or) organic materials used, stored, and disposed of on the property also may be sources of trace elements, although an exact source is not known.

The high frequency of detection of arsenic, chromium, lead, and mercury possibly means that geochemical controls in the ground water at Monsanto allow these elements to remain in solution. Several factors alone or in combination that may keep these trace elements in solution include: generally low pH, a generally reducing environment in the ground water, complexing of trace elements with inorganic ions such as chloride (Moore and Ramamoorthy, 1984, p. 130) or ammonia (Hem, 1970, p. 23), and complexing with soluble organic ions. As indicated by the high ammonia and iron concentrations and low dissolved oxygen concentrations, the ground water at Monsanto seems to be in a reducing state. Concentrations of dissolved ions in ground water at the site also are high; for example, chloride concentrations ranged from 11 to 680 mg/L. These factors and elevated ammonia concentrations are consistent with conditions necessary to keep the trace elements in solution.

Organic carbon and organic-compound contamination

Organic carbon concentrations ranged from 1.8 to 140 mg/L in samples from wells at the Monsanto site (fig. 3). Concentrations of organic carbon in samples from the wells screened in the shallow aquifer were greater than

background levels for this aquifer (3.10 mg/L dissolved or total organic carbon). Organic carbon concentrations decreased with depth and the concentration in the middle aquifer was near the range for this aquifer (0.4 to 3.4 mg/L). There is no obvious correlation between organic carbon concentration and the total concentration of organic compounds detected in ground-water samples from the Monsanto site, probably because the methods of analysis are insufficient to detect the natural and (or) anthropogenic organic compounds in the ground water.

Organic compounds detected at high concentrations (greater than 100 μg/L) in the ground water at Monsanto include methylene chloride, benzaldehyde, benzyl alcohol, benzyl chloride, PCB's (arochlor 1248), and benzal chloride, (Geraghty and Miller, Inc., 1983, table 5). Of these compounds, only PCB's were detected in any sample collected at the site in 1984 (app. 3). Benzal aldehyde, benzyl alcohol, benzyl chloride, and benzal chloride are not part of the quantitative organic analyses (table 2, analyses 2, 3, and 4) but could have been detected by the semiquantitative analysis.

Results of quantitative, semiquantitative, and nonquantitative analyses of ground-water samples for organic compounds indicate low concentrations (less than 20 μg/L) of few organic compounds. The compounds most frequently determined by quantitative methods are bis (2-ethyl hexyl) phthalate, benzene, methlyene chloride, DDD, PCB's, diethyl phthalate, and toluene. None of the concentrations of these compounds exceeded 20 μg/L. Concentrations of most of the compounds determined by semiquantitative analysis were less than 10 μg/L. The phthalate compounds commonly are used in the manufacture of plastics. Monsanto Company in Logan Township manufactures phthalate esters and phthalic anhydride (Miller and others, 1982, p. 13). Aromatic hydrocarbons are used at the site in the manufacture of solvents and dyes (Monsanto Industrial Chemicals Company, 1981). PCB's have been disposed of in the former landfills at Monsanto (Miller and others, 1982). Concentrations of PCB's in samples from wells in the former landfill have been as high as 100,000,000 μg/L (Geraghty and Miller, Inc. 1983, table 5), but the concentration of PCB's in a sample from well 150598, adjacent to past disposal area 3, was only 0.6 μg/L.

Benzene and several other unidentified organic compounds were detected in a water sample from well 150600 (app. 3 and table 4); 1,2-dichloroethane was detected in a sample from well 150601 at the same site (fig. 3). These wells are in the middle of a geophysical anomaly. Organic compounds have been detected in a shallow observation well near the east production well as a result of a localized pipeline leak (Geraghty and Miller, Inc., 1986), but widespread contamination in this part of the Monsanto site has not been cited in the literature.

The only pesticide detected in ground-water samples from Monsanto was DDD in samples from wells 150603 and 150604 (fig. 3). PCB's were detected in a sample from well 150598 (fig. 3) near the past disposal areas. None of the water samples collected in 1984 from these three wells was analyzed for aroclors, but aroclor 1248 has been detected in ground water near past disposal area 1 (Geraghty and Miller, 1983a, p. 16). Aroclors are types of PCB's that differ by the percentage of chlorination of the diphenyl ring.

Correlation of geophysical and chemical data

Wells 150599, 150600, 150604, and 150605 at Monsanto (fig. 3) are in or near areas of anomalously high apparent conductivity. Except for well 150600, ground-water samples from these wells had specific conductances ranging from 500 to 3,700 μS/cm. Organic compounds were detected in samples from each of these wells. Together, the geophysical and chemical data confirm ground-water contamination east of the manufacturing plant. Ground-water contamination had not been reported previously.

Rollins Environmental Services, Inc.

Geophysical Investigation

The locations of the EM stations and the apparent conductivities for the horizontal- and vertical-dipole configurations are shown in figures 12 and 13. EM surveys were limited to areas off Rollins property at the request of Rollins. Apparent conductivities ranged from 4 to 12 mS/m in farm fields and from 12 to 42 mS/m in the marsh land adjacent to Raccoon Creek. Because EM data were collected in a limited area at Rollins, evaluation of the data with respect to potential ground-water contamination is difficult. On the basis of the data, there probably is a small anomaly near the mouth of the tributary at the north boundary of Rollins (figs. 12 and 13). However, the areal extent of this anomaly is too small for qualitative analysis and cannot be determined with the limited data that are available.

Chemical Investigation

Ground-water-sampling network

The hydrogeologic framework at Rollins is complicated because the confining unit that divides the middle aquifer is found only in the extreme northeast part of the property and the confining unit between the upper and middle aquifers is absent in part of the northern marsh (J. Lewis, U.S. Geological Survey, written commun., 1988). Generally, the wells sampled at the Rollins site are in three categories of depth: 14 shallow wells (0-30 ft below land surface: wells 150570, 150572, 150573, 150576, 150579, 150583, 150584, 150589, 150590, 150591, 150592, 150593, 150594, 150595), 8 intermediate-depth wells (30-80 ft below land surface: wells 150575, 150577, 150578, 150580, 150581, 150582, 150587, 150588), and 5 deep wells (more than 80 ft below land surface: wells 150354, 150387, 150388, 150585, 150586). The shallow wells are screened in the unconfined upper aquifer; the intermediate wells are screened in either a semiconfined part of the upper aquifer or the confined upper part of the middle aquifer; the deep wells are screened in either the middle aquifer or a part of the aquifer that cannot be differentiated. No wells greater than 70 ft below land surface in the northern marsh area were sampled.

Distribution of wells sampled was adequate for determining the types of inorganic and organic contamination in the ground water at the site. Distribution of data also was sufficient for determining some trends in ground-water chemistry at the site. However, the network of wells sampled was insufficient for determining the maximum depth of contamination at the site, the lateral extent of contamination away from the plant site, and the quality of water south of the waste-treatment lagoons.

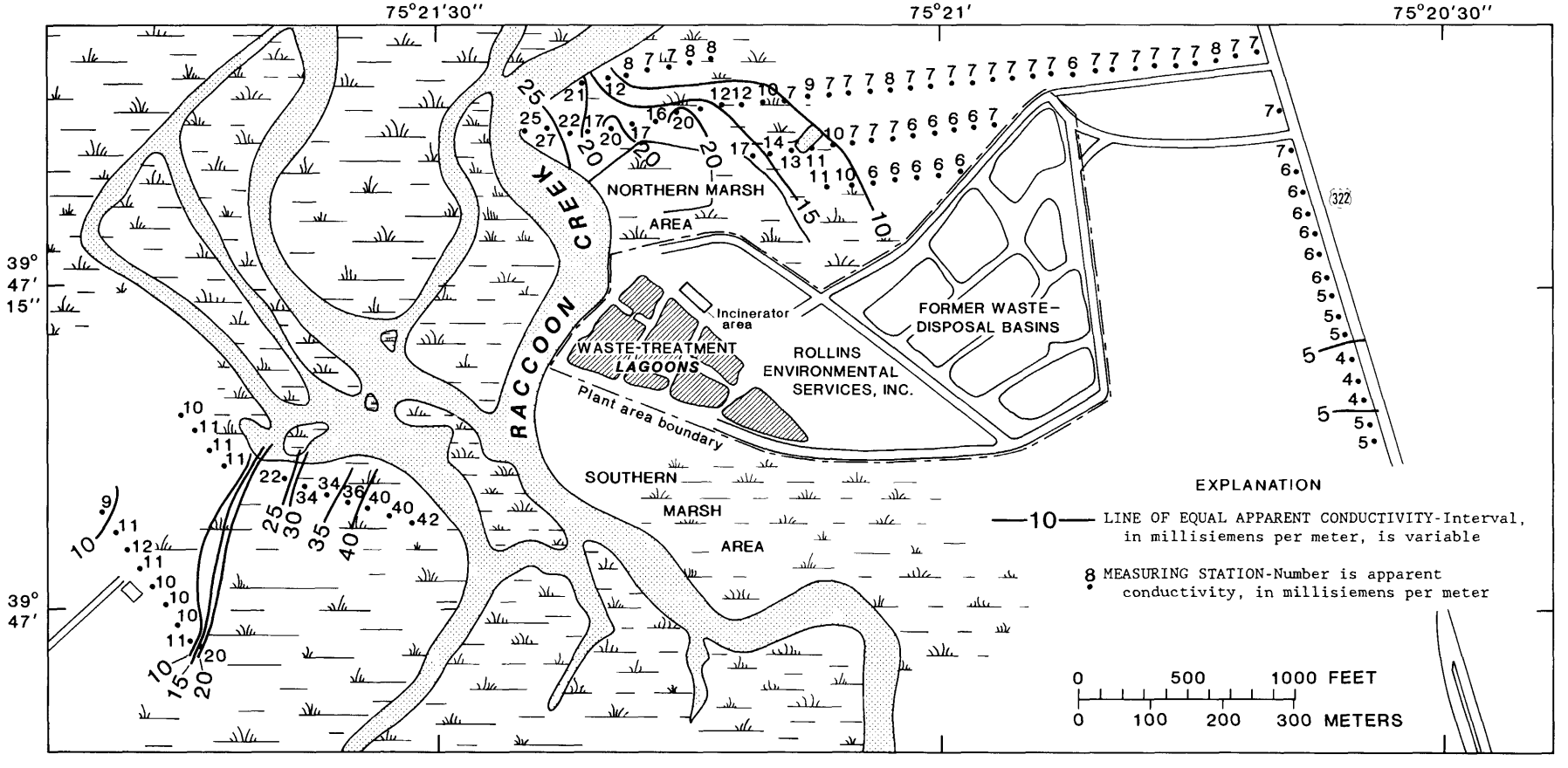


Figure 12.--Distribution of apparent-conductivity data near Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., collected in the horizontal-dipole configuration with 32.8 feet between coils, 1984.

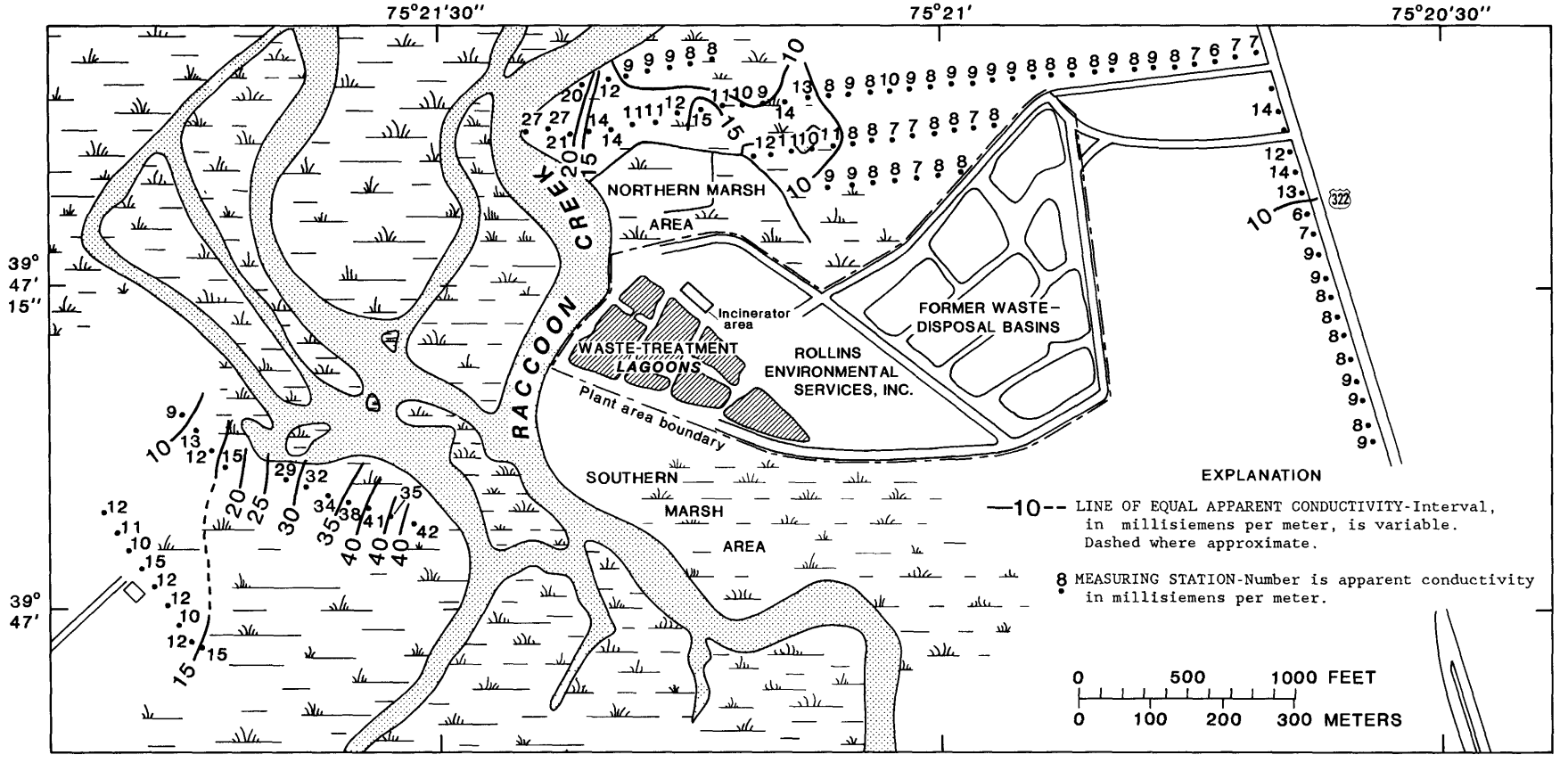


Figure 13.--Distribution of apparent-conductivity data near Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., collected in the vertical-dipole configuration with 32.8 feet between coils, 1984.

Inorganic chemistry and contamination

Samples from wells screened in the deep zone (greater than 80 ft) at the Rollins site contained low levels of inorganic constituents. Concentrations of dissolved solids were less than 200 mg/L and concentrations of the priority trace elements were less than Federal and State primary drinking-water regulations. Sodium and magnesium are the major cations in water from these wells, and chloride and sulfate are the major anions.

Water from the shallow and intermediate-depth zones typically was high in solids (88 to 4,880 mg/L). Concentrations of solids in ground water from the shallow and intermediate zones were higher in areas downgradient from the former waste-disposal basins and the lagoons than in areas near the basins and lagoons. Most of the inorganic contamination was detected in ground-water samples from wells in this area and in the northern marsh area.

At Rollins, a 500-mg/L line of equal dissolved-solids concentration has been used to delineate approximate areas of ground-water contamination (Geraghty and Miller, Inc., 1978, p. 7). Ground water with concentrations of solids greater than 500 mg/L at the site typically contains metals and (or) organic compounds whose concentrations exceed Federal and State primary drinking-water regulations and proposed State regulations. Samples from 9 of 10 wells screened 80 ft below land surface or less with a solids concentration greater than 500 mg/L contained at least one metal whose concentration exceeded primary drinking-water regulations (app. 4). However, in samples from 5 of 11 wells screened in the shallow and intermediate-depth zones that had concentrations of solids less than 500 mg/L, nitrate concentrations exceeded the primary drinking-water regulation of 10 mg/L. The 500-mg/L line of equal dissolved-solids concentration may be useful in monitoring the extent of metals contamination at the Rollins site, but it is not a reliable indicator of high concentrations of nitrate.

Ground-water quality of the shallow and intermediate-depth zones is difficult to describe on the basis of the common-ion chemistry. Chloride generally is the predominant anion, and sodium and calcium are the predominant cations at the Rollins site.

Distribution of nitrogen species delineates reducing and oxidizing zones. The distribution of the ratio of ammonia plus organic nitrogen (as N) to nitrate plus nitrite (as N) concentrations in the shallow zone at the Rollins site is shown in figure 14. Concentrations of ammonia plus organic nitrogen were higher in samples from wells in the center of the plant and in the area between the wastewater lagoons and the former waste-disposal basins than in those downgradient (see wells 150583, 150584, and 150595 in fig. 14). The highest nitrate concentrations (6.10, 4.00, and 12.0 mg/L) were in samples from wells in the northern marsh area and along the eastern and northeastern sides of the plant site (see wells 150572, 150573, and 150576 in fig. 14). In the northern marsh area and east of the plant (near the former waste-disposal basins) there is a transition zone between areas where ammonia is the predominant nitrogen species and areas where nitrate is the predominant species. The transition zone approximates the areas where

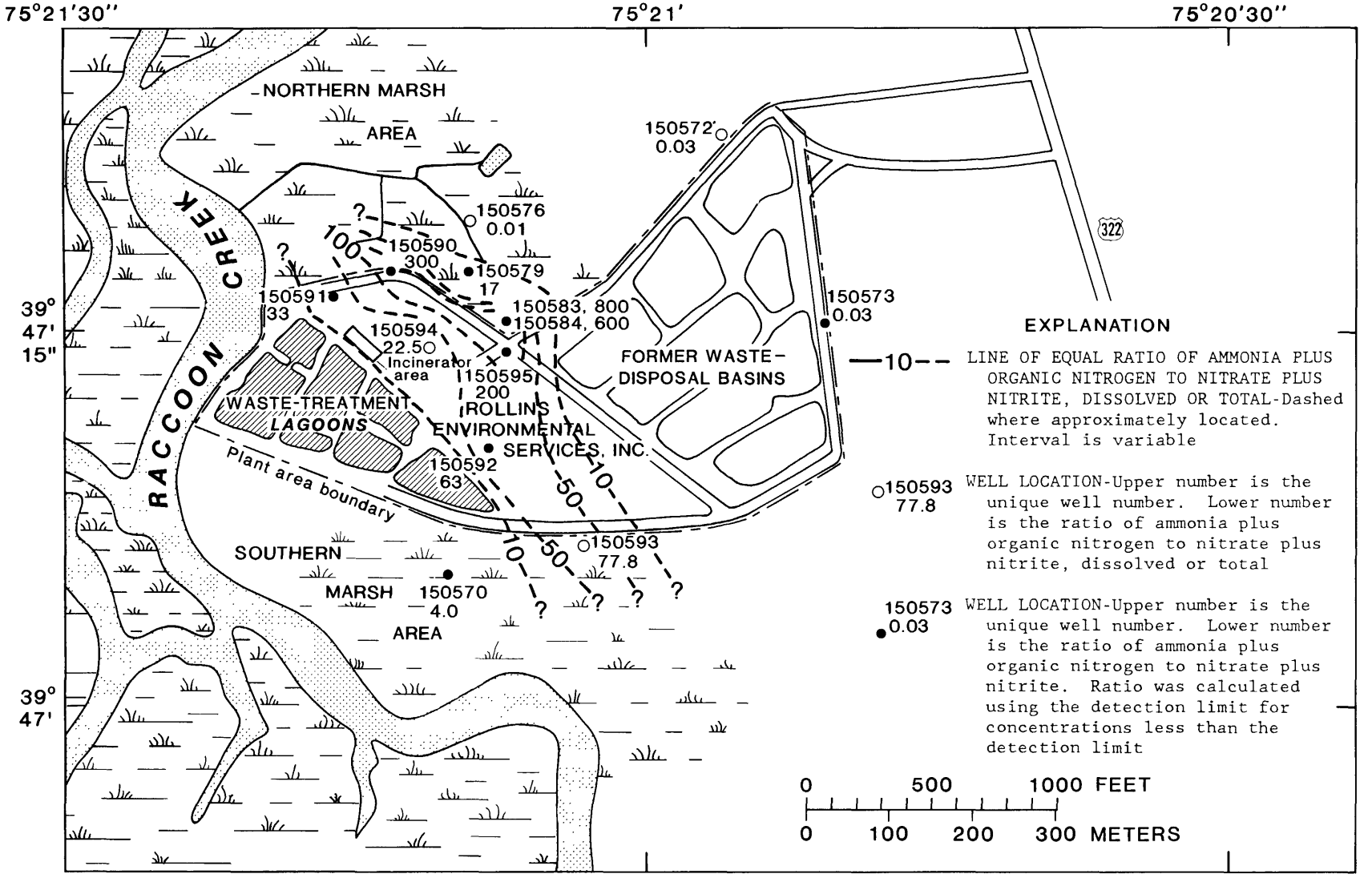


Figure 14.--Distribution of dissolved or total nitrogen species in shallow ground water at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984.

ground water changes from a reducing to an oxidizing environment. pH is low (near 5.0) in these areas. The distribution of nitrogen species in the intermediate aquifer at the Rollins site, though poorly defined, is similar to that in the shallow zone.

In the transition from a reducing to an oxidizing environment, the concentration of dissolved iron decreased from 3,800 µg/L (well 150590) in the reducing environment to 16 µg/L in the oxidizing environment. Because manganese (as Mn^{+2}) can remain in solution at higher oxidizing conditions than iron can, the ratio of dissolved iron to dissolved manganese decreases with distance from the center of the plume. Iron probably is precipitated as an iron hydroxide in the oxidized part of the plume.

The preceding type of chemical zonation is similar to that studied by Baedecker and Back (1979) at landfills. Based on the distribution of nitrogen species in ground water at the Rollins site and studies by Baedecker and Back (1979), the ground-water-contaminant plume probably is in the "late stage" of chemical evolution; that is, reduced species predominate near the source of contamination and oxidized species predominate downgradient from the source.

Concentrations of nitrate greater than the Federal and State primary drinking-water regulation (10 mg/L as N) have been reported for ground-water samples from wells near the Rollins site. The concentration of nitrate plus nitrite in ground-water samples from well 150626 (fig. 1), on a farm adjacent to the north side of the Rollins property, was 16 mg/L (C. Barton, U.S. Geological Survey, written commun., 1988). Reports of previous investigations of shallow ground-water flow at Rollins (Geraghty and Miller, 1981a, fig. 13) and around Rollins (Malcolm Pirnie, Inc., 1985, p. 9-3) suggest that shallow ground-water north of the plant discharges into the drainage ditch in the northern marsh area and thus that well 150626 is upgradient from Rollins. Concentrations of nitrate in ground-water samples from shallow domestic wells just south and east of the Rollins site were greater than 20 mg/L (Malcolm Pirnie, Inc., 1985, p. 6-3). On the basis of these studies, these shallow wells probably are upgradient from Rollins. The source of high concentrations of nitrogen in water from wells bordering the Rollins site is unknown, but may include past or present application of nitrogen fertilizer to current or former agricultural land, sewage from septic tanks, and other anthropogenic contamination.

