GROUND-WATER QUALITY IN EAST-CENTRAL NEW JERSEY, AND A PLAN FOR SAMPLING NETWORKS

By Douglas A. Harriman and B. Pierre Sargent

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 85-4243

Prepared in cooperation with the

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION,

DIVISION OF WATER RESOURCES and the

OCEAN COUNTY PLANNING BOARD

Trenton, New Jersey

1985

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
810 Bear Tavern Road
Suite 206
West Trenton, New Jersey 08628

Copies of this report can be purchased from:

Open-File Services Section
Western Distribution Branch
U.S. Geological Survey
Box 25425, Federal Center
Denver, Colorado 80225
(Telephone: [303] 236-7476)

CONTENTS

ILLUSTRATIONS

TABLES

CONVERSION FACTORS

For the convenience of readers who prefer to use metric (International System) units rather than the inch-pound units used in this report, the following conversion factors may be used:

Multiply Inch-Pound Unit	by	To Obtain Metric Unit
inch (in.)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
acre	0.4047	hectare
mile (mi)	1.609	kilometer (km)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
square mile (mi^2)	2.590	square kilometer (km^2)
foot squared per day (ft^2/d)	0.0929	meter squared per day (m^2/d)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
gallon per minute (gal/min)	0.06308	liter per second (L/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
gallon per minute per foot [(gal/min)/ft]	0.2070	liter per second per meter [(L/s)/m]

Temperature conversion formula: $°F = 1.8°C + 32$

GROUND-WATER QUALITY IN EAST-CENTRAL NEW JERSEY AND A PLAN FOR SAMPLING NETWORKS

By Douglas A. Harriman and B. Pierre Sargent

ABSTRACT

This study evaluates ground-water quality in seven confined aquifers and the water-table aquifer in east-central New Jersey based on 237 analyses of samples collected in 1981-82, and 225 older analyses. This report investigates the effect of land use on water quality and proposes several sampling networks for the region.

Generally, water in the confined aquifers is of satisfactory quality for human consumption and most other uses. Iron and manganese concentrations exceed U.S. Environmental Protection Agency drinking-water standards in some wells screened in the Potomac-Raritan-Magothy aquifer system. Sodium concentrations in samples from three wells more than 800 ft deep in the Englishtown aquifer exceed the standard. Iron and manganese concentrations in this aquifer may also exceed the standards. Iron concentrations in the Wenonah-Mount Laurel aquifer exceed the standard. Based on 15 analyses of water from the Vincentown aquifer, manganese is the only constituent that exceeds the drinking-water standard. In the Manasquan aquifer, 4 of 16 sodium determinations exceed the standard, and 8 of 16 iron determinations exceed the standard. Water quality in the Atlantic City 800-foot sand is generally satisfactory. However, 12 iron and 1 of 12 manganese determinations exceed the standards. For the Rio Grande water-bearing zone, 1 of 3 iron determinations exceed the standard. The Kirkwood-Cohansey aquifer system (the water-table aquifer) was the most thoroughly sampled (249 chemical analyses from 209 wells). Dissolved solids, chloride, iron, nitrate, and manganese concentrations exceed drinking-water standards in some areas. The results of chi-square tests of constituent distributions based on analyses from 158 wells in the water-table aquifer indicate that calcium is higher in industrial and commercial areas; and magnesium, chloride, and nitrate-plus-nitrite are higher in residential areas.

INTRODUCTION

New Jersey has the highest population density of the 50 States. Its natural resources are being stressed and are likely to be stressed further with continued population increases. Within the State, the region of greatest population growth is east-central New Jersey--the subject area of this report.

The study area (also called the area) consists of Ocean County and a narrow strip of Monmouth County to the north (fig. 1). It is identical to a water-quality planning area designated under Section 208 ("Areawide Waste Treatment Management") of the Federal Water Pollution Control Act Amendments of 1972, Public Law 92-500. It covers approximately 673 mi^2, and includes all 33 municipalities in Ocean County. In Monmouth County, it includes those parts of Freehold, Howell, Millstone, and Wall Townships within the Toms River or Metedeconk River basins, and those parts of southern Wall Township and Brielle Borough within the Manasquan River basin. It is situated along the Atlantic Ocean, approximately 60 miles south of New York City and 50 miles east of Philadelphia. Its advantageous location, relatively inexpensive land, and the conversion of seasonal homes to year-round residences have led to rapid growth in the past two decades. Population growth and the accompanying changes in land use create the potential for severe degradation of the County's water resources.

Ground water is the sole source of potable water in the study area. A shallow aquifer (primarily the unconfined Kirkwood-Cohansey aquifer system) is the principal source of potable water. Its proximity to the land surface makes it more susceptible to contamination than deeper confined aquifers. This report presents water-quality data and develops a regional sampling network covering eight aquifers, two specialized water-quality networks covering the Kirkwood-Cohansey aquifer system, and two salinity networks.

This study was made in cooperation with the New Jersey Department of Environmental Protection (NJDEP), Division of Water Resources, and the Ocean County Planning Board. An earlier report (Harriman and Voronin, 1984) presented the data resulting from this project.

Purpose and Scope

The purpose of this report is to present the interpretative results of the study and specifically address the following objectives:

1. Define the present quality of water in the principal aquifers.

2. Investigate the quality of water in the water-table aquifer as related to land use and regional ground-water flow.

3. Develop a strategy for a ground-water-quality sampling network.

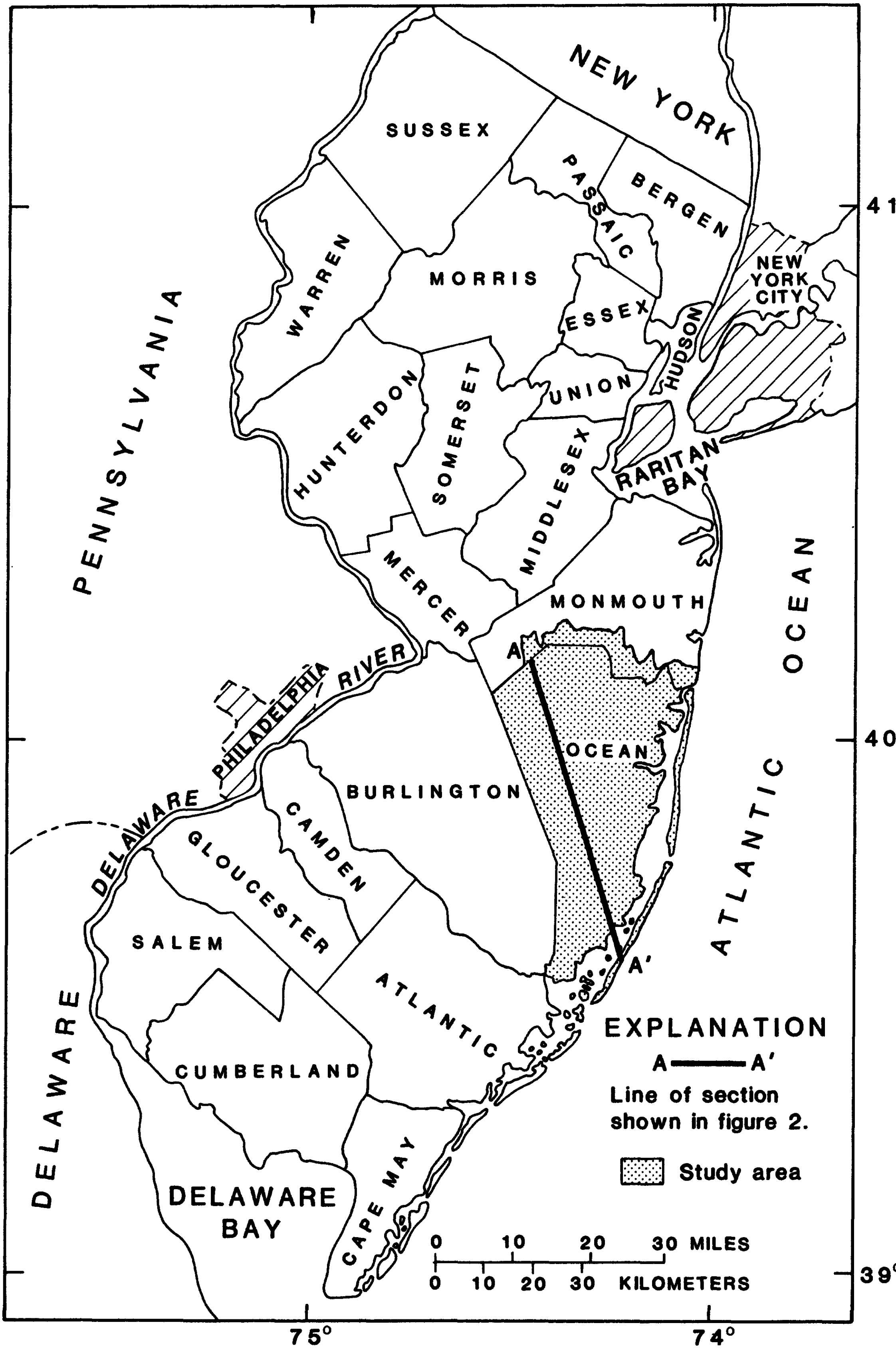

Figure 1.--Location of study area and line of hydrogeologic section.

The study is based on analyses of water from 236 wells sampled from August 1981 through June 1982, and 225 previous U.S. Geological Survey analyses of ground water in the area. Older partial analyses are omitted from the data base for this study, but many of these are published in Seaber (1963), Schaefer (1983), and U.S. Geological Survey Water-Resources Data Reports (annually since 1967).

Thirty chemical constituents and physical characteristics were chosen for analysis, largely on the basis of drinking-water standards. Measurements of selected volatile organic compounds made on 142 samples are included in Harriman and Voronin (1984).

Previous Investigations

Back (1966) investigated the northern part of the Atlantic Coastal Plain from New Jersey to Virginia; he related water quality to ground-water flow patterns. Other reports are restricted to the New Jersey Coastal Plain. Seaber (1963) and Schaefer (1983) determined chloride concentrations in samples from wells near the coast, and summarized the status of saltwater intrusion in different aquifers. Vowinkel and Foster (1981) listed major ground-water withdrawals in the Coastal Plain. Walker (1983) documented and evaluated changes of water level in the major artesian aquifers of the New Jersey Coastal Plain. Zapecza (1984) presented the results of a subsurface mapping program within the Coastal Plain of New Jersey. He defined occurrence and configuration of 15 regional hydrogeologic units based on interpretation of borehole geophysical data.

County water-resources investigations made in the 1960's resulted in reports by Rush (1968) on neighboring Burlington County and Jablonski (1968) on Monmouth County. Anderson and Appel (1969) evaluated the hydrogeology of Ocean County. Disko and others (1978) presented available information on ground water in east-central New Jersey, an area identical with that covered in this report, and made recommendations for its management.

Regional studies have addressed the major aquifers in the New Jersey Atlantic Coastal Plain. Gill and Farlekas (1976) developed geohydrologic maps of the Potomac-Raritan-Magothy aquifer system. Luzier (1980) modeled head distribution in the aquifer system resulting from withdrawal or injection of fresh water. Langmuir (1969), Winograd and Farlekas (1974), Farlekas and others (1976), and Fusillo and Voronin (1981) investigated water quality and the flow system of the Potomac-Raritan-Magothy in outcrop areas and in downdip areas in Camden, Burlington, Monmouth, and Ocean Counties. Seaber (1962, 1965) discussed the geohydrology of the Englishtown Formation.

Nichols (1977a, 1977b) investigated and modeled the geohydrology of the Englishtown aquifer in the northern Coastal Plain of New Jersey. Nemickas (1976) modeled the Wenonah-Mount Laurel aquifer. Rhodehamel (1970, 1973) discussed water quality in the Kirkwood-Cohansey aquifer system; he investigated Wharton State Forest and the Mullica River basin, part of which is in Ocean County. Harbaugh and Tilley (1984) developed a steady-state ground-water flow model of this basin.

Well-numbering system

Two different numbering systems are employed by the U.S. Geological Survey in New Jersey to identify wells. One, the U.S. Geological Survey National Water Data Storage and Retrieval System (WATSTORE), uses a 15-digit station number, or WATSTORE identifier. The first six digits represent degrees, minutes, and seconds of latitude, and the next seven digits represent degrees, minutes, and seconds of longitude. The remaining two digits indicate the sequence in which wells with the same latitude-longitude designation were inventoried. The WATSTORE identifer is used throughout the United States to access water-quality information.

The second numbering system employs a six-digit number developed by the New Jersey District of the U.S. Geological Survey. The well number consists of a two-digit county code and a four-digit sequence number of the well within the county. County codes used in this report are 29 for Ocean, 25 for Monmouth, and 05 for Burlington County.

Acknowledgments

The authors gratefully acknowledge the cooperation of Alan Avery, Principal Planner, Ocean County Planning Board and Joseph Przywara, Environmental Health Coordinator, Ocean County Board of Health. Douglass Rothermel and the staff of the Ocean County Board of Health Laboratory provided timely analytical determinations of water samples. The authors are also indebted to the New Jersey Department of Health, Division of Laboratories and Epidemiology, for analyses of dissolved nutrients collected in June 1982.

Appreciation is extended to the municipal officials, industrial representatives, and others who provided information and permitted access to their wells for the collection of water samples. The authors are grateful to Tom Barringer for his help with the statistical analysis of the data.

GEOGRAPHY

Topography and Drainage

The area is typical of the Atlantic Coastal Plain physiographic province, with gently sloping hills and low relief. Elevations range from 340 ft above sea level near Clarksburg, Monmouth County, to sea level along the coast. Two barrier beaches and two principal bays separate the mainland from the Atlantic Ocean. Streams in the area generally form a dendritic drainage pattern and their gradients are gentle. Wetlands adjacent to waterways are common. Numerous shallow lakes, cranberry bogs, and ponds commonly smaller than 100 acres, are scattered throughout the area.

The area is drained principally by east- and southeast-flowing streams (see pl. 1). From north to south, the major basins draining to the Atlantic Ocean are Manasquan, Metedeconk, and Toms Rivers, Cedar Creek, Forked River, and Oyster, Mill, Westecunk, and Tuckerton Creeks. The Oswego River drains the southwestern part of the area and empties into the Wading River. The drainage divide between flow into the Atlantic Ocean and that into the Delaware River is in the northwestern part of the area. The two major basins in the area that drain to the Delaware River are Rancocas Creek, which flows westward out of the area, and Crosswicks Creek, which flows northward.

Oyster Creek and South Branch Forked River drainage basins consistently have higher runoff than expected based on average runoff/rainfall ratios in the region; ground water is thought to contribute significantly to the flow of these streams. Water in the water-table aquifer in upland areas may flow across surface drainage divides and discharge into streams of nearby basins at lower altitudes (Fusillo and others, 1980).

Climate

East-central New Jersey has a temperate climate modified by its close proximity to the Atlantic Ocean. Winter temperatures along the coast are 10° to 20°F warmer than those inland, summer temperatures are 10° to 15°F cooler. The mean annual temperature from 1951 to 1980 at Freehold Borough (pl. 1) is 52.7°F. Annual precipitation there during the same period averages 45.89 inches and at Toms River, 47.68 inches (National Oceanic and Atmospheric Administration, 1982). Precipitation is distributed fairly evenly throughout the year, averaging 3 to 5 inches per month. July and August are usually the wettest months, and January and February the driest.

GEOHYDROLOGY

The Coastal Plain of New Jersey consists of a seaward-thickening wedge of unconsolidated clay, silt, sand, and gravel. The wedge is 1,100 ft thick at New Egypt, in the northwestern part of the study area, and 4,800 ft thick at Tuckerton along the coast (based on hydrogeologic maps by Gill and Farlekas, 1976). The sediments range in age from Cretaceous to Quaternary and overlie an eroded rock surface of Precambrian metamorphic rocks (table 1). The sediments dip to the southeast, generally at a rate of 10 to 100 ft/mi (Parker and others, 1964, p. 42).

Figure 2 illustrates the seaward thickening of the strata and the sequence of aquifers and confining beds. A brief

Table 1.--Lithology and hydrologic characteristics of geologic units in study area.[1]

SYSTEM	GEOLOGIC UNIT	LITHOLOGY	HYDROLOGIC CHARACTERISTICS
Quaternary	Alluvial deposits	Sand, silt, and black mud.	Locally may yield small quantities of water to shallow wells.
	Beach sand and gravel	Sand, quartz, light-colored, medium-grained, pebbly.	
Tertiary	Beacon Hill Gravel	Gravel, quartz, light-colored, sandy.	No known wells tap this formation.
	Cohansey Sand	Sand, quartz, light-colored, medium- to coarse-grained, pebbly; local clay beds.	A major aquifer; ground water occurs generally under water-table conditions. Inland from coast and in northern part of Ocean County, the Cohansey Sand is hydraulically connected to the Kirkwood Formation, forming the unconfined Kirkwood-Cohansy aquifer system.
	Kirkwood Formation	Sand, quartz, gray to tan, very fine- to medium-grained, micaceous; and clay, dark-colored, diatomaceous.	Includes a major and minor artesian aquifer near the coast. Major aquifer is the Atlantic City 800-foot sand. Minor aquifer is the Rio Grande water-bearing zone. The Kirkwood Formation includes as many as three confining layers near coast. Inland from coast and in the northern part of Ocean County, the Kirkwood Formation is hydraulically connected to the unconfined Cohansey Sand, forming the unconfined Kirkwood-Cohansey aquifer system.
	Shark River Marl	Sand, quartz; glauconite, gray, brown, and green, fine- to coarse-grained, clayey; and clay, green, silty and sandy.	Locally may yield small quantities of water to wells.
	Manasquan Formation		Locally may yield small to moderate quantities of water to wells.
	Vincentown Formation	Sand, quartz, gray and green, fine- to coarse-grained, glauconitic, and quartz calcarenite, brown, clayey, very fossiliferous, glauconitic.	Locally may yield small to moderate quantities of water to wells.
	Hornerstown Sand	Sand, glauconite, green, medium- to coarse-grained, clayey.	Locally may yield small quantities of water to wells.
Cretaceous	Reo Bank Sand	Sand, quartz and glauconite, brown and gray, fine- to coarse-grained, clayey, micaceous.	Yields small quantities of water to wells in Monmouth County.
	Navesink Formation	Sand, quartz and glauconite, green, black, and brown, medium- to coarse-grained, clayey.	Locally may yield small quantities of water to wells.
	Mount Laurel Sand	Sand, quartz, brown and gray, fine- to coarse-grained, glauconitic.	A minor aquifer in study area. A sand unit within the two formations forms the Wenonah-Mount Laurel aquifer.
	Wenonah Formation	Sand, quartz, gray and brown, very fine- to fine-grained, glauconitic, micaceous.	
	Marshalltown Formation	Sand, quartz and glauconite, gray and black, very fine- to medium-grained, very clayey.	Leaky confining bed.
	Englishtown Formation	Sand, quartz, tan and gray, fine- to medium-grained; local clay beds.	A major aquifer in northern part of the Coastal Plain, the Englishtown aquifer contains two sand units in Ocean and Monmouth Counties.
	Woodbury Clay	Clay, gray and black, micaceous.	The two formations form the Merchantville-Woodbury confining unit, a major confining layer throughout the New Jersey Coastal Plain.
	Merchantville Formation	Clay, gray and black, micaceous, glauconitic, silty; locally very fine-grain quartz and glauconitic sand.	
	Magothy Formation	Sand, quartz, light-gray, fine-grained, and clay, dark-gray, lignitic.	Major aquifers in the study area. In this report they are combined to form the Potomac-Raritan-Magothy aquifer system.
	Raritan Formation	Sand, quartz, light-gray, fine- to coarse-grained, pebbly, arkosic, red, white; and variegated clay.	
	Potomac Group	Alternating clay, silt, sand, and gravel.	
Pre-Cretaceous	Pre-Cretaceous basement	Precambrian and lower Paleozoic crystalline metamorphic rocks, schist and gneiss.	No known wells in study area obtain water from these consolidated rocks.

[1] Modified after Walker, 1983, table 1.

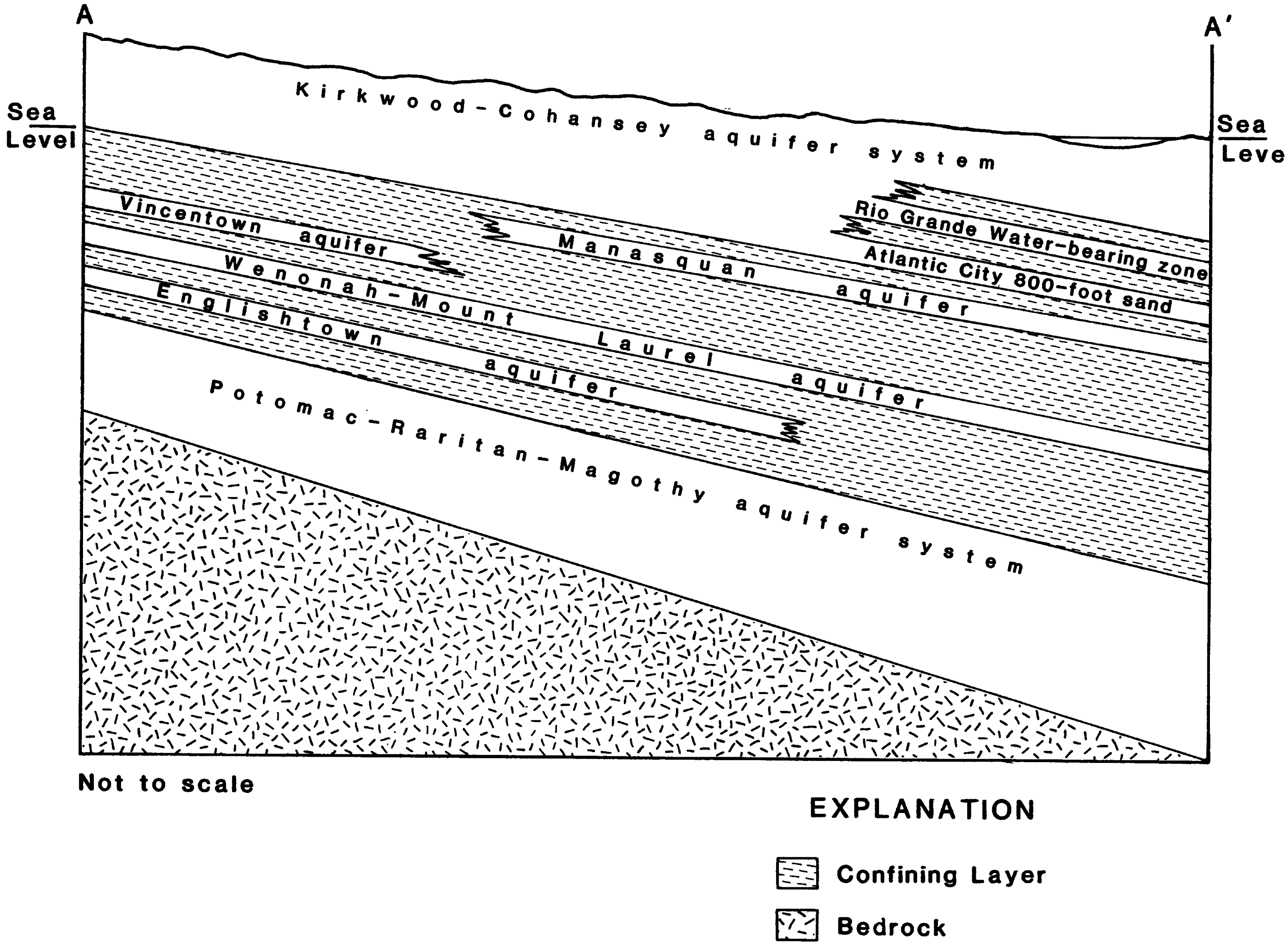

Figure 2.--Generalized hydrogeologic section of study area.

discussion of the principal hydrogeologic units (oldest first) follows.

Confined Aquifers

The Potomac Group and Raritan and Magothy Formations of Cretaceous age are the oldest unconsolidated sediments. They consist of interbedded sand and gravel, silt, and clay that crop out in a narrow band along the Delaware River in New Jersey and eastern Pennsylvania. Their combined thickness ranges from 600 ft at the Monmouth-Ocean County border to 3,400 ft at the southern tip of Long Beach Island (Gill and Farlekas, 1976).

The Potomac Group and the Raritan and Magothy Formations generally have been interpreted as a single aquifer system (Gill and Farlekas, 1976; Luzier, 1980). The transmissivity of this system in the Camden area ranges from 2,300 to 6,700 ft^2/d, and its storage coefficient ranges from 0.000033 to 0.0015 (Farlekas and others, 1976). In southern Ocean County, the lower part of the aquifer system contains salty water (chloride concentrations exceed 250 mg/L). In 1978, water levels generally ranged from 0 to 20 ft below sea level, and several cones of depression extended 40 ft below sea level (Walker, 1983).

The Merchantville Formation, which overlies the Magothy, consists of dark gray to grayish-black micaceous clay and clayey silt with beds and lenses of glauconite sand (Owens and Sohl, 1969). The Woodbury Clay, which overlies the Merchantville, consists of a grayish-black micaceous clayey silt. The Merchantville-Woodbury unit is relatively impermeable and acts as a confining layer for the underlying Potomac-Raritan-Magothy aquifer system. The thickness of the Merchantville-Woodbury confining unit ranges from 50 ft at the outcrop to more than 300 ft along the coast (based on hydrogeologic maps by Gill and Farlekas, 1976).