Concentrations of arsenic, chromium, lead, and mercury in ground-water samples from wells at Rollins exceeded Federal and State drinking-water regulations. Because concentrations of some inorganic constituents were high, the samples were diluted before analysis to avoid contaminating the laboratory equipment and disturbing the calibration of the equipment. As a result of the dilutions, minimum detection levels for some inorganic constituents were greater than the Federal and State primary drinking-water regulations.

Arsenic was detected in samples from wells in the northern marsh area. Concentrations of arsenic in samples from wells 150582, 150583, and 150584 (near the center of the plant) tended to increase with depth (see table 1 and app. 4). Chromium concentrations ranged from less than the detection limit (<100 µg/L) to 4,200 µg/L. The concentration of chromium was highest

in a sample from a shallow well (150594) just south of the northern marsh area and at a depth of more than 30 ft, although chromium concentrations also were high (2,000 µg/L) in samples from two intermediate-depth wells (150582 and 150588). Concentrations of hexavalent chromium ranged from less than detection limit to 6 µg/L, although the detection ranged from <1 to <1,000 µg/L. The concentration of hexavalent chromium may exceed Federal and State primary drinking-water regulations. The highest concentrations of lead (2,600 µg/L, well 150588) and mercury (370 µg/L, well 150590) were in samples from wells in or on the southern border of the northern marsh area.

Organic carbon and organic-compound contamination

Distribution of organic carbon at the Rollins Environmental Services site is shown in figure 4. Concentrations of organic carbon in wells screened in the lower part of the middle aquifer (wells 150354, 150387, 150388, 150585, 150586) ranged from 1.6 to 4.1 mg/L. In the intermediate-depth zone, organic carbon ranged from 1.7 (well 150388) to 340 mg/L (well 150582) and tended to decrease with distance from the center of the plant site. High concentrations of organic carbon (340, 150, 500, 220, and 87 mg/L) were measured in samples from wells 150582, 150583, 150584, 150588, and 150594 in the shallow unconfined aquifer in the center of the plant. Concentrations of organic carbon in samples from shallow wells on the perimeter of the site were similar to background concentrations for this aquifer (1.7 to 3.4 mg/L dissolved or total organic carbon). Previous investigators proposed that natural background concentrations of organic carbon in ground water at the site can be as high as 10 mg/L as a result of vegetation decay (Geraghty and Miller, Inc., 1984a, p. 9). High concentrations of organic carbon (greater than 40 mg/L) also have been documented in the water-table aquifer in the southern marsh area just south of the wastewater lagoons and adjacent to Raccoon Creek (Geraghty and Miller, Inc., 1984a, plate 4); however, no wells in this area of Rollins were sampled in 1984 to verify this finding.

The correlation between the concentration of organic carbon and the concentration of total organic compounds detected in ground-water samples is fair. The concentration of organic carbon tends to increase with increasing concentration of total organic compounds as determined by quantitative and semiquanititative methods. A correlation also exists between the concentration of organic carbon and the number of unknown organic compounds detected by the nonquantitative GC-FID scan. (See table 4.)

Ground-water samples from two of the five wells screened in the deep zone beneath the Rollins site contained some organic compounds. A sample from well 150585, in the southern marsh area, contained the chlorinated aliphatic hydrocarbons 1,2-dichloroethane (12 µg/L) and trichloroethylene (7.6 µg/L), but no aromatic hydrocarbons. Another sample, collected 9 months later and analyzed by the contract laboratory, contained no organic compounds in concentrations greater than a detection limit of 10 µg/L. Concentrations of 1,2-dichloroethane (150 µg/L), trichloroethylene (11 µg/L), and acetone (11 µg/L) were detected in samples from well 150585 (Geraghty and Miller, Inc., 1987, table 4). Results of these analyses indicate that organic compounds have penetrated the deep zone in this area, and that the concentrations of 1,2-dichloroethane and trichloroethylene have increased through time. No organic compounds were detected in samples from

well 150587 (fig. 4) near well 150585 but screened in the intermediate-depth zone. Results of the nonquantitative GC-FID scan of a sample from well 150354 (fig. 4), also a deep well, indicate some organic compounds at low concentrations (table 4). Further sampling of this well is needed to determine whether organic contamination has reached this part of the aquifer system.

Organic compounds in ground water in the intermediate-depth zone at Rollins (between 30-80 ft deep) were detected in samples from the central part of the plant and from the northern marsh area just south of the stream. No organic compounds were detected in samples from wells 150575, 150580, and 150581, which also are in the intermediate-depth zone but north and northwest of the stream in the northern marsh area. A sample from well 150587, between the lagoons and the basins, also was free of detectable concentrations of organic compounds. No wells of intermediate depth in the southern marsh area south of the lagoons were available for sampling at the time of data collection; therefore, the concentrations of organic compounds in ground water of the southern side of the site could not be determined.

Organic compounds in ground water of the shallow-depth zone (less than 30 ft below land surface) were detected in samples from wells in the central part of the plant site, from well 150579 in the northern marsh area, from well 150593 to the south, and from well 150591 west of the plate site (fig. 4). Whether organic compounds are in the shallow ground water in the southern marsh area is unknown. The highest total concentration of organic compounds (89,922 μg/L) was measured in a sample from well 150584 (fig. 4), in the center of the plant site.

The types of contamination in the intermediate- and shallow-depth zones are similar, although concentrations tend to decrease with depth. Contamination in these zones of the aquifer system is characterized by both aromatic and aliphatic hydrocarbons. Organic compounds most frequently detected by quantitative methods are chlorinated solvents, such as trichloroethlyene, and monocyclic aromatic hydrocarbons, such as benzene, ethyl benzene and phenols (app. 4).

Organic compounds most frequently detected by semiquantitative methods are nitrogen-containing aromatic hydrocarbons such as benzenamines (app. 5). Ground-water samples with high concentrations of benzenamines and other nitrogen-containing organic compounds are those with high concentrations of nitrogen and ammonia and high concentrations of organic carbon. More than 60 percent by weight of the tentatively identified organic compounds in well 150584 are nitrogen-containing. No nitrogen-containing compounds were detected by quantitative methods. Rollins has accepted several types of nitrogen-containing organic compounds (S.J. Cuiba, Delaware River Basin Commission, to Ernest Segesser, Rollins, written commun., 1977): cyanide, aliphatic nitriles, aliphatic and aromatic amines, and nitrobenzene and formimide recovery tars.

For samples from two well clusters (150582, 150583, and 150584; 150588 and 150589) in figure 4, the total amount of purgeable organic compounds generally decreased with depth, but the proportion of chlorinated aliphatic compounds to aromatic compounds decreased with depth. Because chlorinated aliphatic compounds such as trichloroethylene and 1,2-dichloroethane are

more dense than water and the aromatic compounds generally are less dense than water, the amount of aliphatics relative to aromatics probably would increase with depth if the two types of compounds were introduced into the system at the same time and the same point and were moving along the same general flow path. Clearly, the distribution of organic compounds in the ground water at the site is complicated.

The semiquanitative GC method for determining organic compounds was essential to describing the type of organic contamination in ground water at the Rollins site. For example, the concentration of organic compounds in the sample from well 150584 was greater than 30,000 μg/L as determined by quantitative methods (app. 4) and greater than 55,000 μg/L as determined by semiquantitative methods (app. 4). The concentration of organic compounds in a sample from well 150583 was greater than 17,000 μg/L as determined by quantitative methods and greater than 14,000 μg/L as determined by semiquantitative methods. Clearly, standard quantitative analytical methods would not be sufficient to describe organic contamination at the Rollins site.

The only ground-water sample that contained PCB's was from well 150592, between the lagoons and the basins; concentration of aroclor 1016 in this sample was 1.6 μg/L (app. 4). PCB's also were detected in samples from two other wells located in the same area (Geraghty and Miller, Inc., 1982b, table 1) as well as from three other wells on the north side of the lagoons, and one to the north of the basins (Geraghty and Miller, Inc., 1987, table 6). Well 150592 also is unique in that it is the only well sampled that contains pesticides (diazinon, 0.02 and 0.04 μg/L; and dieldrin, 0.04 and 0.05 μg/L). According to published water-level maps, ground-water samples that contain detectable concentrations of PCB's or pesticides are from wells downgradient from the lagoons and the former waste-disposal basins (Geraghty and Miller, Inc., 1982b, pl. 1; Geraghty and Miller, Inc., 1987, fig. 1). The source of these compounds may be the lagoons or the basins, but the absence of these compounds in other wells in this area of Rollins probably means that the sources are local.

Correlation of Geophysical and Chemical Data

At the Rollins site, chemical data were not collected in areas where EM surveys were done.

SUMMARY AND CONCLUSIONS

This report presents the results of geophysical and chemical investigations of water quality at five industrial or waste-disposal sites in Logan Township, Gloucester County, N.J. Electromagnetic surface-geophysical methods were used to delineate areas of shallow, ionic ground-water contamination. Chemical analyses of ground water were made to determine the lateral and vertical extents of contamination, the types of inorganic and organic constituents in the ground water, and the effectiveness of the EM method in detecting contamination.

Natural ground water in Logan Township is slightly saline (1,000 to 3,000 mg/L of dissolved solids) in the lower aquifer of the Potomac-Raritan-Magothy aquifer system, and dilute (<1,000 mg/L dissolved solids) in the upper and middle aquifers. Concentrations of manganese and iron exceeded

Federal secondary drinking-water recommended limits in all three aquifers. Concentrations of sulfate, nitrogen, and phosphorous were highest in the upper aquifer. The concentration of dissolved or total organic carbon in the aquifer system ranged from 0.80 to 4.2 mg/L.

Air Products and Chemicals, Inc.

High apparent conductivities at the Air Products and Chemicals, Inc., waste-disposal site most likely are related to the shallow water table, not to ground-water contamination.

Bridgeport Rental and Oil Services, Inc.

Areas of anomalously high apparent conductivity detected at BROS are attributed to shallow (less than 50 ft below land surface), ionic ground-water contamination. The principal source of organic compounds in ground water is petroleum products. Other than nitrate, the major inorganic contaminant in ground water at the site is lead. The major organic contaminants are aromatic hydrocarbons such as benzene and toluene. Contaminants have entered the ground-water system to a depth of at least 108 ft, and possibly deeper. Inorganic and organic contamination of the ground water is severe on the northeast side of the waste-oil lagoon, but was detected on all sides of the lagoon.

Chemical Leaman Tank Lines, Inc.

Apparent conductivity was high (greater than 15 mS/m) near former wastewater and settling lagoons at this site. Ground water at the site contained arsenic, chromium, lead, and mercury at concentrations that exceeded primary drinking-water regulations at depths as much as 102 ft below land surface. Mercury was present in all of the five wells sampled at the site. Organic compounds detected in the ground water include chlorinated aliphatic hydrocarbon solvents and aromatic hydrocarbons. Chemical data are insufficient for determining whether one large continuous contaminant plume or two small plumes of similar origin are present at the site.

Monsanto Company

Areas of high (more than 35 mS/m) apparent conductivity were detected near former or active waste-disposal areas at the Monsanto site. An area of anomalously high apparent conductivity (30 to 73 mS/m) detected on the southeast part of the plant site is not related to any previously determined ground-water-quality problems there. Concentrations of dissolved solids in the ground water tend to be high (greater than 500 mg/L), but the source is unknown. Concentrations of silica and alkalinity were greater than the medians for the aquifer system; dissolution of silicate minerals is suspected. The extent of organic contamination at the site is limited mostly to areas near and around former or active landfills. The most commonly detected organic compounds are associated with the manufacture of plastics or are common industrial solvents and degreasers. A contaminant plume has been delineated east of the manufacturing plant, but the source of the contamination is unknown.

Rollins Environmental Services, Inc.

Apparent conductivity was high (greater than 20 mS/m) in an area near the tributary of a ditch draining from Rollins to Raccoon Creek, but the data are insufficient for determining the reason for the high measurements. Inorganic ground-water contamination is restricted to depths less than 80 ft below land surface, and maximum concentrations were found in areas downgradient from former waste-disposal basins and lagoons, including the northern marsh area. Ground water is present in a reducing environment in the central part of the plant and in an oxidizing environment toward the perimeter, away from the organic contamination. Concentrations of arsenic, chromium, lead, and mercury exceeded Federal and State primary drinking-water regulations. Although the data are inconclusive, organic compounds may have penetrated to depths greater than 80 ft. At depths less than 80 ft, the most commonly detected organic compounds are chlorinated solvents and monocyclic aromatic hydrocarbons. Concentrations of nitrogen-containing organic compounds were high (1,000 μg/L). About half of the concentration of organic compounds in some ground-water samples were detected by semiquantitative methods. PCB's were only in samples from wells downgradient from the lagoons and the basins, in the south-central part of the site.

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GLOSSARY

Aliphatic hydrocarbons. A group of organic compounds consisting of an open-chain molecular structure composed of only hydrogen and carbon. Halogenated aliphatic hydrocarbons contain one or more chloride, bromide, or iodide atoms in the molecular structure. Industrially halogenated aliphatic hydrocarbons, which include the chlorinated solvents, are toxic.

Aromatic hydrocarbons. A group of organic compounds consisting of a molecular structure of one benzene ring (monocyclic aromatic hydrocarbons) or fused benzene rings (polycyclic aromatic hydrocarbons).

Apparent conductivity. Apparent conductivity is a measure of the ease with which a material transmits electric current. The measurement is made without physically contacting the material that is measured. Inverse: apparent resistivity.

Contaminant plume. A continuous or nearly continuous volume of contaminated water in the ground-water system, usually characterized by a group of chemical constituents, and identified by chemical and (or) geophysical methods.

Current. A flow of electricity, measured in amperes.

Dissolved. That material in a representative water sample which passes through a 0.45-micron membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Gas Chromatography (GC). A process in which the components of a mixture are separated according to volatility and equilibrium between a stationary phase inside a column and a gas stream through the column. The separation is achieved by the unique time required by each compound to travel the length of the column. The compound is detected after it leaves the column.

Mass Spectrometry (MS). A method of chemical analysis in which the substance is analyzed in a vacuum. The resulting vapor is exposed to a beam of electrons that causes ionization, either of the molecules or their fragments. The ions thus produced are accelerated by an electric field through a quadrupole mass filter where they are separated according to the mass-to-charge ratio of the ions. The ions discharge on the surface of an appropriate collector device producing a current which is proportional to the amount of material present. The mass fragmentation patterns are characteristic of specific compounds. Mass spectrometry is commonly used as a detector on a gas chromatograph for the identification of organic substances in water.

Micrograms per liter (μg/L). A unit expressing the concentration of a chemical constituent in solution as the mass (1 microgram = 1 X 10^{-6} gram) of solute per unit volume (liter) of water. One μg/L is approximately equal to 1 part per billion (ppb) in aqueous solutions of low dissolved-solids concentration.

Milligrams per liter (mg/L). A unit expressing the concentration of chemical constituents in solution as the mass (1 milligram = 1 X 10^{-3} gram) of solute per unit volume (liter) of water. One mg/L is approximately equal to 1 part per million (ppm) in aqueous solutions of low dissolved-solids concentration.

Minimum detection limit. For a given type of sample and analytical procedure, that concentration below which the presence of the constituent being analyzed cannot be verified or denied to a satisfactory degree of confidence. Minimum detection limits are represented by a "less than" symbol (<) preceding a numerical value.

Organic compounds, acid extractable (U.S. Environmental Protection Agency "priority" pollutants). A group of 11 semivolatile phenolic compounds. These compounds are extracted with methylene chloride from a water sample under acidic conditions prior to analysis by gas chromatography-mass spectrometry (GC-MS).

Organic compounds, base-neutral extractable (U.S. Environmental Protection Agency "priority" pollutants). A group consisting of 46 semivolatile compounds from various chemical families extracted with methylene chloride from a water sample under alkaline conditions prior to analysis by GC-MS.

Organic compounds, purgeable (U.S. Environmental Protection Agency "priority" pollutants). A group of 31 organic compounds which, because of their volatile nature, are purged from a water sample with an inert gas prior to analysis by GC-MS. Two compounds (acrolein and acrylonitrile) of this group remain in the water sample after purging. These two compounds are analyzed by direct aqueous injection GC-MS.

Primary drinking-water regulations. Maximum concentrations of certain trace elements and nitrate allowed in drinking water by the U.S. Environmental Protection Agency. The New Jersey Department of Environmental Protection has adopted the same regulations for drinking water in New Jersey. New Jersey also has proposed maximum allowable concentrations for 26 organic compounds.

Secondary drinking-water recommended limit. Unenforceable U.S. Environmental Protection Agency guidelines of permissible levels of certain chemical constituents in drinking water. These constituents are those that affect aesthetic qualities of the water, such as taste and smell.

Specific conductance. A measure of the ability of water to conduct electrical current expressed in microsiemens per centimeter at 25 degrees Celsius. Because the specific conductance is related to the number and specific chemical types of ions in solution, it may be used for approximating the dissolved-solids content in the water. Commonly, the amount of dissolved solids (in milligrams per liter) is 55 to 75 percent of the specific conductance (in microsiemens per centimeter at 25 °C). This relation is not constant from well to well, and it may even vary in the same source with changes in the composition of the water.

Total. The amount of a given constituent in a representative sample of water-suspended sediment, regardless of the constituent's physical or chemical form. This term is used only if the analytical procedure assures measurement of at least 95 percent of the constituent in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to decide whether the results should be reported as "total." Note that "total" indicates both that the sample consists of a mixture of water-suspended sediment and that the analytical method determines all of the constituent in the sample. The results of analytical procedures which measure less than 95 percent of the constituent present are reported as "total recoverable".

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Station number	Local well name or number	Sample-collection date	Code of agency analyzing sample	Alkalinity, Whole Water, total, field (mg/L as $CaCO_3$)	Dissolved oxygen, field (mg/L)	pH, field	Specific conductance, field (µS/cm)	Temperature, water, field (°C)
150475	394754075192001	101	05-17-84	80010	9	0.2	5.40	152	14.0
150476	394800075192901	102	05-17-84	80010	10	1.3	5.60	250	13.5
150478	394806075192901	104	05-16-84	80010	164	.5	6.90	415	14.0
150481	394814075192001	107	05-16-84	80010	158	.2	7.00	370	13.0
150539	394752075190701	S-6	05-17-84	80010	20	.3	5.80	158	14.5
150554	394809075191401	S-2A	05-18-84	80010	113	.3	5.80	620	11.5
150555	394809075191402	S-2B	05-18-84	80010	454	.1	6.10	1,340	13.5
150555	394809075191402	S-2B	05-18-84	80010	--	--	--	--	--
150555	394809075191402	S-2B	05-18-84	99001	--	--	--	--	--
150556	394809075191403	S-2C	05-18-84	80010	--	.9	4.00	2,430	13.5
150556	394809075191403	S-2C	05-18-84	80010	--	--	--	--	--

Unique well number	Solids, residue at 180 ° C (mg/L)	Nitrogen, dissolved (mg/L as N)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, ammonia total (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Nitrogen, nitrite total (mg/L as N)	Nitrogen, ammonia + organic, dissolved (mg/L as N)	Nitrogen, ammonia + organic, total (mg/L as N)	Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Nitrogen, NO_2+NO_3, total (mg/L as N)
150475	106	--	<0.010	--	<0.010	--	0.70	--	<0.100	--
150476	173	--	<.010	--	<.010	--	<.10	--	6.20	--
150478	281	--	.210	--	<.010	--	.80	--	<.100	--
150481	233	--	.160	--	<.010	--	.50	--	<.100	--
150539	110	--	.350	--	<.010	--	.50	--	<.100	--
150554	1,010	--	--	2.60	--	<0.010	--	110	--	<0.100
150555	1,090	88	--	2.20	--	<.010	--	88	--	.120
150555	500	93	--	2.30	--	<.010	--	93	--	.110
150555	--	--	--	--	--	--	--	--	--	--
150556	5,680	7.1	--	.500	--	<.010	--	1.4	--	5.70
150556	6,060	--	--	.450	--	<.010	--	1.2	--	<.100

Unique well number	Phosphorus, ortho, dissolved (mg/L as P)	Phosphorus, ortho, total (mg/L as P)	Calcium, dissolved (mg/L as Ca)	Calcium, total recoverable (mg/L as Ca)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Fluoride, total (mg/L as F)	Iron, dissolved (µg/L as Fe)	Iron, total recoverable (µg/L as Fe)	Magnesium, dissolved (mg/L as Mg)
150475	<0.010	--	7.8	--	11	<0.10	--	590	--	6.1
150476	.030	--	14	--	12	<.10	--	52	--	12
150478	<.010	--	5.3	--	22	<.10	--	15,000	--	9.7
150481	<.010	--	23	--	22	<.10	--	2,500	--	22
150539	.080	--	7.8	--	14	.10	--	240	--	7.2
150554	--	<0.010	--	12	89	--	0.2	--	180,000	--
150555	--	.030	--	23	180	--	.1	--	340,000	--
150555	--	<.010	--	22	180	--	.2	--	280,000	--
150555	--	--	--	--	--	--	--	300,000	--	--
150556	--	.070	--	45	25	--	1.0	--	240,000	--
150556	--	.060	--	55	25	--	1.0	--	240,000	--

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Magnesium, total recoverable (mg/L as Mg)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Potassium, dissolved (mg/L as K)	Potassium, total recoverable (mg/L as K)	Silica, dissolved (mg/L as SiO_2)	Silica, total (mg/L as SiO_2)	Sodium, dissolved (mg/L as Na)	Sodium, total recoverable (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Sulfate, total (mg/L as SO_4)
150475	--	300	--	2.6	--	4.6	--	3.0	--	35	--
150476	--	770	--	7.8	--	5.4	--	3.0	--	56	--
150478	--	530	--	2.5	--	5.5	--	46	--	38	--
150481	--	82	--	3.0	--	4.0	--	11	--	24	--
150539	--	53	--	2.8	--	4.5	--	4.1	--	25	--
150554	11	--	7,500	--	2.2	--	16	--	13	--	130
150555	21	--	3,600	--	3.5	--	2.5	--	9.2	--	2.8
150555	21	--	4,100	--	3.5	--	2.0	--	8.9	--	36
150555	--	--	--	--	--	--	--	--	--	--	--
150556	78	--	8,900	--	10	--	38	--	12	--	1,700
150556	77	--	9,300	--	10	--	38	--	12	--	1,700

Unique well number	Arsenic, dissolved (µg/L as As)	Arsenic, total (µg/L as As)	Cadmium, dissolved (µg/L as Cd)	Cadmium, total recoverable (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Chromium, hexavalent, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Mercury dissolved (µg/L as Hg)
150475	1	--	<1	--	20	--	<1	20	--	<0.1
150476	1	--	<1	--	<10	--	<1	10	--	<.1
150478	5	--	2	--	10	--	<1	10	--	.1
150481	1	--	<1	--	10	--	<1	20	--	<.1
150539	1	--	<1	--	<10	--	<1	10	--	<.1
150554	--	3	--	9	--	40	<1	--	1,100	--
150555	--	4	--	22	--	<10	<1	--	140	--
150555	--	3	--	10	--	<10	<1	--	<100	--
150555	--	46	--	<5	--	<20	<5	--	25	--
150556	--	<1	--	10	--	20	<1	--	100	--
150556	--	1	--	10	--	30	<1	--	100	--

Unique well number	Mercury, total recoverable (µg/L as Hg)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)	Carbon, organic, total (mg/L as C)	Carbon, organic, dissolved (mg/L as C)	Benzene, total (µg/L)	Bromoform, total (µg/L)	Carbon tetrachloride, total (µg/L)	Chlorobenzene, total (µg/L)	Chlorodibromomethane, total (µg/L)	Chloroethane, total (µg/L)
150475	--	4,800	--	2.8	--	1,100	<3.0	<3.0	<3.0	<3.0	<3.0
150476	--	3,200	--	--	4.2	<3.0	<3.0	<3.0	<3.0	<3.0	--
150478	--	41,000	--	--	14	8.5	<3.0	<3.0	3.4	<3.0	<3.0
150481	--	17,000	--	--	3.4	<3.0	<3.0	<3.0	<3.0	<3.0	--
150539	--	3,700	--	--	2.4	<3.0	<3.0	<3.0	<3.0	<3.0	--
150554	0.40	--	210	350	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150555	1.8	--	31,000	200	--	260	<3.0	<3.0	<3.0	<3.0	<3.0
150555	.70	--	23,000	43	--	--	--	--	--	--	--
150555	<.30	--	31,000	--	--	387	<10	<10	<10	<10	<10
150556	<.10	--	34,000	44	--	16	<3.0	<3.0	<3.0	<3.0	<3.0
150556	<.10	--	38,000	190	--	16	<3.0	<3.0	<3.0	<3.0	<3.0

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	2-Chloroethyl vinyl ether, total (µg/L)	Chloroform, total (µg/L)	Dichlorobromomethane, total (µg/L)	Dichlorodifluoromethane, total (µg/L)	1,1-Dichloroethane, total (µg/L)	1,2-Dichloroethane, total (µg/L)	1,1-Dichloroethylene, total (µg/L)	1,2-Dichloropropane, total (µg/L)	1,3-Dichloropropane, total (µg/L)	Ethylbenzene, total (µg/L)
150475	<3.0	<3.0	<3.0	<3.0	<3.0	64	<3.0	<3.0	<3.0	680
150476	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	11	--	<3.0
150478	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150481	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0
150539	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0
150554	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150555	<3.0	<3.0	<3.0	<3.0	<3.0	65	<3.0	<3.0	<3.0	220
150555	--	--	--	--	--	--	--	--	--	--
150555	<10	<10	<10	<10	<10	94	<10	<10	<10	250
150556	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	5.2
150556	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	4.4

Unique well number	Methylene chloride, total (µg/L)	Methylbromide, total (µg/L)	Tetrachloroethylene, total (µg/L)	1,1,2,2 Tetrachloroethane, total (µg/L)	Toluene, total (µg/L)	1,2-Dichloroethylene, total (µg/L)	1,1,1-Trichloroethane, total (µg/L)	1,1,2-Trichloroethane, total (µg/L)	Trichloroethylene, total (µg/L)	Trichlorofluoromethane, total (µg/L)
150475	<3.0	<3.0	<3.0	<3.0	12,000	<3.0	<3.0	<3.0	<3.0	<3.0
150476	11	--	3.9	<3.0	<3.0	9.5	<3.0	<3.0	9.6	<3.0
150478	<3.0	<3.0	<3.0	<3.0	<3.0	8.7	<3.0	<3.0	25.0	<3.0
150481	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150539	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150554	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150555	<3.0	<3.0	<3.0	<3.0	1,200	19	<3.0	<3.0	<3.0	<3.0
150555	--	--	--	--	--	--	--	--	--	--
150555	7.0	<10	<10	<10	1,410	31	<10	<10	5.0	<10
150556	<3.0	<3.0	<3.0	<3.0	22	<3.0	<3.0	<3.0	3.2	<3.0
150556	<3.0	<3.0	<3.0	<3.0	19	<3.0	<3.0	<3.0	3.7	<3.0

Unique well number	Vinyl chloride, total (µg/L)	Acenaphthylene, total (µg/L)	Acenaphthene, total (µg/L)	Anthracene, total (µg/L)	Benzo(b) fluoranthene, total (µg/L)	Benzo(k) fluoranthene, total (µg/L)	Benzo(a)pyrene, total (µg/L)	bis 2-Chloroethyl ether, total (µg/L)	bis (2-Chloroethoxy) methane, total (µg/L)	bis (2-Chloroisopropyl) ether, total (µg/L)	n-Butyl benzyl phthalate, total (µg/L)
150475	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150476	--	--	--	--	--	--	--	--	--	--	--
150478	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10.0	<1.0	<1.0	<1.0
150481	--	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--	--
150554	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	--	--	--	--	--	--	--	--	--	--	--
150555	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150556	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.0	<1.0	<1.0	<1.0
150556	<3.0	--	--	--	--	--	--	--	--	--	--

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Chrysene, total (µg/L)	Diethyl phthalate, total (µg/L)	Dimethyl phthalate, total (µg/L)	Fluoranthene, total (µg/L)	Fluorene, total (µg/L)	Hexachlorocyclopentadiene, total (µg/L)	Hexachloroethane, total (µg/L)	Indeno (1,2,3-CD) pyrene, total (µg/L)	Isophorone, total (µg/L)	n-Nitrosodi-n-propylamine, total (µg/L)
150475	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150476	--	--	--	--	--	--	--	--	--	--
150478	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150481	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--
150554	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	--	--	--	--	--	--	--	--	--	--
150555	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	4.0	<10.0
150556	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150556	--	--	--	--	--	--	--	--	--	--

Unique well number	n-Nitrosodiphenylamine, total (µg/L)	n-Nitrosodimethylamine, total (µg/L)	Nitrobenzene, total (µg/L)	Parachlorometa cresol, total (µg/L)	Phenanthrene, total (µg/L)	Pyrene, total (µg/L)	Benzo (g,h,i) perylene, total (µg/L)	Benzo (A) anthracene, total (µg/L)	1,2-Dichlorobenzene, total (µg/L)	1,2,4-Trichlorobenzene, total (µg/L)	1,2,5,6-Dibenzanthracene, total (µg/L)
150475	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150476	--	--	--	--	--	--	--	--	--	--	--
150478	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150481	--	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--	--
150554	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	--	--	--	--	--	--	--	--	--	--	--
150555	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150556	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150556	--	--	--	--	--	--	--	--	--	--	--

Unique well number	1,3-Dichlorobenzene, total (µg/L)	1,4-Dichlorobenzene, total (µg/L)	2-Chloronaphthalene, total (µg/L)	2-Chlorophenol, total (µg/L)	2-Nitrophenol, total (µg/L)	Di-N-octyl phthalate, total (µg/L)	2,4-Dichlorophenol, total (µg/L)	2,4-Dimethylphenol, total (µg/L)	2,4-Dinitrotoluene, total (µg/L)	2,4,-Dinitrophenol, total (µg/L)	2,4,6-Trichlorophenol, total (µg/L)
150475	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150476	--	--	--	--	--	--	--	--	--	--	--
150478	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150481	--	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--	--
150554	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	56.0	<1.0	<1.0	<1.0
150555	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150555	--	--	--	--	--	--	--	--	--	--	--
150555	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150556	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150556	--	--	--	--	--	--	--	--	--	--	--

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	2,6-Dinitrotoluene, total (µg/L)	3,3'-Dichlorobenzidine, total (µg/L)	4-Bromophenyl phenyl ether, total (µg/L)	4-Chlorophenyl phenyl ether, total (µg/L)	4-Nitrophenol, total (µg/L)	4,6-Dinitro-ortho-cresol, total (µg/L)	2,3,7,8 Tetrachlorodibenzo-p-dioxin, total (µg/L)	Phenol, total (µg/L)	Naphthalene, total (µg/L)	Pentachlorophenol, total (µg/L)
150475	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150476	--	--	--	--	--	--	--	--	--	--
150478	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150481	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--
150554	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8.0	110	<1.0
150555	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.0	<1.0	<1.0
150555	--	--	--	--	--	--	--	--	--	--
150555	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	--	34.0	<10.0	<10.0
150556	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150556	--	--	--	--	--	--	--	--	--	--

Unique well number	bis(2-Ethylhexyl) phthalate, total (µg/L)	Di-n-butyl phthalate, total (µg/L)	Benzidine, total (µg/L)	Hexachlorobenzene, total (µg/L)	Hexachlorobutadiene, total (µg/L)	Aldrin, total (µg/L)	Chlordane, total (µg/L)	DDD, total (µg/L)	DDE, total (µg/L)	DDT, total (µg/L)	Diazinon, total (µg/L)
150475	<1.0	<1.0	<1.0	<1.0	<1.0	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01
150476	--	--	--	--	--	--	--	--	--	--	--
150478	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01
150481	--	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--	--
150554	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01
150555	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01
150555	--	--	--	--	--	<.010	<.0	<.010	<.010	<.010	<.01
150555	10.0	<10.0	<10.0	<10.0	<10.0	--	--	--	--	--	--
150556	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01
150556	--	--	--	--	--	<.010	<.1	<.010	<.010	<.010	<.01

Unique well number	Dieldrin, total (µg/L)	Endrin, total (µg/L)	Endosulfan, total (µg/L)	Ethion, total (µg/L)	Heptachlor, total (µg/L)	Heptachlor epoxide, total (µg/L)	Lindane, total (µg/L)	Malathion, total (µg/L)	Methoxychlor, total (µg/L)	Methyl parathion, total (µg/L)
150475	0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01
150476	--	--	--	--	--	--	--	--	--	--
150478	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01
150481	--	--	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--	--	--
150554	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01
150555	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01
150555	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01
150555	--	--	--	--	--	--	--	--	--	--
150556	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01
150556	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.01	<.01

Appendix 1.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Bridgeport Rental and Oil Services Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Methyl trithion, total (µg/L)	Mirex, total (µg/L)	PCB, total (µg/L)	Gross PCN's, total (µg/L)	Parathion, total (µg/L)	Perthane, total (µg/L)	Trithion, total (µg/L)	Toxaphene, total (µg/L)
150475	<0.01	<0.01	<0.1	<0.10	<0.01	<0.1	<0.01	<1
150476	--	--	--	--	--	--	--	--
150478	<.01	<.01	<.1	<.10	<.01	<.1	<.01	<1
150481	--	--	--	--	--	--	--	--
150539	--	--	--	--	--	--	--	--
150554	<.01	<.01	<.1	<.10	<.01	<.1	<.01	<1
150555	<.01	<.01	<.1	<.10	<.01	<.1	<.01	<1
	<.01	<.01	<.0	<.10	<.01	<.1	<.01	<1
	--	--	--	--	--	--	--	--
150556	<.01	<.01	1.3	<.10	<.01	<.1	<.01	<1
	<.01	<.01	<.1	<.10	<.01	<.1	<.01	<1

Appendix 2.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984

[--, no determination; µS/cm, microsiemens per centimeterat 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Station number	Local well name or number	Sample-collection date	Code of Agency analyzing sample	Alkalinity, whole water, total, field (mg/L as $CaCO_3$)	Dissolved oxygen, field (mg/L)	pH, field	Specific conductance, field (µS/cm)	Temperature, water, field (°C)
150543	394750075195801	CL1	06-20-84	80020	2	--	5.90	258	13.5
150543	394750075195801	CL1	10-05-84	80020	--	8.0	5.90	293	16.5
150544	394752075195201	CL4	06-20-84	80020	52	--	5.50	810	13.0
150544	394752075195201	CL4	10-05-84	80020	--	--	5.40	725	14.5
150546	394800075195001	CL2	06-19-84	80020	35	--	5.50	877	15.5
150546	394800075195001	CL2	10-03-84	80020	--	0.1	5.40	704	15.5
150549	394757075194202	DW1	06-19-84	80020	54	0.1	5.60	1,310	13.5
150549	394757075194202	DW1	06-19-84	80020	--	--	--	--	--
150549	394757075194202	DW1	06-19-84	99001	--	--	--	--	--
150549	394757075194202	DW1	10-03-84	80020	--	0.1	5.90	1,220	13.0
150549	394757075194202	DW1	10-03-84	80020	--	--	--	--	--
150549	394757075194202	DW1	10-03-84	99001	--	--	--	--	--
150550	394800075195002	DW2	06-19-84	80020	3	6.0	5.20	134	15.5
150550	394800075195002	DW2	10-03-84	80020	--	6.8	5.40	118	15.0

Unique well number	Solids, residue at 180 °C (mg/L)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Nitrogen, ammonia + organic, dis. (mg/L as N)	Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Calcium, dissolved (mg/L as Ca)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Iron, dissolved (µg/L as Fe)
150543	161	0.010	<0.010	40	1.20	0.030	31	37	<0.10	4,400
150543	--	--	--	--	--	--	--	--	--	--
150544	506	.970	<.010	<20	<.100	<.010	35	29	.10	44,000
150544	--	--	--	--	--	--	--	--	--	--
150546	534	.570	.030	20	41.0	.010	37	57	<.10	1,100
150546	--	--	--	--	--	--	--	--	--	--
150549	661	32.0	.060	40	<.100	.010	53	160	27	47,000
150549	--	--	--	--	--	--	53	--	--	47,000
150549	--	--	--	--	--	--	--	--	--	42,000
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150550	83	<.010	<.010	<20	7.00	.020	15	13	<.10	24,000
150550	--	--	--	--	--	--	--	--	--	--

Unique well number	Magnesium, dissolved (mg/L as Mg)	Manganese, dissolved (µg/L as Mn)	Potassium, dissolved (mg/L as K)	Silica, dissolved (mg/L as SiO_2)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Arsenic, dissolved (µg/L as As)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, hexavalent, dis. (µg/L as Cr)
150543	8.6	<100	13	17	41	36	50	<100	<100	<1,000
150543	--	--	--	--	--	--	--	--	--	--
150544	30	1,700	11	17	73	300	10	<100	1,000	<1,000
150544	--	--	--	--	--	--	--	--	--	--
150546	16	870	27	19	120	140	<10	<100	2,000	<1,000
150546	--	--	--	--	--	--	--	--	--	--
150549	35	6,200	26	14	77	340	30	<100	<100	<1,000
150549	30	6,400	--	13	80	--	<10	<100	<100	<1,000
150549	--	--	--	--	--	--	22	<7	<20	--
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150550	8.6	<100	<.10	22	18	7.2	<10	<100	<100	<1,000
150550	--	--	--	--	--	--	--	--	--	--

Appendix 2.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeterat 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Lead, dissolved (µg/L as Pb)	Mercury, dissolved (µg/L) as Hg)	Zinc, dissolved (µg/L) as Zn)	Carbon, organic, total (mg/L as C)	Benzene, total (µg/L)	Bromoform, total (µg/L)	Carbon-tetrachloride, total (µg/L)	Chlorobenzene, total (µg/L)	Chlorodibromomethane, total (µg/L)	Chloroethane, total (µg/L)	2-Chloroethylvinylether, total (µg/L)
150543	<1,000	15	930	2.8	--	--	--	--	--	--	--
150543	--	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150544	<1,000	30	<300	15	--	--	--	--	--	--	--
150544	--	--	--	--	89	<10	<10	27	<10	<10	<10
150546	<1,000	20	610	7.5	--	--	--	--	--	--	--
150546	--	--	--	--	<10	<10	<10	<10	<10	<10	<10
150549	<1,000	.1	<300	18	--	--	--	--	--	--	--
150549	2,000	.2	800	--	--	--	--	--	--	--	--
150549	1	<.3	<10	--	181	<10	<10	<10	<10	<10	<10
150549	--	--	--	--	42	<50	<50	<50	<50	<50	<50
150549	--	--	--	--	50	<50	<50	<50	<50	<50	<50
150549	--	--	--	--	97	<10	<10	19	<10	7.0	<10
150550	<1,000	35	400	4.8	--	--	--	--	--	--	--
150550	--	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Unique well number	Chloroform, total (µg/L)	Dichlorobromomethane, total (µg/L)	Dichlorodifluoromethane, total (µg/L)	1,1-Dichloroethane, total (µg/L)	1,2-Dichloroethane, total (µg/L)	1,1-Dichloroethylene, total (µg/L)	1,2-Dichloropropane, total (µg/L)	1,3-Dichloropropane, total (µg/L)	Ethylbenzene, total (µg/L)
150543	--	--	--	--	--	--	--	--	--
150543	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150544	--	--	--	--	--	--	--	--	--
150544	<10	<10	<10	<10	70	<10	<10	<10	<10
150546	--	--	--	--	--	--	--	--	--
150546	6.5	<10	<10	<10	18	<10	<10	<10	<10
150549	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--
150549	110	<10	<10	<10	<10	8,800	<10	<10	<10
150549	<50	<50	<50	<50	<50	<50	<50	<50	21
150549	<50	<50	<50	<50	<50	<50	<50	<50	17
150549	14	<10	<10	<10	62	12	<10	<10	14
150550	--	--	--	--	--	--	--	--	--
150550	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Unique well number	Methylene chloride, total (µg/L)	Methylbromide, total (µg/L)	Tetrachloroethylene, total (µg/L)	1,1,2,2 Tetrachloroethane, total (µg/L)	Toluene, total (µg/L)	1,2-dichloroethylene, total (µg/L)	1,1,1-Trichloroethane, total (µg/L)	1,1,2-Trichloroethane, total (µg/L)	Trichloroethylene, total (µg/L)	Trichlorofluoromethane, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--
150543	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150544	--	--	--	--	--	--	--	--	--	--
150544	62	<10	<10	<10	11	1,300	<10	<10	470	<10
150546	--	--	--	--	--	--	--	--	--	--
150546	51	<10	820	<10	<10	140	<10	<10	150	<10
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150549	<10	<10	105	<10	<10	10,000	<10	<10	9,400	<10
150549	210	<50	59	<50	26	4,700	<50	<50	3,200	<50
150549	500	<50	54	<50	28	4,400	<50	<50	3,100	<50
150549	53	<10	50	<10	30	5,480	<10	<10	5,040	3.0
150550	--	--	--	--	--	--	--	--	--	--
150550	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Appendix 2.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeterat 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Vinyl-chloride, total (µg/L)	Acenaphthylene, total (µg/L)	Acenaphthene, total (µg/L)	Anthracene, total (µg/L)	Benzo(b) fluoranthene, total (µg/L)	Benzo(k) fluoranthene, total (µg/L)	Benzo (a) pyrene, total (µg/L)	bis 2-Chloroethyl ether, total (µg/L)	bis (2-Chloroethoxy) methane, total (µg/L)	bis (2-Chloroisopropyl) ether, total (µg/L)	n-Butyl benzyl phthalate, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--	--
150543	<3.0	--	--	--	--	--	--	--	--	--	--
150544	--	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	10.0	<5.0	<5.0	<5.0
150544	29	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	4.5	<5.0	<5.0	<5.0
150546	--	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150546	12	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150549	--	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150549	--	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150549	<10	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150549	210	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150549	210	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0
150549	393	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150550	--	--	--	--	--	--	--	--	--	--	--
150550	<3.0	--	--	--	--	--	--	--	--	--	--

Unique well number	Chrysene, total (µg/L)	Diethyl phthalate, total (µg/L)	Dimethyl phthalate, total (µg/L)	Fluoranthene, total (µg/L)	Fluorene, total (µg/L)	Hexachlorocyclopentadiene, total (µg/L)	Hexachloroethane, total (µg/L)	Indeno (1,2,3-CD) pyrene, total (µg/L)	Isophorone, total (µg/L)	n-Nitrosodi-n-propylamine, total (µg/L)	n-Nitrosodiphenylamine, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--	--	--
150544	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	6.0	<5.0	<5.0
150544	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	4.3	<5.0	<5.0
150546	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0
150546	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0
150549	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	19.0	<5.0	18.0
150549	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	22.0	<5.0	21.0
150549	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	33.0	<10.0	17.0
150549	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	15.0	<5.0	27.0
150549	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	14.0	<5.0	34.0
150549	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	24.0	<10.0	18.0
150550	--	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--	--

Unique well number	n-Nitrosodimethylamine, total (µg/L)	Nitrobenzene, total (µg/L)	Parachlorometa cresol, total (µg/L)	Phenanthrene, total (µg/L)	Pyrene, total (µg/L)	Benzo (g,h,i) perylene total (µg/L)	Benzo (A) anthracene, total (µg/L)	1,2-Dichlorobenzene, total (µg/L)	1,2,4-Trichlorobenzene, total (µg/L)	1,2,5,6-Dibenzanthracene, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--	--
150544	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	55.0	<5.0	<10.0
150544	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	140	<5.0	<10.0
150546	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<10.0
150546	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<10.0
150549	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<10.0
150549	<5.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<10.0
150549	<10.0	5.0	<10.0	<10.0	<10.0	<10.0	<10.0	2.0	1.0	<10.0
150549	1.1	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	2.0	<5.0	<10.0
150549	1.0	<5.0	<30.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<10.0
150549	<10.0	1.0	<10.0	<10.0	<10.0	<10.0	<10.0	4.0	1.0	<10.0
150550	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--

Appendix 2.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeterat 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	1,3-Dichlorobenzene, total (µg/L)	1,4-Dichlorobenzene, total (µg/L)	2-Chloronaphthalene, total (µg/L)	2-chlorophenol, total (µg/L)	2-Nitrophenol, total (µg/L)	Di-n-octyl phthalate, total (µg/L)	2,4-Dichlorophenol, total (µg/L)	2,4-Dimethylphenol, total (µg/L)	2,4-Dinitrotoluene, total (µg/L)	2,4,-Dinitrophenol, total (µg/L)	2,4,6-Trichlorophenol, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--	--	--
150544	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150544	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	4.9	<5.0	<20.0	<20.0
150546	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150546	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150549	<5.0	<5.0	<5.0	<5.0	5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150549	<5.0	<5.0	<5.0	<5.0	5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150549	<10.0	2.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150549	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150549	<5.0	<5.0	<5.0	<5.0	3.2	<10.0	<5.0	<5.0	<5.0	<20.0	<20.0
150549	<10.0	3.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150550	--	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--	--

Unique well number	2,6-Dinitrotoluene, total (µg/L)	3,3'-Dichlorobenzidine, total (µg/L)	4-Bromophenyl phenyl ether, total (µg/L)	4-Chlorophenyl phehyl ether, total (µg/L)	4-Nitrophenol, total (µg/L)	4,6-Dinitro-ortho-cresol, total (µg/L)	Phenol, total (µg/L)	Naphthalene, total (µg/L)	Pentachlorophenol, total (µg/L)
150543	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--
150544	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	10.0	<30.0
150544	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	23.0	<30.0
150546	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	<5.0	<30.0
150546	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	<5.0	<30.0
150549	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	68.0	<30.0
150549	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	75.0	<30.0
150549	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	5.0	67.0	<10.0
150549	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	88.0	<30.0
150549	<5.0	--	<5.0	<5.0	<30.0	<30.0	<5.0	69.0	<30.0
150549	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	70.0	<10.0
150550	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--