The Englishtown Formation is typically a series of white-to-light-gray thin cross-stratified fine- to medium-grained lignitic quartz sand beds intercalated with thin beds of dark-gray sandy silty clay and clayey silt (Nichols, 1977a, p. 12, 1977b, p. 9). Total thickness ranges from 160 ft in northern Ocean County to more than 200 ft in the Toms River area (Nichols, 1977a). Locally it consists of an upper and lower sand, separated by a clayey silt (Nichols 1977a, 1977b).

The Englishtown aquifer consists of the upper and lower sand facies of the Englishtown Formation. It is a major source of water in southern Monmouth County and northeastern Ocean County. Transmissivity ranges from 650 to 2,400 ft^2/d and estimated hydraulic conductivity ranges from 11 to 20 ft/d (Nichols 1977a). Lowest potentiometric heads in the Englishtown aquifer in 1978 were 220 ft below sea level, near Point Pleasant; here they were approximately 200 ft lower than the water level in the Potomac-Raritan-Magothy aquifer system (Walker, 1983).

The Marshalltown Formation, which overlies the Englishtown, is a dark greenish-black fine- to very fine-grained clayey glauconite-quartz sand and silt (Nichols 1977b). This 10 to 20 ft thick formation and the overlying fine-grained lower part of the Wenonah Formation act as a leaky confining bed between the Wenonah-Mount Laurel aquifer and the underlying Englishtown aquifer (Nemickas, 1976).

The Wenonah-Mount Laurel aquifer consists of the sandy upper part of the Wenonah Formation, which coarsens upward from a silt and sand to a medium-grained sand, and the overlying Mount Laurel Sand. The average thickness of the aquifer in the area is 60 to 80 ft (Zapecza, 1984).

Overlying the Wenonah-Mount Laurel aquifer in the study area is a thick confining layer that may include the Navesink Formation, Red Bank Sand, Hornerstown Sand, parts of the Vincentown and Manasquan Formations, and Shark River Marl (Zapecza, 1984). The total thickness of the confining layer ranges from approximately 150 ft at New Egypt to 900 ft at Beach Haven. The Navesink, which is the basal unit of the confining layer, contains glauconitic sand and shell beds.

The Vincentown Formation of Tertiary age, which crops out in the New Egypt area, consists of a clay and silt unit and a sandy unit. Its thickness ranges from about 20 ft in the outcrop area along the Monmouth-Ocean County border to approximately 80 ft in northern Ocean County. The Vincentown aquifer, as used here, refers to the sandy part of the formation. The aquifer, consisting of massive glauconitic quartz grains, extends from its outcrop approximately 9 miles downdip where it grades into silty clay (Zapecza, 1984).

The Manasquan Formation crops out in northwestern Ocean County where its upper zone consists of quartz sand, silt, and clay; its lower zone is clayey quartz sand. Its maximum recorded thickness in the study area is about 130 ft. The Manasquan aquifer, which consists of the sandy part of the formation, is a major aquifer in the area. It is pumped mainly in central Ocean County. Average yield is about 260 gal/min and average specific capacity is about 3.4 (gal/min)/ft of drawdown (Anderson and Appel, 1969).

The overlying Kirkwood Formation is characterized by a gray to tan quartz sand, and beds of dark diatomaceous clay. It crops out in the northern part of Ocean County where it is about 50 ft thick. Its maximum thickness is about 500 ft, at Beach Haven (Zapecza, 1984).

In the southern part of the area, along the coast, the Kirkwood Formation contains two confined aquifers separated by a confining layer (fig. 2). The lower aquifer is the Atlantic City 800-foot sand and the upper one is the Rio Grande water-bearing zone (Zapecza, 1984). The Atlantic City 800-foot sand is a medium- to coarse-grained quartz sand interspersed with fragmented shell material. It is approximately 40 ft thick at Barnegat Light and thickens to 125 ft in southern Ocean County. The Rio Grande water-bearing zone is approximately 20 to 40 ft thick (see section C-C', pl. 1).

Water-Table Aquifer

In the northern part of Ocean County and inland from the coast south of Barnegat Light (pl. 1), the Kirkwood Formation is hydraulically connected to the overlying Cohansey Sand; these formations form the Kirkwood-Cohansey aquifer system (Zapecza, 1984). The Cohansey Sand attains a maximum thickness of 250 ft in the southeastern part of the study area, and thins to a featheredge along the outcrop of the Kirkwood Formation in the northwestern part of the area. It is predominantly a pebbly, silty quartz sand containing interbedded clay (Rhodehamel, 1973).

Ground water in the upper part of the Kirkwood-Cohansey aquifer system commonly occurs under water-table conditions. In general, the overlying surficial deposits, including alluvial deposits and beach sand and gravel, are hydraulically connected to the underlying aquifer. The thickness of the water-table aquifer ranges from about 50 ft in northwestern Ocean County, near the Monmouth County border, to about 400 ft near Island Beach (see sections A-A', B-B', and C-C', pl. 1). Transmissivity ranges from 10,000 to 13,000 ft^2/d (Rhodehamel, 1973).

Ground-Water Flow

A contour map of the water table in the Kirkwood-Cohansey aquifer system is shown in figure 3. The generalized configuration is based on the altitudes of streams, swamps, and lakes as shown on USGS $7^1/_2$-minute topographic maps, water-level data from observation wells, and records of 150 sampled wells. In general, the water table coincides with streams and wetlands in low areas and forms a subdued replica of the topography in high areas. A crest of the water table in the northwestern part of the area forms a ground-water divide (see fig. 3). West of the divide, water flows toward the Delaware River, and east of it, water flows toward the Atlantic Ocean.

Below the water table, water moves along curved paths called flow lines. Figure 4 shows a shallow system recharging and discharging locally, and a deeper system responding to regional differences in head. Regional recharge occurs at and near the major ground-water divide and regional discharge is concentrated near the coast. A contaminant in the ground-water flow system may follow flow lines from local and regional recharge areas to local and regional discharge areas or, under complex conditions, may move between flow systems.

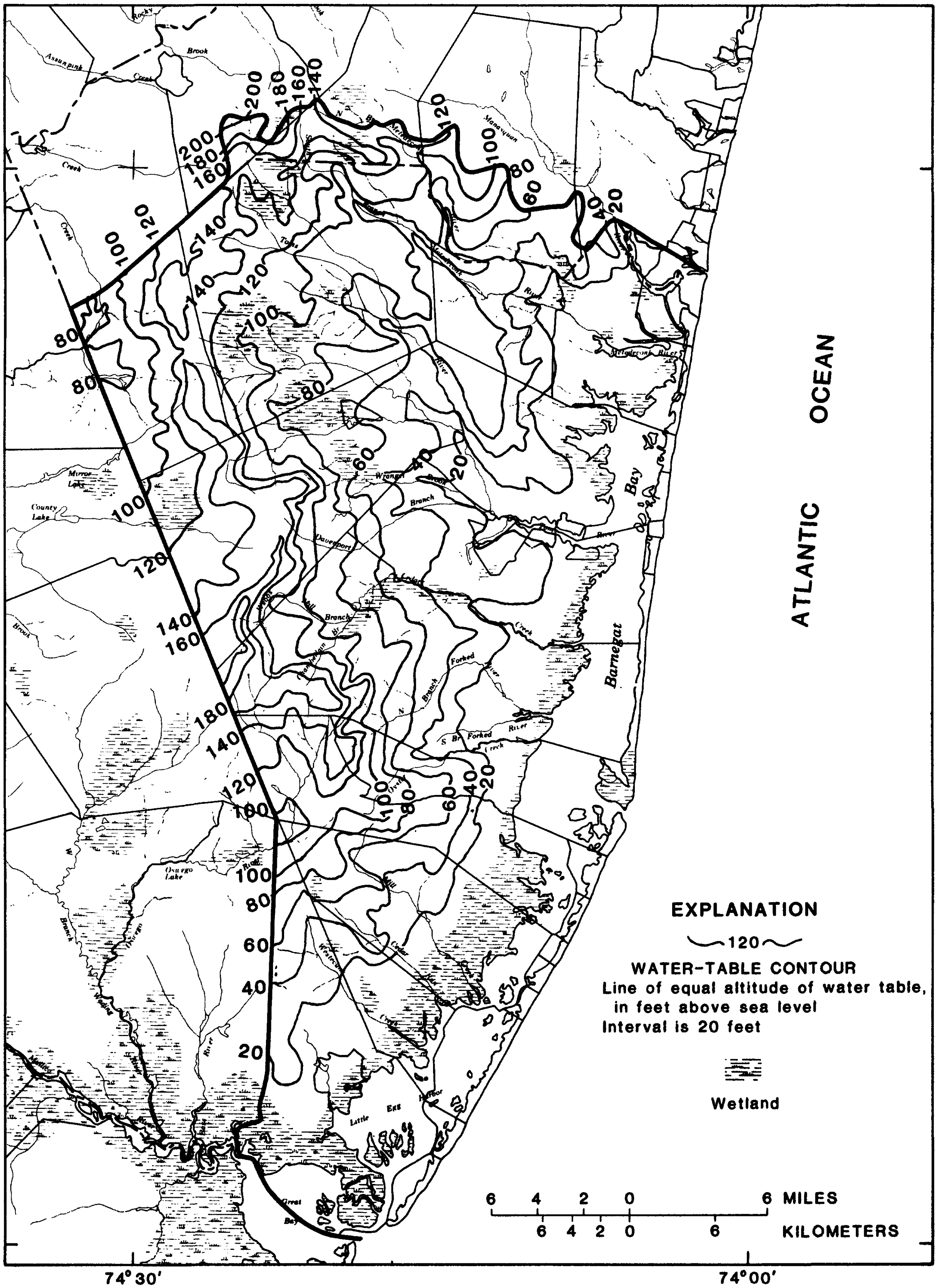

Figure 3.--Generalized water-table map of study area.

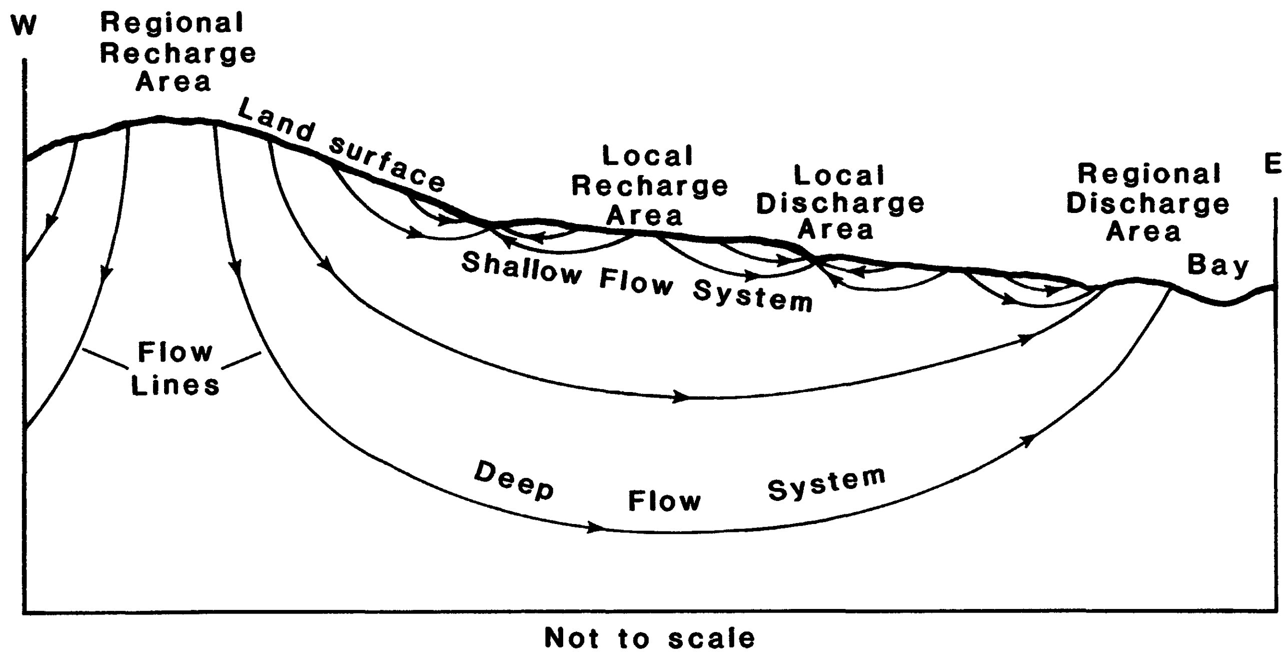

Figure 4.--Generalized ground-water flow pattern in the Kirkwood-Cohansey aquifer system.

Water-Level Fluctuations

Water levels in the water-table aquifer under natural conditions generally reflect the balance between precipitation and evapotranspiration plus ground-water discharge. Water levels fluctuate more widely near the ground-water divide than near discharge areas along the coast. Observation well 29-486 (see pl. 1) is near the ground-water divide, where seasonal fluctuations may lag several months behind climatic changes (fig. 5). Annual water-level fluctuations in this well have been correlated with annual variations in precipitation. For each 1 ft increase or decrease in precipitation there is a corresponding approximate 2 ft rise or fall in the lowest annual water level (Anderson and Appel, 1969, p. 16).

Water-level fluctuations, in two adjacent observation wells in Ocean Township (wells 29-513 and 29-514) that are screened in the Kirkwood-Cohansey aquifer system, are shown in figure 6. The wells are located in the regional discharge area along the coast (see pl. 1). If the aquifer were homogeneous and isotropic at this location, the water-level fluctuations in both wells would be synchronous. The differences in fluctuations indicate that the aquifer system may be partially confined. A geophysical log of the deeper well indicates that a confining layer does separate the water-bearing zones tapped by the two wells. In the 1978 and 1979 water years the fluctuations are almost diametrically opposed. The deeper well is thought to be responding to dewatering for construction of the proposed Forked River Nuclear Power Plant which is on the opposite side of Oyster Creek, about two miles from the wells. The shallow well is thought to reflect local hydrology as influenced by the nearby creek.

Ground-Water Withdrawals

Ground water is the primary source of supply in the study area. Its use has increased substantially from about 5 million gallons per day (Mgal/d) in 1956 to 45 Mgal/d in 1980. The relationship between ground-water withdrawals and population growth is shown in figure 7. Withdrawals are expected to increase in the future as population increases.

The Kirkwood-Cohansey aquifer system is the major source of potable ground water; it supplied 16.1 Mgal/d in 1980 (fig. 8). Withdrawal figures do not include unreported or domestic diversions. Large withdrawals for dewatering for construction of the Forked River Nuclear Power Plant foundation started in 1977 and peaked in 1978 (fig. 8).

The Potomac-Raritan-Magothy aquifer system is the second largest source of potable ground water; it supplied 15.8 Mgal/d in 1980. In the same year, withdrawals from three less important aquifers were: Englishtown (5.3 Mgal/d), Atlantic City 800-foot sand (4.1 Mgal/d), and Manasquan (2.1 Mgal/d) (fig. 8).

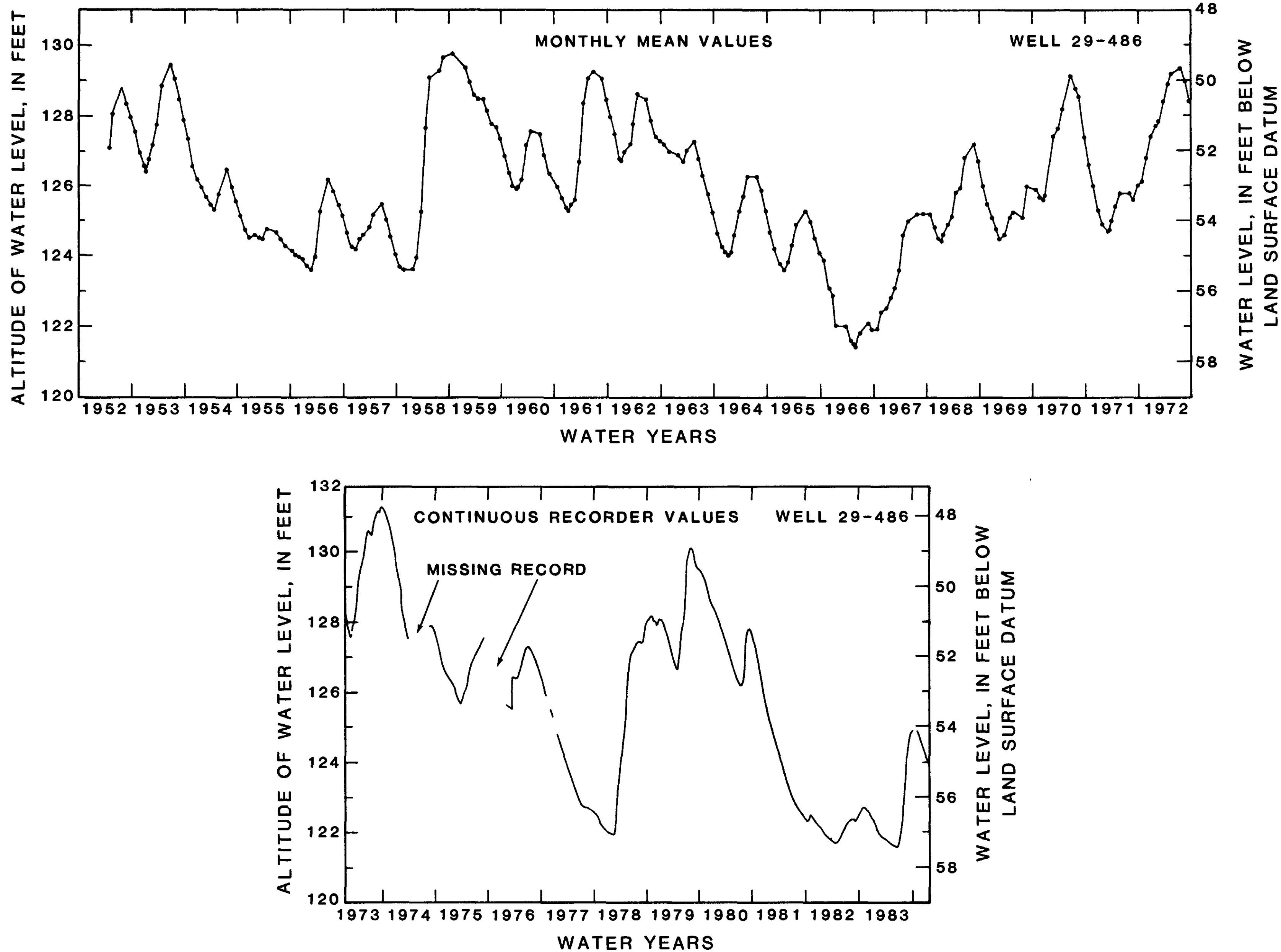

Figure 5.--Water-level fluctuations in the Crammer Observation Well, 1952-83. (Location is shown on pl. 1.)

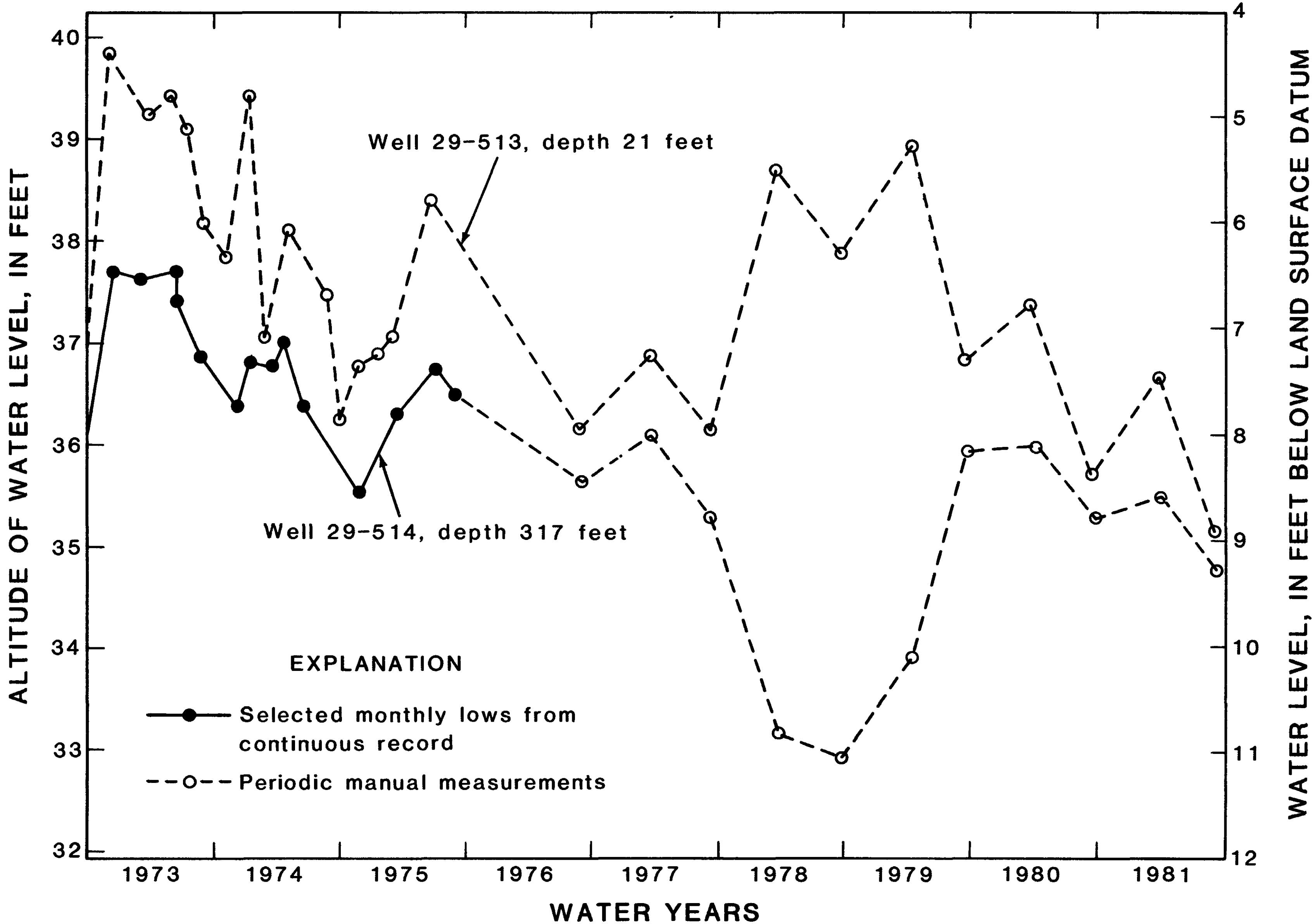

Figure 6.--Water-level fluctuations in two observation wells screened in the Kirkwood-Cohansey aquifer system near Waretown, 1973-81.

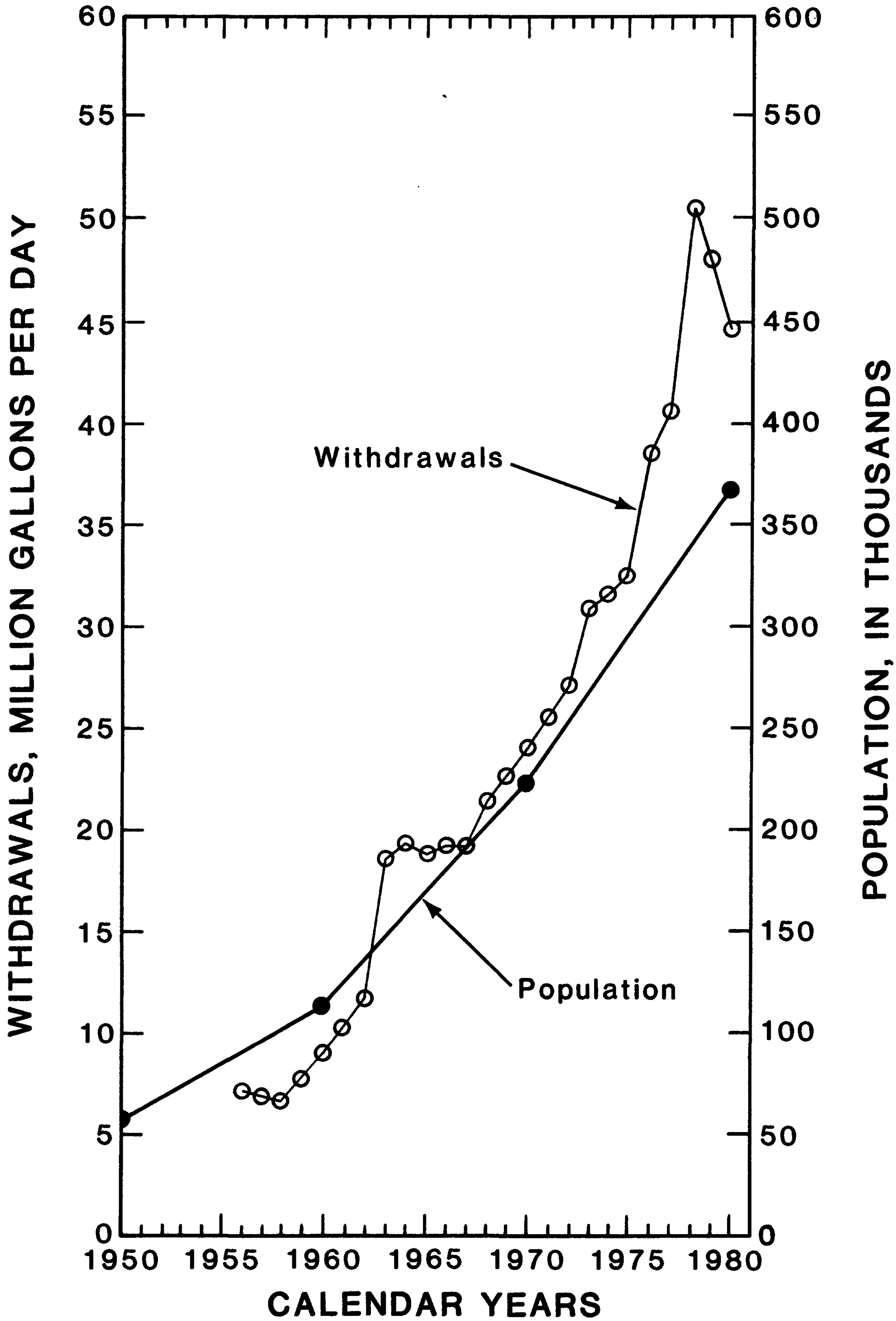

Figure 7.--Major ground-water withdrawals and population in study area, 1950-80.

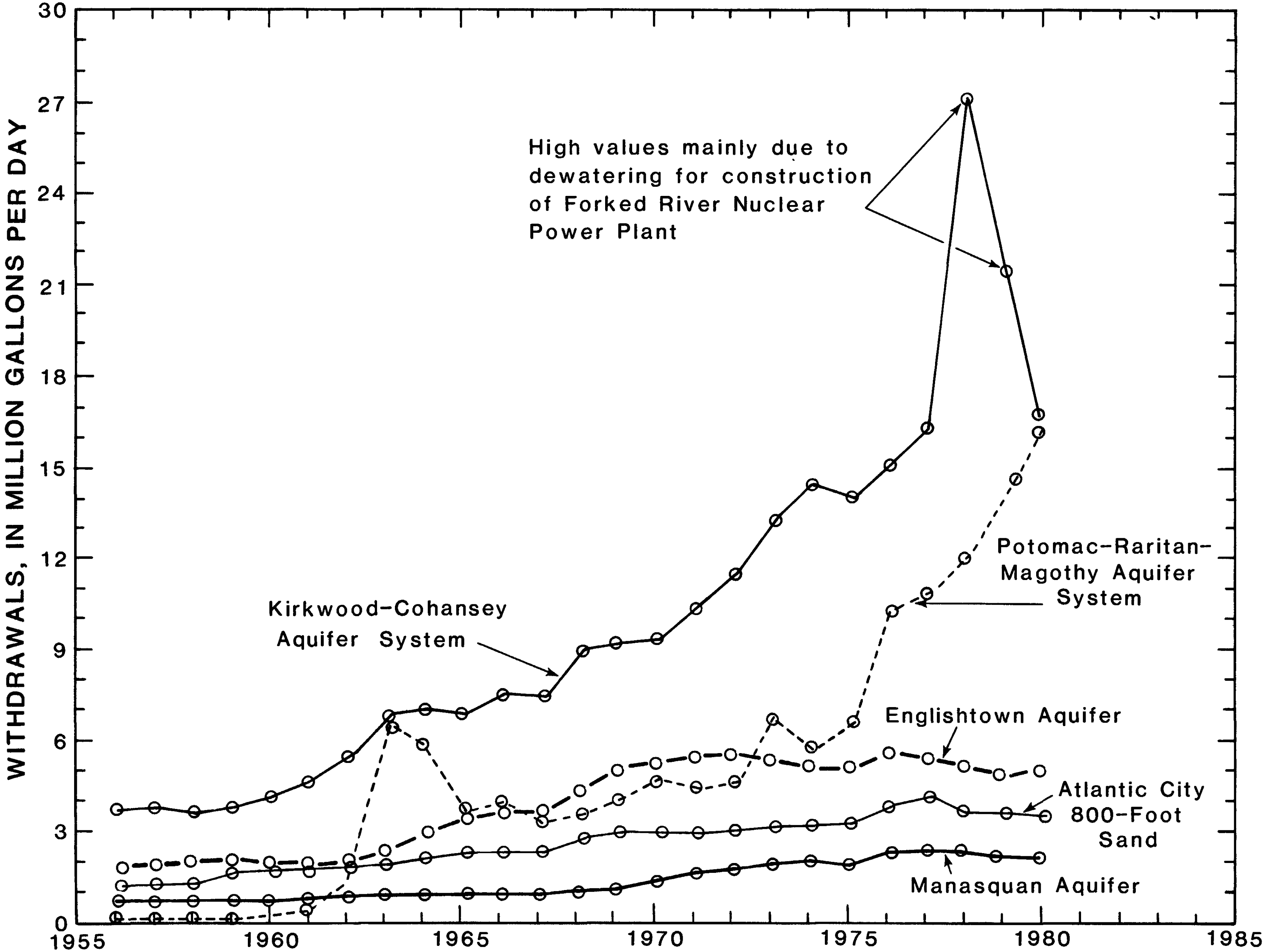

Figure 8.--Major withdrawals from aquifers in study area, 1956-80.

Withdrawals from the minor aquifers (less than one Mgal/d withdrawn in 1980) were: Vincentown (0.56 Mgal/d), Rio Grande water-bearing zone (0.47 Mgal/d), and Wenonah-Mount Laurel (0.37 Mgal/d).

The distribution of high-capacity wells screened in the major aquifers is shown in figures 9 and 10. High-capacity wells screened in the Kirkwood-Cohansey aquifer system are concentrated mainly in the northeastern part of the area (fig. 9). Figure 10 indicates that high-capacity wells in the Potomac-Raritan-Magothy aquifer system are likewise concentrated in the northeastern part of the area.

SAMPLE COLLECTION AND ANALYSIS

From August 1981 through June 1982, 236 wells were sampled for this study. In addition, 225 older U.S. Geological Survey analyses supplemented the data base. Each of these analyses includes all or most of the predominant cations and anions. However, older analyses consisting only of pH, specific conductance, water temperature, and chloride data were not added to the data base. Some of these data are published in Seaber (1963), Schaefer (1983), and annual U.S. Geological Survey Water-Resources Data Reports from 1967 onward.

Selection of Wells

The principle objective in sampling was to characterize the quality of ground water in the area; therefore, wells near landfills or other pollution sources were avoided. Large-capacity wells were favored for sampling; they generally are more representative than small-capacity wells because they draw water from a large volume of the aquifer (Wood, 1976). This project emphasized the water-table aquifer, which provided about two-thirds of the well samples.

Field Procedures

Water samples were collected, filtered, and preserved according to accepted U.S. Geological Survey field techniques (Brown and others, 1970; Wood, 1976). Field measurements included temperature, specific conductance, pH, and alkalinity. Samples were restricted to untreated water collected as close to the wellhead as possible. Unused wells were pumped until at least two well-casing volumes were withdrawn. During pumping, the specific conductance, pH, and temperature of the water were monitored. After measurements stabilized, a sample was collected.

Laboratory Methods

Table 2 lists the laboratories making the analyses, their detection limits during different sampling periods, and drinking-water standards. The Ocean County Board of Health Laboratory (County Laboratory) in Toms River, New Jersey, analyzed 195

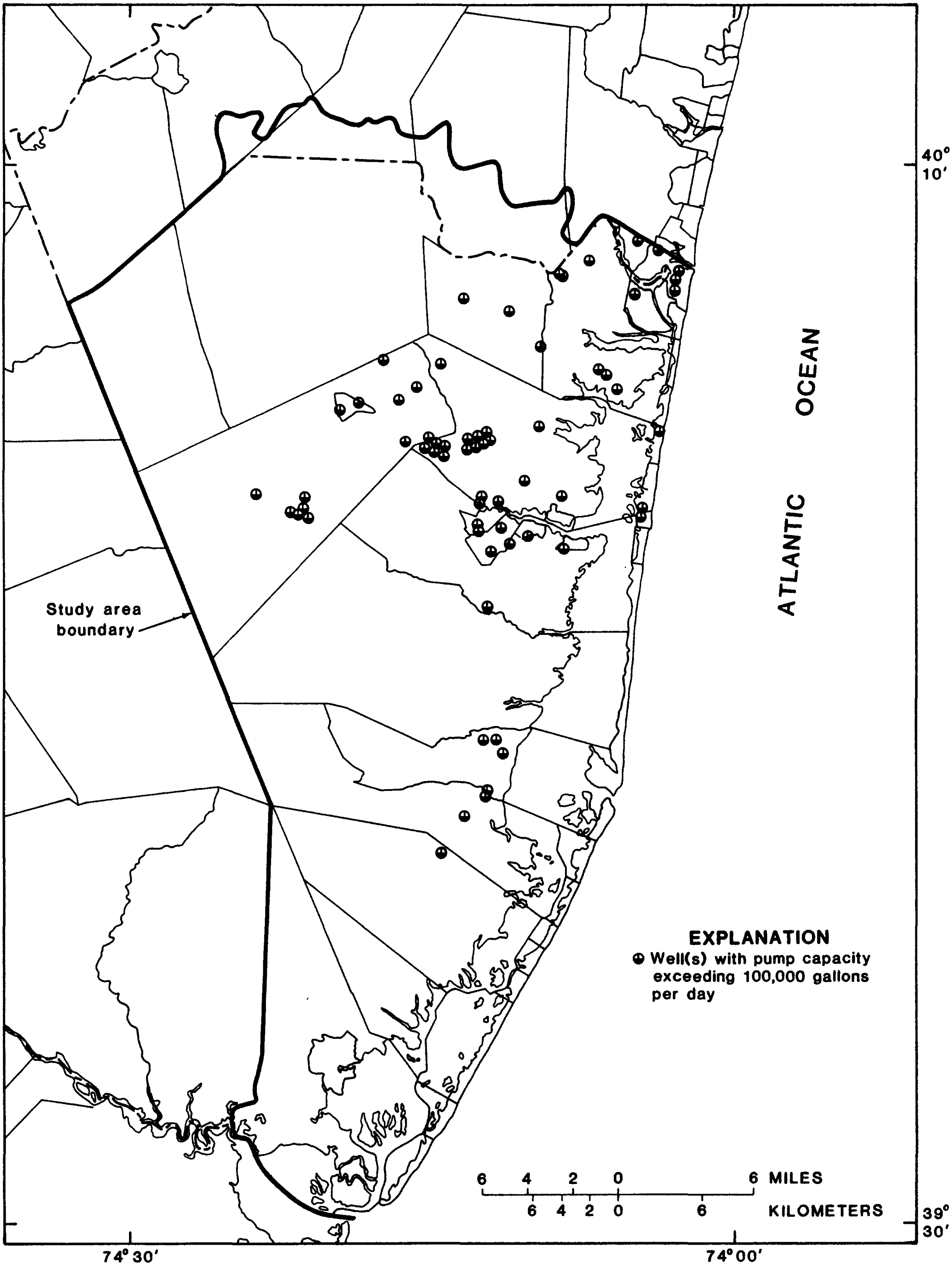

Figure 9.--Location of major withdrawals from the Kirkwood-Cohansey aquifer system, 1956-80.

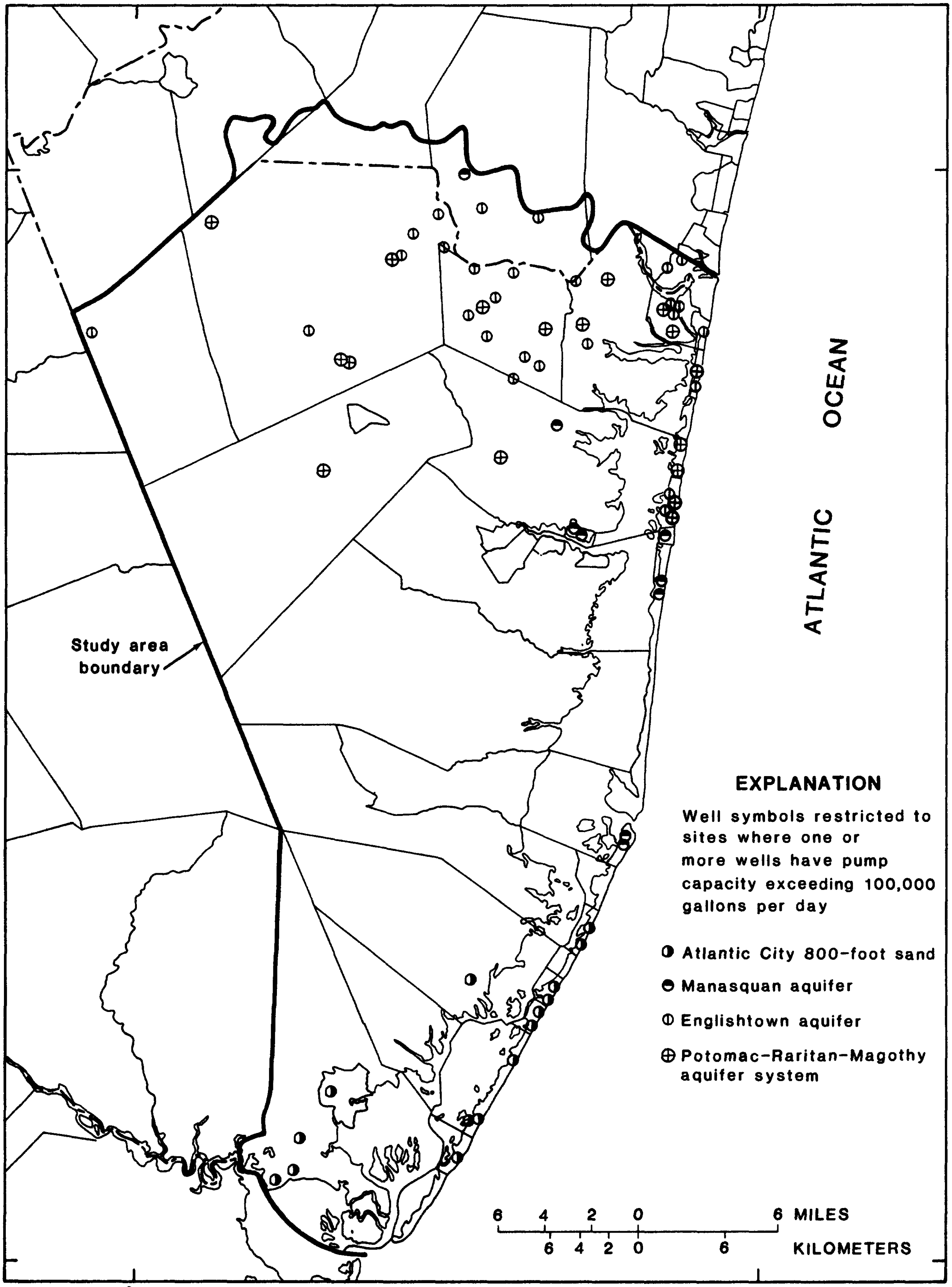

Figure 10.--Location of withdrawals from major confined aquifers, 1956-80.

Table 2.--Laboratory detection limits for constituents in ground water.

Constituent	Laboratory detection limit (mg/L) USGS[1] 8/81-9/81	Ocean County[2] 10/81-5/82	USGS[1] 6/82	Drinking water standard[3] (mg/L)	
Dissolved solids*	1	1	1	500	(S)
Ammonia as N	.01	.05**	--	--	
Nitrite as N	.01	.01	.003‡	--	
Ammonia + organic N as N	--	.05**	.05‡	--	
Nitrate + nitrite as N	.1	.01	.05‡	10	(P)[4]
Phosphorus as P	--	.01	--	--	
Orthophosphate as P	.01	.01	.01‡	--	
Carbon, organic (DOC)†	.3	--	.3	--	
Calcium	.02	.01	.1	--	
Magnesium	.01	.001	.1	--	
Sodium	.2	.01	.1	50	(NJS)
Potassium	.1	.01	.1	--	
Chloride	.1	1	.1	250	(S)
Sulfate	5.0	1	5.0	250	(S)
Silica as SiO	.01	--	.1	--	
Barium	.002	.1	--	1	(P)
Beryllium	.0005	.005	--	--	
Cadmium	.001	.005	.001	.01	(P)
Chromium	.001	.05	.01	.05	(P)
Copper	.01	.02	.001	1	(S)
Iron	.003	.03	.01	.3	(S)
Lead	.01	.1	.001	.05	(P)
Manganese	.001	.01	.01	.05	(S)
Silver	--	.01	--	.05	(P)
Strontium	.0005	--	--	--	
Zinc	.003	.005	.01	5	(S)

[1] USGS - U.S. Geological Survey National Water Quality Laboratory, Doraville, Georgia.
[2] Ocean County - Ocean County Board of Health Laboratory.
[3] (P) = Primary (mandatory) Standard (USEPA, 1976); (S) = Secondary (recommended) Standard USEPA, 1979); (NJS) = NJDEP Secondary (recommended) Standard (N.J. Department of Environmental Protection, 1982).
[4] Standard is for nitrate only, not nitrate plus nitrite.
* Residue on evaporation at 180°C.
† Dissolved organic carbon (DOC) determinations were performed by the USGS National Water Quality Laboratory.
** Prior to December 23, 1981, the detection limit was .1 mg/L.
‡ Constituent determined by the New Jersey Department of Health Laboratory. Detection limit is for this Laboratory.

samples. Here, cation concentrations were determined using direct aspiration atomic absorption on an Instrument Laboratories Model 551 Atomic Absorption Spectrometer 1/, according to (USEPA) (1979c) methods. Spectrophotometric methods were used to determine nitrate and nitrite, and the manual cadmium reduction method (U.S. Environmental Protection Agency, 1979c), was used to determine nitrate-plus-nitrite. Chloride, sulfate, phosphate, orthophosphate, and dissolved solids were determined using methods described by the American Public Health Association and others (1976). Chloride was determined using the mercuric nitrate method, sulfate by the turbidimetric method, phosphate by persulfate digestion followed by ascorbic acid colorimetry, and orthophosphate by ascorbic-acid colorimetry.

The County Laboratory used a Varian Model 3700 gas chromatograph to determine concentrations of benzene, ethylbenzene, toluene, and xylenes in samples from 131 wells. The results are presented in Harriman and Voronin (1984). Of the 131 samples, 6 had trace concentrations of benzene, toluene, or xylenes.

The U.S. Geological Survey Laboratory analyzed concentrations of inorganic constituents in 42 samples from 41 wells by the methods of Skougstad and others (1979). The laboratory also analyzed dissolved organic carbon in 231 well samples by the method of Goerlitz and Brown (1972).

The New Jersey Department of Health, Division of Laboratories and Epidemiology (State Laboratory) in Trenton determined nitrite, nitrate-plus-nitrite, organic nitrogen-plus-ammonia, and orthophosphate in seven samples collected in June 1982. These samples were analyzed according to the methods of the U.S. Environmental Protection Agency (1979a). The U.S. Geological Survey has a cooperative agreement with this Laboratory, and check samples are routinely submitted for quality assurance.

The U.S. Geological Survey conducted a quality-assurance program for the County Laboratory based on the methods of Friedman and Erdmann (1982). The results were generally satisfactory. To insure continued accuracy, blind check samples were submitted along with regular well samples. The check samples produced satisfactory results. In addition, analyses of the regular well samples were checked for data quality assurance (Friedman and Erdmann, 1982). As a result of these checks, 20 samples were reanalyzed for selected ions, and new data that met the quality assurance criteria were entered into the data base.

Water-Quality Data Management

Developing and maintaining a water-quality data base is important in any monitoring program. Three WATSTORE files were

1/ Use of company or brand names in this report is for identification purposes only and does not constitue endorsement by the U.S. Geological Survey.

used to store, manipulate, and retrieve data for the study. (1) The Station-Header File contains the WATSTORE identifier, latitude and longitude, site type, site altitude, well depth, geologic-unit code, and aquifer-type code. (2) The Water-Quality File contains data on chemical, physical, and radiochemical characteristics of surface water and ground water. (3) The Ground-Water Site Inventory (GWSI) File contains well data including construction, site location, and geohydrologic characteristics. The GWSI system is described in detail by Mercer and Morgan (1981). General inquiries about WATSTORE may be directed to:

Chief Hydrologist
United States Geological Survey
437 National Center
Reston, Virginia 22092

GROUND-WATER QUALITY

Ground water has the capacity, through various chemical processes, to dissolve and transport minerals and gases (Hem, 1970). Factors that control these chemical processes, and ultimately ground-water quality, include temperature, pressure, duration of contact with lithologic units, and chemical characteristics of the water entering the aquifer system.

The distribution of concentrations of major ions in ground water of the study area tends to approximate a normal curve. For trace metals, however, many determinations are commonly at the detection limit, so the distribution is not normal. Therefore, median and percentile values are listed in statistical tables in this report. Statistical tests and data tabulations were performed using the Statistical Analysis System (SAS) (Ray, 1982a; 1982b).

Well-construction and site data are listed in table 11 near the end of this report. Chemical analyses of all samples are shown in table 12, also near the end of this report. Analyses of these data provide a basis for assessing future changes in water quality. Figure 11 shows the location of wells tapping the confined aquifers that were sampled for this study. The significance of chemical constituents and physical properties in ground water is described in the Appendix.

Percentages of the major ions in water can be shown on the trilinear diagram (see fig. 12) developed by Piper (1944). The apex of each of the two triangles represents 100 percent of one of three constituents. The large diamond-shaped field in the center represents the composition of water with respect to both cations and anions.

Water in one part of an aquifer may differ in quality from that in another part. This difference stems largely from differences in the proportions of major cations and anions. The

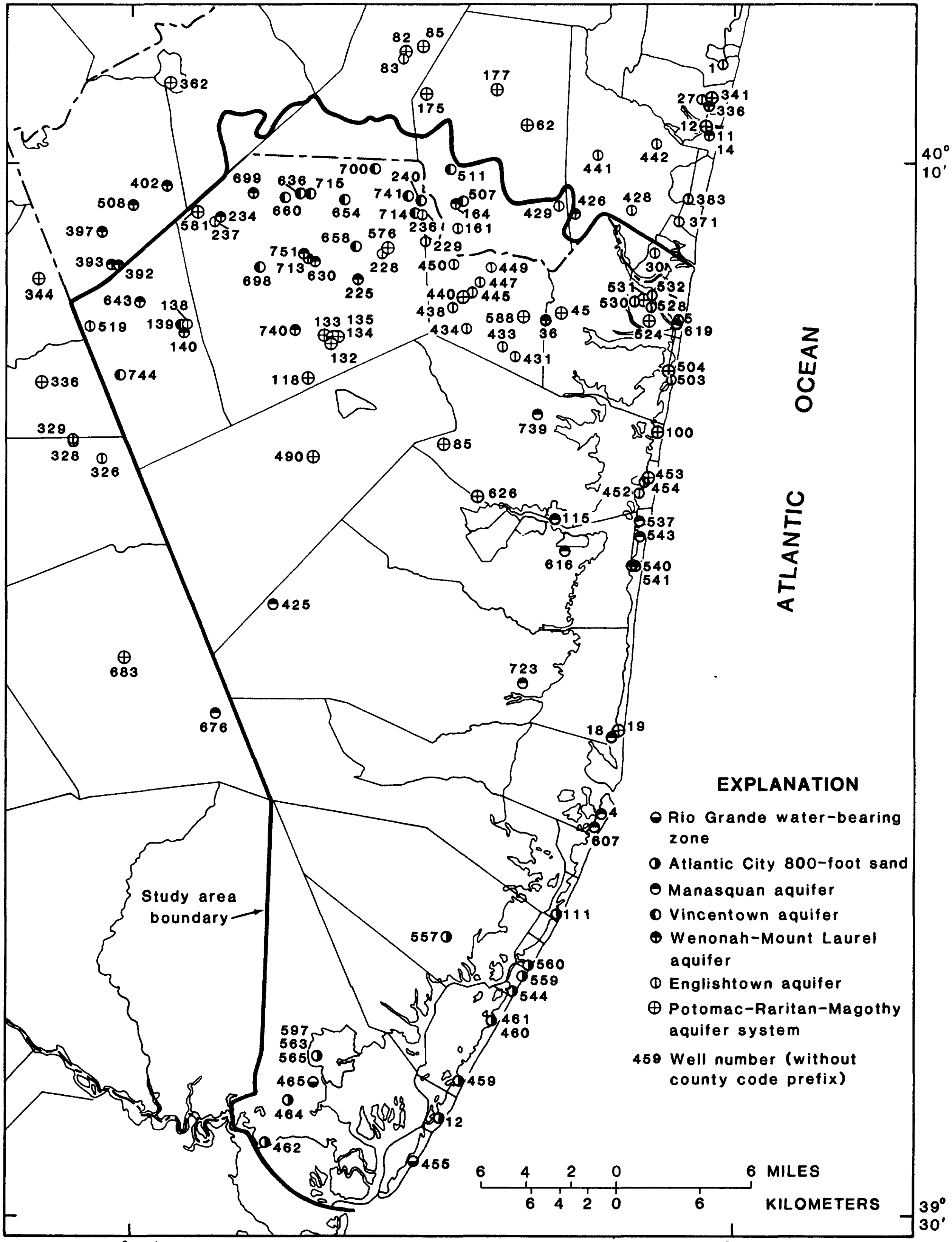

Figure 11.--Location of wells screened in confined aquifers for which analyses are available.