Unique well number	bis(2-Ethyl hexyl) phthalate, total (µg/L)	Di-n-butyl phthalate, total (µg/L)	Benzidine, total (µg/L)	Hexachlorobenzene, total (µg/L)	Hexachlorobutadiene, total (µg/L)	Aldrin, total (µg/L)	Chlordane, total (µg/L)	DDD, total (µg/L)	DDE, total (µg/L)	DDT, total (µg/L)	Diazinon, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--	--	--
150544	<5.0	<5.0	--	<5.0	<5.0	<0.10	<1.0	<0.10	<0.10	<0.10	<0.10
150544	<5.0	<5.0	--	<5.0	<5.0	--	--	--	--	--	--
150546	<5.0	<5.0	--	<5.0	<5.0	<.10	<1.0	<.10	<.10	<.10	<.10
150546	<5.0	<5.0	--	<5.0	<5.0	--	--	--	--	--	--
150549	<5.0	<5.0	--	<5.0	<5.0	<.10	<1.0	<.10	<.10	<.10	<.10
150549	<5.0	<5.0	--	<5.0	<5.0	<.10	<1.0	<.10	<.10	<.10	<.10
150549	<10.0	<10.0	<10.0	<10.0	<10.0	--	--	--	--	--	--
150549	<5.0	<5.0	--	<5.0	<5.0	--	--	--	--	--	--
150549	<5.0	<5.0	--	<5.0	<5.0	--	--	--	--	--	--
150549	<10.0	<10.0	<10.0	<10.0	<10.0	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--	--

Appendix 2.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Chemical Leaman Tank Lines, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeterat 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Dieldrin, total (µg/L)	Endrin, total (µg/L)	Endosulfan, total (µg/L)	Ethion, total (µg/L)	Heptachlor, total (µg/L)	Heptachlor epoxide total (µg/L)	Lindane total (µg/L)	Malathion, total (µg/L)	Methoxychlor, total (µg/L)	Methyl parathion, total (µg/L)
150543	--	--	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--	--	--
150544	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
150544	--	--	--	--	--	--	--	--	--	--
150546	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10
150546	--	--	--	--	--	--	--	--	--	--
150549	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10
150549	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--	--	--

Unique well number	Methyl trithion, total (µg/L)	Mirex, total (µg/L)	Gross PCB's, total (µg/L)	Gross PCN's, total (µg/L)	Parathion, total (µg/L)	Perthane total (µg/L)	Total trithion (µg/L)	Toxaphene, total (µg/L)
150543	--	--	--	--	--	--	--	--
150543	--	--	--	--	--	--	--	--
150544	<0.10	<0.10	<1.0	<1.0	<0.10	<1.0	<0.10	<10
150544	--	--	--	--	--	--	--	--
150546	<.10	<.10	<1.0	<1.0	<.10	<1.0	<.10	<10
150546	--	--	--	--	--	--	--	--
150549	<.10	<.10	<1.0	<1.0	<.10	<1.0	<.10	<10
150549	<.10	<.10	<1.0	<1.0	<.10	<1.0	<.10	10
150549	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--
150549	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--
150550	--	--	--	--	--	--	--	--

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for groundwater samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <less than]

Unique well number	Station number	Local well name or number	Sample-collection date	Code of agency analyzing sample	Alkalinity, whole water, total, field (mg/L as $CaCO_3$)	Dissolved oxygen, field (mg/L)	pH, field	Specific conductance, field (µS/cm)	Temperature, water, field (°C)
150163	394747075241001	OB3	06-04-84	80010	266	0.1	6.60	1,060	15.0
150444	394737075224301	7D	05-31-84	80010	398	.1	6.40	950	15.0
150450	394726075231801	10D	06-01-84	80010	205	.2	6.40	1,050	14.5
150596	394730075240602	28S	05-31-84	80010	38	--	6.30	640	17.0
150597	394730075240601	28D	05-31-84	80010	112	.3	6.70	1,370	13.5
150598	394738075235701	1S	06-01-84	80010	110	--	6.20	540	15.0
150599	394743075240501	50-1A	06-04-84	80010	1220	.3	6.70	3,750	17.0
150599	394743075240501	50-1A	06-04-84	80010	--	--	--	--	--
150600	394738075233402	35S	05-29-84	80010	74	--	6.10	--	15.0
150601	394738075233401	35D	05-29-84	80010	73	.3	6.30	--	16.0
150602	394741075241701	5D	06-04-84	80010	172	.1	6.50	1,130	15.5
150603	394742075241901	52-1	06-04-84	80010	175	--	6.70	370	14.5
150604	394726075231802	10S	06-01-84	80010	602	.5	6.70	1,450	12.0
150604	394726075231802	10S	06-01-84	80010	--	--	--	--	--
150604	394726075231802	10S	06-01-84	99001	--	--	--	--	--
150605	394737075224302	7S	05-31-84	80010	244	.2	6.50	780	14.0
150605	394737075224302	7S	05-31-84	80010	--	.2	6.50	780	14.0

Unique well number	Solids, residue at 180 °C (mg/L)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Nitrogen, ammonia + organic, dissolved (mg/L as N)	Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Calcium dissolved (mg/L as Ca)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)
150163	708	17.0	<0.010	15	<0.100	0.040	19	160	0.30
150444	623	17.0	<.010	15	<.100	.030	25	70	.10
150450	754	14.0	<.010	13	<.100	<.010	15	190	.20
150596	651	.060	<.010	.50	<.100	.550	56	160	.20
150597	906	.520	<.010	.30	<.100	<.010	13	350	.10
150598	534	.500	<.010	1.2	.160	.030	55	53	.30
150599	3,090	3.90	<.010	8.5	<.100	.290	250	650	.40
150599	3,530	3.20	<.010	5.4	<.100	.460	260	680	.40
150600	339	.050	<.010	1.2	.280	.040	32	6.4	.70
150601	570	.460	<.010	.50	<.100	<.010	11	150	<.10
150602	805	8.80	<.010	5.5	<.100	<.010	16	220	.20
150603	344	4.00	<.010	4.2	<.100	.020	14	11	.20
150604	954	41.0	<.010	33	<.100	.030	90	27	.30
150604	--	--	--	--	--	--	--	--	--
150604	--	--	--	--	--	--	--	--	--
150605	736	9.00	<.010	8.5	<.100	.090	54	59	.10
150605	568	9.20	<.010	7.5	<.100	.090	55	62	.20

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for groundwater samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	Iron, dissolved (µg/L as Fe)	Magnesium, dissolved (mg/L as Mg)	Manganese, dissolved (µg/L as Mn)	Potassium, dissolved (mg/L as K)	Silica, dissolved (mg/L as SiO_2)	Sodium, dissolved (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Arsenic, dissolved (µg/L as As)	Cadmium, dissolved (µg/L as Cd)
150163	55,000	9.3	1,100	5.6	38	110	2.2	1	3
150444	130,000	15	3,600	4.7	52	36	3.1	2	8
150450	100,000	15	2,100	3.7	28	66	1.3	17	7
150596	58	5.8	160	3.7	7.5	36	7.1	5	<1
150597	32,000	5.3	570	2.9	15	210	19	1	2
150598	5,100	13	1,800	4.5	32	15	55	3	<1
150599	59,000	110	1,400	5.9	35	190	39	38	<10
150599	66,000	120	1,600	6.2	52	190	37	18	<10
150600	10,000	8.2	2,100	7.5	31	4.7	64	5	<10
150601	74,000	9.2	1,200	2.2	26	55	24	1	<10
150602	60,000	7.3	590	4.7	38	140	1.0	1	4
150603	63,000	8.7	4,200	3.2	54	4.6	10	39	4
150604	56,000	48	1,100	10	32	36	20	10	4
150604	53,000	--	--	--	--	--	--	8	<10
150604	41,000	--	--	--	--	--	--	10	<10
150605	33,000	32	3,100	4.5	59	8.5	85	2	2
150605	33,000	32	3,100	4.5	58	8.7	76	3	2

Unique well number	Chromium, dissolved (µg/L as Cr)	Chromium, hexavalent, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Mercury, dissolved (µg/L as Hg)	Zinc, dissolved (µg/L as Zn)	Carbon, organic total (mg/L as C)	Benzene, total (µg/L)	Bromoform, total (µg/L)	Carbon tetrachloride, total (µg/L)	Chlorobenzene, total (µg/L)	Chlorodibromomethane, total (µg/L)	Chloroethane, total (µg/L)
150163	10	1	10	0.2	13	6.6	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150444	20	<1	70	.2	160	3.8	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150450	20	1	50	.5	8	4.1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150596	10	<1	<10	.4	200	12	<3.0	<3.0	<3.0	<3.0	<3.0	--
150597	10	1	<10	.2	98	4.1	<3.0	<3.0	<3.0	<3.0	<3.0	--
150598	10	<1	10	.5	410	22	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150599	10	<1	<100	.2	40	140	16	<3.0	<3.0	3.1	<3.0	<3.0
150599	20	1	<100	.4	230	140	16	<3.0	<3.0	3.7	<3.0	<3.0
150600	20	1	<100	.2	600	18	5.0	<3.0	<3.0	<3.0	<3.0	--
150601	10	<1	<100	.2	50	1.8	<3.0	<3.0	<3.0	<3.0	<3.0	--
150602	10	1	20	.3	99	7.4	<3.0	<3.0	<3.0	<3.0	<3.0	--
150603	20	1	30	.1	210	15	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150604	10	<1	<10	.6	17	90	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150604	10	<1	<100	.8	<10	90	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150604	<10	--	<10	<.3	60	--	<10	<10	<10	<10	<10	<10
150605	10	<1	<10	.4	150	15	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150605	10	<1	<10	.1	30	8.1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for groundwater samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	2-Chloroethylvinyl ether, total (µg/L)	Chloroform, total (µg/L)	Dichlorobromomethane, total (µg/L)	Dichlorodifluoromethane, total (µg/L)	1,1-Dichloroethane, total (µg/L)	1,2-Dichloroethane, total (µg/L)	1,1-Dichloroethylene, total (µg/L)	1,2-Dichloropropane, total (µg/L)	1,3-Dichloropropane, total (µg/L)	Ethylbenzene, total (µg/L)	Methylene chloride, total (µg/L)	Methylbromide, total (µg/L)
150163	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150444	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150450	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150596	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150597	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150598	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150599	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	8.5	<3.0
150599	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150600	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150601	--	<3.0	<3.0	<3.0	<3.0	9.6	<3.0	<3.0	--	<3.0	<3.0	--
150602	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150603	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	6.9	<3.0
150604	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150604	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150604	<10	2.0	<10	<10	<10	<10	<10	<10	<10	1.0	5.0	<10
150605	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150605	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

Unique well number	Tetrachloroethylene, total (µg/L)	1,1,2,2 Tetrachloroethane, total (µg/L)	Toluene, total (µg/L)	1,2-Dichloroethylene, total (µg/L)	1,1,1-Trichloroethane, total (µg/L)	1,1,2-Trichloroethane, total (µg/L)	Trichloroethylene, total (µg/L)	Trichlorofluoromethane, total (µg/L)	Vinyl chloride, total (µg/L)	Acenaphthene, total (µg/L)	Acenaphthylene, total (µg/L)	Anthracene, total (µg/L)
150163	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150444	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150450	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150596	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150597	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150598	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150599	<3.0	<3.0	6.3	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150599	<3.0	<3.0	6.9	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150600	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150601	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150602	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150603	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150604	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150604	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150604	2.0	<10	6.0	<10	<10	<10	<10.0	<10	<10	1.0	<10.0	<10.0
150605	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0
150605	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<1.0	<1.0

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	Benzo (a) anthricene, total (µg/L)	Benzo (b) fluoranthene, total (µg/L)	Benzo (k) fluoranthene, total (µg/L)	Benzo (g,h,i) perylene, total (µg/L)	Benzo (a) pyrene, total (µg/L)	Benzidine, total (µg/L)	bis (2-chloroethoxy) methane, total (µg/L)	bis 2-chloroethyl ether, total (µg/L)	bis (2-Chloroisopropyl) ether, total (µg/L)	bis(2-Ethyl hexyl) phthalate, total (µg/L)	4-Bromophenyl phenyl ether, total (µg/L)	n-Butyl benzyl phthalate, total (µg/L)
150163	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10.0	<1.0	<1.0
150444	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150450	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150596	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--
150598	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	8.0	<1.0	<1.0
150600	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--
150603	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	11.0	<1.0	<1.0
150604	1.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	2.0	<10.0	<10.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6.0	<1.0	<1.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0	<1.0

Unique well number	Para-chloro-meta cresol, total (µg/L)	2-Chloro-naphthalene, total (µg/L)	2-Chloro-phenol, total (µg/L)	4-Chloro-phenyl phenyl ehter, total (µg/L)	Chrysene, total (µg/L)	1,2,5,6-Dibenz-anthracene, total (µg/L)	1,2-Dichloro-benzene, total (µg/L)	1,3-Dichloro-benzene, total (µg/L)	1,4-Dichloro-benzene, total (µg/L)	3,3'-Dichloro-benzidine, total (µg/L)	2,4-Dichloro-phenol, total (µg/L)	Diethyl phthalate, total (µg/L)
150163	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150444	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150450	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150596	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--
150598	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	9.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
150599	10.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0
150600	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--
150603	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<10.0	<10.0	<10.0	<10.0	1.0	<10.0	<10.0	<10.0	1.0	<10.0	<10.0	<10.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for groundwater samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	2,4-Dimethylphenol, total (µg/L)	Dimethyl phthalate, total (µg/L)	Di-n-butyl phthalate, total (µg/L)	4,6-Dinitro-ortho-cresol, total (µg/L)	2,4-Dinitrophenol, total (µg/L)	2,4-Dinitrotoluene, total (µg/L)	2,6-Dinitrotoluene, total (µg/L)	Di-n-octyl phthalate, total (µg/L)	Fluoranthene, total (µg/L)	Fluorene, total (µg/L)	Hexachlorobenzene, total (µg/L)	Hexachlorobutadiene, total (µg/L)
150163	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150444	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150450	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150596	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--
150598	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150600	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--
150603	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<10.0	<10.0	1.0	<10.0	<10.0	<10.0	<10.0	<10.0	2.0	<10.0	<10.0	<10.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Unique well number	Hexachlorocyclopentadiene, total (µg/L)	Hexachloroethane, total (µg/L)	Indeno (1,2,3-CD) pyrene, total (µg/L)	Isophorone, total (µg/L)	Naphthalene, total (µg/L)	Nitrobenzene, total (µg/L)	2-Nitrophenol, total (µg/L)	4-Nitrophenol, total (µg/L)	n-Nitrosodimethylamine, total (µg/L)	n-Nitrosodiphenylamine, total (µg/L)	n-Nitrosodi-n-propylamine, total (µg/L)	Pentachlorophenol, total (µg/L)	Phenanthrene, total (µg/L)
150163	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150444	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150450	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150596	--	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--	--
150598	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150600	--	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--	--
150603	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150604	<10.0	<10.0	<10.0	<10.0	5.0	<10.0	<10.0	--	<10.0	3.0	<10.0	<10.0	2.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	Phenol, total (µg/L)	Pyrene, total (µg/L)	2,3,7,8 Tetra-chlorodi-benzo-P-dioxin, total (µg/L)	1,2,4-Tri-chloro-benzene, total (µg/L)	2,4,6-Tri-chloro-phenol, total (µg/L)	Aldrin, total (µg/L)	Chlor-dane, total (µg/L)	DDD, total (µg/L)	DDE, total (µg/L)	DDT, total (µg/L)	Di-azinon, total (µg/L)	Di-eldrin, total (µg/L)
150163	<1.0	<1.0	<1.0	<1.0	<1.0	<0.010	<0.1	<0.010	<0.010	<0.010	--	<0.010
150444	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	--	<.010
150450	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	--	<.010
150596	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--
150598	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	--	<.010
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	--	<.010
150599	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010
150600	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--
150603	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	.18	<.010	<.010	--	<.010
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	.010	<.010	<.010	--	<.010
150604	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	--	<.010
150604	<10.0	2.0	--	<10.0	<10.0	--	--	--	--	--	--	--
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010
150605	<1.0	<1.0	<1.0	<1.0	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010

Unique well number	Endrin, total (µg/L)	Ethion, total (µg/L)	Gross PCB's total (µg/L)	Gross PCN's total (µg/L)	Hepta-chlor, total (µg/L)	Hepta-chlor epoxide total (µg/L)	Lindane total (µg/L)	Mala-thion, total (µg/L)	Meth-oxy-chlor, total (µg/L)	Methyl para-thion, total (µg/L)	Methyl tri-thion, total (µg/L)	Para-thion, total (µg/L)
150163	<0.010	--	<0.1	<0.10	<0.010	<0.010	<0.010	--	<0.01	--	--	--
150444	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150450	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150596	--	--	--	--	--	--	--	--	--	--	--	--
150597	--	--	--	--	--	--	--	--	--	--	--	--
150598	<.010	--	.6	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150599	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150599	<.010	<.01	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01
150600	--	--	--	--	--	--	--	--	--	--	--	--
150601	--	--	--	--	--	--	--	--	--	--	--	--
150602	--	--	--	--	--	--	--	--	--	--	--	--
150603	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150604	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150604	<.010	--	<.1	<.10	<.010	<.010	<.010	--	<.01	--	--	--
150604	--	--	--	--	--	--	--	--	--	--	--	--
150605	<.010	<.01	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01
150605	<.010	<.01	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01

Appendix 3.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for groundwater samples from wells at Monsanto Company, Logan Township, Gloucester County, N.J., 1984--Continued

Unique well number	Perthane, total (µg/L)	Toxaphene, total (µg/L)	Total trithion, (µg/L)	Mirex, total (µg/L)
150163	<0.1	<1	--	<0.01
150444	<.1	<1	--	<.01
150450	<.1	<1	--	<.01
150596	--	--	--	--
150597	--	--	--	--
150598	<.1	<1	--	<.01
150599	<.1	<1	--	<.01
150599	<.1	<1	<.01	<.01
150600	--	--	--	--
150601	--	--	--	--
150602	--	--	--	--
150603	<.1	<1	--	<.01
150604	<.1	<1	--	<.01
150604	<.1	<1	--	<.01
150604	--	--	--	--
150605	<.1	<1	<.01	<.01
150605	<.1	<1	<.01	<.01

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Station number	Local well name or number	Sample-collection date	Code of agency analyzing sample	Alkalinity, whole water, total, field (mg/L as $CaCO_3$)	Dissolved oxygen, field (mg/L)	pH, field	Specific conductance, field (µS/cm)	Temperature, water, field (°C)
150354	394717075211701	DP2	06-06-84	80010	2	0.3	4.80	159	14.0
150387	394713075212101	DP1	06-07-84	80010	37	0.3	6.40	398	14.0
150388	394716075204701	DP3	06-07-84	80010	2	7.1	5.00	288	14.5
150570	394705075210901	W23	06-08-84	80010	27	--	6.50	145	12.0
150572	394721075205601	W18	06-13-84	80010	3	--	4.70	280	15.0
150573	394715075205001	U	06-07-84	80010	1	--	5.10	150	12.5
150575	394719075210802	MA-11D	06-11-84	80010	--	--	4.43	375	13.5
150576	394719075210801	MA-11I	06-11-84	80010	--	--	4.40	358	--
150577	394717075210803	MA-8D	06-12-84	80010	108	--	6.50	585	14.0
150577	394717075210803	MA-8D	09-24-84	80020	--	0	6.50	480	14.0
150578	394717075210802	MA-8I	06-12-84	80010	1	--	4.90	375	14.0
150578	394717075210802	MA-8I	09-24-84	80020	--	0.4	5.00	418	14.5
150579	394717075210801	MA-8S	06-12-84	80010	79	--	6.10	440	13.0
150579	394717075210801	MA-8S	09-24-84	80020	--	0	6.20	515	14.5
150580	394718075210202	MA-5D	06-11-84	80010	--	--	4.50	330	14.0
150581	394718075210201	MA-5I	06-11-84	80010	--	--	4.60	347	14.0
150582	394715075210603	MA-1D	06-15-84	80020	2,420	--	6.90	8,300	--
150582	394715075210603	MA-1D	09-28-84	80020	--	0	7.00	7,800	--
150583	394715075210602	MA-1I	06-15-84	80020	1,650	--	6.90	6,300	13.5
150583	394715075210602	MA-1I	09-28-84	80020	--	0	6.80	3,630	14.0
150584	394715075210601	MA-1S	06-15-84	80020	163	--	5.80	1,180	12.5
150584	394715075210601	MA-1S	09-28-84	80020	--	0	6.00	740	15.0
150585	394704075205801	DP5	06-06-84	80010	4	6.7	4.60	286	14.5
150585	394704075205801	DP5	03-13-85	99001	--	--	4.60	330	14.0
150586	394720075205201	DP4	06-06-84	80010	7	2.3	5.20	187	14.5
150587	394707075205501	C	06-08-84	80010	6	--	5.30	305	13.5
150588	394717075210902	31D	06-14-84	80020	1,070	--	6.60	3,950	13.5
150588	394717075210902	31D	09-28-84	80020	--	--	--	--	15.5
150589	394717075210201	31S	06-14-84	80020	220	--	6.20	1,360	13.5
150589	394717075210201	31S	09-28-84	80020	--	1.0	6.20	1,270	15.5
150590	394704075211401	26	06-14-84	80020	399	--	6.30	2,130	14.0
150590	394704075211401	26	09-26-84	80020	--	0	6.30	1,840	16.0
150591	394714075211601	25	06-13-84	80010	82	--	6.50	5,550	15.0
150592	394710075210701	22	06-13-84	80010	49	--	5.84	6,600	16.0
150592	394710075210701	22	06-13-84	99001	--	--	--	--	--
150592	394710075210701	22	06-13-84	80010	--	--	--	--	--
150592	394710075210701	22	09-26-84	80020	--	2.6	6.00	7,500	24.0
150592	394710075210701	22	09-26-84	99001	--	--	--	--	--
150592	394710075210701	22	09-26-84	80020	--	--	--	--	--
150593	394707075210201	20B	06-12-84	80010	558	--	6.40	3,030	13.0
150593	394707075210201	20B	09-24-84	80020	--	0	6.40	3,230	16.0
150594	394714075211001	15	06-13-84	80010	452	--	6.00	4,400	16.5
150594	394714075211001	15	06-13-84	99001	--	--	--	--	--
150594	394714075211001	15	06-13-84	80010	--	--	--	--	--
150594	394714075211001	15	09-26-84	80020	--	0	6.40	6,300	20.0
150594	394714075211001	15	09-26-84	99001	--	--	--	--	--
150594	394714075211001	15	09-26-84	80020	--	--	--	--	--
150595	394714075210601	4	06-14-84	80020	92	--	6.20	1,130	14.5
150595	394714075210601	4	09-26-84	80020	--	0	6.30	910	18.5