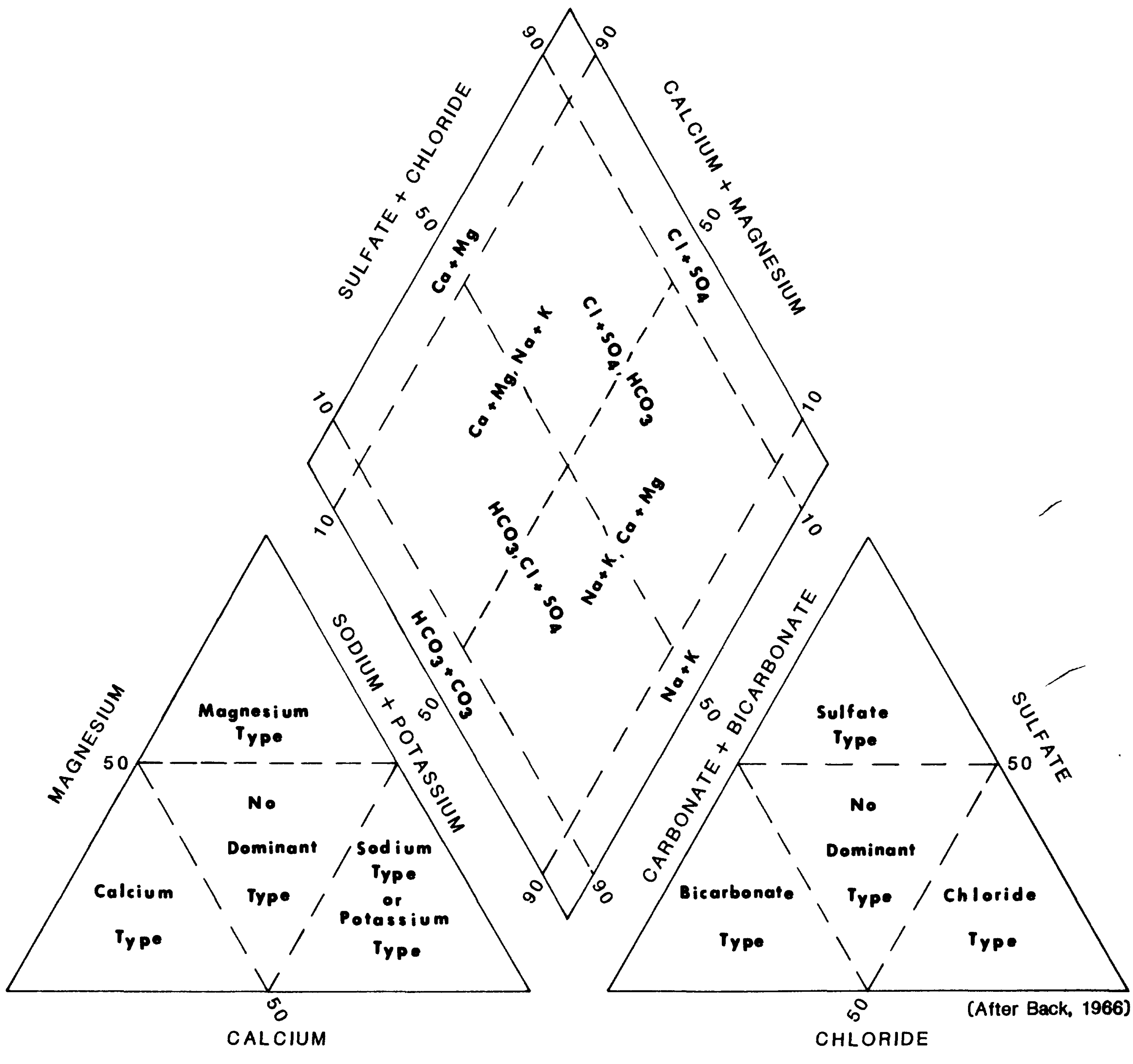

Figure 12.--Trilinear diagram for classifying water types.

term hydrochemical facies is used to describe such differences (Seaber, 1965; Back, 1966). Hydrochemical facies depend on the lithology, solution kinetics, and flow pattern of the aquifer (Fetter, 1980). They are classified on the basis of the predominant ions as shown in the diamond-shaped field in figure 12.

Potomac-Raritan-Magothy Aquifer System

The results of 70 chemical analyses of water samples from 29 wells tapping this aquifer system indicate that it can be treated as a single unit in the area. This follows the approach of Winograd and Farlekas (1974); elsewhere the aquifer has been divided into three hydrogeologic units (Farlekas and others, 1976, p. 22).

Generally, water from this aquifer is suitable for drinking; only iron and manganese concentrations exceed drinking-water standards. However, a saltwater-freshwater interface in the Potomac-Raritan-Magothy aquifer system lies somewhere south of wells 29-453 and 29-626, and north of well 29-19 (see fig. 11). Water from well 29-19, the southernmost well sampled in this aquifer (2,756 ft deep), is too salty to be used for drinking. Based on eight analyses from 1962 to 1968, the average concentrations are: chloride, 746 mg/L; sodium, 504 mg/L; and dissolved solids, 1,425 mg/L. There is no sign of saltwater intrusion in water samples collected from two wells located north of the interface. Well 29-453 (1,515 ft deep) was sampled in 1961 and again in 1981. The chloride concentration changed from 1.4 mg/L to 1.0 mg/L and the sodium concentration changed from 27 mg/L to 25 mg/L. A sample collected in 1981 from well 29-626 (1,875 ft deep), located about eight miles west of well 29-453, had a chloride concentration of 1.1 mg/L and a sodium concentration of 1.9 mg/L.

Table 3 shows that nitrogen and phosphorus concentrations are low. Except for iron, trace metal concentrations are less than 1 mg/L. Areally, iron and manganese concentrations vary greatly (fig. 13).

Ground water from the Potomac-Raritan-Magothy aquifer system in most of the study area has a calcium bicarbonate character (fig. 14). In the cation triangle, wells 29-453 and 29-19 are of the sodium type. Actual sodium values are low, generally less than 25 mg/L. Sodium predominance probably reflects natural cation exchange processes occurring in this aquifer system. Well 29-19, shown in the figure in the lower right-hand corner of the anion triangle, is in a saltwater zone.

Three calcium-magnesium hydrochemical facies of water in the Potomac-Raritan-Magothy aquifer system are distinguishable in figure 15. These facies (as a percentage of total cations in milliequivalents per liter) fall into three groups: 90- to 100-, 50- to 90-, and 10- to 50-percent.

Table 3.--Statistical summary of water analyses from the Potomac-Raritan-Magothy aquifer system.[1]
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	53	14.5	19.0	22.0	23.5	26.0
Specific conductance[2]	45	47	80	111	150	380
pH (units)	45	5.8	6.7	7.1	7.6	8.4
Alkalinity (mg/L as $CaCO_3$)	29	8	31	48	72	144
Dissolved solids[3]	59	31	58	81	93	223
Ammonia as N	11	<.05	.07	<.10	.20	.70
Nitrite as N	11	<.01	<.0	<.01	<.01	.01
Organic nitrogen plus ammonia as N	7	<.05	<.10	.10	.14	.70
Nitrate plus nitrate as N	11	<.01	<.01	.01	.04	.05
Phosphorus	7	<.01	.01	.03	.07	.11
Orthophosphate as P	19	0	<.01	.01	.025	.11
Organic carbon	11	<.3	.3	.3	1.0	1.4
Calcium	58	.7	9.8	13	16	67
Magnesium	58	.2	1.7	2.4	2.9	6.1
Sodium	57	1.0	1.9	3.8	6.8	27
Potassium	57	1.1	2.2	3.8	5.2	11
Chloride	60	.60	1.4	2.0	2.6	7.0
Sulfate	60	.1	7.2	9.0	11	33
Silica	52	3.6	8.4	9.5	10	14
Barium	12	<.002	.06	<.1	<.1	.17
Beryllium	11	<.0005	<.005	<.005	<.005	.005
Cadmium	12	<.001	<.005	<.005	<.005	.006
Chromium	11	<.001	<.001	<.05	<.05	<.05
Copper	11	<.01	<.01	<.02	<.02	<.02
Iron	14	<.03	.74	1.2	4.4	6.4
Lead	12	<.01	<.01	<.1	<.1	<.1
Manganese	13	.010	.053	.063	.12	.20
Silver	8	<.01	<.01	<.01	<.01	<.01
Strontium	7	.05	.17	.39	.60	.79
Zinc	12	<.003	<.005	<.005	.01	.02

[1]Well 29-19 excluded because it is in saltwater zone.
[2](microsiemens/cm at 25°C)
[3]Residue on evaporation at 180°C

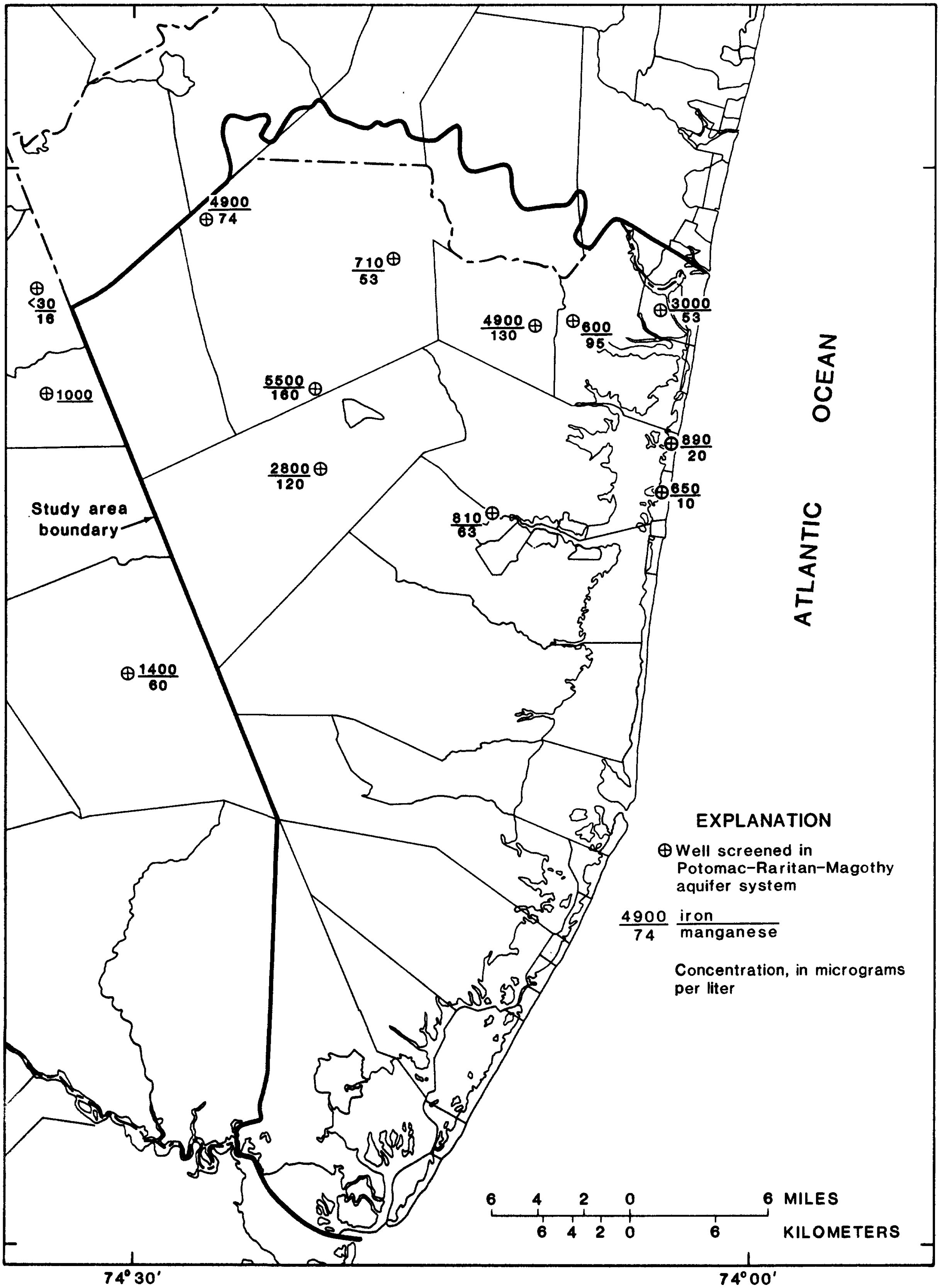

Figure 13.--Dissolved-iron and manganese concentrations in water from the Potomac-Raritan-Magothy aquifer system.

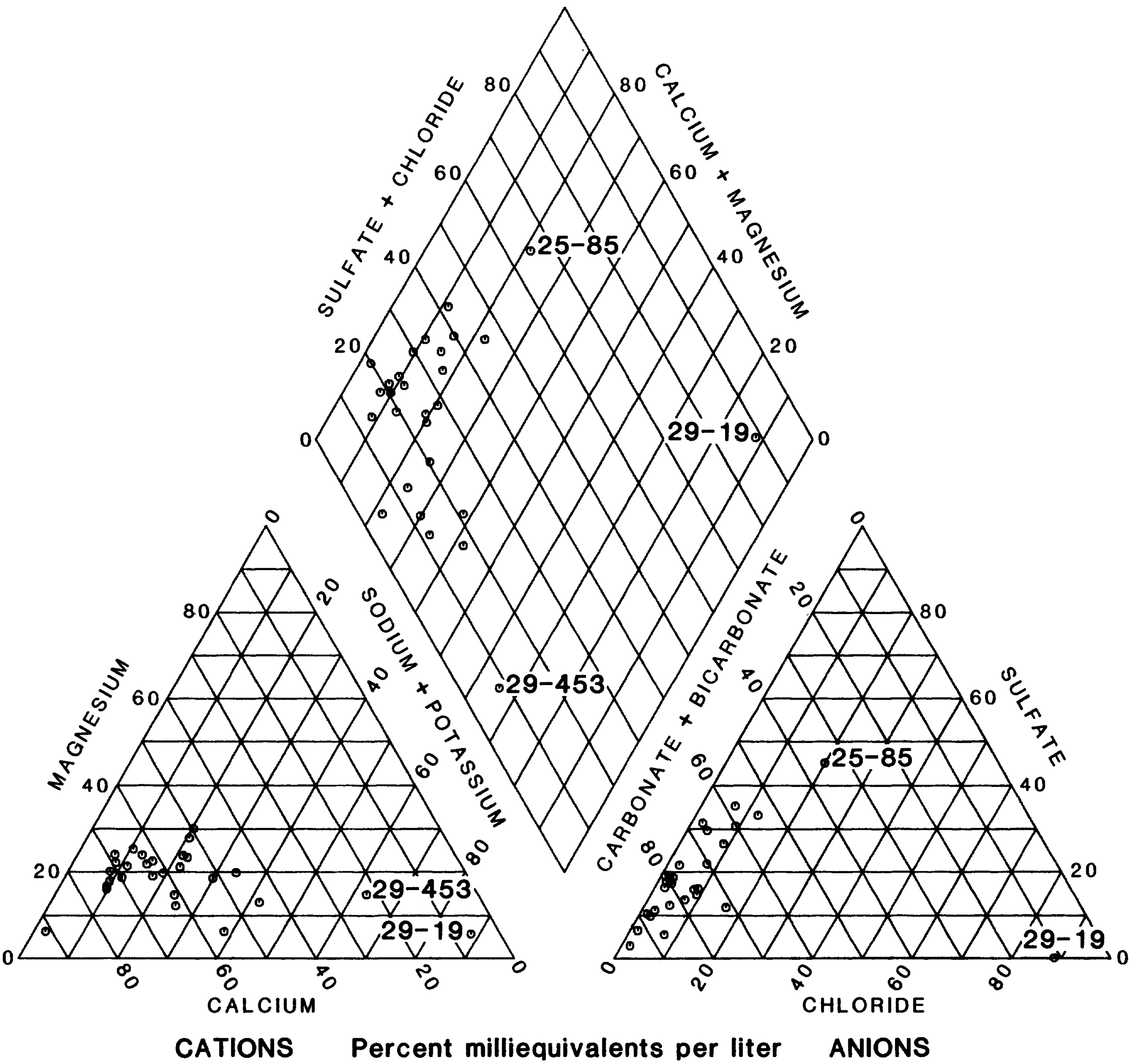

Figure 14.--Trilinear diagram showing relative amounts of major ions in water from the Potomac-Raritan-Magothy aquifer system.

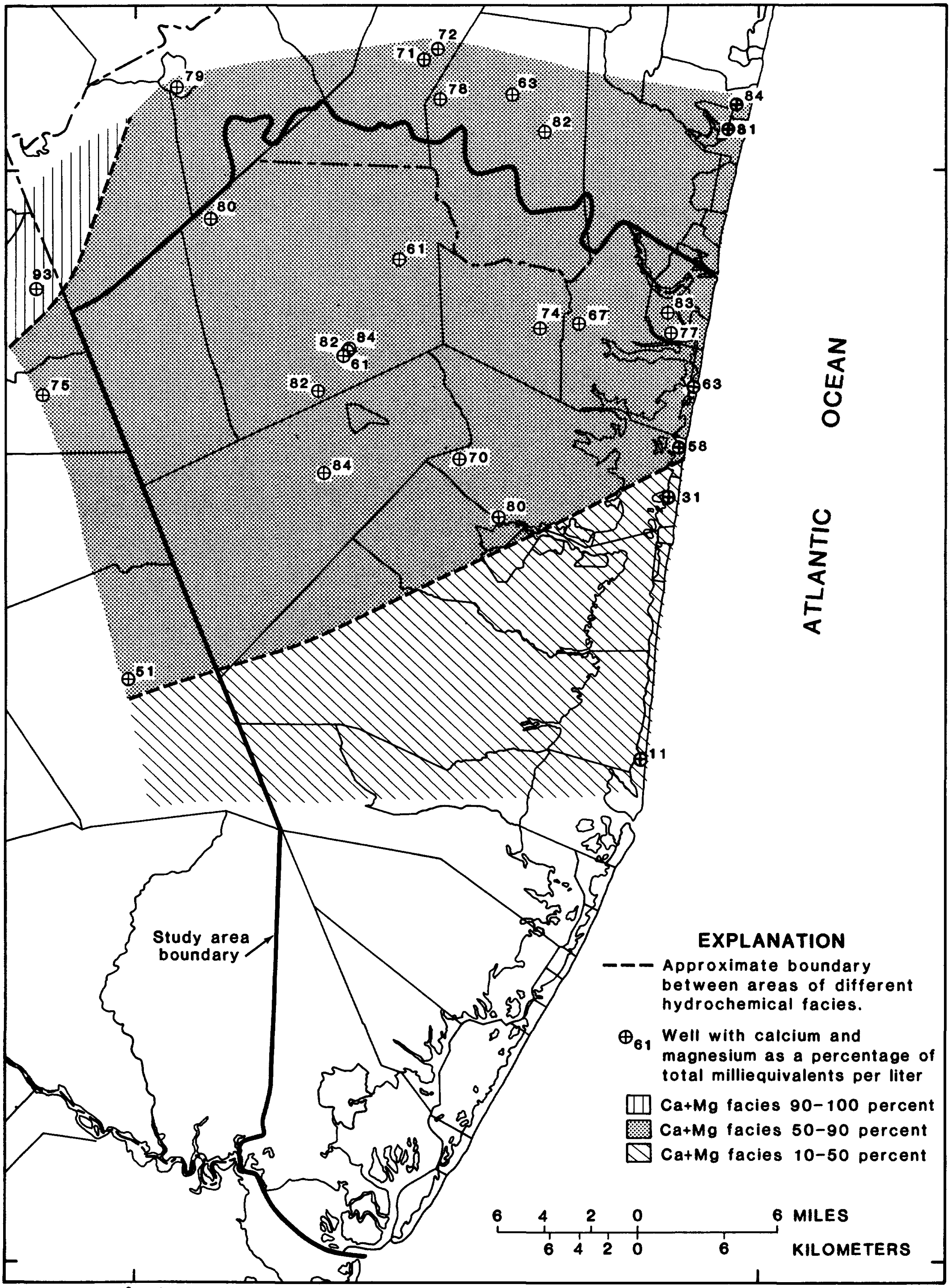

Figure 15.--Calcium-magnesium hydrochemical facies in the Potomac-Raritan-Magothy aquifer system.

Ion-exchange processes probably cause this progressive change in water moving south-southeast in the downdip direction. Back (1966) investigated the northern part of the Atlantic Coastal Plain, including the study area. He found that ground water is modified as it flows through the aquifer system; at shallow depths of less than 200 ft, the calcium-magnesium cation facies and the bicarbonate anion facies generally predominate, whereas at greater depths, water of sodium chloride character predominates.

In figure 16 typical samples of water from the three facies can be compared. Calcium consistently predominates over magnesium, and bicarbonate is the predominant anion regardless of which cation is predominant. Chloride and fluoride as a percentage of total anions vary little among the three facies.

Englishtown aquifer

Based on 59 analyses of water from 36 wells, water in this aquifer is generally satisfactory for most uses. However, sodium exceeds the drinking-water standard in a few deep wells. Table 4 shows that the highest sodium concentration is 80 mg/L, in a sample from well 29-454. This is 30 mg/L above the drinking-water standard (table 2). A nearby well (29-452) also has water with sodium concentrations that exceed the drinking water standard. The two wells are screened at depths more than 800 ft below sea level. Among the trace metals, only iron and manganese exceed the drinking-water standards. The areal distribution of iron in water from the Englishtown aquifer varies greatly (fig. 17). Wells close to each other may produce water with markedly different iron concentrations.

Water in the Englishtown aquifer generally is of a calcium bicarbonate character (fig. 18). On the cation triangle, progressive increases in percentage of sodium are directly related to progressively more distant locations of sampled wells down-gradient. In the Englishtown, the calcium-magnesium cation facies changes toward the south-southeast in the downdip direction (fig. 19). Comparison of chemical characteristics of water samples shows a decrease in sulfate concentration from the 90- to 100-percent to the 50- to 90-percent calcium-magnesium facies (fig. 20). In the figure, the percentage of calcium-magnesium decreases with increase in depth.

Wenonah-Mount Laurel Aquifer

Water in this aquifer is generally satisfactory for drinking, based on 25 analyses from 21 wells; only iron concentrations exceed the drinking-water standard. The dissolved-iron concentration in water from well 29-140 increased from 0.16 mg/L in 1977 to 2.4 mg/L in 1982 (see table 12). Table 5 shows that concentrations of nitrogen-containing compounds in water from this aquifer are low. Calcium has a maximum

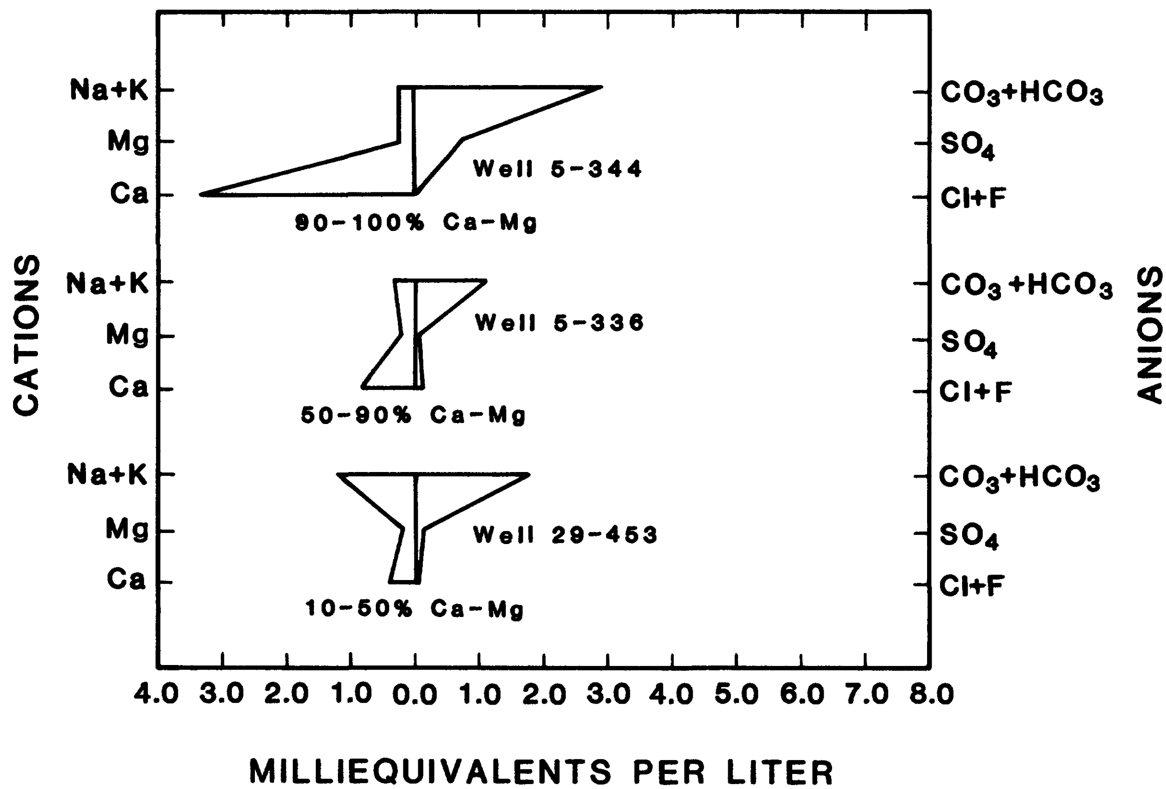

Figure 16.--Chemical composition of typical samples from the three hydrochemical facies (see fig. 15) in the Potomac-Raritan-Magothy aquifer system. (Well locations shown in fig. 11.)

Table 4.--Statistical summary of water analyses from the Englishtown aquifer.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	53	12.0	16.0	18.5	20.5	25.0
Specific conductance[1]	54	138	174	187	209	382
pH (units)	55	7.0	7.7	7.9	8.2	8.6
Alkalinity (mg/L as $CaCO_3$)	42	52	80	87	98	201
Dissolved solids[2]	50	83	105	113	125	233
Ammonia as N	16	<.05	<.10	.165	.40	.85
Nitrite as N	16	<.01	<.01	<.01	<.01	.04
Organic nitrogen plus ammonia as N	13	<.05	.10	.20	.40	.85
Nitrate and nitrate as N	16	<.01	<.01	.02	.035	.11
Phosphorus	16	<.01	.04	.08	.10	.58
Orthophosphate as P	15	.01	.04	.06	.085	.44
Organic carbon	17	<.30	.40	.50	.80	3.9
Calcium	50	4.9	18	22	24	45
Magnesium	50	.04	3.25	4.4	5.48	6.9
Sodium	50	.93	2.8	3.6	9.5	80
Potassium	52	1.6	4.0	5.8	8.0	11
Chloride	58	.50	1.0	1.5	2.0	6.0
Sulfate	58	0.0	4.25	6.45	7.85	26
Silica	40	6.9	10	11	12	17
Barium	16	<.002	<.1	<.1	<.1	.2
Beryllium	16	<.0005	<.005	<.005	<.005	<.005
Cadmium	16	.002	<.005	<.005	<.005	.007
Chromium	13	<.001	<.05	<.05	<.05	<.05
Copper	16	<.01	<.02	<.02	<.02	<.02
Iron	21	.02	.056	.190	.24	.7
Lead	16	<.01	<.1	<.1	<.1	<.1
Manganese	19	.004	.020	.031	.037	.060
Silver	13	<.01	<.01	<.01	<.01	<.01
Strontium	3	.16	.16	.44	.48	.48
Zinc	16	<.003	<.005	<.005	.01	.14

[1](microsiemens/cm at 25°C)
[2]Residue on evaporation at 180°C

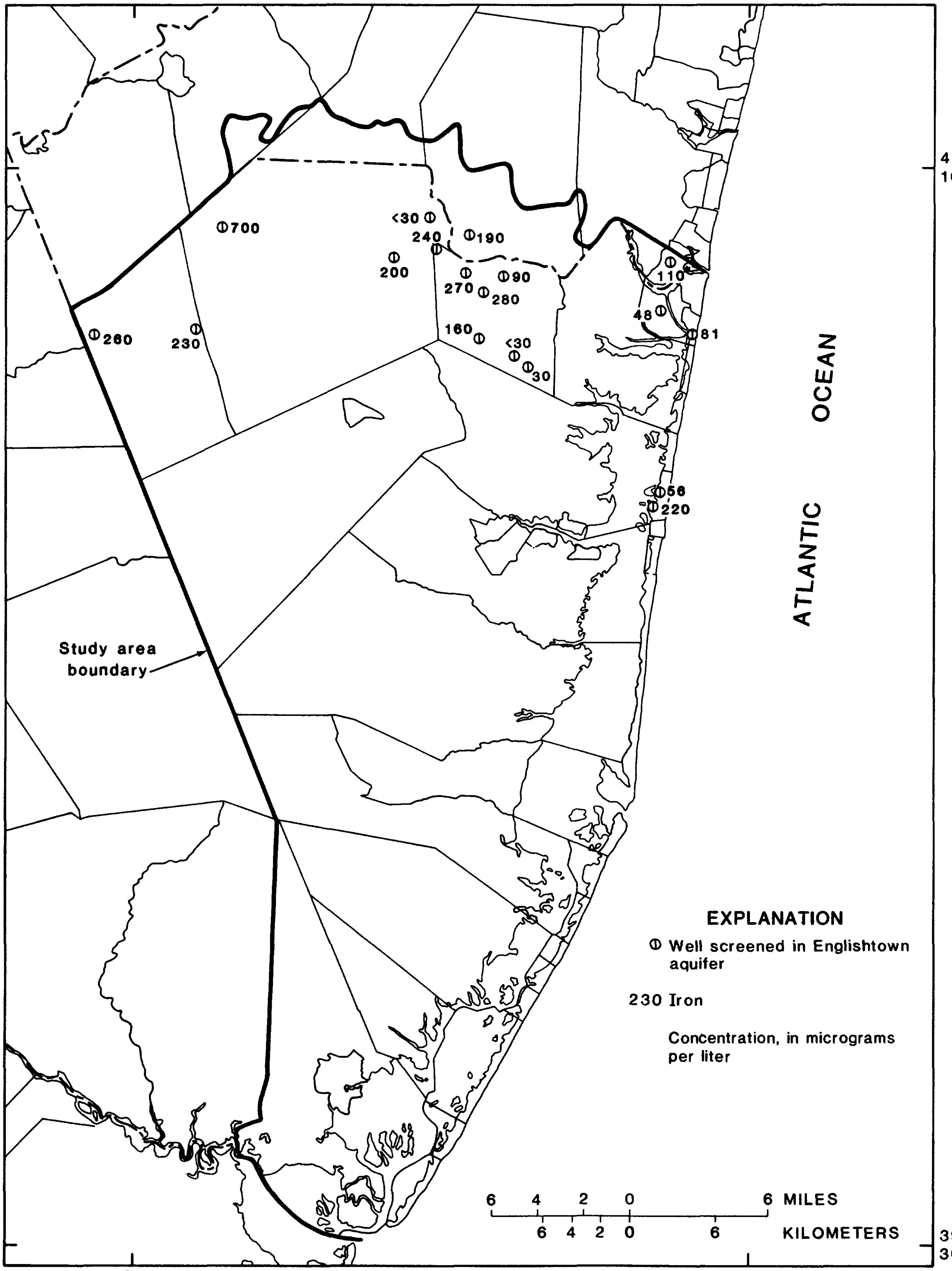

Figure 17.--Dissolved-iron concentrations in water from the Englishtown aquifer.

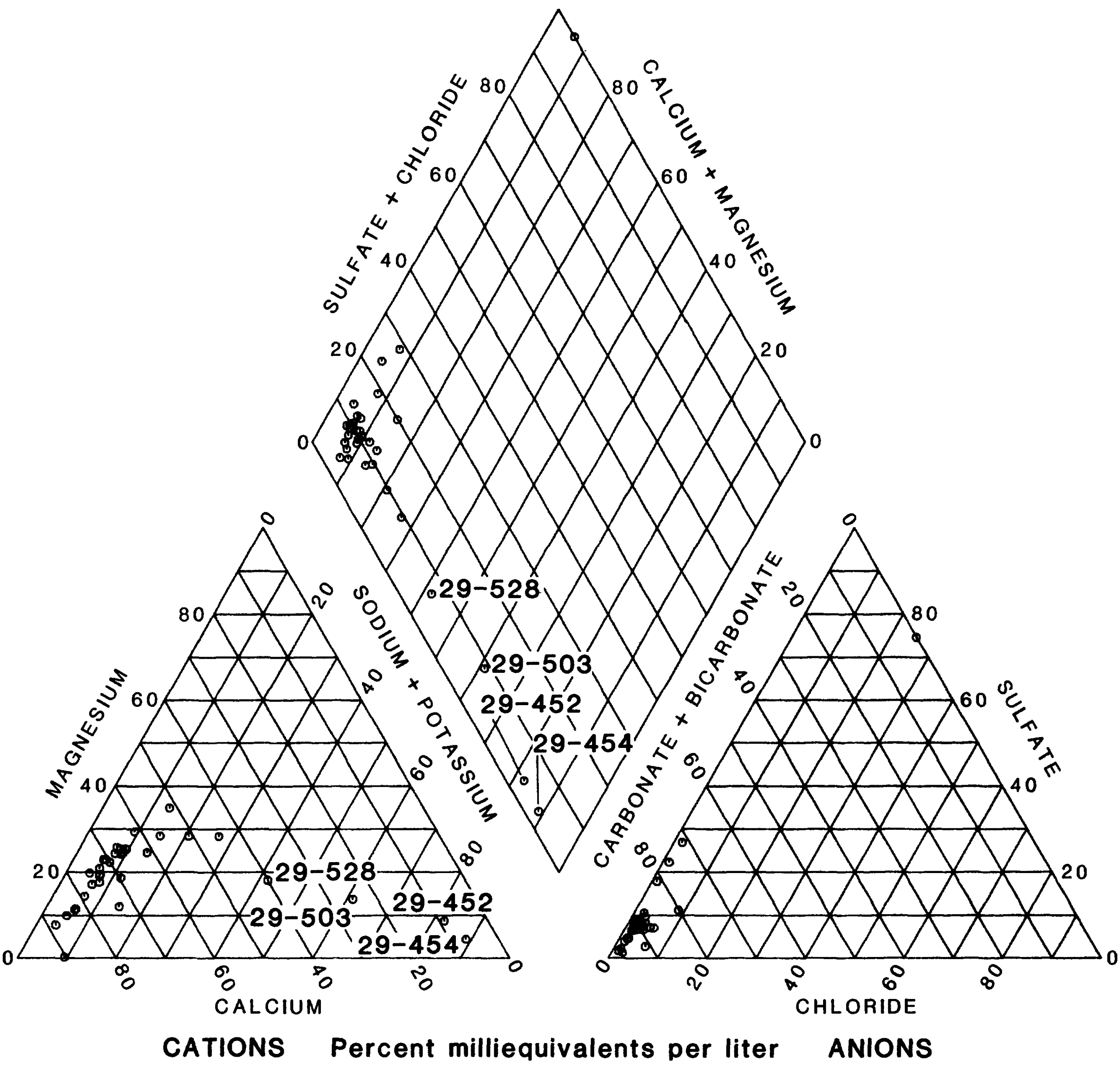

Figure 18.--Trilinear diagram showing relative amounts of major ions in water from the Englishtown aquifer.

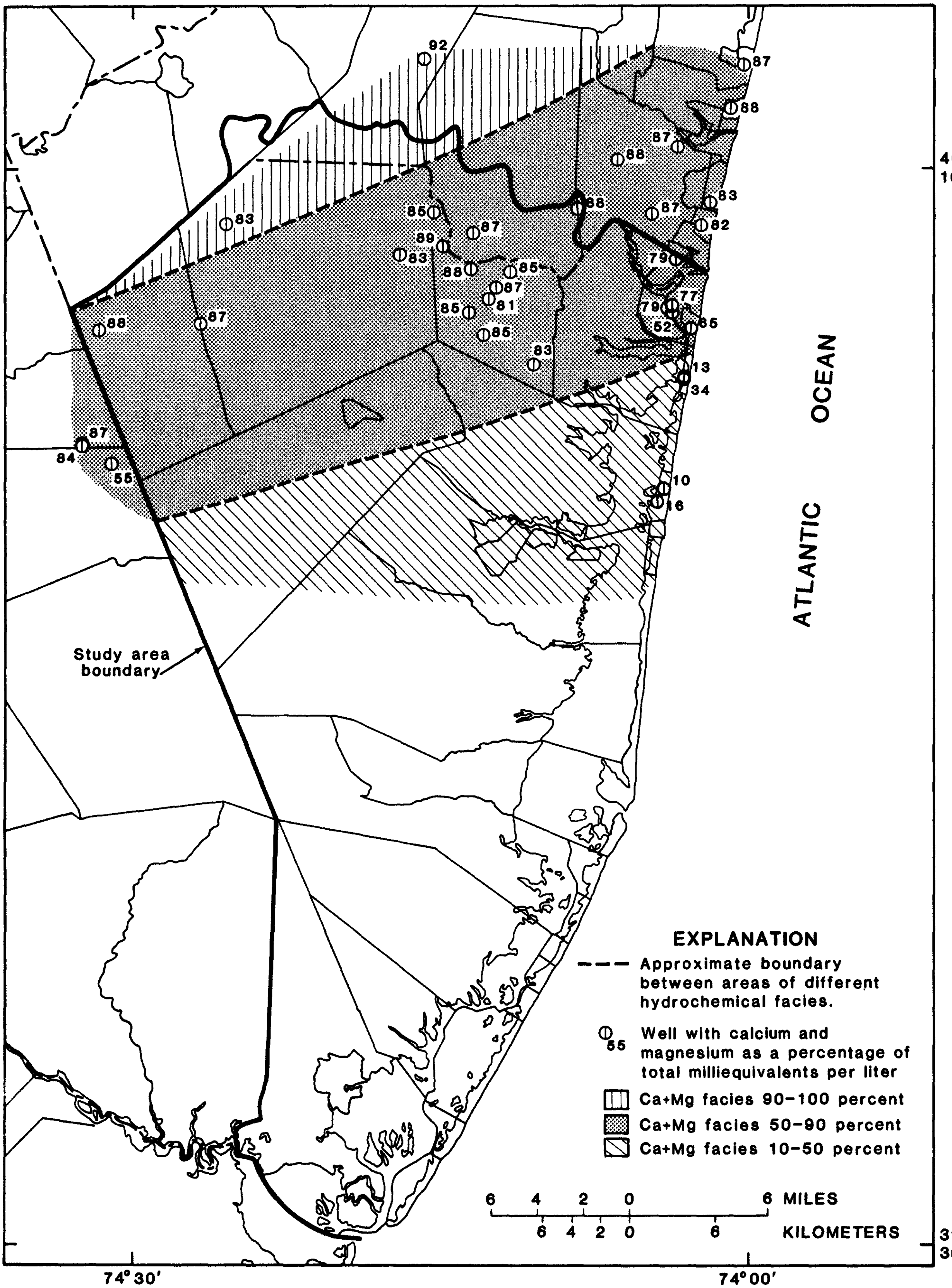

Figure 19.--Calcium-magnesium hydrochemical facies in the Englishtown aquifer.

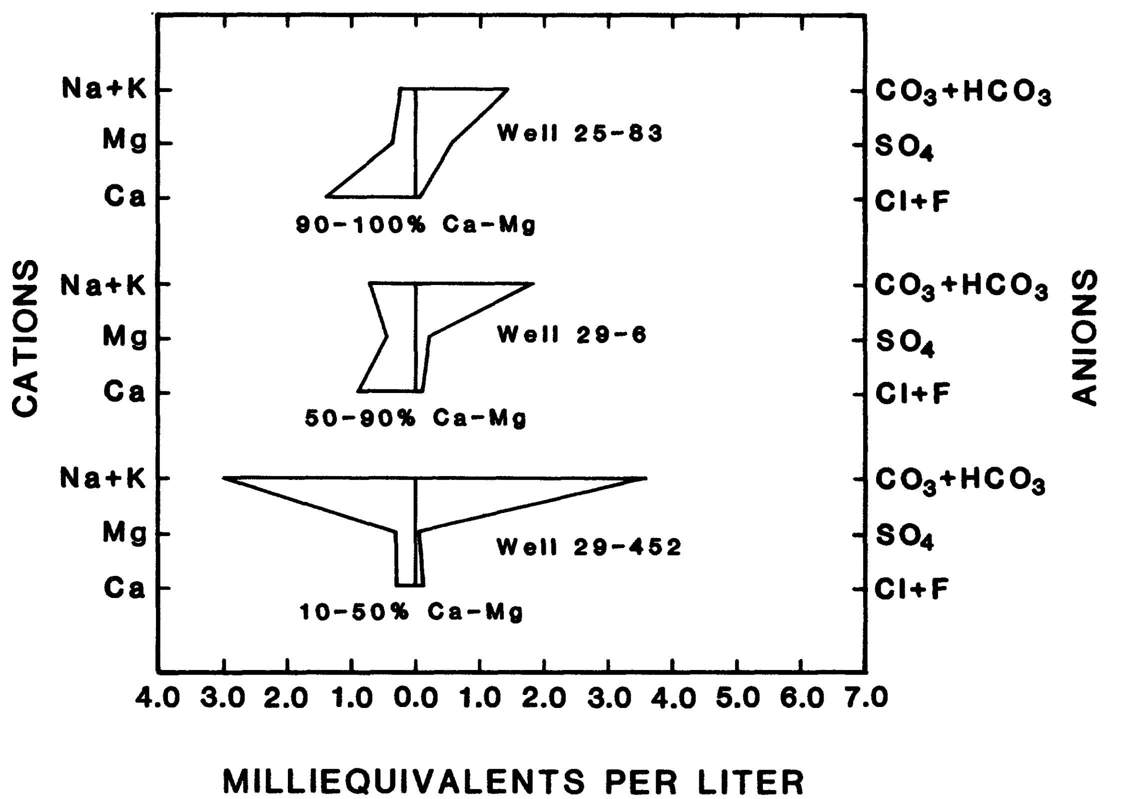

Figure 20.--Chemical composition of typical samples from the three hydrochemical facies (see fig. 19) in the Englishtown aquifer. (Well locations shown in fig. 11.)

Table 5.--Statistical summary of water analyses from the Wenonah-Mount Laurel aquifer system.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	25	12.5	13.5	15.0	17.0	20.5
Specific conductance[1]	25	155	168	180	215	290
pH (units)	25	7.0	8.0	8.1	8.2	8.5
Alkalinity (mg/L as $CaCO_3$)	16	72	82	84	88	100
Dissolved solids[2]	25	88	101	110	128	195
Ammonia as N	11	<.05	<.05	.10	.18	.45
Nitrite as N	12	<.01	<.01	<.01	<.01	.02
Organic nitrogen plus ammonia as N	12	.10	.16	.23	.26	.45
Nitrate plus nitrite as N	12	<.01	<.01	.02	.06	.07
Phosphorus	11	<.01	<.01	.02	.03	.22
Orthophosphate as P	11	<.01	<.01	.02	.03	.38
Organic carbon	13	.3	.6	1.0	1.1	4.0
Calcium	25	12	20	28	31	50
Magnesium	25	.85	2.1	3.0	5.5	7.0
Sodium	25	1.2	1.7	2.1	3.6	14
Potassium	25	2.3	3.5	5.2	7.2	9.6
Chloride	25	<1	1.5	2.0	2.3	6.0
Sulfate	25	<1	3.0	5.7	14	35
Silica	14	7.2	9.8	11	14.5	25
Barium	11	<.1	<.1	<.1	<.1	<.1
Beryllium	11	<.005	<.005	<.005	<.005	.005
Cadmium	12	<.001	<.005	<.005	<.005	<.005
Chromium	12	.01	<.05	<.05	<.05	<.05
Copper	12	<.001	<.02	<.02	<.02	<.02
Iron	13	<.03	.12	.16	.31	2.4
Lead	12	.003	<.1	<.1	<.1	<.1
Manganese	13	<.01	<.01	.010	.014	.017
Silver	11	<.01	<.01	<.01	<.01	<.01
Zinc	12	<.005	<.005	<.005	.01	.068

[1](microsiemens/cm at 25°C)
[2]Residue on evaporation at 180°C

concentration of 50 mg/L, the highest of any of the major ions.

Ground water in the Wenonah-Mount Laurel aquifer is of calcium bicarbonate character (fig. 21). Water from well 29-36 has the highest percentage of sodium in the aquifer, although the actual concentration is low (14 mg/L). As in the other confined aquifers, calcium and magnesium concentrations decrease (fig. 22), and sodium and potassium concentrations increase, downdip. Calcium as a percentage of total cations is greater than magnesium in representative samples from the two hydrochemical facies (fig. 23). Sulfate concentration increases as calcium-magnesium concentration decreases.

Vincentown Aquifer

Based on 15 samples from 14 wells, water from this aquifer is generally satisfactory for drinking. Manganese is the only constituent that exceeds the drinking-water standard (see table 2). Comparison of two analyses for well 29-139 (table 12) shows little change in chemical concentrations after a period of 18 years. (Location shown in fig. 11.)

Table 6 shows that nitrogen and trace metal concentrations are low in water from the Vincentown aquifer. Iron concentrations in all samples are less than 0.3 mg/L.

Water in the Vincentown aquifer is of calcium bicarbonate character. Figure 24 shows that calcium makes up more than 70 percent of the milliequivalents of cations, and bicarbonate-plus-carbonate makes up more than 70 percent of the milliequivalents of anions. The high calcium percentage in ground water located near the outcrop area is consistent with observations made by Back (1966).

The percentage of milliequivalents of calcium and magnesium in water from the Vincentown aquifer decreases downdip (fig. 25), whereas percentages of milliequivalents of sulfate and chloride-plus-fluoride do not differ greatly (fig. 26).

Manasquan Aquifer

Water from the Manasquan aquifer is generally satisfactory for drinking based on 19 analyses from 13 wells. However, some sodium and iron concentrations exceed the drinking-water standard. Of the 16 sodium concentrations, 4 exceed the 50 mg/L standard; 8 of 11 iron values exceed the 0.3 mg/L standard.

Well 29-425 was sampled in 1961, 1962, and 1982 (see table 12). Overall, concentrations have changed little since 1961. Calcium concentration declined from 31 to 16 mg/L, and chloride concentration declined from 3.6 to 1.0 mg/L.

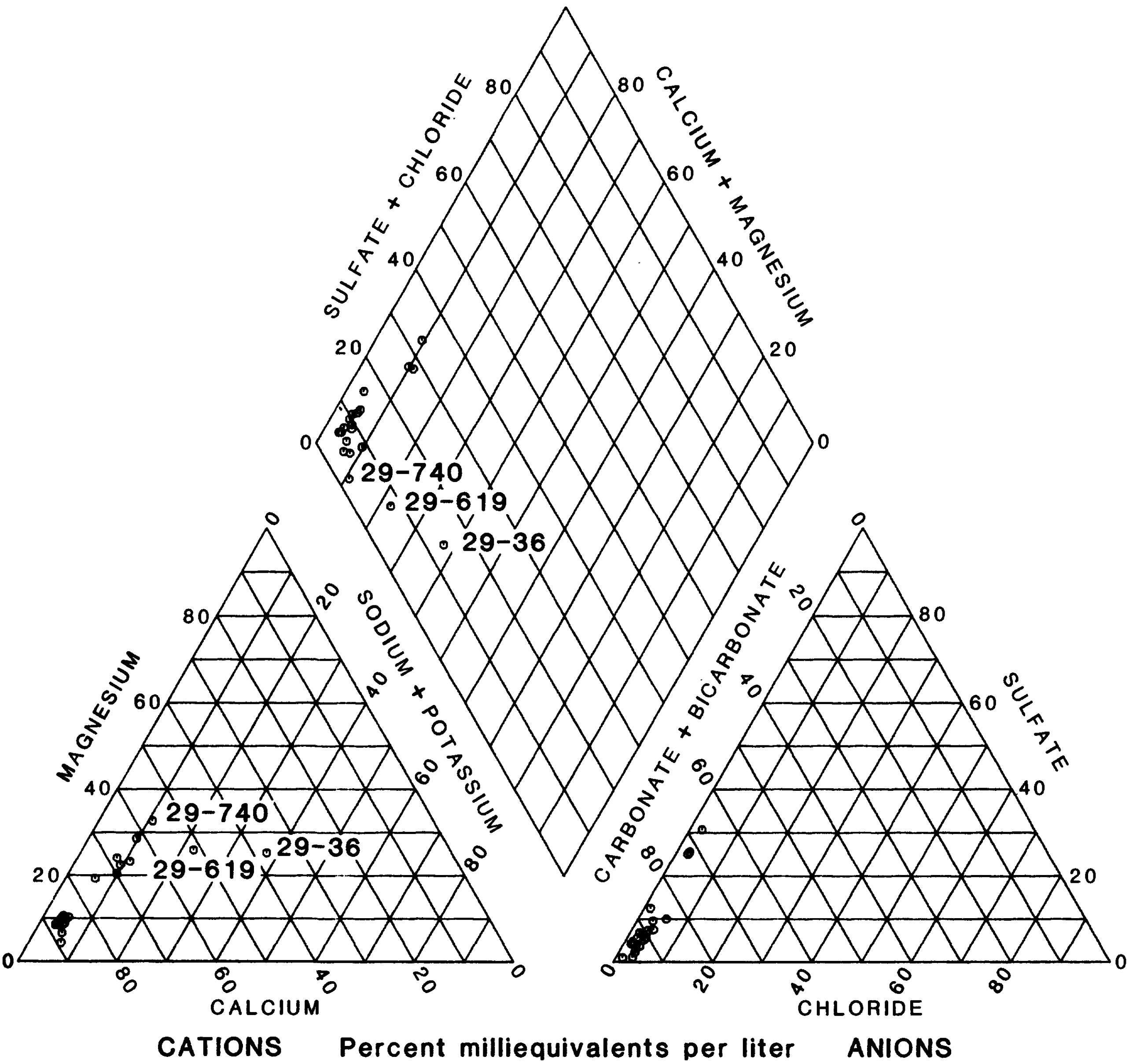

Figure 21.--Trilinear diagram showing relative amounts of major ions in water from the Wenonah-Mount Laurel aquifer.