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Solids, residue at 180 °C (mg/L)	Nitrogen, ammonia, dissolved (mg/L as N)	Nitrogen, ammonia total (mg/L as N)	Nitrogen, nitrite, dissolved (mg/L as N)	Nitrogen, nitrite, total (mg/L as N)	Nitrogen, ammonia + organic, dissolved (mg/L as N)	Nitrogen, ammonia + organic, total (mg/L as N)	Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Nitrogen, NO_2+NO_3, total (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)
150354	101	0.160	--	<0.010	--	0.30	--	3.00	--	<0.010
150387	196	.200	--	<.010	--	.10	--	<.100	--	<.010
150388	180	.060	--	<.010	--	<.10	--	9.30	--	<.010
150570	88	.660	--	<.010	--	.40	--	<.100	--	<.010
150572	180	.080	--	<.010	--	.20	--	6.10	--	<.010
150573	86	.010	--	<.010	--	<.10	--	4.00	--	<.010
150575	152	.060	--	<.010	--	<.10	--	12.0	--	<.010
150576	224	.040	--	<.010	--	<.10	--	12.0	--	<.010
150577	352	1.10	--	<.010	--	.90	--	.350	--	<.010
150577	--	--	--	--	--	--	--	--	--	--
150578	295	.360	--	.010	--	<.10	--	5.10	--	<.010
150578	--	--	--	--	--	--	--	--	--	--
150579	222	.850	--	<.010	--	1.7	--	<.100	--	<.010
150579	--	--	--	--	--	--	--	--	--	--
150580	218	.010	--	<.010	--	<.10	--	11.0	--	<.010
150581	218	.050	--	<.010	--	<.10	--	14.0	--	<.010
150582	4,880	--	74.0	--	.190	--	150	--	<.100	--
150582	--	--	--	--	--	--	--	--	--	--
150583	3,630	--	86.0	--	.050	--	80	--	<.100	--
150583	--	--	--	--	--	--	--	--	--	--
150584	688	--	34.0	--	.020	--	60	--	<.100	--
150584	--	--	--	--	--	--	--	--	--	--
150585	223	.010	--	<.010	--	<.10	--	8.30	--	<.010
150585	--	--	--	--	--	--	--	--	--	--
150586	107	.010	--	.020	--	.10	--	6.20	--	<.010
150587	208	.030	--	<.010	--	<.10	--	12.0	--	<.010
150588	2,330	--	<.010	--	.110	--	20	--	<.100	--
150588	--	--	--	--	--	--	--	--	--	--
150589	742	1.30	--	.090	--	20	--	3.60	--	.030
150589	--	--	--	--	--	--	--	--	--	--
150590	1,250	--	21.0	--	<.010	--	30	--	<.100	--
150590	--	--	--	--	--	--	--	--	--	--
150591	3,590	--	4.40	--	<.010	--	3.3	--	<.100	--
150592	--	--	10.0	--	<.010	--	6.3	--	<.100	--
150592	--	--	--	--	--	--	--	--	--	--
150592	--	--	10.0	--	<.010	--	8.5	--	<.100	--
150592	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--
150593	3,360	--	25.0	--	.050	--	21	--	.270	--
150593	--	--	--	--	--	--	--	--	--	--
150594	1,660	--	15.0	--	.010	--	16	--	.710	--
150594	--	--	--	--	--	--	--	--	--	--
150594	2,260	--	28.0	--	.010	--	24	--	.460	--
150594	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--
150595	541	--	15.0	--	.010	--	<20	--	<.100	--
150595	--	--	--	--	--	--	--	--	--	--

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Phosphorus, ortho, total (mg/L as P)	Calcium, dissolved (mg/L as Ca)	Calcium, total recoverable (mg/L as Ca)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Fluoride, total (mg/L as F)	Iron, dissolved (µg/L as Fe)	Iron, total recoverable (µg/L as Fe)	Magnesium, dissolved (mg/L as Mg)
150354	--	5.2	--	25	0.10	--	22	--	2.1
150387	--	5.4	--	90	.10	--	6,700	--	1.9
150388	--	15	--	23	<.10	--	30	--	13
150570	--	7.4	--	12	.10	--	8,200	--	2.7
150572	--	16	--	32	.10	--	6	--	6.4
150573	--	12	--	2.3	<.10	--	25	--	2.6
150575	--	26	--	22	.20	--	10	--	13
150576	--	23	--	21	.20	--	7	--	13
150577	--	23	--	55	.20	--	2,500	--	13
150577	--	--	--	--	--	--	--	--	--
150578	--	30	--	23	.20	--	45	--	14
150578	--	--	--	--	--	--	--	--	--
150579	--	9.3	--	55	.20	--	32,000	--	6.9
150579	--	--	--	--	--	--	--	--	--
150580	--	24	--	21	.20	--	19	--	10
150581	--	27	--	33	.20	--	13	--	10
150582	.410	--	100	1,100	--	.3	--	4,000	--
150582	--	--	--	--	--	--	--	--	--
150583	.290	--	120	820	--	2.0	--	4,300	--
150583	--	--	--	--	--	--	--	--	--
150584	.010	--	44	210	--	<.1	--	83,000	--
150584	--	--	--	--	--	--	--	--	--
150585	--	12	--	24	<.10	--	51	--	13
150585	--	--	--	--	--	--	--	--	--
150586	--	11	--	16	.10	--	970	--	6.8
150587	--	27	--	7.4	.10	--	290	--	8.3
150588	.120	--	70	560	--	<.1	--	5,500	--
150588	--	--	--	--	--	--	--	--	--
150589	--	38	--	180	.30	--	36,000	--	22
150589	--	--	--	--	--	--	--	--	--
150590	.030	--	160	450	--	<.1	--	150,000	--
150590	--	--	--	--	--	--	--	--	--
150591	.050	--	500	2,000	--	4.2	--	20,000	--
150592	<.010	--	710	2,100	--	.4	--	32,000	--
150592	--	--	--	--	--	--	--	24,000	--
150592	<.010	--	700	2,100	--	.3	--	32,000	--
150592	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--
150593	<.010	--	100	530	--	.2	--	33,000	--
150593	--	--	--	--	--	--	--	--	--
150594	<.010	--	14	420	--	.8	--	8,100	--
150594	--	--	--	--	--	--	--	12,000	--
150594	<.010	--	16	760	--	1.1	--	15,000	--
150594	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--
150595	.110	--	69	220	--	<.1	--	58,000	--
150595	--	--	--	--	--	--	--	--	--

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Magnesium, total recoverable (mg/L as Mg)	Manganese, dissolved (µg/L as Mn)	Manganese, total recoverable (µg/L as Mn)	Potassium, dissolved (mg/L as K)	Potassium, total recoverable (mg/L as K)	Silica, dissolved (mg/L as SiO_2)	Silica total (mg/L-SiO_2)	Sodium, dissolved (mg/L as Na)	Sodium, total recoverable (mg/L as Na)	Sulfate, dissolved (mg/L as SO_4)	Sulfate, total (mg/L as SO_4)
150354	--	76	--	2.1	--	10	--	14	--	9.0	--
150387	--	99	--	2.2	--	11	--	54	--	7.9	--
150388	--	54	--	6.6	--	7.2	--	4.7	--	46	--
150570	--	120	--	2.0	--	8.0	--	5.9	--	20	--
150572	--	150	--	5.6	--	7.5	--	16	--	50	--
150573	--	16	--	7.3	--	6.6	--	1.6	--	33	--
150575	--	310	--	11	--	7.5	--	4.3	--	66	--
150576	--	310	--	9.7	--	7.6	--	4.9	--	59	--
150577	--	510	--	5.8	--	5.1	--	68	--	79	--
150577	--	--	--	--	--	--	--	--	--	--	--
150578	--	740	--	7.6	--	6.8	--	6.3	--	95	--
150578	--	--	--	--	--	--	--	--	--	--	--
150579	--	160	--	2.5	--	4.6	--	48	--	75	--
150579	--	--	--	--	--	--	--	--	--	--	--
150580	--	330	--	9.7	--	6.8	--	4.6	--	52	--
150581	--	66	--	11	--	6.4	--	4.1	--	60	--
150582	130	--	470	--	44	--	12	--	1,400	--	160
150582	--	--	--	--	--	--	--	--	--	--	--
150583	76	--	3,100	--	67	--	13	--	1,000	--	610
150583	--	--	--	--	--	--	--	--	--	--	--
150584	9.6	--	1,300	--	43	--	17	--	98	--	300
150584	--	--	--	--	--	--	--	--	--	--	--
150585	--	54	--	4.7	--	7.1	--	7.5	--	46	--
150585	--	--	--	--	--	--	--	--	--	--	--
150586	--	160	--	3.7	--	7.5	--	4.3	--	25	--
150587	--	150	--	7.7	--	6.6	--	2.1	--	60	--
150588	83	--	820	--	19	--	2.3	--	680	--	130
150588	--	--	--	--	--	--	--	--	--	--	--
150589	--	750	--	43	--	14	--	180	--	190	--
150589	--	--	--	--	--	--	--	--	--	--	--
150590	42	--	3,800	--	58	--	9.8	--	150	--	130
150590	--	--	--	--	--	--	--	--	--	--	--
150591	270	--	840	--	17	--	7.4	--	94	--	300
150592	340	--	1,400	--	20	--	1.5	--	120	--	930
150592	--	--	--	--	--	--	--	--	--	--	--
150592	330	--	1,400	--	20	--	1.4	--	120	--	910
150592	--	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--	--
150593	59	--	960	--	10	--	2.5	--	390	--	210
150593	--	--	--	--	--	--	--	--	--	--	--
150594	4.0	--	210	--	37	--	19	--	480	--	280
150594	--	--	--	--	--	--	--	--	--	--	--
150594	5.8	--	320	--	37	--	19	--	830	--	530
150594	--	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--	--
150595	13	--	1,700	--	30	--	18	--	82	--	83
150595	--	--	--	--	--	--	--	--	--	--	--

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Arsenic, dissolved (µg/L as As)	Arsenic, total (µg/L as As)	Cadmium, dissolved (µg/L as Cd)	Cadmium, total recoverable (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Chromium, total recoverable (µg/L as Cr)	Chromium, hexavalent, dissolved (µg/L as Cr)	Lead, dissolved (µg/L as Pb)	Lead, total recoverable (µg/L as Pb)	Mercury, dissolved (µg/L as Hg)
150354	1	--	<1	--	10	--	<1	<10	--	0.2
150387	4	--	<1	--	10	--	<1	<10	--	.7
150388	1	--	<1	--	10	--	<1	<10	--	<.1
150570	1	--	1	--	10	--	<1	<10	--	<.1
150572	1	--	<1	--	10	--	<1	20	--	.1
150573	1	--	<1	--	10	--	<1	<10	--	<.1
150575	1	--	<10	--	20	--	2	<100	--	.1
150576	1	--	<1	--	10	--	1	<10	--	<.1
150577	3	--	<1	--	10	--	<1	<10	--	.4
150577	--	--	--	--	--	--	--	--	--	--
150578	1	--	<1	--	10	--	1	<10	--	.1
150578	--	--	--	--	--	--	--	--	--	--
150579	8	--	<2	--	30	--	<1	<10	--	.1
150579	--	--	--	--	--	--	--	--	--	--
150580	1	--	<1	--	20	--	1	<10	--	<.1
150581	1	--	<1	--	10	--	<1	<10	--	.2
150582	--	200	--	<100	--	2,000	<1,000	--	300	--
150582	--	--	--	--	--	--	--	--	--	--
150583	--	60	--	<100	--	<100	<1,000	--	400	--
150583	--	--	--	--	--	--	--	--	--	--
150584	--	80	--	<100	--	<100	<1,000	--	<1,000	--
150584	--	--	--	--	--	--	--	--	--	--
150585	1	--	<1	--	10	--	<1	<10	--	.1
150585	--	--	--	--	--	--	--	--	--	--
150586	1	--	<1	--	10	--	<1	<10	--	.1
150587	1	--	<1	--	10	--	<1	<10	--	<.1
150588	--	50	--	<100	--	2,000	<1,000	--	2,600	--
150588	--	--	--	--	--	--	--	--	--	--
150589	<10	--	<100	--	2,000	--	<1,000	<1,000	--	30
150589	--	--	--	--	--	--	--	--	--	--
150590	--	60	--	<100	--	2,000	<1,000	--	<1,000	--
150590	--	--	--	--	--	--	--	--	--	--
150591	--	9	--	<1	--	30	<1	--	50	--
150592	--	3	--	<10	--	40	<1	--	<100	--
150592	--	6	--	<5	--	30	--	--	3	--
150592	--	4	--	<10	--	40	<1	--	<100	--
150592	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--
150593	--	10	--	<10	--	40	<1	--	<100	--
150593	--	--	--	--	--	--	--	--	--	--
150594	--	1	--	<10	--	1,900	2	--	<100	--
150594	--	<10	--	3	--	4,200	--	--	6	--
150594	--	1	--	<10	--	4,700	6	--	<100	--
150594	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--
150595	--	40	--	<100	--	<100	<1,000	--	<1,000	--
150595	--	--	--	--	--	--	--	--	--	--

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[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Mercury, total recoverable (µg/L as Hg)	Zinc, dissolved (µg/L as Zn)	Zinc, total recoverable (µg/L as Zn)	Carbon, organic, total (mg/L as C)	Benzene, total (µg/L)	Bromoform, total (µg/L	Carbon-tetrachloride, total (µg/L)	Chlorobenzene, total (µg/L)	Chlorodibromomethane, total (µg/L)	Chloroethane, total (µg/L)	2-Chloroethylvinylether, total (µg/L)
150354	--	23	--	4.1	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150387	--	84	--	3.1	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150388	--	39	--	1.7	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150570	--	870	--	9.3	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150572	--	24	--	1.7	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150573	--	180	--	1.7	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150575	--	120	--	1.4	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150576	--	120	--	1.3	--	--	--	--	--	--	--
150577	--	<10	--	16	--	--	--	--	--	--	--
150577	--	--	--	--	20	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150578	--	230	--	1.8	--	--	--	--	--	--	--
150578	--	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150579	--	230	--	7.6	--	--	--	--	--	--	--
150579	--	--	--	--	38	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150580	--	<41	--	2.1	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150581	--	37	--	1.1	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150582	<.10	--	370	340	--	--	--	--	--	--	--
150582	--	--	--	--	1,600	<10	<10	66	<10	<10	<10
150583	--	--	1,200	150	--	--	--	--	--	--	--
150583	--	--	--	--	2,500	<10	120	260	<10	<10	<10
150584	22	--	720	500	--	--	--	--	--	--	--
150584	--	--	--	--	1,500	<100	380	<100	<100	<100	<100
150585	--	270	--	1.6	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150585	--	--	--	--	<10	<10	<10	<10	<10	<10	<10
150586	--	84	--	2.2	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150587	--	420	--	3.6	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150588	<.10	--	500	220	--	--	--	--	--	--	--
150588	--	--	--	--	480	<3.0	<3.0	19	<3.0	<3.0	<3.0
150589	--	600	--	35	160	<5.0	<5.0	14	<5.0	<5.0	<5.0
150589	--	--	--	--	140	<3.0	<3.0	21	<3.0	<3.0	<3.0
150590	370	--	590	41	--	--	--	--	--	--	--
150590	--	--	--	--	57	<5.0	<5.0	240	<5.0	<5.0	<5.0
150591	.70	--	40	8.8	<3.0	<3.0	<3.0	<3.0	<3.0	--	--
150592	.80	--	80	9.1	--	--	--	--	--	--	--
150592	<.30	--	20	--	10	<10	<10	12	<10	<10	<10
150592	.30	--	410	8.9	--	--	--	--	--	--	--
150592	--	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150592	--	--	--	--	<10	<10	<10	<10	<10	<10	<10
150592	--	--	--	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150593	.20	--	30	64	--	--	--	--	--	--	--
150593	--	--	--	--	140	<5.0	88	66	<5.0	<5.0	<5.0
150594	.50	--	280	87	--	--	--	--	--	--	--
150594	.30	--	420	--	676	<10	<10	159	<10	6.0	<10
150594	.60	--	820	170	--	--	--	--	--	--	--
150594	--	--	--	--	1,200	<5.0	<5.0	260	<5.0	<5.0	<5.0
150594	--	--	--	--	1,410	<10	<10	262	<10	<10	<10
150594	--	--	--	--	1,100	<5.0	<5.0	240	<5.0	<5.0	<5.0
150595	170	--	530	30	--	--	--	--	--	--	--
150595	--	--	--	--	410	<5.0	170	65	<5.0	<5.0	<5.0

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[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Chloroform, total (µg/L)	Dichlorobromomethane, total (µg/L)	Dichlorodifluoromethane, total (µg/L)	1,1-Dichloroethane, total (µg/L)	1,2-Dichloroethane, total (µg/L)	1,1-Dichloroethylene, total (µg/L)	1,2-Dichloropropane, total (µg/L)	1,3-Dichloropropane, total (µg/L)	Ethylbenzene, total (µg/L)	Methylene chloride, total (µg/L)	Methylbromide, total (µg/L)
150354	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150387	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150388	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150570	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150572	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150573	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150575	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150576	--	--	--	--	--	--	--	--	--	--	--
150577	--	--	--	--	--	--	--	--	--	--	--
150577	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150578	--	--	--	--	--	--	--	--	--	--	--
150578	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150579	--	--	--	--	--	--	--	--	--	--	--
150579	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	28	<3.0	3.6	<3.0	<3.0
150580	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150581	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150582	--	--	--	--	--	--	--	--	--	--	--
150582	21	<10	<10	30	94	4.7	<10	<10	220	140	<10
150583	--	--	--	--	--	--	--	--	--	--	--
150583	1,700	8.8	<10	190	1,200	78	<10	<10	180	2,400	<10
150584	--	--	--	--	--	--	--	--	--	--	--
150584	2,700	<100	<100	200	1,200	120	<100	<100	380	3,800	<100
150585	<3.0	<3.0	<3.0	<3.0	12	<3.0	<3.0	--	<3.0	<3.0	--
150585	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
150586	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150587	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150588	--	--	--	--	--	--	--	--	--	--	--
150588	<3.0	<3.0	<3.0	10	14	<3.0	<3.0	<3.0	43	28	<3.0
150589	7.0	<5.0	<5.0	14	<5.0	<5.0	<5.0	<5.0	12	<5.0	<5.0
150589	3.1	<3.0	<3.0	8.4	<3.0	<3.0	<3.0	<3.0	12	15	<3.0
150590	--	--	--	--	--	--	--	--	--	--	--
150590	6.2	<5.0	<5.0	14	<5.0	<5.0	<5.0	<5.0	23	<5.0	<5.0
150591	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	--
150592	--	--	--	--	--	--	--	--	--	--	--
150592	<10	<10	<10	22	6.0	<10	<10	<10	8.0	19	<10
150592	--	--	--	--	--	--	--	--	--	--	--
150592	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150592	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
150592	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
150593	--	--	--	--	--	--	--	--	--	--	--
150593	30	<5.0	<5.0	16	53	60	<5.0	<5.0	12	2,600	<5.0
150594	--	--	--	--	--	--	--	--	--	--	--
150594	31	<10	<10	35	22	6.0	1.0	<10	91	139	<10
150594	--	--	--	--	--	--	--	--	--	--	--
150594	110	<5.0	<5.0	90	38	8.2	<5.0	<5.0	140	300	<5.0
150594	110	<10	<10	123	42	<10	<10	<10	215	98	<10
150594	110	<5.0	<5.0	84	41	8.5	<5.0	<5.0	150	240	<5.0
150595	--	--	--	--	--	--	--	--	--	--	--
150595	550	<5.0	<5.0	110	250	25	<5.0	<5.0	99	820	<5.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Tetrachloroethylene, total (µg/L)	1,1,2,2 Tetrachloroethane, total (µg/L)	Toluene, total (µg/L)	1,2-Dichloroethylene, total (µg/L)	1,1,1-Trichloroethane, total (µg/L)	1,1,2-Trichloroethane, total (µg/L)	Trichloroethylene, total (µg/L)	Trichlorofluoromethane, total (µg/L)	Vinyl chloride, total (µg/L)	Acenaphthene, total (µg/L)	Acenaphthylene, total (µg/L)	Anthracene, total (µg/L)
150354	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150387	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150388	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150570	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150572	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150573	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150575	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--	--	--
150577	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150577	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--
150578	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150578	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--
150579	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150579	4.4	<3.0	<3.0	11	<3.0	<3.0	8.4	<3.0	3.1	--	--	--
150580	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150581	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150582	--	--	--	--	--	--	--	--	--	<50.0	<50.0	<50.0
150582	16	<10	190	29	19	<10	76.0	<10	21	<50.0	<50.0	<50.0
150583	--	--	--	--	--	--	--	--	--	<50.0	<50.0	<50.0
150583	160	<10	2,600	240	560	<10	730	<10	140	<50.0	<50.0	<50.0
150584	--	--	--	--	--	--	--	--	--	<2,500	<2,500	<2,500
150584	210	<100	6,000	710	1,600	<100	2,000	<100	<100	<500	<500	<500
150585	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	7.6	<3.0	--	--	--	--
150585	<10	<10	<10	<10	<10	<10	<10.0	<10	<10	--	--	--
150586	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150587	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--	--
150588	<3.0	<3.0	81	12	<3.0	<3.0	20.0	<3.0	6.8	--	--	--
150589	6.5	<5.0	26	130	18	<5.0	17.0	<5.0	<5.0	--	--	--
150589	3.0	<3.0	22	130	9.0	<3.0	17.0	<3.0	26	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--	--
150590	12	<5.0	20	190	<5.0	<5.0	32.0	<5.0	170	--	--	--
150591	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150592	1.0	<10	10	21	8.0	<10	8.0	<10	24	<10.0	<10.0	<10.0
150592	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150592	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<5.0	<5.0	<5.0
150592	<10	<10	<10	<10	<10	<10	<10.0	<10	<10	<10.0	<10.0	<10.0
150592	<3.0	<3.0	<3.0	3.3	<3.0	<3.0	<3.0	<3.0	<3.0	<5.0	<5.0	<5.0
150593	--	--	--	--	--	--	--	--	--	1.0	<1.0	<1.0
150593	180	<5.0	120	37	450	<5.0	350	<5.0	7.7	--	--	--
150594	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150594	10	<10	139	38	11	<10	105	<10	96	<10.0	<10.0	<10.0
150594	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
150594	16	<5.0	230	57	15	<5.0	110	<5.0	80	<50.0	<50.0	<50.0
150594	<10	<10	258	52	18	<10	161	<10	115	<10.0	<10.0	<10.0
150594	33	<5.0	310	63	65	<5.0	130	<5.0	82	<50.0	<50.0	<50.0
150595	--	--	--	--	--	--	--	--	--	<50.0	<50.0	<50.0
150595	81	<5.0	1,400	470	840	<5.0	570	<5.0	31	<50.0	<50.0	<50.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Benzo (a) anthracene, total (µg/L)	Benzo (b) fluoranthene, total (µg/L)	Benzo (k) fluoranthene, total (µg/L)	Benzo (g,h,i) perylene, total (µg/L)	Benzo, (a) pyrene, total (µg/L)	Benzidine, total (µg/L)	bis (2-Chloroethoxy) methane, total (µg/L)	bis 2-Chloroethyl ether, total (µg/L)	bis (2-Chloroisopropyl) ether, total (µg/L)	bis(2-Ethylhexyl) phthalate, total (µg/L)	4-Bromophenyl phenyl ether, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150577	--	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150578	--	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150579	--	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--	--
150582	<50.0	<100	<100	<100	<100	--	<50.0	<50.0	<50.0	<50.0	<50.0
150582	<50.0	<100	<100	<100	<100	--	<50.0	<50.0	<50.0	<50.0	<50.0
150583	<50.0	<100	<100	<100	<100	--	<50.0	240	<50.0	<50.0	<50.0
150583	<50.0	<100	<100	<100	<100	--	<50.0	1,100	<50.0	<50.0	<50.0
150584	<2,500	<5,000	<5,000	<5,000	<5,000	--	<2,500	2,500	<2,500	<2,500	<2,500
150584	<500	<1,000	<1,000	<1,000	<1,000	--	<500	420	<500	<500	<500
150585	--	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<5.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150592	<5.0	<10.0	<10.0	<10.0	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0
150593	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150593	--	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150594	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0	<1.0	<1.0
150594	<50.0	<100	<100	<100	<100	--	<50.0	<50.0	<50.0	<50.0	<50.0
150594	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	14.0	<10.0	<10.0	<10.0
150594	<50.0	<100	<100	<100	<100	--	<50.0	<50.0	<50.0	<50.0	<50.0
150595	<50.0	<100	<100	<100	<100	--	<50.0	51.0	<50.0	<50.0	<50.0
150595	<50.0	<100	<100	<100	<100	--	<50.0	88.0	<50.0	<50.0	<50.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique Well number	n-Butyl benzyl phthalate, total (µg/L)	Para-chloro-meta cresol, total (µg/L)	2-Chloro-naphthalene, total (µg/L)	2-Chloro-phenol, total (µg/L)	4-Chloro-phenyl phenyl ether, total (µg/L)	Chrysene, total (µg/L)	1,2,5,6-Dibenz-anthracene, total (µg/L)	1,2-Dichloro-benzene, total (µg/L)	1,3-Dichloro-benzene, total (µg/L)	1,4-Dichloro-benzene, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150577	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150578	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150579	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--
150582	<50.0	<300	<50.0	<50.0	<50.0	<100	<100	3.8	<50.0	15.0
150582	<50.0	<300	<50.0	28.0	<50.0	<100	<100	<50.0	<50.0	31.0
150583	<50.0	<150	<50.0	10.0	<50.0	<100	<100	21.0	30.0	15.0
150583	<50.0	<300	<50.0	28.0	<50.0	<100	<100	62.0	23.0	<50.0
150584	<2,500	<15,000	<2,500	<2,500	<2,500	<5,000	<5,000	220	<2,500	<2,500
150584	<500	<3,000	<500	<500	<500	<1,000	<1,000	170	<500	<500
150585	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	3.0	<10.0	2.0
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<5.0	<30.0	<5.0	<5.0	<5.0	<10.0	<10.0	<5.0	2.8	<5.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	3.0	<10.0
150592	<5.0	<30.0	<5.0	<5.0	<5.0	<10.0	<10.0	<5.0	2.8	<5.0
150593	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150593	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	9.0	6.0	5.0
150594	<10.0	<10.0	<10.0	21.0	<10.0	<10.0	<10.0	49.0	40.0	28.0
150594	<1.0	<1.0	<1.0	4.0	<1.0	<1.0	<1.0	10.0	8.0	8.0
150594	<50.0	<300	<50.0	18.0	<50.0	<100	<100	60.0	51.0	55.0
150594	<10.0	<10.0	<10.0	45.0	<10.0	<10.0	<10.0	42.0	41.0	36.0
150594	<50.0	<300	<50.0	<50.0	<50.0	<100	<100	55.0	50.0	54.0
150595	<50.0	<30.0	<50.0	<5.0	<50.0	<100	<100	<50.0	<50.0	<50.0
150595	<50.0	<300	<50.0	<50.0	<50.0	<100	<100	36.0	<50.0	<50.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	3,3'-Dichlorobenzidine, total (µg/L)	2,4-Dichlorophenol, total (µg/L)	Diethyl phthalate, total (µg/L)	2,4-Dimethylphenol, total (µg/L)	Dimethyl phthalate, total (µg/L)	Di-n-butyl phthalate, total (µg/L)	4,6-Dinitro-ortho-cresol, total (µg/L)	2,4-Dinitrophenol, total (µg/L)	2,4-Dinitrotoluene, total (µg/L)	2,6-Dinitrotoluene, total (µg/L)	Di-n-octyl phthalate, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150577	--	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150578	--	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150579	--	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--	--
150582	--	180	<50.0	<50.0	<50.0	<50.0	<300	<200	<50.0	<50.0	<100
150582	--	350	<50.0	<50.0	<50.0	<50.0	<300	<200	<50.0	<50.0	<100
150583	--	8.2	<50.0	51.0	<50.0	<50.0	<150	<100	<50.0	<50.0	<100
150583	--	700	<50.0	49.0	<50.0	<50.0	<300	<200	<50.0	<50.0	<100
150584	--	290	<2,500	11,000	<2,500	<2,500	<15,000	10,000	<2,500	<2,500	<5,000
150584	--	<500	<500	7,600	<500	<500	<3,000	2,000	<500	<500	<1,000
150585	--	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<30.0	<20.0	<5.0	<5.0	<10.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150592	--	<5.0	<5.0	<5.0	<5.0	<5.0	<30.0	<20.0	<5.0	<5.0	<10.0
150593	<1.0	25.0	<1.0	6.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150593	--	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<1.0	<1.0	3.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	<10.0	14.0	<10.0	6.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150594	<1.0	4.0	<1.0	5.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	--	<50.0	<50.0	<50.0	<50.0	<50.0	<300	<200	<50.0	<50.0	<100
150594	<10.0	21.0	<10.0	23.0	<10.0	2.0	<10.0	<10.0	<10.0	<10.0	<10.0
150594	--	<50.0	<50.0	<50.0	<50.0	<50.0	<300	<200	<50.0	<50.0	<100
150595	--	17.0	<50.0	160	<50.0	<50.0	<30.0	<20.0	<50.0	<50.0	<100
150595	--	<50.0	<50.0	1,600	<50.0	<50.0	<300	<200	<50.0	<50.0	<100