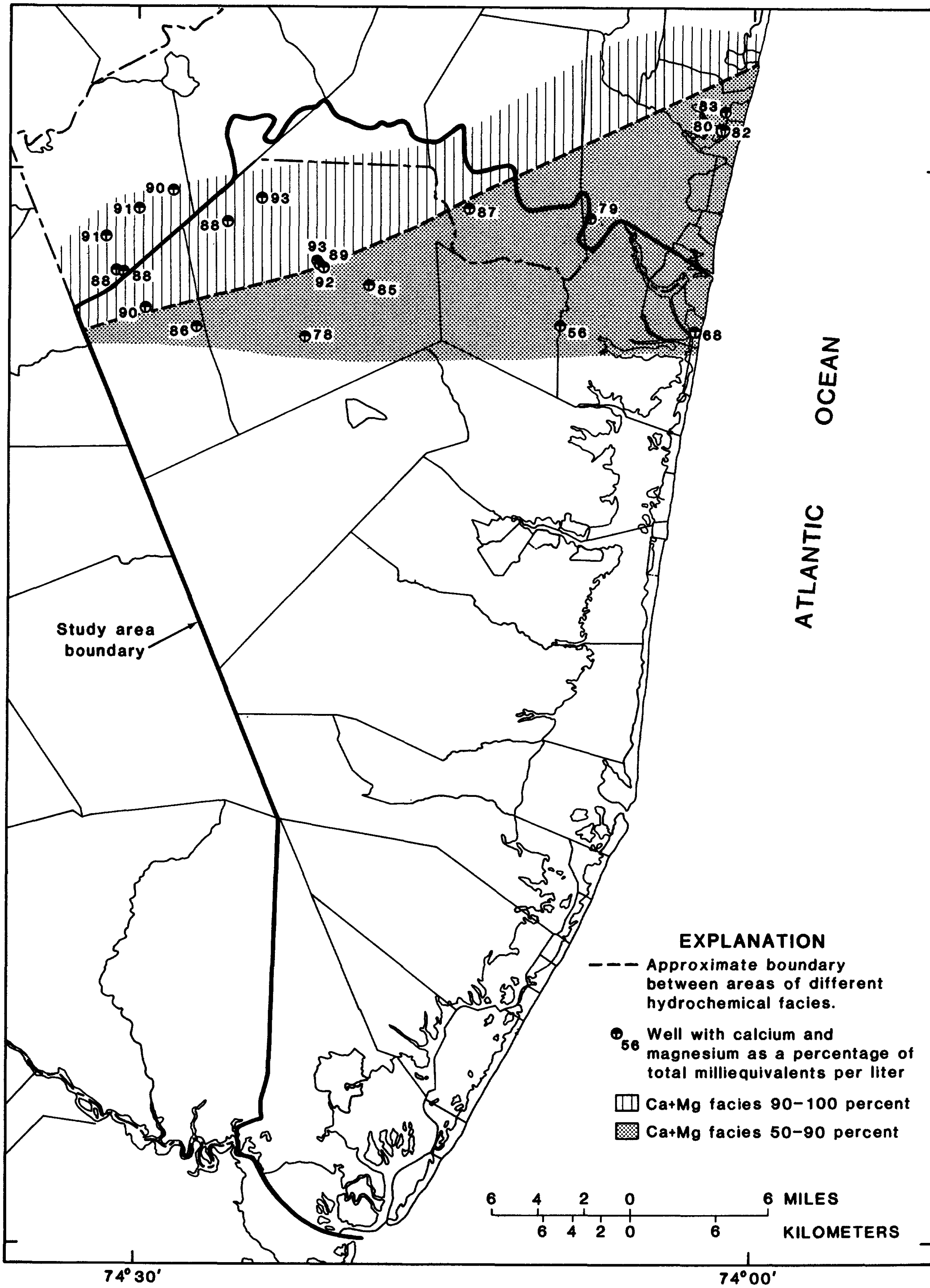

Figure 22.--Calcium-magnesium hydrochemical facies in the Wenonah-Mount Laurel aquifer.

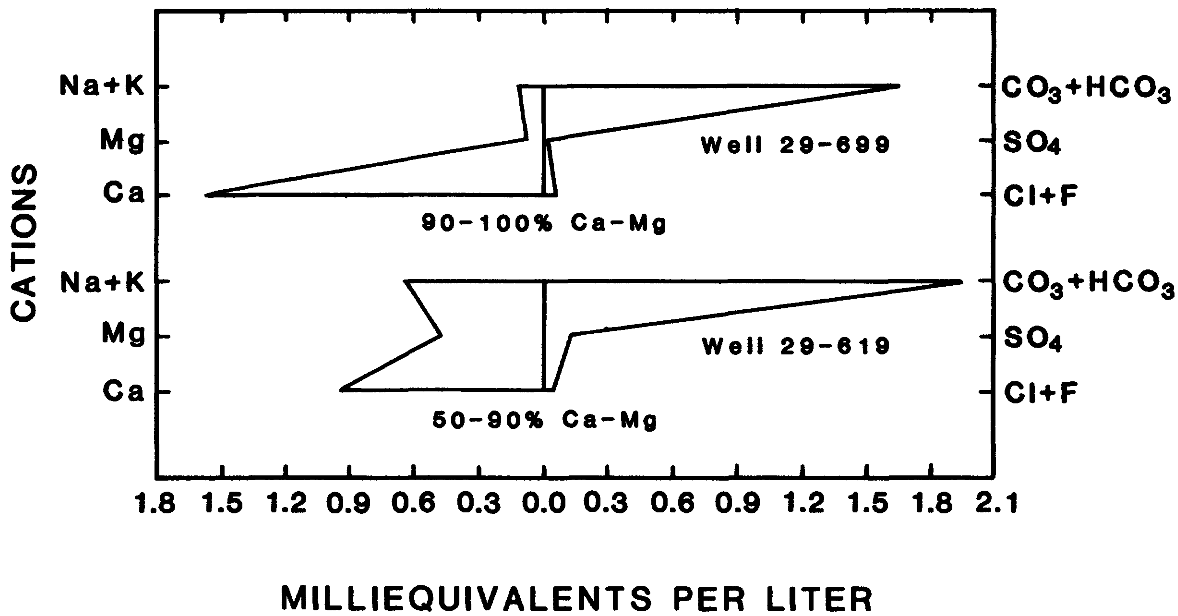

Figure 23.--Chemical composition of typical samples from the two hydrochemical facies (see fig. 22) in the Wenonah-Mount Laurel aquifer. (Well locations shown in fig. 11.)

Table 6.--Statistical summary of water analyses from the Vincentown aquifer.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	15	12.0	12.2	13.0	13.2	15.0
Specific conductance[1]	15	106	140	153	164	200
pH (units)	15	6.8	8.0	8.2	8.2	8.8
Alkalinity (mg/L as $CaCO_3$)	12	56	58	66	74	80
Dissolved solids[2]	15	78	90	96	106	116
Ammonia as N	14	<.05	<.05	<.10	.17	.52
Nitrite as N	14	<.01	<.01	<.01	<.01	<.01
Organic nitrogen plus ammonia as N	14	<.05	<.10	.14	.20	.52
Nitrate plus nitrite as N	14	<.01	<.01	.02	.04	.05
Phosphorus	14	<.01	.06	.08	.14	.28
Orthophosphate as P	12	<.01	.04	.07	.12	.17
Organic carbon	14	.20	.45	.65	.88	1.8
Calcium	13	13	17	22	23	34
Magnesium	14	.34	.82	1.4	2.4	3.9
Sodium	14	1.3	1.5	2.0	2.6	3.4
Potassium	14	1.1	1.6	2.7	3.8	5.9
Chloride	14	1.0	2.0	2.2	3.0	4.0
Sulfate	14	3.0	5.0	7.5	8.4	16
Silica	1	9.6	9.6	9.6	9.6	9.6
Barium	14	<.1	<.1	<.1	<.1	<.1
Beryllium	14	<.005	<.005	<.005	<.005	.005
Cadmium	14	<.005	<.005	<.005	<.005	<.005
Chromium	13	<.05	<.05	<.05	<.05	<.05
Copper	14	<.02	<.02	<.02	<.02	<.02
Iron	14	<.03	.03	.07	.12	.28
Lead	14	<.1	<.1	<.1	<.1	<.1
Manganese	14	<.01	.012	.018	.03	.138
Silver	14	<.01	<.01	<.01	<.01	<.01
Zinc	12	<.005	<.005	.006	.012	.04

[1](microsiemens/cm at 25°C)
[2]Residue on evaporation at 180°C

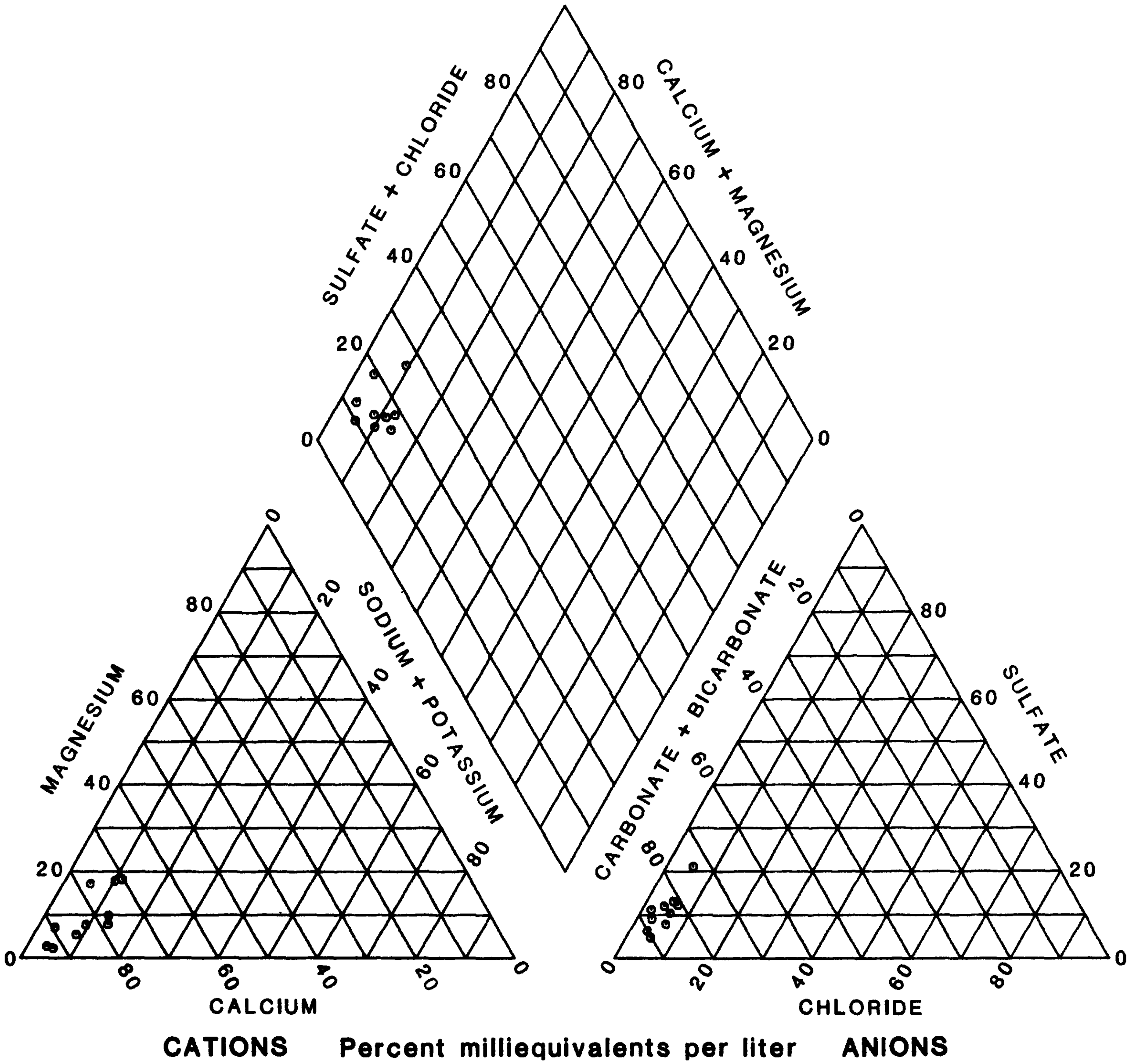

Figure 24.--Trilinear diagram showing relative amounts of major ions from the Vincentown aquifer.

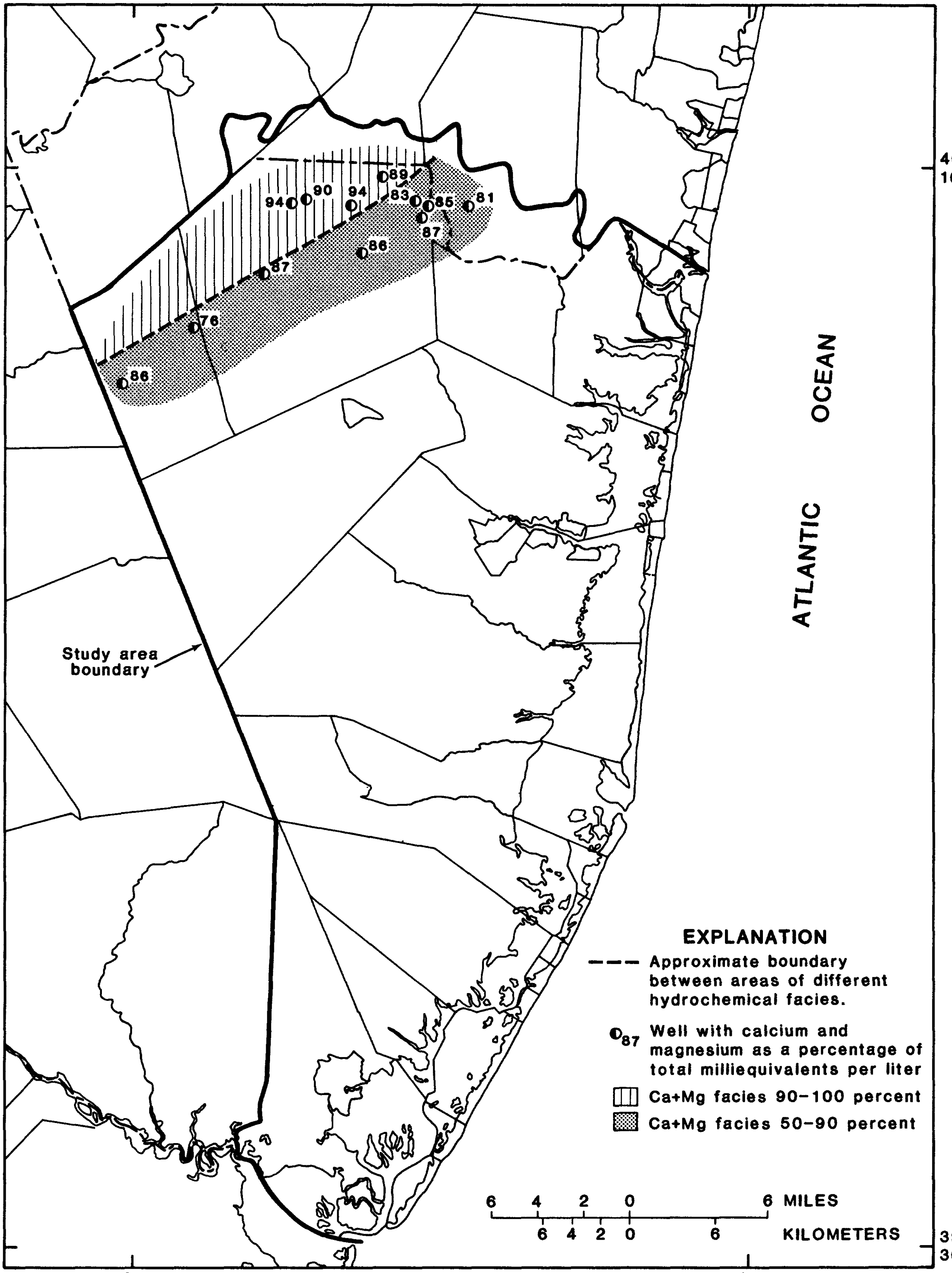

Figure 25.--Calcium-magnesium hydrochemical facies in the Vincentown aquifer.

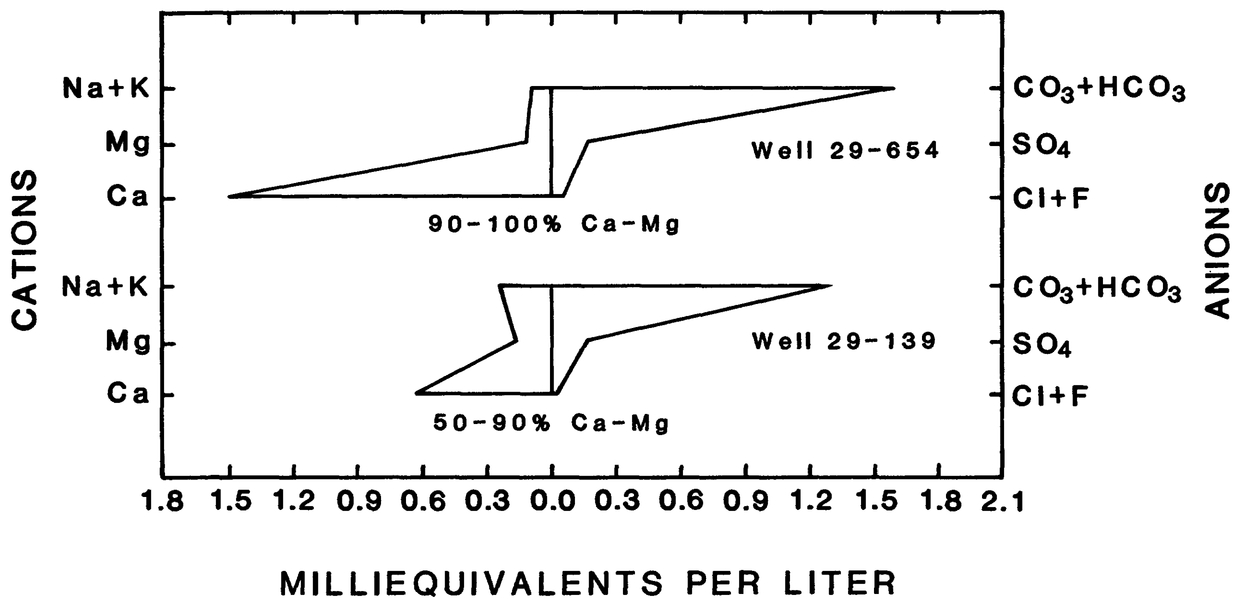

Figure 26.--Chemical composition of typical samples from the two hydrochemical facies (see fig. 25) in the Vincentown aquifer. (Well locations shown in fig. 11.)

In the Manasquan aquifer nitrate concentrations are substantially below the drinking-water standard (see table 7). Water samples with sodium concentrations exceeding the drinking-water standard are from wells 29-723, 29-607, 29-4, and 29-18. Among the trace metals, only iron concentrations exceed 1 mg/L. The areal distribution of iron concentrations varies greatly (see fig. 27).

Water in this aquifer is of sodium bicarbonate character (fig. 28). The predominance of sodium in this aquifer differentiates it from all those underlying it, which are predominantly of the calcium type. The 90- to 100-percent calcium-magnesium facies is absent for this aquifer (fig. 29). Bicarbonate-plus-carbonate is the predomiant anion group in typical samples from the two facies (fig. 30). For water from well 29-537, the sodium-potassium cation group predominates. Sulfate exceeds the chloride-plus-fluoride percentage in both samples.

Atlantic City 800-Foot Sand

Water-quality data for the Atlantic City 800-foot sand consist of 22 analyses from 15 wells. The water is generally satisfactory for drinking, except for locally excessive concentrations of iron and manganese. All 12 iron and 1 of the 12 manganese determinations exceed the secondary drinking-water standards. Locations of selected wells and corresponding iron concentrations are shown in figure 31. A statistical summary of the analytical results for this aquifer is presented in table 8. Sampled wells are located in the southern part of the area, principally along the coast (fig. 11). Multiple analyses for well 29-563 indicate that the chemical characteristics of its water have varied only slightly since 1973.

No single cation predominates in water from the Atlantic City 800-foot sand (fig. 32). The dominant anion is bicarbonate. A map of the calcium-magnesium hydrochemical facies (fig. 33) shows that the 10- to 50-percent zone is downdip from the 50- to 90-percent zone. In figure 34, typical samples of water from the two facies can be compared.

Rio Grande Water-Bearing Zone

Data from the Rio Grande water-bearing zone consist of four analyses of water from two wells (see table 12). Of two iron determinations, one (from well 29-465) is four times the drinking-water standard.

Of the major ions, sodium has the highest concentration (20 mg/L). Well 29-455 was sampled once in 1963 and twice in 1972. The only other well sampled in this aquifer, well 29-465, has water with much lower sodium and alkalinity values. On the basis of these analyses, water from the Rio Grande water-bearing zone is interpreted as having a sodium bicarbonate character.

Table 7.--Statistical summary of water analyses from the Manasquan aquifer.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	14	10.5	13.5	14.0	16.0	17.0
Specific conductance[1]	16	68	166	224	260	410
pH (units)	18	6.6	7.7	8.1	8.3	9.2
Alkalinity (mg/L as $CaCO_3$)	18	20	73	102	117	220
Dissolved solids[2]	16	30	107	141	186	269
Ammonia as N	8	<.05	<.05	.12	.14	.22
Nitrite as N	8	<.01	<.01	<.01	<.01	.01
Organic nitrogen plus ammonia as N	4	<.05	.09	.16	.21	.22
Nitrate plus nitrate as N	8	<.01	<.01	.03	.04	2.1
Phosphorus	4	<.01	.15	.33	.53	.74
Orthophosphate as P	8	<.01	.14	.23	.28	.74
Organic carbon	8	.4	.6	1.0	1.9	4.4
Calcium	15	2.0	3.8	5.3	12	31
Magnesium	15	.41	1.0	1.9	2.4	5.1
Sodium	16	3.8	5.9	39	52	95
Potassium	16	.41	3.9	4.5	5.2	7.3
Chloride	19	.90	1.4	2.0	3.3	8.2
Sulfate	19	2.0	8.6	11	12	16
Silica	12	1.1	12	18	19	34
Barium	8	<.002	<.002	<.1	<.1	<.1
Beryllium	8	<.0005	<.0005	<.0005	<.005	<.005
Cadmium	8	<.001	.003	<.005	<.005	<.005
Chromium	8	<.001	.002	<.05	<.05	<.05
Copper	8	<.01	<.01	<.02	<.02	<.02
Iron	11	.011	.022	.13	.93	1.6
Lead	8	<.01	<.01	<.1	<.1	<.1
Manganese	8	<.001	.003	.014	.022	.046
Silver	4	<.01	<.01	<.01	<.01	<.01
Strontium	4	.043	.050	.076	.10	.12
Zinc	8	<.003	.004	.006	.006	.01

[1](microsiemens/cm at 25°C)
[2]Residue on evaporation at 180°C

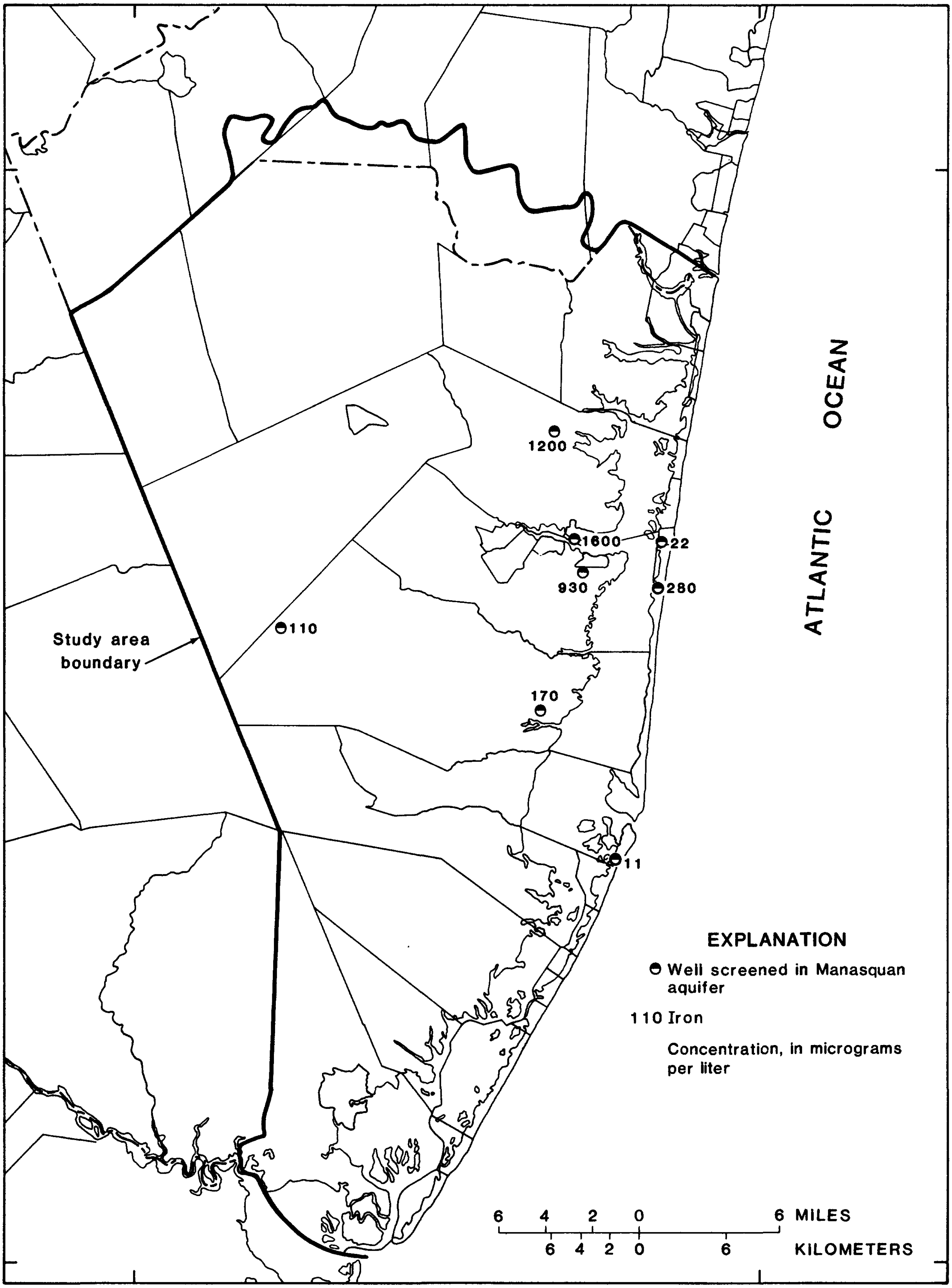

Figure 27.--Dissolved-iron concentrations in water from the Manasquan aquifer.

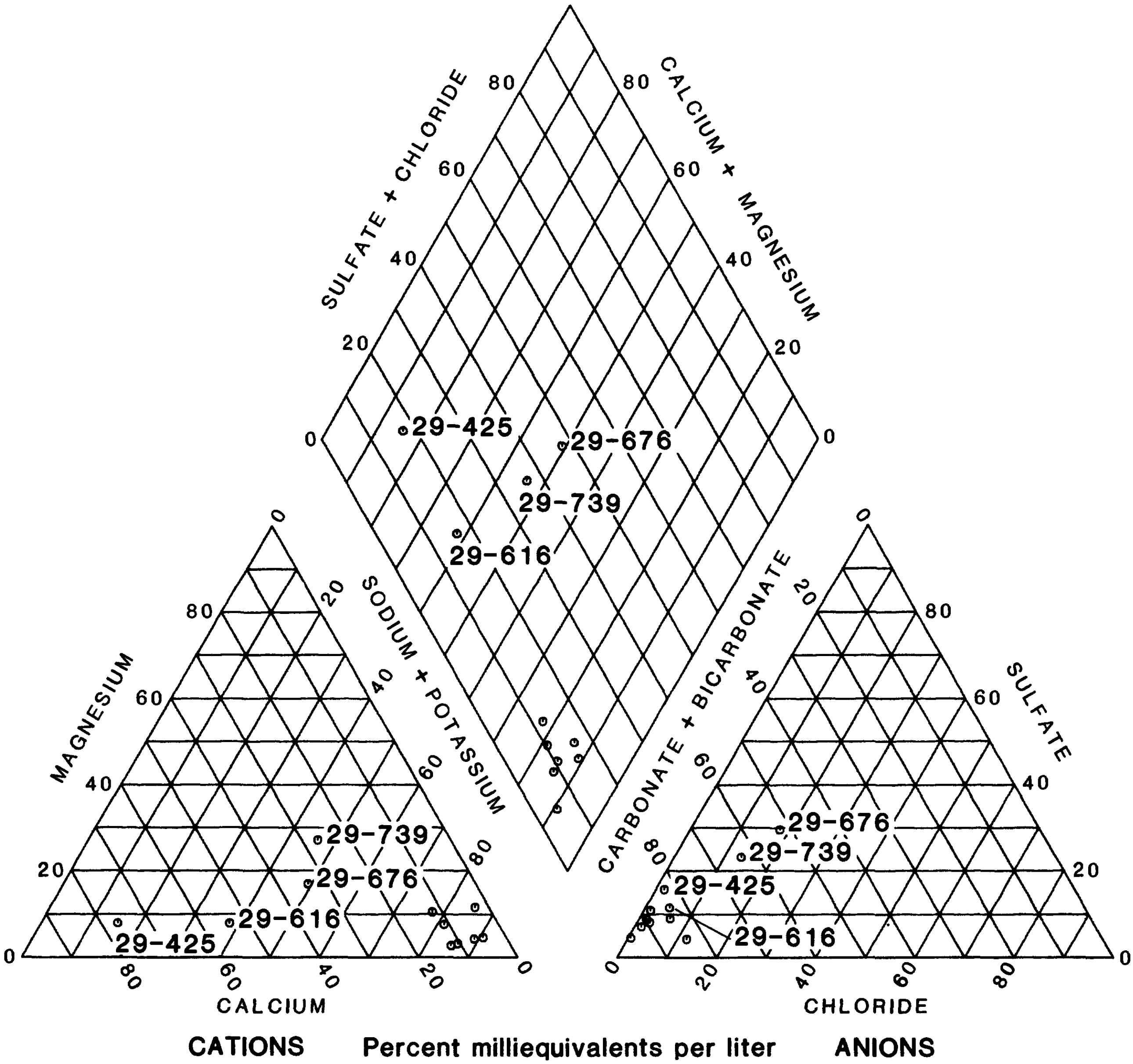

Figure 28.--Trilinear diagram showing relative amounts of major ions in water from the Manasquan aquifer.

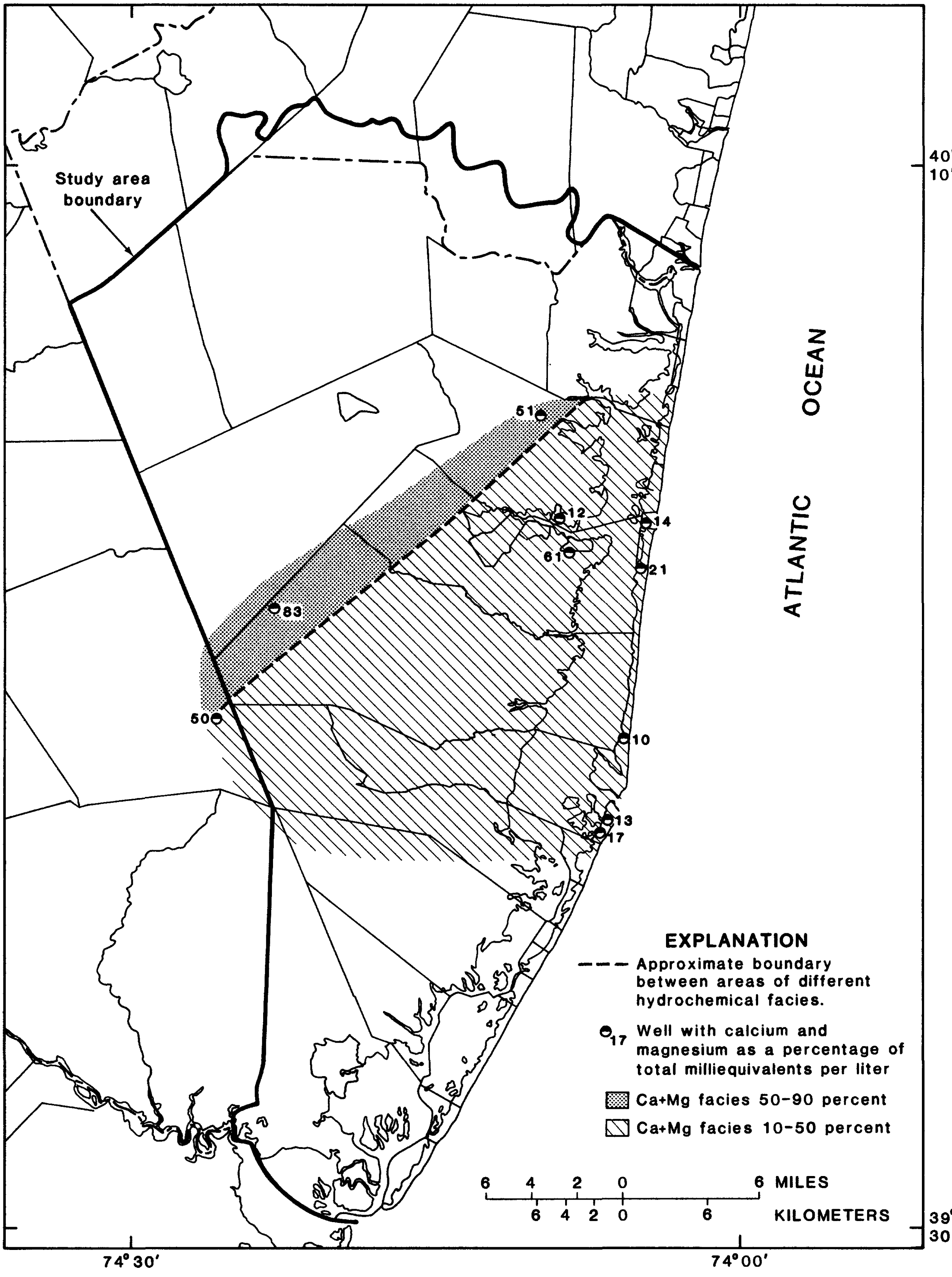

Figure 29.--Calcium-magnesium hydrochemical facies in the Manasquan aquifer.

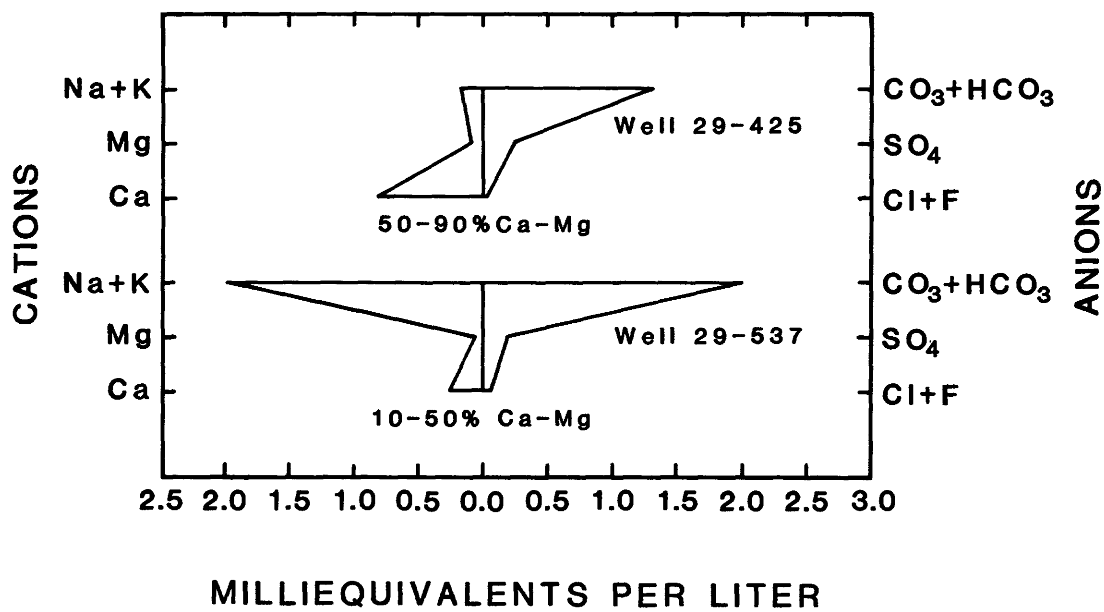

Figure 30.--Chemical composition of typical samples from the two hydrochemical facies (see fig. 29) in the Manasquan aquifer. (Well locations shown in fig. 11.)

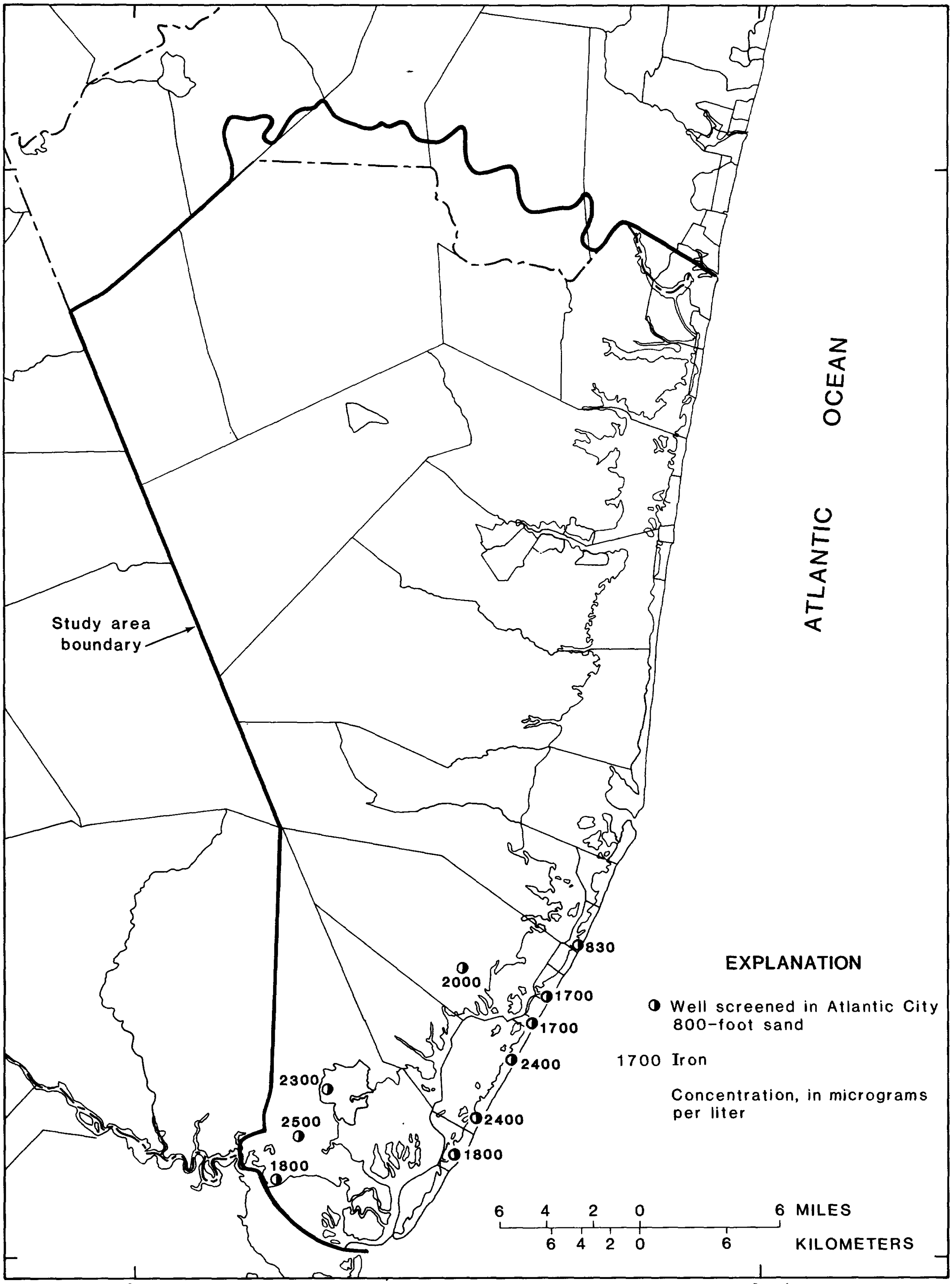

Figure 31.--Dissolved-iron concentrations in water from the Atlantic City 800-foot sand.

Table 8.--Statistical summary of water analyses from the Atlantic City 800-foot sand.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	20	14.5	15.0	16.0	16.5	17.0
Specific conductance[1]	22	43	53	60	65	130
pH (units)	22	6.0	6.2	6.3	6.7	6.9
Alkalinity (mg/L as $CaCO_3$)	20	7.0	12	14	16	30
Dissolved solids[2]	16	42	52	56	64	86
Ammonia as N	11	.04	.05	.06	<.10	.22
Nitrite as N	11	<.01	<.01	<.01	<.01	<.01
Organic nitrogen plus ammonia as N	5	<.10	<.10	<.10	.24	.24
Nitrate plus nitrate as N	11	<.01	.01	.02	.06	1.60
Phosphorus	5	.02	.07	.07	.09	.44
Orthophosphate as P	11	<.01	<.01	.02	.06	.44
Organic carbon	11	<.30	.45	.70	1.2	1.7
Calcium	18	1.5	1.9	2.4	2.8	4.0
Magnesium	18	.70	.85	1.0	1.2	1.6
Sodium	20	2.2	2.8	3.3	4.0	7.0
Potassium	20	.18	2.4	3.0	3.1	3.7
Chloride	22	1.0	3.0	3.2	3.6	24
Sulfate	22	4.0	7.1	8.3	9.0	17
Silica	15	24	26	27	28	34
Barium	11	<.002	.01	.03	<.1	<.1
Beryllium	11	<.0005	<.0005	<.0005	<.005	<.005
Cadmium	11	<.001	.002	.003	<.005	<.005
Chromium	10	<.001	.001	.003	<.05	<.05
Copper	11	<.01	<.01	<.01	<.02	<.02
Iron	12	.83	1.77	2.15	2.4	4.3
Lead	11	<.01	<.01	<.01	<.1	.1
Manganese	12	.029	.040	.040	.044	.080
Silver	5	<.01	<.01	<.01	<.01	<.01
Strontium	6	.033	.035	.04	.043	.062
Zinc	11	<.005	.01	.01	.015	.041

[1](microsiemens/cm at 25°C)
[2]Residue on evaporation at 180°C

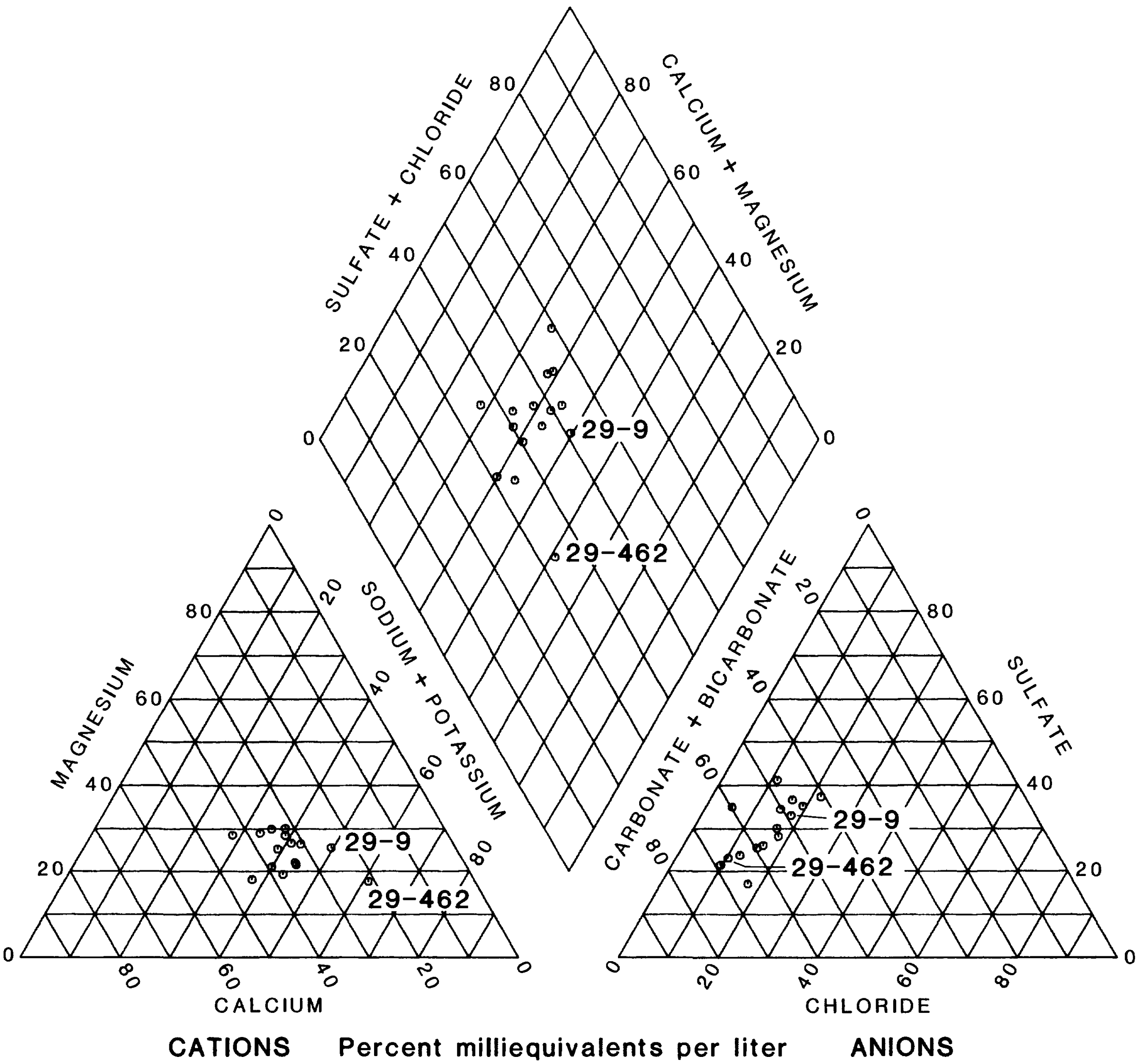

Figure 32.--Trilinear diagram showing relative amounts of major ions in water from the Atlantic City 800-foot sand.

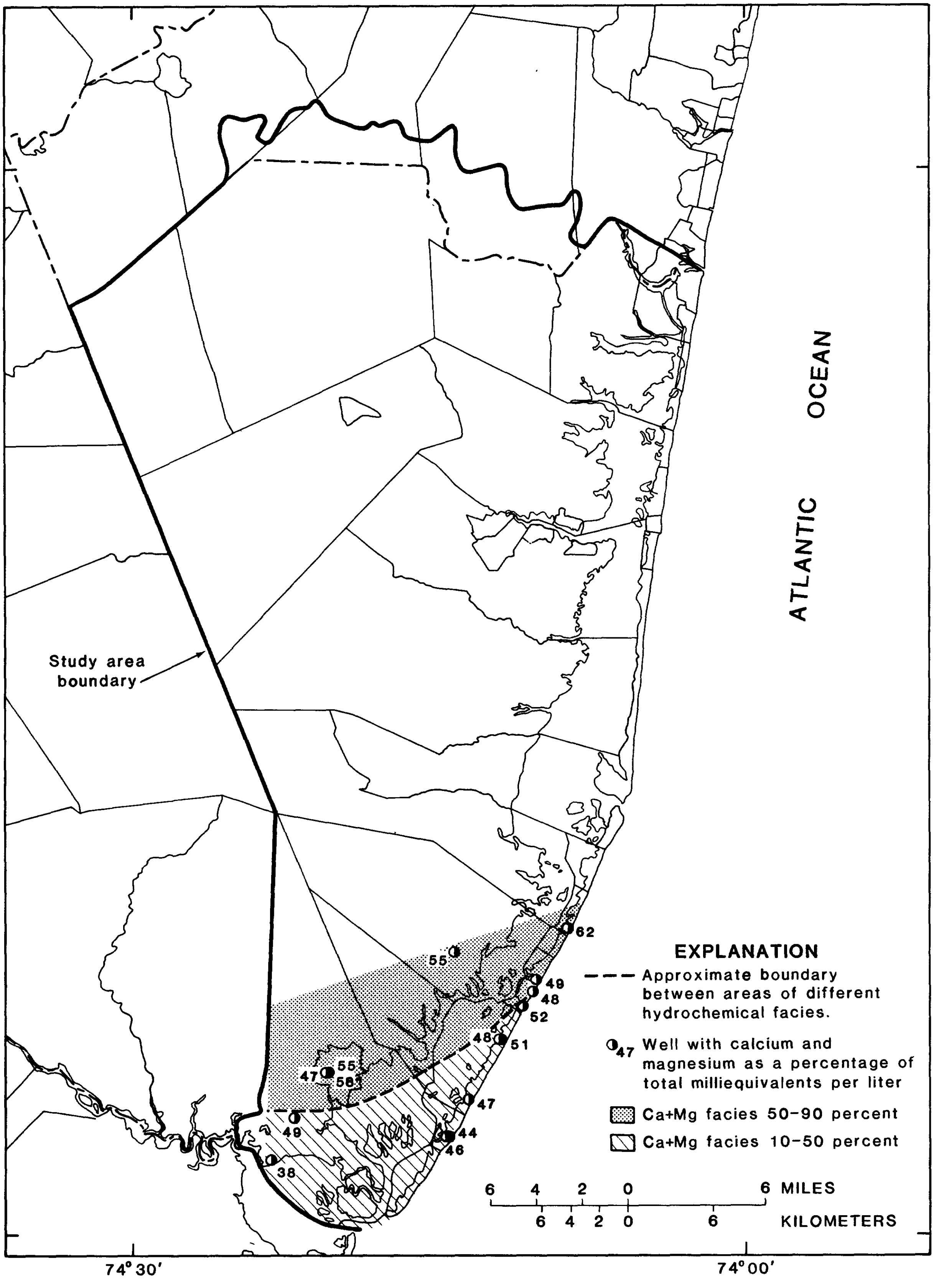

Figure 33.--Calcium-magnesium hydrochemical facies in the Atlantic City 800-foot sand.