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Fluoranthene, total (µg/L)	Fluorene, total (µg/L)	Hexachlorobenzene, total (µg/L)	Hexachlorobutadiene, total (µg/L)	Hexachlorocyclopentadiene, total (µg/L)	Hexachloroethane, total (µg/L)	Indeno (1,2,3-CD) pyrene, total (µg/L)	Isophorone, total (µg/L)	Naphthalene, total (µg/L)	Nitrobenzene, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150577	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150578	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150579	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--
150582	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	11.0	15.0	<50.0
150582	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	16.0	<50.0
150583	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	12.0	15.0	<50.0
150583	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	25.0	<50.0
150584	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<5,000	380	890	<2,500
150584	<500	<500	<500	<500	<500	<500	<1,000	130	990	<500
150585	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1.0	<10.0
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
150592	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0
150593	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	28.0	<1.0
150593	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	6.0	7.0	<10.0
150594	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	3.0	<1.0
150594	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	10.0	<50.0
150594	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	8.0	<10.0
150594	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	9.8	<50.0
150595	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	2,300	<50.0
150595	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<100	<50.0	1,000	10.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	2-Nitrophenol, total (µg/L)	4-Nitrophenol, total (µg/L)	n-Nitrosodimethylamine, total (µg/L)	n-Nitrosodiphenylamine, total (µg/L)	n-Nitrosodi-n-propylamine, total (µg/L)	Pentachlorophenol, total (µg/L)	Phenanthrene, total (µg/L)	Phenol, total (µg/L)	Pyrene, total (µg/L)	2,3,7,8 Tetrachlorodibenzo-P-dioxin, total (µg/L)	1,2,4-Trichlorobenzene, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	130	<1.0	<1.0	<1.0
150577	--	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150578	--	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150579	--	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--	--
150582	<50.0	<300	27.0	<50.0	<50.0	<300	<50.0	4,500	<50.0	--	<50.0
150582	<50.0	<300	29.0	<50.0	<50.0	<300	<50.0	1,500	<50.0	--	<50.0
150583	<25.0	<150	21.0	<50.0	<50.0	<150	<50.0	210	<50.0	--	53.0
150583	<50.0	<300	<50.0	<50.0	<50.0	<300	<50.0	2,900	<50.0	--	54.0
150584	<2,500	<15,000	<2,500	<2,500	<2,500	<15,000	<2,500	2,440	<2,500	--	<2,500
150584	<500	<3,000	<500	<500	<500	<3,000	<500	1,200	<500	--	<500
150585	--	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	--	2.0
150592	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150592	<5.0	<30.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<5.0	--	.80
150592	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	--	<10.0
150592	<5.0	<30.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<5.0	--	<5.0
150593	<1.0	<1.0	6.0	<1.0	<1.0	<1.0	<1.0	69.0	<1.0	<1.0	<1.0
150593	--	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<1.0	7.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	--	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	94.0	<10.0	--	7.0
150594	<1.0	<1.0	14.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150594	<50.0	<300	30.0	<50.0	<50.0	<300	<50.0	25.0	<50.0	--	<50.0
150594	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	140	<10.0	--	7.0
150594	<50.0	<300	28.0	<50.0	<50.0	<300	<50.0	39.0	<50.0	--	<50.0
150595	<5.0	<30.0	<50.0	<50.0	<50.0	<30.0	<50.0	60.0	<50.0	--	<50.0
150595	<50.0	<300	<50.0	<50.0	<50.0	<300	<50.0	350	<50.0	--	28.0

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	2,4,6-Tri-chloro-phenol, total (µg/L)	Aldrin, total (µg/L)	Chlor-dane, total (µg/L)	DDD, total (µg/L)	DDE, total (µg/L)	DDT, total (µg/L)	Di-azinon, total (µg/L)	Di-eldrin total (µg/L)	Endrin, total (µg/L)	Ethion, total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--
150577	<1.0	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.01
150577	--	--	--	--	--	--	--	--	--	--
150578	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010	<.010	<.01
150578	--	--	--	--	--	--	--	--	--	--
150579	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010	<.010	<.01
150579	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--
150582	<200	<.10	<1.0	<.10	<.10	<.10	<10	<.10	<.10	<10
150582	<200	--	--	--	--	--	--	--	--	--
150583	<100	<.10	<1.0	<.10	<.10	<.10	<10	<.10	<.10	<10
150583	<200	--	--	--	--	--	--	--	--	--
150584	10,000	<.10	<1.0	<.10	<.10	<.10	<10	<.10	<.10	<10
150584	2,000	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--
150592	<1.0	<.010	<.1	<.010	<.010	<.010	.02	.040	<.010	<.01
150592	<10.0	--	--	--	--	--	--	--	--	--
150592	<1.0	<.010	<.1	<.010	<.010	<.010	.04	.050	<.010	<.01
150592	<20.0	--	--	--	--	--	--	--	--	--
150592	<10.0	--	--	--	--	--	--	--	--	--
150592	<20.0	--	--	--	--	--	--	--	--	--
150593	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010	<.010	<.01
150593	--	--	--	--	--	--	--	--	--	--
150594	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010	<.010	<.01
150594	<10.0	--	--	--	--	--	--	--	--	--
150594	<1.0	<.010	<.1	<.010	<.010	<.010	<.01	<.010	<.010	<.01
150594	<200	--	--	--	--	--	--	--	--	--
150594	<10.0	--	--	--	--	--	--	--	--	--
150594	<200	--	--	--	--	--	--	--	--	--
150595	<20.0	<.10	<1.0	<.10	<.10	<.10	<1.0	<.10	<.10	<1.0
150595	<200	--	--	--	--	--	--	--	--	--

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Gross PCB's, total (µg/L)	Gross PCN's, total (µg/L)	Hepta-chlor, total (µg/L)	Hepta-chlor epoxide, total (µg/L)	Lindane, total (µg/L)	Mala-thion, total (µg/L)	Meth-oxy-chlor, total (µg/L)	Methyl para-thion, total (µg/L)	Methyl tri-thion, total (µg/L)	Myrex total (µg/L)	Para-thion, total (µg/L)	Per-thane total (µg/L)
150354	--	--	--	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--	--	--	--
150577	<0.1	<0.10	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
150577	--	--	--	--	--	--	--	--	--	--	--	--
150578	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150578	--	--	--	--	--	--	--	--	--	--	--	--
150579	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150579	--	--	--	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--	--	--	--
150582	<1.0	<1.0	<.10	<.10	<.10	<10	<.10	<10	<10	<.10	<10	<1.0
150582	--	--	--	--	--	--	--	--	--	--	--	--
150583	<1.0	<1.0	<.10	<.10	<.10	<10	<.10	<10	<10	<.10	<10	<1.0
150583	--	--	--	--	--	--	--	--	--	--	--	--
150584	<1.0	<1.0	<.10	<.10	<.10	<10	<.10	<10	<10	<.10	<10	<1.0
150584	--	--	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--	--	--	--
150591	--	--	--	--	--	--	--	--	--	--	--	--
150592	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150592	--	--	--	--	--	--	--	--	--	--	--	--
150592	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150592	--	--	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--	--	--	--
150593	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150593	--	--	--	--	--	--	--	--	--	--	--	--
150594	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150594	--	--	--	--	--	--	--	--	--	--	--	--
150594	<.1	<.10	<.010	<.010	<.010	<.01	<.01	<.01	<.01	<.01	<.01	<.1
150594	--	--	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--	--	--	--
150595	<1.0	<1.0	<.10	<.10	.30	<1.0	<.10	<1.0	<1.0	<.10	<1.0	<1.0
150595	--	--	--	--	--	--	--	--	--	--	--	--

Appendix 4.--Results of field measurements of alkalinity, dissolved oxygen, pH, specific conductance, and water temperature; and analyses of inorganic constituents, organic carbon, and organic compounds, for ground-water samples from wells at Rollins Environmental Services, Inc., Logan Township, Gloucester County, N.J., 1984--Continued

[--, no determination; µS/cm, microsiemens per centimeter at 25 degrees Celsius; °C, degree Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; PCB's, polychlorinated biphenyls; PCN's, polychlorinated naphthalenes; <, less than]

Unique well number	Toxaphene, total (µg/L)	Total trithion (µg/L)	Aroclor 1016 PCB, total (µg/L)	Aroclor 1221 PCB, total (µg/L)	Aroclor 1232 PCB, total (µg/L)	Aroclor 1242 PCB, total (µg/L)	Aroclor 1248 PCB, total (µg/L)	Aroclor 1254 PCB, total (µg/L)	Aroclor 1260 PCB, total (µg/L)
150354	--	--	--	--	--	--	--	--	--
150387	--	--	--	--	--	--	--	--	--
150388	--	--	--	--	--	--	--	--	--
150570	--	--	--	--	--	--	--	--	--
150572	--	--	--	--	--	--	--	--	--
150573	--	--	--	--	--	--	--	--	--
150575	--	--	--	--	--	--	--	--	--
150576	--	--	--	--	--	--	--	--	--
150577	<1	<0.01	--	--	--	--	--	--	--
150577	--	--	--	--	--	--	--	--	--
150578	<1	<.01	--	--	--	--	--	--	--
150578	--	--	--	--	--	--	--	--	--
150579	<1	<.01	--	--	--	--	--	--	--
150579	--	--	--	--	--	--	--	--	--
150580	--	--	--	--	--	--	--	--	--
150581	--	--	--	--	--	--	--	--	--
150582	<10	<10	--	--	--	--	--	--	--
150582	--	--	--	--	--	--	--	--	--
150583	<10	<10	--	--	--	--	--	--	--
150583	--	--	--	--	--	--	--	--	--
150584	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150584	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--
150585	--	--	--	--	--	--	--	--	--
150586	--	--	--	--	--	--	--	--	--
150587	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--
150588	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--
150589	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--
150590	--	--	--	--	--	--	--	--	--
150591	--	--	<.1	<.1	<.1	<.1	<.1	<.1	<.1
150592	<1	<.01	1.3	<.1	<.1	<.1	<.1	<.1	<.1
150592	--	--	--	--	--	--	--	--	--
150592	<1	<.01	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--
150592	--	--	--	--	--	--	--	--	--
150593	<1	<.01	--	--	--	--	--	--	--
150593	--	--	--	--	--	--	--	--	--
150594	<1	<.01	<.1	<.1	<.1	<.1	<.1	<.1	<.1
150594	--	--	--	--	--	--	--	--	--
150594	<1	<.01	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--
150594	--	--	--	--	--	--	--	--	--
150595	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
150595	--	--	--	--	--	--	--	--	--

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984

[Tentative identifications of organic compounds based on comparison of laboratory data with National Bureau of Standards (NBS) library of mass spectra and examination by gas chromatography-mass spectrometry analysts. Tentative identification of isomers is approximate. ND, no compounds detected in the analysis; D, compound detected in some successive samples from well, but not detected in this sample. Approximate concentrations are micrograms per liter. n.a., not applicable.]

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
			Bridgeport Rental and Oil Services, Inc.		
394754075192001 150475	05/17/1984	1620	n.a.	ND	n.a.
394806075192901 150478	05/16/1984	1440	60-29-7	6	Diethyl ether
			100-86-7	10	Alpha,alpha-dimethyl-benzeneethanol
			110-91-8	8	Morpholine
			112-26-5	7	1,2-bis-(2-Chloroethoxy)-ethane
			203-64-5	20	4H-Cyclopenta(d,e,f)phenanthrene
			632-22-4	6	Tetramethylurea
			5197-62-6	5	2-(2-(2-Chloroethoxy)ethoxy)-ethanol
			54932-78-4	8	4-(2,2,3,3-Tetramethyl butyl)phenol
394809075191401 150554	05/18/1984	1440	78-78-4	10	2-Methylbutane
			83-33-0	80	2,3-Dihydro-1-H-inden-1-one
			91-57-6	20	2-Methylnaphthalene
			95-48-7	40	2-Methylphenol
			96-37-7	60	Methylcyclopentane
			98-86-2	90	1-Phenyl-ethanone
			107-40-4	30	2,4,4-Trimethyl-2-Pentene
			107-83-5	100	2-Methyl-pentane
			108-20-3	40	Diisopropyl ether
			109-66-0	9	[1]Pentane
			110-54-3	20	[1]Hexane
			110-82-7	70	[1]Cyclohexane
			287-92-3	10	Cyclopentane
			480-63-7	10	2,4,6-Trimethyl-benzoic acid
			529-34-0	20	3,4-Dihydro-1(2H)-naphthalenone
			543-39-5	1,000	2-Methyl-6-methylene-7-octen-2-ol
			563-46-2	90	2-Methyl-1-butene
			1590-08-5	9	3,4-Dihydro-2-methyl-1(2H)-naphthalenone
			1759-81-5	40	4-Methylcyclopentene
			1839-63-0	100	1,3,5-Trimethyl cyclohexane
			4830-99-3	20	1-Ethyl-2,3-dihydro-1H-indene
			6072-57-7	40	2,3-Dihydro-3-methyl-1H-inden-1-one
			11071-47-9	90	Isooctene
			15584-52-8	20	Octahydro-1,2,4-metheno-3H-cyclobuta(cd)pentalen-3-one
			16491-15-9	20	1,5 Dimethylcyclopentene
			26444-19-9	30	1-(Methylphenyl)-ethanone
			28790-86-5	30	2,3,4-Trimethyl-2-cyclopenten-1-one
			54120-64-8	7	5-Methyl-1(3H)-isobenzofuranone
			54446-78-5	50	1-(2-Butoxyethoxy)-ethanol
394809075191402 150555	05/18/1984	1250	75-71-8	3	Dichlorodiflouromethane
			78-78-4	9	2-Methylbutane
			95-47-6	80	[1]1,2-Dimethyl benzene
			100-86-7	7	Alpha,alpha-dimethyl-benzeneethanol
			106-42-3	30	[1] [2]para-Xylene
			108-20-3	30	Diisopropyl ether
			463-82-1	80	2,2-Dimethyl propane
			543-39-5	300	2-Methyl-6-methylene-7-octen-2-ol
			563-80-4	60	3-Methyl-2-butanone
			590-50-1	100	4,4-Dimethyl-2-pentanone
			763-29-1	10	2-Methyl-1-Pentene
			6321-14-8	30	3-Hydroxy-3,5-dimethyl-2-hexanone
			14310-29-3	70	1-Nitro-4-(2-phenylethyl)-benzene
			18368-61-1	50	6-Nitro-2-picoline
			26118-38-7	20	3,3-Dimethyl-2-hexanone

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Time	Chemical abstracts service number	Approximate concentration	Compound
			Bridgeport Rental and Oil Services, Inc.--Continued		
394809075191403 150556	05/18/1984	1050	75-18-3	20	Dimethyl sulfide
			75-71-8	3	Dichlorodiflouromethane
			75-97-8	90	3,3-Dimethyl-2-butanone
			98-82-8	30	(1-Methylethyl)-benzene
			98-83-9	90	Ethenylmethyl-benzene
			98-86-2	20	1-Phenyl-ethanone
			112-26-5	30	1,2-bis-(2-Chloroethoxy)-ethane
			563-80-4	40	3-Methyl-2-butanone
			590-50-1	20	4,4-Dimethyl-2-pentanone
			617-94-7	700	.Alpha.,.alpha.-dimethyl-benzenemethanol
			2417-88-1	10	3,4-Dimethyl-(E,Z)-2,4-hexadiene
			26118-38-7	20	3,3-Dimethyl-2-hexanone
394809075191403 150556	05/18/1984	1051	75-18-3	20	Dimethyl sulfide
			75-71-8	4	Dichlorodiflouromethane
			75-97-8	100	3,3-Dimethyl-2-butanone
			98-82-8	D	(1-Methylethyl)-benzene
			98-83-9	D	Ethenylmethyl-benzene
			98-86-2	D	1-Phenyl-ethanone
			112-26-5	D	1,2-bis-(2-Chloroethoxy)-ethane
			563-80-4	40	3-Methyl-2-butanone
			590-50-1	40	4,4-Dimethyl-2-pentanone
			617-94-7	D	.Alpha.,.alpha.-dimethyl-benzenemethanol
			2417-88-1	D	3,4-Dimethyl-(E,Z)-2,4-hexadiene
			26118-38-7	D	3,3-Dimethyl-2-hexanone
			Chemical Leaman Tank Lines, Inc.		
394752075195201 150544	06/20/1984	1225	62-53-3	7	Benzenamine
			68-12-2	30	n,n-Dimethyl-formamide
			78-40-0	60	Triethyl ester phosphoric acid
			95-51-2	30	2-Chloro-benzenamine
			99-94-5	D	[1]4-Methyl benzoic acid
			100-41-4	D	Ethyl benzene
			103-84-4	5	n-Phenyl-acetamide
			103-89-9	D	n-(4-Methylphenyl)-acetamide
			106-42-3	6	[1] [2]para-Xylene
			106-47-8	10	4-Chloro benzenamine
			106-49-0	70	4-Methyl-benzenamine
			108-88-3	D	[1]Toluene
			108-90-7	D	Chlorobenzene
			108-94-1	7	Cyclohexanone
			112-26-5	90	1,2-bis-(2-Chloroethoxy)-ethane
			140-66-9	20	4-(1,1,3,3-Tetramethylbutyl)-phenol
			617-94-7	9	.Alpha.,.alpha.-dimethyl-benzenemethanol
			54932-78-4	7	4-(2,2,3,3-Tetramethyl butyl)phenol
394752075195201 150544	10/05/1984	1320	62-53-3	10	Benzenamine
			68-12-2	40	n,n-Dimethyl-formamide
			78-40-0	80	Triethyl ester phosphoric acid
			95-51-2	60	2-Chloro-benzenamine
			99-94-5	7	[1]4-Methyl benzoic acid
			100-41-4	3	Ethyl benzene
			103-84-4	10	n-Pheneyl-acetamide
			103-89-9	6	n-(4-Methylphenyl)-acetamide
			106-42-3	10	[1] [2]para-xylene
			106-47-8	D	4-Chloro benzenamine
			106-49-0	80	4-Methyl-benzenamine
			108-88-3	5	[1]Toluene
			108-90-7	2	Chlorobenzene
			108-94-1	D	Cyclohexanone
			112-26-5	200	1,2-bis-(2-Chloroethoxy)-ethane
			140-66-9	4	4-(1,1,3,3-Tetramethylbutyl)-phenol
			617-94-7	10	.Alpha.,.alpha.-dimethyl-benzenemethanol
			54932-78-4	D	4-(2,2,3,3-Tetramethyl butyl)phenol

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
			Chemical Leaman Tank Lines, Inc., continued		
394800075195001 150546	06/19/1984	1205	127-18-4	200	Tetrachloroethene
394800075195001 150546	06/19/1984	1105	127-18-4	200	Tetrachloroethene
394757075194202 150549	06/19/1984	1440	62-53-3	30	Benzenamine
			68-12-2	20	n,n-Dimethyl-formamide
			78-40-0	7	Triethyl ester phosphoric acid
			79-01-6	6	Trichloroethene
			90-12-0	10	1-Methyl naphthalene
			91-22-5	D	Quinoline
			91-57-6	5	2-Methyl-naphthalene
			95-47-6	6	[1]ortho-Xylene
			95-51-2	10	2-Chloro-benzenamine
			100-41-4	D	Ethyl benzene
			106-42-3	D	[1] [2]para-Xylene
			106-49-0	10	4-Methyl-benzenamine
			106-51-4	4	2,5-Cyclohexadiene-1,4-dione
			108-88-3	6	[1]Toluene
			108-90-7	D	Chlorobenzene
			119-65-3	5	Isoquinoline
			127-18-4	6	Tetrachloro ethene
			127-19-5	20	n,n-Dimethyl-acetamide
			140-66-9	2	4-(1,1,3,3-Tetramethylbutyl)-phenol
			480-63-7	D	2,4,6-Trimethyl-benzoic acid
			526-75-0	D	2,3-Dimethyl-phenol
			617-94-7	20	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	D	Dimethyl disulfide
			873-94-9	4	3,3,5-Trimethyl-cyclohexanone
			10544-50-0	2	Molecular sulfur
394757075194202 150549		1510	62-53-3	50	Benzenamine
			68-12-2	20	n,n-Dimethyl-formamide
			78-40-0	7	Triethyl ester phosphoric acid
			79-01-6	3	Trichloroethene
			90-12-0	9	1-Methyl naphthalene
			91-22-5	D	Quinoline
			91-57-6	10	2-Methyl-naphthalene
			95-47-6	D	[1]ortho-Xylene
			95-51-2	20	2-Chloro-benzenamine
			100-41-4	D	Ethyl benzene
			106-42-3	20	[1] [2]para-Xylene
			106-49-0	20	4-Methyl-benzenamine
			106-51-4	3	2,5-Cyclohexadiene-1,4-dione
			108-88-3	5	[1]Toluene
			108-90-7	D	Chlorobenzene
			119-65-3	9	Isoquinoline
			127-18-4	5	Tetrachloroethene
			127-19-5	30	n,n-Dimethyl-acetamide
			140-66-9	D	4-(1,1,3,3-Tetramethylbutyl)-phenol
			480-63-7	4	2,4,6-Trimethyl-benzoic acid
			526-75-0	5	2,3-Dimethyl-phenol
			617-94-7	20	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	D	Dimethyldisulfide
			873-94-9	5	3,3,5-Trimethyl-cyclohexanone
			10544-50-0	3	Molecular sulfur

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
			Chemical Leaman Tank Lines, Inc., continued		
394757075194202 150549	10/03/1984	1315	62-53-3	60	Benzenamine
			68-12-2	20	N,N-dimethyl-formamide
			78-40-0	9	Triethyl ester phosphoric acid
			79-01-6	D	Trichloroethene
			90-12-0	D	1-Methyl naphthalene
			91-22-5	9	Quinoline
			91-57-6	20	2-Methyl-naphthalene
			95-47-6	D	[1]ortho-Xylene
			95-51-2	30	2-Chloro benzenamine
			100-41-4	3	Ethyl benzene
			106-42-3	10	[1] [2]para-Xylene
			106-49-0	30	4-Methyl benzenamine
			106-51-4	4	2,5-Cyclohexadiene-1,4-dione
			108-88-3	10	[1]Toluene
			108-90-7	4	Chlorobenzene
			119-65-3	9	Isoquinoline
			127-18-4	8	Tetrachloroethene
			127-19-5	20	n,n-Dimethyl-acetamide
			140-66-9	D	4-(1,1,3,3-Tetramethylbutyl)-phenol
			480-63-7	D	2,4,6-Trimethyl benzoic acid
			526-75-0	D	2,3-Dimethyl phenol
			617-94-7	D	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	3	Dimethyl disulfide
			873-94-9	D	3,3,5-Trimethyl cyclohexanone
			10544-50-0	D	Molecular sulfur
394757075194202 150549	10/03/1984	1320	62-53-3	40	Benzenamine
			68-12-2	20	n,n-Dimethyl-formamide
			78-40-0	8	Triethyl ester phosphoric acid
			79-01-6	2	Trichloroethene
			90-12-0	D	1-Methyl naphthalene
			91-22-5	D	Quinoline
			91-57-6	D	2-Methyl naphthalene
			95-47-6	D	[1]ortho-Xylene
			95-51-2	20	2-Chloro benzenamine
			100-41-4	D	Ethyl benzene
			106-42-3	10	[1] [2]para-Xylene
			106-49-0	20	4-Methyl benzenamine
			106-51-4	D	2,5-Cyclohexadiene-1,4-dione
			108-88-3	9	[1]Toluene
			108-90-7	3	Chlorobenzene
			119-65-3	6	Isoquinoline
			127-18-4	5	Tetrachloroethene
			127-19-5	20	n,n-Dimethyl-acetamide
			140-66-9	D	4-(1,1,3,3-Tetramethylbutyl)-phenol
			480-63-7	D	2,4,6-Trimethyl benzoic acid
			526-75-0	D	2,3-Dimethyl phenol
			617-94-7	20	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	2	Dimethyl disulfide
			873-94-9	D	3,3,5-Trimethyl-cyclohexanone
			10544-50-0	D	Molecular sulfur
394758075194802 150606	06/20/1984	1405	108-90-7	6	Chlorobenzene
			114-19-4	4	2,2,4-Trimethyl-1,3 Pentanediol
			10544-50-0	3	Molecular sulfur
394758075194802 150606	10/05/1984	1425	108-90-7	10	Chlorobenzene
			114-19-4	D	2,2,4-Trimethyl-1,3 Pentanediol
			10544-50-0	D	Molecular sulfur

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Time	Chemical abstracts service number	Approximate concentration	Compound
			Monsanto Industrial Chemicals Co.		
394747075241001 150163	06/04/1984	1530	n.a.	ND	no compounds detected in the analysis
394737075224301 150444	05/31/1984	1510	51422-75-4	40	1-Bromo-2-chloro-cis-cyclohexane
394726075231801 150450	06/01/1984	1115	111-90-0	2	2-(2-Ethoxyethoxy)-ethanol
394738075235701 150598	06/01/1984	1345	111-90-0	2	2-(2-Ethoxyethoxy)-ethanol
			565-61-7	2	3-Methyl-2-pentanone
			822-66-2	2	3-Cyclohexen-1-ol
			1610-18-0	20	6-Methoxy-n,n'-bis-(1-methylethyl)-1,3,5-triazine-2,4-diamine
394743075240501 150599	06/04/1984	920	n.a.	ND	n.a.
		921	n.a.	ND	n.a.
394742075241901 150603	06/04/1984	1210	108-41-8	2	1-Chloro-3-methyl benzene
394726075231802 150604	06/01/1984	940	95-16-9	D	Benzothiazole
			106-44-5	4	4-Methyl-phenol
			108-39-4	D	3-Methyl-phenol
			111-90-0	3	2-(2-Ethoxyethoxy)-ethanol
			546-49-6	D	3,3,6-Trimethyl-1,5-heptadien-4-one
			822-67-3	D	2-Cyclohexen-1-ol
			2233-00-3	D	3,3,3-Trichloro-1-propene
			10544-50-0	D	Molecular sulfur
394726075231802 150604	06/01/1984	955	95-16-9	1	Benzothiazole
			106-44-5	D	4-Methyl phenol
			108-39-4	4	3-Methyl phenol
			111-90-0	1	2-(2-Ethoxyethoxy)-ethanol
			546-49-6	1	3,3,6-Trimethyl-1,5-heptadien-4-one
			822-67-3	3	2-Cyclohexen-1-ol
			2233-00-3	2	3,3,3-Trichloro-1-propene
			10544-50-0	4	Molecular sulfur
394737075224302 150605	05/31/1984	1400	n.a.	ND	n.a.
394737075224302 150605	05/31/1984	1401	n.a.	ND	n.a.
			Rollins Environmental Services, Inc.		
394717075210803 150577	06/12/1984	820	106-42-3	3	[1] [2]para-Xylene
			106-93-4	8	1,2-Dibromo ethane
			108-20-3	D	Diisopropyl ether
			108-43-0	D	3-Chloro phenol
			108-94-1	D	Cyclohexanone
			110-83-8	5	[1]Cyclohexene
			323-09-1	D	2-Fluoro naphthalene
			591-78-9	D	2-Hexanone
			680-31-9	D	Hexamethyl-phosphoric triamide
394717075210803 150577	09/24/1984	1005	106-42-3	D	[1] [2]para-Xylene
			106-93-4	20	1,2-Dibromo ethane
			108-20-3	700	Diisopropyl ether
			108-43-0	10	3-Chloro phenol
			108-94-1	4	Cyclohexanone
			110-83-8	D	[1]Cyclohexene
			323-09-1	10	2-Fluoro naphthalene
			591-78-9	2	2-Hexanone
			680-31-9	2	Hexamethyl-phosphoric triamide

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Time	Chemical abstracts service number	Approximate concentration	Compound
			Rollins Environmental Services, Inc., continued		
394717075210802	06/12/1984	920	106-93-4	30	1,2-Dibromo ethane
150578			51422-75-4	2	1-Bromo-2-chloro-cis-cyclohexane
394717075210802	09/24/1984	1045	106-93-4	70	1,2-Dibromo ethane
150578			51422-75-4	D	1-Bromo-2-chloro-cis-cyclohexane
394717075210801	06/12/1984	1015	68-12-2	3	n,n-Dimethyl formamide
150579			106-47-8	2	4-Chloro benzenamine
			106-93-4	D	1,2-Dibromo ethane
			680-31-9	3	Hexamethyl-phosphoric triamide
394717075210801	09/24/1984	1125	68-12-2	D	n,n-Dimethyl formamide
150579			106-47-8	D	4-Chloro benzenamine
			106-93-4	5	1,2-Dibromo ethane
			680-31-9	D	Hexamethyl-phosphoric triamide
394715075210603	06/15/1984	845	65-85-0	D	Benzoic acid
150582			75-15-0	100	Carbon disulfide
			79-31-2	50	2-Methyl-propanoic acid
			87-64-9	70	2-chloro-6-Methyl-phenol
			89-74-7	40	1-(2,4-Dimethylphenyl)-ethanone
			95-47-6	400	[1]ortho-Xylene
			95-48-7	40	2-Methyl phenol
			95-51-2	200	2-Chloro benzenamine
			95-53-4	D	2-Methyl benzenamine
			95-76-1	D	3,4-Dichloro benzenamine
			100-41-4	70	Ethyl benzene
			104-76-7	80	2-Ethyl-1-hexanol
			105-55-5	100	n,n'-Diethyl thiourea
			106-42-3	50	[1] [2]para-Xylene
			106-48-9	300	4-Chloro phenol
			108-39-4	100	3-Methyl phenol
			108-88-3	40	[1]Toluene
			108-91-8	D	Cyclohexanamine
			110-86-1	D	Pyridine
			542-85-8	D	Isothiocyanato-ethane
			608-27-5	50	2,3-Dichloro benzenamine
			611-06-3	40	2,4-Dichloro-1-nitro-benzene
			624-92-0	3	Dimethyldisulfide
			680-31-9	200	Hexamethyl-phosphoric triamide
			872-50-4	100	1-Methyl-2-pyrrolidinone
			10544-50-0	D	Molecular sulfur
			17233-71-5	D	Hexathiepane
			20324-32-7	30	1-(2-Methoxy-1-methylethoxy)-2-propanol
394715075210603	09/28/1984	1140	65-85-0	30	Benzoic acid
150582			75-15-0	100	Carbon disulfide
			79-31-2	D	2-Methyl-propanoic acid
			87-64-9	200	2-chloro-6-Methyl-phenol
			89-74-7	D	1-(2,4,-Dimethylphenyl)-ethanone
			95-47-6	600	[1]ortho-Xylene
			95-48-7	D	2-Methyl phenol
			95-51-2	200	2-Chloro benzenamine
			95-53-4	60	2-Methyl benzenamine
			95-76-1	50	3,4-Dichloro benzenamine
			100-41-4	100	Ethyl benzene
			104-76-7	D	2-Ethyl-1-hexanol
			105-55-5	D	n,n'-Diethyl thiourea
			106-42-3	60	[1] [2]para-Xylene
			106-48-9	500	4-Chloro phenol

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394715075210603 150582	09/28/1984	1140	108-39-4	30	3-Methyl phenol
			108-88-3	60	[1]Toluene
			108-91-8	70	Cyclohexanamine
			110-86-1	70	Pyridine
			542-85-8	40	Isothiocyanato-ethane
			608-27-5	70	2,3-Dichloro benzenamine
			611-06-3	D	2,4-Dichloro-1-nitro-benzene
			624-92-0	50	Dimethyl disulfide
			680-31-9	D	Hexamethyl-phosphoric triamide
			872-50-4	D	1-Methyl-2-pyrrolidinone
			10544-50-0	40	Molecular sulfur
			17233-71-5	50	Hexathiepane
			20324-32-7	D	1-(2-Methoxy-1-methylethoxy)-2-propanol
394715075210602 150583	06/15/1984	945	59-50-7	80	4-Chloro-3-methyl-phenol
			62-53-3	90	Benzenamine
			68-12-2	700	n,n-Dimethyl formamide
			75-15-0	10	Carbon disulfide
			75-18-3	50	Dimethyl sulfide
			76-13-1	D	[1]1,1,2-Trichloro-1,2,2-triflouro ethane
			91-57-6	D	[1]2-Methyl naphthalene
			95-47-6	D	[1]ortho-Xylene
			95-48-7	D	2-Methyl phenol
			95-49-8	D	[1]1-Chloro-2-methyl-benzene
			95-51-2	1,000	2-Chloro benzenamine
			95-76-1	D	3,4-Dichloro benzenamine
			98-86-2	70	1-Phenyl-ethanone
			100-41-4	D	Ethyl benzene
			106-42-3	60	[1] [2]para-Xylene
			106-48-9	30	4-Chloro phenol
			106-49-0	300	4-Methyl benzenamine
			108-39-4	D	3-Methyl phenol
			108-88-3	100	[1]Toluene
			108-90-7	D	Chlorobenzene
			110-86-1	D	Pyridine
			111-76-2	D	2-Butoxy-ethanol
			127-18-4	D	Tetrachloroethene
			144-19-4	100	2,2,4-Trimethyl-1,3-pentanediol
			354-23-4	4	[1]1,2 Dichloro-1,1,2-triflouro ethane
			554-00-7	60	2,4-Dichloro-benzenamine
			583-78-8	D	2,5-Dichloro-phenol
			608-27-5	400	2,3-Dichloro benzenamine
			615-65-6	D	2-Chloro-4-methyl-benzenamine
			617-94-7	80	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	D	Dimethyl disulfide
			680-31-9	D	Hexamethyl-phosphoric triamide
			822-86-6	D	[1]1,2-Dichloro-trans-cyclohexane
			1649-08-7	5	1,2-Dichloro-1,1-difluoro-ethane
			17849-38-6	D	2-Chlorobenzenemethanol
			18368-63-3	90	2-Chloro-6-methyl-pyridine
			20324-32-7	90	1-(2-Methoxy-1-methylethoxy)-2-propanol
394715075210602 150583	09/28/1984	1230	59-50-7	D	4-Chloro-3-methyl-phenol
			62-53-3	400	Benzenamine
			68-12-2	1,000	n,n-Dimethyl formamide
			75-15-0	D	Carbon disulfide
			75-18-3	800	Dimethyl sulfide

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394715075210602 150583	09/28/1984	1230	76-13-1	30	[1]1,1,2-Trichloro-1,2,2-triflouro ethane
			91-57-6	50	2-Methyl naphthalene
			95-47-6	200	[1]ortho-Xylene
			95-48-7	30	2-Methyl phenol
			95-49-8	40	[1]1-Chloro-2-methyl benzene
			95-51-2	5,000	2-Chloro benzenamine
			95-76-1	2,000	3,4-Dichloro benzenamine
			98-86-2	D	1-Phenyl-ethanone
			100-41-4	60	Ethyl benzene
			106-42-3	60	[1] [2]para-Xylene
			106-48-9	80	4-Chloro phenol
			106-49-0	2,000	4-Methyl benzenamine
			108-39-4	500	3-Methyl phenol
			108-88-3	1,000	[1]Toluene
			108-90-7	60	Chlorobenzene
			110-86-1	200	Pyridine
			111-76-2	70	2-Butoxy-ethanol
			127-18-4	30	Tetrachloroethene
			144-19-4	90	2,2,4-Trimethyl-1,3-pentanediol
			354-23-4	9	[1]1,2 Dichloro-1,1,2-triflouro ethane
			554-00-7	D	2,4-Dichloro-benzenamine
			583-78-8	100	2,5-Dichloro-phenol
			608-27-5	200	2,3-Dichloro benzenamine
			615-65-6	20	2-Chloro-4-methyl-benzenamine
			617-94-7	400	.Alpha.,.alpha.-dimethyl-benzenemethanol
			624-92-0	4	Dimethyl disulfide
			680-31-9	80	Hexamethyl-phosphoric triamide
			822-86-6	20	[1]1,2-Dichloro-trans-cyclohexane
			1649-08-7	60	1,2-Dichloro-1,1-difluoro-ethane
			17849-38-6	50	2-Chlorobenzenemethanol
			18368-63-3	D	2-Chloro-6-methyl-pyridine
			20324-32-7	D	1-(2-Methoxy-1-methylethoxy)-2-propanol
394715075210601 150584	06/15/1984	1040	65-85-0	D	Benzoic acid
			75-15-0	2	Carbon disulfide
			75-18-3	20	Dimethyl sulfide
			95-47-6	1,000	[1]ortho-Xylene
			95-48-7	D	2-Methyl phenol
			95-51-2	10,000	2-Chloro benzenamine
			95-65-8	D	3,4-Dimethyl-phenol
			95-76-1	D	3,4-Dichloro benzenamine
			95-87-4	D	2,5-Dimethyl-phenol
			100-41-4	D	Ethyl benzene
			106-42-3	20	[1] [2]para-Xylene
			106-47-3	2,000	4-Chloro benzenamine
			106-49-0	6,000	4-Methyl benzenamine
			108-39-4	10,000	3-Methyl phenol
			108-88-3	6,000	[1]Toluene
			110-86-1	D	Pyridine
			554-00-7	6,000	2,4-Dichloro-benzenamine
			608-27-5	8,000	2,3-Dichloro benzenamine
			611-06-3	D	2,4-Dichloro-1-nitro-benzene
			673-32-5	1,000	1-Propynyl benzene
			1649-08-7	5	1,2-Dichloro-1,1-difluoro ethane
			13360-63-9	6,000	n-Ethyl-1-butanamine
150584	09/28/1984	1315	65-85-0	1,000	Benzoic acid
			75-15-0	D	Carbon disulfide
			75-18-3	10	Dimethyl sulfide
			95-47-6	1,000	[1]ortho-Xylene
			95-48-7	10,000	2-Methyl phenol

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration		Compound
			Rollins Environmental Services, Inc.--Continued			
150584	09/28/1984	1315	95-51-2	8,000		2-Chloro benzenamine
			95-65-8	700		3,4-Dimethyl-phenol
			95-76-1	9,000		3,4-Dichloro benzenamine
			95-87-4	3,000		2,5-Dimethyl-phenol
			100-41-4	200		Ethyl benzene
			106-42-3	400	1	2para-Xylene
			106-47-3	D		4-Chloro benzenamine
			106-49-0	4,000		4-Methyl benzenamine
			108-39-4	D		3-Methyl phenol
			108-88-3	5,000		1Toluene
			110-86-1	300		Pyridine
			554-00-7	D		2,4-Dichloro-benzenamine
			608-27-5	D		2,3-Dichloro benzenamine
			611-06-3	7,000		2,4-Dichloro-1-nitro-benzene
			673-32-5	D		1-Propynyl benzene
			1649-08-7	2		1,2-Dichloro-1,1-difluoro ethane
			13360-63-9	5,000		n-Ethyl-1-butanamine
394717075210902 150588	06/14/1984	1130	75-15-0	D		Carbon disulfide
			106-42-3	7	1	2para-Xylene
			106-93-4	D		1,2-Dibromo ethane
			110-83-8	D		1Cyclohexene
			624-92-0	D		Dimethyl disulfide
			2179-60-4	D		Methyl propyldisulfide
394717075210902 150588	09/28/1984	920	75-15-0	400		Carbon disulfide
			106-42-3	60	1	2para-Xylene
			106-93-4	2		1,2-Dibromo ethane
			110-83-8	8		1Cyclohexene
			624-92-0	5		Dimethyl disulfide
			2179-60-4	9		Methyl propyl disulfide
394717075210901 150589	06/14/1984	1205	75-15-0	7		Carbon disulfide
			76-13-1	D		1,1,1,2-Trichloro-1,2,2-triflouro ethane
			106-42-3	3	1	2para-Xylene
			106-93-4	8		1,2-Dibromo ethane
			354-23-4	4		1,2 Dichloro-1,1,2-triflouro ethane
394717075210901 150589	09/28/1984	950	75-15-0	40		Carbon disulfide
			76-13-1	D		1,1,1,2-Trichloro-1,2,2-triflouro ethane
			106-42-3	20	1	2para-Xylene
			106-93-4	7		1,2-Dibromo ethane
			354-23-4	10		1,2 Dichloro-1,1,2-trifluoro ethane
394710075210701 150592	06/13/1984	1250	62-53-3	D		Benzenamine
			68-12-2	2		n,n-Dimethyl formamide
			75-18-3	10		Dimethyl sulfide
			88-73-3	10		1-Chloro-2-nitro benzene
			95-51-2	20		2-Chloro benzenamine
			95-76-1	5		3,4-Dichloro benzenamine
			95-82-9	60		2,5-Dichloro-benzenamine
			100-00-5	D		1-Chloro-4-nitro-benzene
			105-60-2	4		Hexahydro-2H-azepin-2-one
			106-42-3	2	1	2para-Xylene
			106-47-8	10		4-Chloro benzenamine
			106-49-0	20		4-Methyl benzenamine
			108-42-9	40		3-Chloro-benzenamine
			108-88-3	D		1Toluene
			579-10-2	D		n-Methyl-n-Phenyl-acetamide
			608-27-5	20		2,3-Dichloro benzenamine
			626-43-7	D		3,5-Dichloro-benzenamine
			680-31-9	7		Hexamethyl-phosphoric triamide
			1656-48-0	3		3,3'-Oxy-bis-propanenitrile
			10544-50-0	3		Molecular sulfur

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration		Compound
						Rollins Environmental Services, Inc.--Continued
394710075210701 150592	09/26/1984	1315	62-53-3	2		Benzenamine
			68-12-2	3		n,n-Dimethyl formamide
			75-18-3	10		Dimethyl sulfide
			88-73-3	D		1-Chloro-2-nitro benzene
			95-51-2	30		2-Chloro benzenamine
			95-76-1	D		3,4-Dichloro benzenamine
			95-82-9	60		2,5-Dichloro-benzenamine
			100-00-5	9		1-Chloro-4-nitro-benzene
			105-60-2	D		Hexahydro-2H-azepin-2-one
			106-42-3	2	1 2	para-Xylene
			106-47-8	10		4-Chloro benzenamine
			106-49-0	30		4-Methyl benzenamine
			108-42-9	40		3-Chloro-benzenamine
			108-88-3	D	1	Toluene
			579-10-2	2		n-Methyl-n-phenyl-acetamide
			608-27-5	30		2,3-Dichloro benzenamine
			626-43-7	3		3,5-Dichloro-benzenamine
			680-31-9	4		Hexamethyl-phosphoric triamide
			1656-48-0	D		3,3'-Oxy-bis-propanenitrile
			10544-50-0	D		Molecular sulfur
394710075210701 150592	09/26/1984	1115	62-53-3	D		Benzenamine
			68-12-2	D		n,n-Dimethyl formamide
			75-18-3	D		Dimethyl sulfide
			88-73-3	D		1-Chloro-2-nitro benzene
			95-51-2	2		2-Chloro benzenamine
			95-76-1	D		3,4-Dichloro benzenamine
			95-82-9	D		2,5-Dichloro-benzenamine
			100-00-5	D		1-Chloro-4-nitro-benzene
			105-60-2	D		Hexahydro-2H-azepin-2-one
			106-42-3	D	1 2	para-Xylene
			106-47-8	D		4-Chloro benzenamine
			106-49-0	D		4-Methyl benzenamine
			108-42-9	D		3-Chloro-benzenamine
			108-88-3	2	1	Toluene
			579-10-2	D		n-Methyl-n-phenyl-acetamide
			608-27-5	D		2,3-Dichloro benzenamine
			626-43-7	D		3,5-Dichloro-benzenamine
			680-31-9	3		Hexamethyl-phosphoric triamide
			1656-48-0	D		3,3'-Oxy-bis-propanenitrile
			10544-50-0	D		Molecular sulfur
394710075210701 150592	09/26/1984	1120	62-53-3	D		Benzenamine
			68-12-2	D		n,n-Dimethyl formamide
			75-18-3	D		Dimethyl sulfide
			88-73-3	D		1-Chloro-2-nitro benzene
			95-51-2	D		2-Chloro benzenamine
			95-76-1	D		3,4-Dichloro benzenamine
			95-82-9	D		2,5-Dichloro-benzenamine
			100-00-5	D		1-Chloro-4-nitro-benzene
			105-60-2	D		Hexahydro-2H-azepin-2-one
			106-42-3	2	1 2	para-Xylene
			106-47-8	D		4-Chloro benzenamine
			106-49-0	D		4-Methyl benzenamine
			108-42-9	2		3-Chloro-benzenamine
			108-88-3	4	1	Toluene
			579-10-2	D		n-Methyl-n-phenyl-acetamide
			608-27-5	D		2,3-Dichloro benzenamine
			626-43-7	D		3,5-Dichloro-benzenamine
			680-31-9	5		Hexamethyl-phosphoric triamide
			1656-48-0	D		3,3'-Oxy-bis-propanenitrile
			10544-50-0	2		Molecular sulfur

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394707075210201 150593	06/12/1984	1145	62-53-3	20	Benzenamine
			68-12-2	40	n,n-Dimethyl formamide
			75-18-3	D	Dimethyl sulfide
			90-12-0	60	1-Methyl naphthalene
			91-57-6	50	2-Methyl naphthalene
			95-48-7	10	2-Methyl phenol
			96-41-3	90	Cyclopentanol
			106-42-3	4	[1] [2]para-Xylene
			106-44-5	20	4-Methyl phenol
			106-48-9	10	4-Chloro phenol
			106-49-0	200	4-Methyl benzenamine
			108-42-9	70	3-Chloro-benzenamine
			354-23-4	3	[1]1,2 Dichloro-1,1,2-triflouro ethane
			527-54-8	10	3,4,5-Trimethyl phenol
			527-60-6	60	2,4,6-Trimethyl phenol
			698-71-5	40	3-Ethyl-5-methyl-phenol
			2550-26-7	20	4-Phenyl-2-butanone
			7326-46-7	30	Tetrahydro-2-methyl-2-furanol
			16747-50-5	10	1-Ethyl-1-methyl-cyclopentane
			29538-70-0	9	4-Chloro-trans-cyclohexanol
394707075210201 150593	09/24/1984	1220	62-53-3	D	Benzenamine
			68-12-2	D	n,n-Dimethyl formamide
			75-18-3	20	Dimethyl sulfide
			90-12-0	D	1-Methyl naphthalene
			91-57-6	D	2-Methyl naphthalene
			95-48-7	D	2-Methyl phenol
			96-41-3	D	Cyclopentanol
			106-42-3	D	[1] [2]para-Xylene
			106-44-5	D	4-Methyl phenol
			106-48-9	D	4-Chloro phenol
			106-49-0	D	4-Methyl benzenamine
			108-42-9	D	3-Chloro-benzenamine
			354-23-4	D	[1]1,2 Dichloro-1,1,2-triflouroethane
			527-54-8	D	3,4,5-Trimethyl phenol
			527-60-6	D	2,4,6-Trimethyl phenol
			698-71-5	D	3-Ethyl-5-methyl-phenol
			2550-26-7	D	4-Phenyl-2-butanone
			7326-46-7	D	Tetrahydro-2-methyl-2-furanol
			16747-50-5	D	1-Ethyl-1-methyl-cyclopentane
			29538-70-0	D	4-Chloro-trans-cyclohexanol

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration		Compound
			Rollins Environmental Services, Inc.--Continued			
394714075211001 150594	06/13/1984	955	62-53-3	D		Benzenamine
			65-85-0	D		Benzoic acid
			67-68-5	D		Sulfinyl-bis-methane
			68-12-2	80		n,n-Dimethyl formamide
			75-18-3	D		Dimethyl sulfide
			88-73-3	D		1-Chloro-2-nitro benzene
			95-47-6	10	[1]	ortho-Xylene
			95-48-7	D		2-Methyl phenol
			95-51-2	D		2-Chloro benzenamine
			95-76-1	D		3,4-Dichloro benzenamine
			95-82-9	30		2,5-Dichloro-benzenamine
			98-54-4	10		4-(1,1-Dimethylethyl)-phenol
			100-41-4	D		Ethyl benzene
			100-61-6	D		n-Methyl-benzenamine
			100-61-8	50		n-Methyl-benzenamine
			101-84-8	D		Diphenyl ether
			106-42-3	20	[1] [2]	para-Xylene
			106-47-8	40		4-Chloro benzenamine
			106-48-9	D		4-Chloro phenol
			106-49-0	20		4-Methyl benzenamine
			108-42-9	100		3-Chloro-benzenamine
			108-88-3	D	[1]	Toluene
			108-90-7	D		Chlorobenzene
			110-86-1	D		Pyridine
			110-98-5	D		1,1'-Oxy-bis-2-propanol
			111-96-6	60		1,1'-Oxy-bis-(2-methoxy-ethane)
			121-69-7	20		n,n-Dimethyl-benzenamine
			143-24-8	10		2,5,8,11,14-Pentaoxapentadecane
			144-79-6	D		Chloromethyl diphenyl-silane
			598-94-7	D		n,n-Dimethyl-urea
			608-27-5	D		2,3-Dichloro benzenamine
			611-06-3	D		2,4-Dichloro-1-nitro-benzene
			626-43-7	8		3,5-Dichloro-benzenamine
			719-22-2	40		2,6-bis-(1,1-Dimethylethyl)-2,5-cyclohexadiene-1,4-dione
			872-50-4	20		1-Methyl-2-pyrrolidinone
			873-94-9	D		3,3,5-Trimethyl-cyclohexanone
			931-20-4	D		1-Methyl-2-piperidinone
			1330-20-7	D		Xylenes
			16082-71-6	D		2-(3-Chlorophenyl)-1H-isoindole-1,3(2H)-dione
			54845-35-1	10		2-Butyl-5-(2-methylpropyl)-thiophene

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration		Compound
			Rollins Environmental Services, Inc.--Continued			
394714075211001 150594	06/13/1984	1020	62-53-3	D		Benzenamine
			65-85-0	20		Benzoic acid
			67-68-5	10		Sulfinyl-bis-methane
			68-12-2	200		n,n-Dimethyl formamide
			75-18-3	D		Dimethyl sulfide
			88-73-3	20		1-Chloro-2-nitro benzene
			95-47-6	D	[1]	ortho-Xylene
			95-48-7	D		2-Methyl phenol
			95-51-2	D		2-Chloro benzenamine
			95-76-1	D		3,4-Dichloro benzenamine
			95-82-9	60		2,5-Dichloro-benzenamine
			98-54-4	30		4-(1,1-Dimethylethyl)-phenol
			100-41-4	D		Ethyl benzene
			100-61-6	D		n-Methyl-benzenamine
			100-61-8	70		n-Methyl-benzenamine
			101-84-8	10		Diphenyl ether
			106-42-3	20	[1] [2]	para-Xylene
			106-47-8	90		4-Chloro benzenamine
			106-48-9	20		4-Chloro phenol
			106-49-0	10		4-Methyl benzenamine
			108-42-9	200		3-Chloro-benzenamine
			108-88-3	D	[1]	Toluene
			108-90-7	D		Chlorobenzene
			110-86-1	D		Pyridine
			110-98-5	10		1,1'-Oxy-bis-2-propanol
			111-96-6	200		1,1'-Oxy-bis-(2-methoxy-ethane)
			121-69-7	30		n,n-Dimethyl-benzenamine
			143-24-8	20		2,5,8,11,14-Pentaoxapentadecane
			144-79-6	90		Chloromethyl diphenyl-silane
			598-94-7	20		n,n-Dimethyl-urea
			608-27-5	D		2,3-Dichloro benzenamine
			611-06-3	D		2,4-Dichloro-1-nitro benzene
			626-43-7	D		3,5-Dichloro-benzenamine
			719-22-2	80		2,6-bis-(1,1-Dimethylethyl)-2,5-cyclohexadiene-1,4-dione
			872-50-4	100		1-Methyl-2-pyrrolidinone
			873-94-9	20		3,3,5-Trimethyl-cyclohexanone
			931-20-4	20		1-Methyl-2-piperidinone
			1330-20-7	20		Xylenes
			16082-71-6	30		2-(3-Chlorophenyl)-1H-isoindole-1,3(2H)-dione
			54845-35-1	20		2-Butyl-5-(2-methylpropyl)-thiophene

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
			Rollins Environmental Services, Inc.--Continued		
394714075211001 150594	09/26/1984	945	62-53-3	D	Benzenamine
			65-85-0	100	Benzoic acid
			67-68-5	D	Sulfinyl-bis-methane
			68-12-2	90	n,n-Dimethyl formamide
			75-18-3	40	Dimethyl sulfide
			88-73-3	D	1-Chloro-2-nitro benzene
			95-47-6	100	[1]ortho-Xylene
			95-48-7	50	2-Methyl phenol
			95-51-2	2,000	2-Chloro benzenamine
			95-76-1	D	3,4-Dichloro benzenamine
			95-82-9	D	2,5-Dichloro-benzenamine
			98-54-4	D	4-(1,1-Dimethylethyl)-phenol
			100-41-4	80	Ethyl benzene
			100-61-6	200	n-Methyl-benzenamine
			100-61-8	D	n-Methyl-benzenamine
			101-84-8	D	Diphenyl ether
			106-42-3	80	[1] [2]para-Xylene
			106-47-8	D	4-Chloro benzenamine
			106-48-9	D	4-Chloro phenol
			106-49-0	300	4-Methyl benzenamine
			108-42-9	D	3-Chloro-benzenamine
			108-88-3	100	[1]Toluene
			108-90-7	100	Chlorobenzene
			110-86-1	D	Pyridine
			110-98-5	D	1,1'-Oxy-bis-2-propanol
			111-96-6	200	1,1'-Oxy-bis-(2-methoxy-ethane)
			121-69-7	40	n,n-Dimethyl-benzenamine
			143-24-8	D	2,5,8,11,14-Pentaoxapentadecane
			144-79-6	D	Chloromethyl diphenyl-silane
			598-94-7	D	n,n-Dimethyl-urea
			608-27-5	100	2,3-Dichloro benzenamine
			611-06-3	20	2,4-Dichloro-1-nitro benzene
			626-43-7	D	3,5-Dichloro-benzenamine
			719-22-2	D	2,6-bis-(1,1-Dimethylethyl)-2,5-cyclohexadiene-1,4-dione
			872-50-4	70	1-Methyl-2-pyrrolidinone
			873-94-9	D	3,3,5-Trimethyl-cyclohexanone
			931-20-4	D	1-Methyl-2-piperidinone
			1330-20-7	D	xylenes
			16082-71-6	D	2-(3-Chlorophenyl)-1H-isoindole-1,3(2H)-dione
			54845-35-1	D	2-Butyl-5-(2-methylpropyl)-thiophene

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394714075211001 150594	09/26/1984	1000	62-53-3	30	Benzenamine
			65-85-0	D	Benzoic acid
			67-68-5	D	Sulfinyl-bis-methane
			68-12-2	200	n,n-Dimethyl formamide
			75-18-3	40	Dimethyl sulfide
			88-73-3	D	1-Chloro-2-nitro benzene
			95-47-6	100	[1]ortho-Xylene
			95-48-7	50	2-Methyl phenol
			95-51-2	2,000	2-Chloro benzenamine
			95-76-1	20	3,4-Dichloro benzenamine
			95-82-9	D	2,5-Dichloro-benzenamine
			98-54-4	D	4-(1,1-Dimethylethyl)-phenol
			100-41-4	80	Ethyl benzene
			100-61-6	D	n-Methyl-benzenamine
			100-61-8	200	n-Methyl-benzenamine
			101-84-8	D	Diphenyl ether
			106-42-3	100	[1] [2]para-Xylene
			106-47-8	D	4-Chloro benzenamine
			106-48-9	D	4-Chloro phenol
			106-49-0	300	4-Methyl benzenamine
			108-42-9	D	3-Chloro-benzenamine
			108-88-3	100	[1]Toluene
			108-90-7	100	Chlorobenzene
			110-86-1	20	Pyridine
			110-98-5	D	1,1'-Oxy-bis-2-propanol
			111-96-6	300	1,1'-Oxy-bis-(2-methoxy-ethane)
			121-69-7	40	n,n-Dimethyl-benzenamine
			143-24-8	D	2,5,8,11,14-Pentaoxapentadecane
			144-79-6	D	Chloromethyl diphenyl-silane
			598-94-7	D	n,n-Dimethyl-urea
			608-27-5	100	2,3-Dichloro benzenamine
			611-06-3	D	2,4-Dichloro-1-nitro benzene
			626-43-7	D	3,5-Dichloro-benzenamine
			719-22-2	D	2,6-bis-(1,1-Dimethylethyl)-2,5-cyclohexadiene-1,4-dione
			872-50-4	300	1-Methyl-2-pyrrolidinone
			873-94-9	D	3,3,5-Trimethyl cyclohexanone
			931-20-4	D	1-Methyl-2-piperidinone
			1330-20-7	D	Xylenes
			16082-71-6	D	2-(3-Chlorophenyl)-1H-isoindole-1,3(2H)-dione
			54845-35-1	D	2-Butyl-5-(2-methylpropyl)-thiophene

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394714075210601 150595	06/14/1984	1005	62-53-3	D	Benzenamine
			65-85-0	D	Benzoic acid
			74-11-3	6	[1]4-Chloro-benzoic acid
			75-18-3	6	Dimethyl sulfide
			78-40-0	D	Phosphoric acid, triethyl ester
			87-61-6	D	1,2,3-Trichloro benzene
			88-72-2	D	[1]1-Methyl-2-nitro benzene
			90-00-6	2	2-Ethyl-phenol
			90-12-0	200	1-Methyl naphthalene
			91-57-6	400	2-Methyl naphthalene
			92-52-4	D	1,1'-Biphenyl
			95-15-8	80	Benzo(b)thiophene
			95-47-6	D	[1]ortho-Xylene
			95-48-7	7	2-Methyl phenol
			95-51-2	300	2-Chloro benzenamine
			95-63-6	D	1,2,4-Trimethyl benzene
			95-76-1	200	3,4-Dichloro benzenamine
			95-87-4	D	2,5-Dimethyl phenol
			99-99-0	D	[1]1-Methyl-4-nitro-benzene
			100-41-4	D	Ethylbenzene
			100-51-6	D	[1]Benzenemethanol
			104-55-2	100	3-Phenyl-2-propenal
			106-42-3	20	[1] [2]para-Xylene
			106-49-0	200	4-Methyl benzenamine
			108-39-4	100	3-Methyl phenol
			108-42-9	D	3-Chloro-benzenamine
			108-68-9	D	3,5-Dimethyl-phenol
			108-88-3	200	[1]Toluene
			108-90-7	D	Chlorobenzene
			110-86-1	D	Pyridine
			126-73-8	D	Phosphoric acid tributyl ester
			127-18-4	D	Tetrachloroethene
			137-18-8	3	2,5-Dimethyl-2,5-cyclohexadiene-1,4-dione
			271-89-6	100	Benzofuran
			300-57-2	100	2-Propenyl-benzene
			526-75-0	9	2,3-Dimethyl phenol
			608-27-5	200	2,3-Dichloro benzenamine
			619-04-5	3	3,4-Dimethyl-benzoic acid
			620-17-7	D	3-Ethyl phenol
			673-32-5	800	1-Propynyl benzene
			1649-08-7	1	1,2-Dichloro-1,1-difluoro ethane
			3209-22-1	D	1,2-Dichloro-3-nitrobenzene
			5131-66-8	D	1-Butoxy-2-propanol
			6863-58-7	D	Diisobutyl ether
			10544-50-0	3	Molecular sulfur
			13360-63-9	200	n-Ethyl-1-butanamine
			15176-21-3	D	2,5-Dimethyl-1,4-dioxane
			17059-52-8	D	7-Methyl-benzofuran
			17849-38-6	D	2-Chlorobenzenemethanol

Appendix 5.--Results of semiquantitative analyses for tentatively identified organic compounds of ground-water samples from Bridgeport Rental and Oil Services, Inc., Chemical Leaman Tank Lines, Inc., Monsanto Company, and Rollins Environmental Services, Inc., Logan Township, Gloucester County, NJ, 1984--Continued.

USGS site identification and unique well numbers	Sample collection Date	Sample collection Time	Chemical abstracts service number	Approximate concentration	Compound
					Rollins Environmental Services, Inc.--Continued
394714075210601 150595	09/26/1984	1415	62-53-3	80	Benzenamine
			65-85-0	200	Benzoic acid
			74-11-3	D	[1]4-Chloro-benzoic acid
			75-18-3	40	Dimethyl sulfide
			78-40-0	600	Phosphoric acid, triethyl ester
			87-61-6	300	1,2,3-Trichloro benzene
			88-72-2	70	[1]1-Methyl-2-nitro benzene
			90-00-6	50	2-Ethyl phenol
			90-12-0	400	1-Methyl naphthalene
			91-57-6	900	2-Methyl naphthalene
			92-52-4	30	1,1'-Biphenyl
			95-15-8	30	Benzo(b)thiophene
			95-47-6	100	[1]ortho-Xylene
			95-48-7	1,000	2-Methyl phenol
			95-51-2	2,000	2-Chloro benzenamine
			95-63-6	70	1,2,4-Trimethyl benzene
			95-76-1	40	3,4-Dichloro benzenamine
			95-87-4	1,000	2,5-Dimethyl phenol
			99-99-0	90	[1]1-Methyl-4-nitro-benzene
			100-41-4	70	Ethyl benzene
			100-51-6	700	[1]Benzenemethanol
			104-55-2	30	3-Phenyl-2-propenal
			106-42-3	400	[1] [2]para-Xylene
			106-49-0	2,000	4-Methyl benzenamine
			108-39-4	2,000	3-Methyl phenol
			108-42-9	50	3-Chloro-benzenamine
			108-68-9	80	3,5-Dimethyl-phenol
			108-88-3	1,000	[1]Toluene
			108-90-7	20	Chlorobenzene
			110-86-1	90	Pyridine
			126-73-8	20	Phosphoric acid tributyl ester
			127-18-4	20	Tetrachloroethene
			137-18-8	D	2,5-Dimethyl-2,5-cyclohexadiene-1,4-dione
			271-89-6	80	Benzofuran
			300-57-2	600	2-Propenyl-benzene
			526-75-0	200	2,3-Dimethyl phenol
			608-27-5	2,000	2,3-Dichloro benzenamine
			619-04-5	D	3,4-Dimethyl-benzoic acid
			620-17-7	200	3-Ethyl phenol
			673-32-5	700	1-Propynyl benzene
			1649-08-7	D	1,2-Dichloro-1,1-difluoro ethane
			3209-22-1	40	1,2-Dichloro-3-nitro-benzene
			5131-66-8	400	1-Butoxy-2-propanol
			6863-58-7	200	Diisobutyl ether
			10544-50-0	D	Molecular sulfur
			13360-63-9	D	n-Ethyl-1-butanamine
			15176-21-3	30	2,5-Dimethyl-1,4-dioxane
			17059-52-8	70	7-Methyl-benzofuran
			17849-38-6	100	2-Chlorobenzenemethanol

[1] Compound may be laboratory contaminant

[2] Compound may represent mixed xylenes