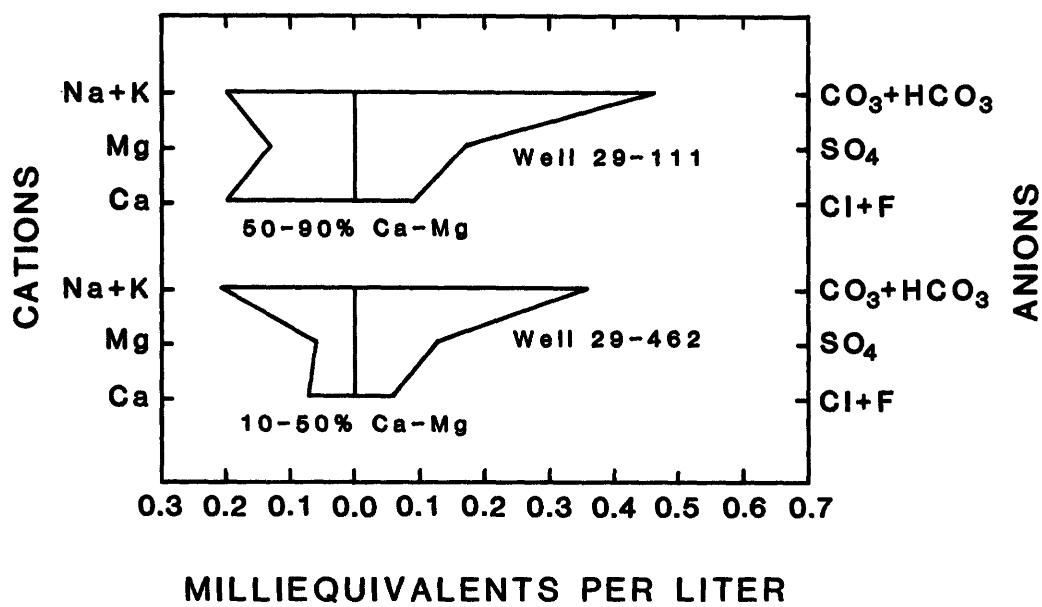

Figure 34.--Chemical composition of typical samples from the two hydrochemical facies (see fig. 33) in the Atlantic City 800-foot sand. (Well locations shown in fig. 11.)

Kirkwood-Cohansey Aquifer System

This was the most thoroughly sampled aquifer (249 chemical analyses from 209 wells). Wells screened in the Kirkwood-Cohansey aquifer system that were sampled are shown on plate 1. The water-table aquifer varies more widely in chemical quality than any of the confined aquifers. Nevertheless, water from this aquifer is generally suitable for drinking.

Table 9 presents a statistical summary of analytical results for this aquifer. Values from dissolved solids, chloride, nitrate, iron, and manganese occasionally exceed drinking-water standards. Constituent concentrations in water from well 29-123, sampled in 1948, differ only slightly from the results of the 1982 analysis (see table 12).

Iron concentrations in the aquifer system are high (more than 1 mg/L) at scattered points in the area. A well with relatively low iron concentration may be close to one with high iron. In most samples, sodium and potassium are the predominant cations in water from the Kirkwood-Cohansey aquifer system (fig. 35). No single anion predominates. A nitrate concentration of 10.5 mg/L in a sample from well 29-738 exceeds the drinking-water standard.

Chloride concentrations exceeding 50 mg/L in wells near the Atlantic Ocean may indicate saltwater intrusion. A comparison of the ratio of chloride to sodium helps verify the presence of saltwater. In seawater, the concentration of chloride is about 1.8 times that of sodium. Six wells that show this proportion are listed below. The three wells with multiple samples show an increase in chloride concentration for the periods indicated.

Name of well	Well number	Date sampled	Sodium (mg/L)	Chloride (mg/L)
USGS Island Beach 4 Obs	29-20	28 Oct 77	30	57
NJWC OC Div Normandy 2	29-99	03 Sep 46	--	13
NJWC OC Div Normandy 2	29-99	31 Aug 61	65	264
Pt Pleas Bch Boro WD 9	29-521	05 Sep 50	--	9.8
Pt Pleas Bch Boro WD 9	29-521	22 Jun 61	7.1	13
Pt Pleas Bch Boro WD 9	29-521	01 Sep 81	27	90
Pt Pleas Bch Boro WD 10	29-523	10 Jul 75	24	96
Pt Pleas Bch Boro WD 10	29-523	01 Sep 81	59	280
Seaside Hts Boro WD 1R	29-538	28 Aug 81	55	140
Brick Twp MUA 5-70	29-726	12 Nov 81	197	300

Table 9.--Statistical summary of water analyses from the Kirkwood-Cohansey aquifer system.
[Concentrations in milligrams per liter]

Dissolved constituent or characteristic	Number of samples	Minimum	25th percentile	Median	75th percentile	Maximum
Temperature (°C)	186	5.5	12.0	13.0	14.0	17.0
Specific conductance[1]	249	17	41	56	9	1,030
pH (units)	242	3.9	4.8	5.3	5.9	9.1
Alkalinity (mg/L as $CaCO_3$)	240	0	1	4	8	75
Dissolved solids[2]	208	9	26	41	78	668
Ammonia as N	152	<.01	<.05	<.05	.14	5.6
Nitrite as N	156	0	<.01	<.01	<.01	.05
Organic nitrogen plus ammonia as N	141	<.05	.09	.14	.23	5.6
Nitrate plus nitrate as N	154	<.01	.02	.08	.74	10.5
Phosphorus	133	<.01	<.01	<.01	.02	.72
Orthophosphate as P	183	0	<.01	<.01	<.01	.72
Organic carbon	162	.20	<.30	.5	.7	13
Calcium	211	.20	.50	1.4	3.1	73
Magnesium	212	.21	.33	.60	1.2	25
Sodium	232	.58	2.3	3.5	6.7	197
Potassium	231	.10	.40	.80	1.8	10
Chloride	245	1.1	3.6	5.0	8.0	300
Sulfate	246	0	2.0	7.0	10.0	30
Silica	99	1.9	3.4	4.3	11.5	32
Barium	154	<.002	<.1	<.1	<.1	.4
Beryllium	154	<.0005	<.005	<.005	<.005	.007
Cadmium	161	<.001	<.005	<.005	<.005	.006
Chromium	155	<.001	<.05	<.05	<.05	<.05
Copper	158	.002	<.02	<.02	.05	.73
Iron	166	.016	.07	.29	.97	27
Lead	160	.001	<.1	<.1	<.1	<.1
Manganese	166	0	<.01	.014	.030	.48
Silver	137	<.01	<.01	<.01	<.01	<.01
Strontium	17	.001	.011	.016	.020	.36
Zinc	148	<.005	.01	.02	.06	1.6

[1] (microsiemens/cm at 25°C)
[2] Residue on evaporation at 180°C

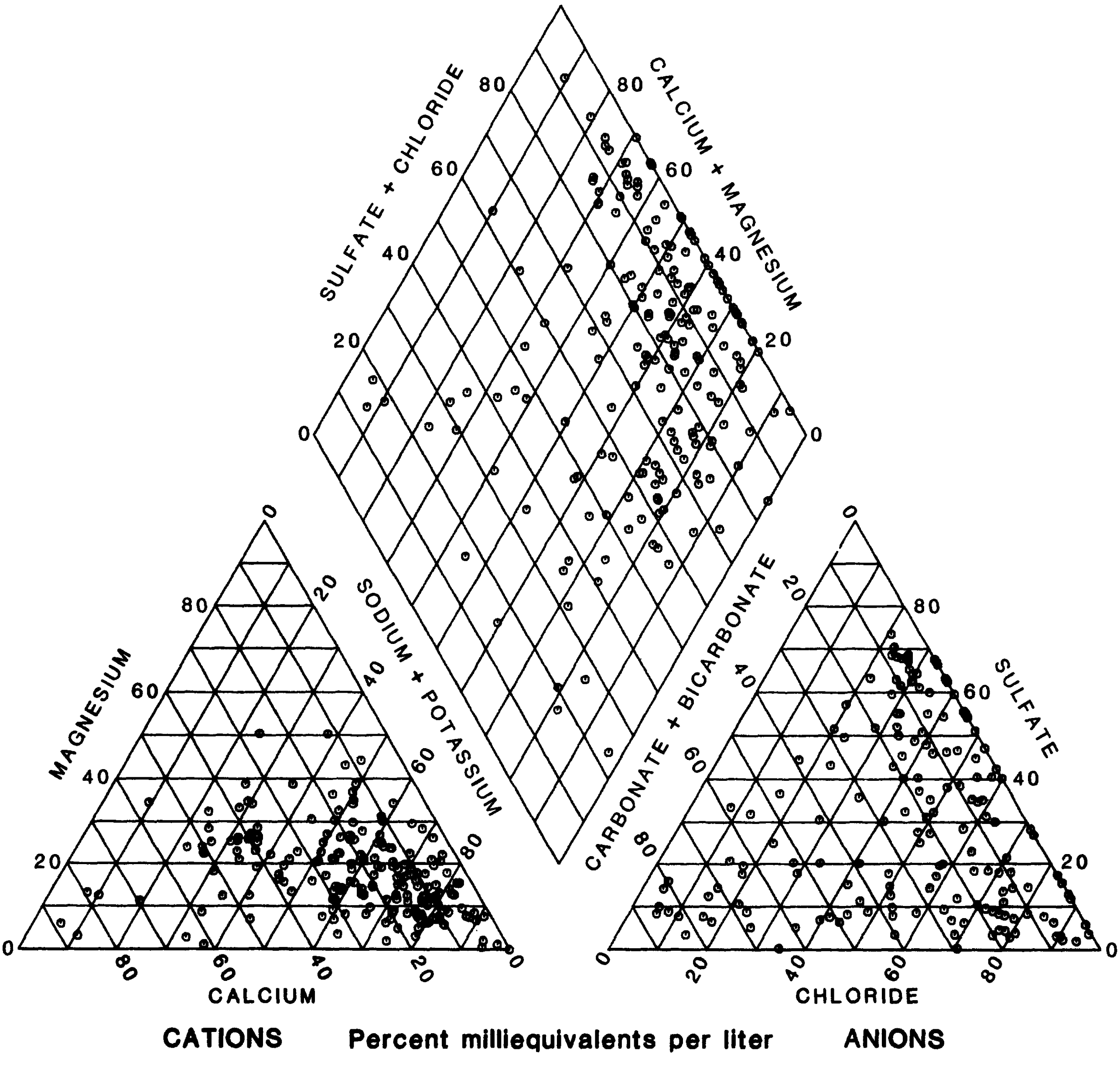

Figure 35.--Trilinear diagram showing relative amounts of major ions in water from the Kirkwood-Cohansey aquifer system.

The maximum pH in samples from the Kirkwood-Cohansey is 9.1, measured at well 29-657 on March 8, 1982 (table 12). Moreover, the ratio of sodium to calcium concentration in water from this well is more than 50. Typically, samples collected from other wells screened in this aquifer have sodium-to-calcium ratios of less than one. A possible explanation is that sodium hydroxide was deposited or spilled at the surface and percolated into the aquifer. Subsequent measurements (Herbert Koffler, Ocean County Vocational Technical School, oral commun., 1983.) have shown a decline in pH. This illustrates the vulnerability of the water-table aquifer to potential contamination.

In water from well 29-736, copper and zinc concentrations are 0.73 and 0.44 mg/L, respectively. This well has a brass screen and steel casing. Deterioration of the screen could cause the elevated levels of copper and zinc. Water collected from another well, well 29-696, has a zinc concentration of 1.6 mg/L, but its copper concentration is only 0.025 mg/L. Both the screen and the casing of this well are made concentration in the water is not known.

EFFECTS OF LAND USE ON GROUND-WATER QUALITY

The relationship between land use and the ground-water quality of the Kirkwood-Cohansey aquifer system was investigated based on wells that were sampled during the period August 1981 through June 1982. In much of the study area, land use reflects a rapidly urbanizing rural environment. Residential areas are located in or adjacent to forests, and industrial areas may be adjacent to agricultural areas.

The predominant land use surrounding each well was assigned based on the following: Ocean County Planning Board's land use may (1977) (unpublished map on file at Ocean County Planning Board), U.S. Geological Survey $7^1/_2$ minute quadrangle maps (1971), and a 1981 Hagstrom road map. However, due to the rapid changes in land use in the study area, and the effects of ground-water flow patterns on recharge to a well, the particular land use classification assigned to a well may not accurately reflect the water quality of the water recharging that well. Land-use designations for the 160 wells are listed below.

Land use classification	Number of wells
forest	22
agriculture	1
industrial	8
commercial	37
residential	86
barren land	5
landfill	1
Total	160

Of this total, two wells thought to be affected by saltwater intrusion were excluded from the analysis.

The water-quality data associated with the remaining 158 wells were tested to determine whether or not to accept the hypothesis that each water-quality characteristic is normally distributed. A Kolomogorov statistic was computed for each characteristic in the data set. Based on these statistics, the hypothesis that the data are normally distributed was rejected at the 0.01 significance level for each characteristic. After further examination of the data, it was decided to apply a logarithmic transformation to the data. However, the hypothesis tested this time, that the logarithmically transformed data are normally distributed, was also rejected. Therefore, use is made of contingency table methods in this analysis, and the hypothesis tested is that, for a given variable, the frequency of occurrence is independent of the land use.

Observations are aggregated into two land-use categories, urban and rural. Using these categories, two different cases are analyzed: In case I, residential, industrial, and commercial areas are classified as urban, and barren land, forests, and agricultural land are classified as rural. In case II, residential land is classified as rural along with barren land, forests, and agricultural land; industrial and commercial areas are classified as urban.

In case I (table 10), the constituents calcium, magnesium, chloride, and nitrate-plus-nitrite show a significant relationship with land use at the 95-percent confidence level. The table compares an observed frequency above and below the median with an expected frequency based on the assumption that the constituent distribution is independent of land use. In the urban category, the observed above-median frequency should be greater than the expected frequency, and the observed below-median frequency should be below the expected frequency. In the rural category, the results should be just the reverse. In other words, constituent concentrations are higher in urban areas in comparison to rural areas as a result of land-use-related ground-water contamination. This relationship holds for all constituents in table 10.

In case II, only calcium shows any land-use-related influence. High calcium concentrations appear directly related to industrial and commercial land use. Magnesium, chloride, and nitrate-plus-nitrite concentrations appear to be related to residential land use. These results are unexpected in view of the relatively low concentration of chemical constituents in water from the aquifer.

PLAN FOR GROUND-WATER-QUALITY SAMPLING NETWORKS

Knowledge of the pattern of ground-water movement is an essential prerequisite to the design of a sampling program. In

Table 10.--Contingency tables of chemical constituent frequencies by land use[1]

Chemical constituent	Land use	Number of wells above median		Number of wells below median		Total	Chi square	Level of significance
Case I: Residential land use grouped in urban category								
Calcium	Urban	68	(63.4)	62	(66.6)	130	3.75	.05
	Rural	9	(13.6)	19	(14.4)	28		
Magnesium	Urban	68	(63.4)	62	(66.6)	130	3.75	.05
	Rural	9	(13.6)	19	(14.4)	28		
Chloride	Urban	63	(57.6)	67	(72.4)	130	5.14	.02
	Rural	7	(12.4)	21	(15.6)	28		
Nitrate plus Nitrite	Urban	65	(58.4)	65	(71.6)	130	7.60	.01
	Rural	6	(12.6)	22	(15.4)	28		
Case II: Residential land use grouped in rural category								
Calcium	Urban	30	(22.4)	16	(23.6)	46	7.06	.01
	Rural	47	(54.6)	65	(57.4)	112		

[1] The observed frequency in each cell is shown, with the frequency expected in parentheses.

the study area, this is especially true for the Kirkwood-Cohansey aquifer system because it is the most heavily used and the most susceptible to contamination. The ground-water-flow section of this report discusses water movement in this aquifer; that information has been used in the design of the monitoring networks.

Flow in the confined aquifers is heavily influenced by ground-water withdrawals, which have created cones of depression. Withdrawals can induce leakage of water from adjacent aquifers. Nemickas (1976), Nichols (1977a), and Walker (1983) present evidence of leakage in the area.

Sources of Contamination

The list of chemical constituents to be monitored needs to be based on identified sources of dispersed, man-related pollution. Otherwise changes in the chemical character of water in an aquifer can remain unobserved because the specific constituents entering the aquifer are not detected.

Sanitary landfills may contain a wide range of potential contaminants. Concentrations of any of the major cations and anions, trace metals, and organic compounds can be affected by solid-waste-disposal activities. Imbrigiotta and Martin (1981) found that concentrations of bromide and dissolved solids in Indiana were reliable indicators of contamination by landfills. Kimmel and Braids (1980) found landfill-contaminated water at two sites on Long Island, New York to be about 1 pH unit higher than that generally found in the local ground-water system. They also noted that bicarbonate is a reliable indicator for tracing contaminants. Residential areas with onsite septic systems may cause nitrates and phosphorus to increase. In a densely populated area with onsite waste disposal systems on Long Island, New York, ground water has been contaminated by nitrate, ammonia, and detergents (Buxton and others, 1981). In agricultural areas, characteristic wastes include nitrogen, phosphorus, potassium, and organic pesticides and herbicides. Industrial areas may contribute trace elements, acids, solvents, and other inorganic and organic substances. Along roads, motor vehicles introduce contaminants such as lead, oil, and gasoline.

Sampling Strategies

The development of a monitoring strategy needs to be carefully planned because sample collection and analysis is expensive. Difficulty in predicting the movement of ground-water contamination presents special problems for monitoring. In addition, constituents may interact with the rock matrix or with each other.

At least three approaches to ground-water-quality monitor ing are commonly in use (Sgambat and others, 1978). One approach is employed at a specific source of contamination, such as a chemical spill. Observation wells are commonly positioned upgradient and downgradient from the site. A second approach is aimed at safeguarding public health. Samples are usually analyzed for inorganic or organic chemical constituents for which drinking water standards have been developed. A third approach aims at assessing the regional effects of point and nonpoint pollution sources. It attempts to document long-term trends in ground-water quality and detect changes resulting from land-use-related contamination. The proposed networks fall into this third category.

Several different criteria have been proposed for designing a regional water-quality-monitoring network. Eccles and Nicklen (1978) state that the key factors to consider in designing a network include location of hydrogeologic discontinuities such as faults; presence of ground-water barriers; existence of multiple aquifers; past, present, and future land uses; areas of recharge and discharge; method of well construction; and vertical distribution of chemical constituents. Whitehead and Parliman (1979) suggest that the following aspects of network design are important: the status of ground-water-quality information; the definition of aquifer systems; the direction of ground-water movement; the location of areas of potential pollution; and the definition of types of associated waters. The directly applicable criteria from these reports are incorporated in the monitoring networks.

Design of regional monitoring networks in the area should address two sources of dispersed pollution. Along the coast, salt water intrusion is a constant threat. Saltwater may enter the well through the screen, or through the top of the casing as a result of flooding caused by high tides and storms. Inland, land-use activities comprise the other possible pollution source.

Three important components make up ground-water-monitoring networks: Constituent selection, sampling-site location, and sampling frequency (Nelson and Ward, 1981). These components are discussed in each of the proposed networks.

Descriptions of Proposed Networks

Regional Sampling Network

In this network wells screened in the confined aquifers need to be sampled in conjunction with those in the water-table aquifer. The wells listed in table 11 can be sampled to provide additional data for all the aquifers in the area. Comparisons can then be made with the data in this report. The Kirkwood-Cohansey is the major aquifer, and the sampling emphasis would reflect this. Future sampling needs to be based on the relative importance of each aquifer as indicated by the volume of ground-water withdrawals from it.

The rather uniform quality of ground water over many years suggests that a 5-year sampling interval is adequate. It is not necessary to sample all the wells simultaneously. Approximately one-fifth of the wells could be sampled each year unless a need for additional sampling developed.

Sampling in the autumn is suggested, because that is when water levels ordinarily are lowest. The maximum rate of advance of any contaminant toward a well usually occurs when water levels are lowest. Concurrent measurement of water levels would facilitate delineation of the flow-system in the water-table aquifer and could show changes in head in the confined aquifers.

Future sampling needs to be based, at a minimum, on the chemical constituents listed in table 2. Other constituents that could be determined are arsenic, nickel, mercury, selenium, and selected volatile organic compounds. In addition, it is suggested that fluoride, aluminum, and antimony be determined for selected samples. Analysis frequency could be low for these constituents unless significant concentrations are found.

Selected organic compounds need to be added to the list of constituents chosen for determination. A statewide investigation by Tucker (1981) of water samples from 670 wells established a data base on the presence and concentration of 50 toxic chemicals in New Jersey. The most frequently detected halogenated volatile organic compounds (solvents) were carbon tetrachloride and trichloroethylene. The most commonly found member of a group of chlorinated pesticides and related compounds was the beta isomer of 1,2,3,4,5,6- hexachlorocyclohexane (beta-BHC).

Of nine trace metals determined in Tucker's study, lead most frequently exceeded the drinking-water standard. An inventory of past and present land uses could help to identify additional chemical constituents to include in future analyses. The inventory could include active and abandoned mines or quarries, former agricultural areas, and active and abandoned landfills and disposal ponds.

Water-Table Aquifer Networks

Forest-Area Sampling

Available information on the flow system in the water-table aquifer and the regional land-use pattern suggests a need for specialized monitoring networks (fig. 36). The largest one would extend along the west-central part of Ocean County and would be part of a preservation area and forest zone previously designated by the New Jersey Pinelands Commission. The preservation area is the regional recharge area for water in the Kirkwood-Cohansey aquifer system flowing toward the Atlantic Ocean. Ground water in this area is largely uncontaminated. A forest-area network is proposed for this region (fig. 36).

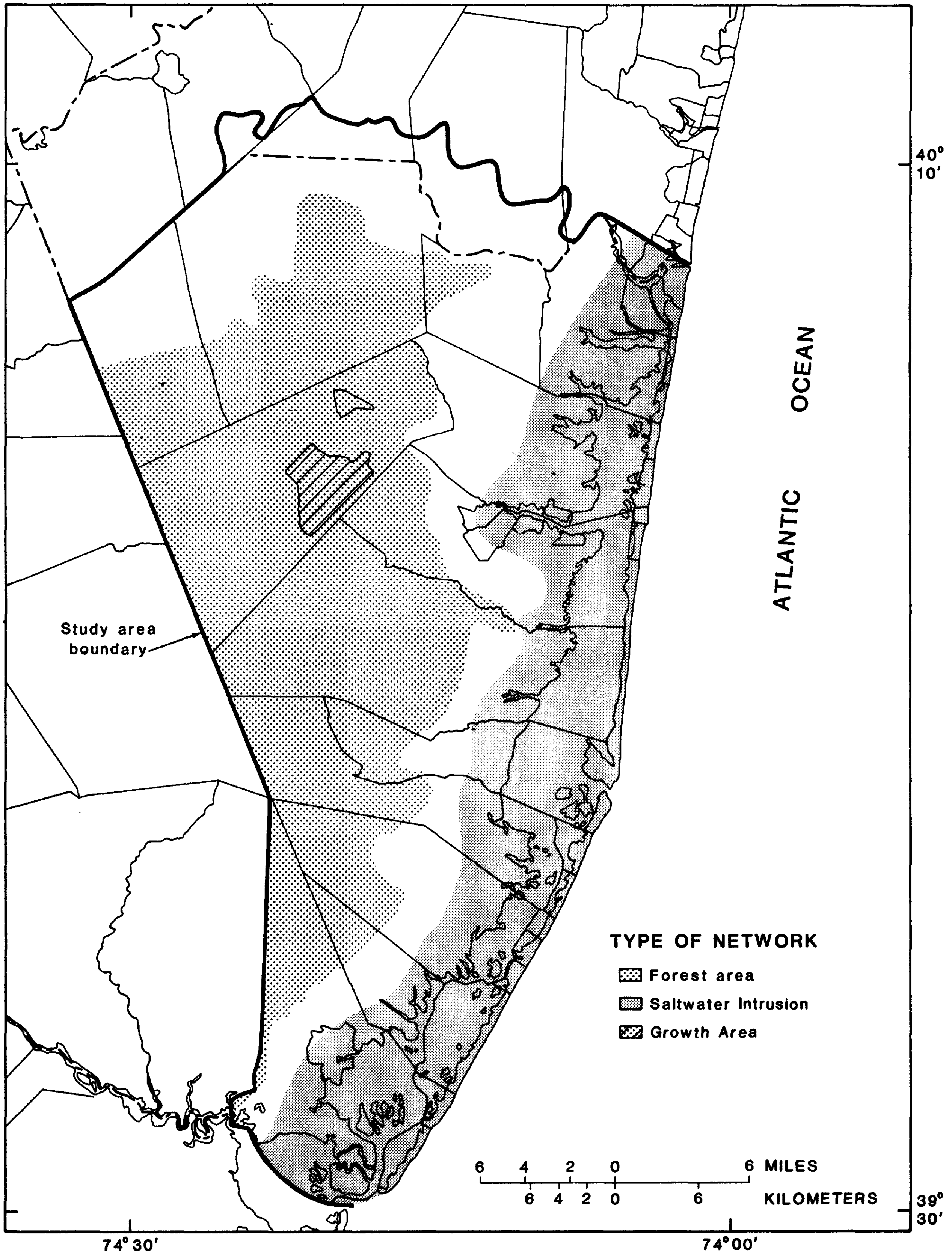

Figure 36.--Proposed monitoring networks for the water-table aquifer.

The network wells need to be fairly evenly distributed. Five observation wells recently drilled by NJDEP in places where suitable wells were unavailable had not been sampled when this study was completed. They need to be sampled together with suitable wells selected from the list in table 11. Additional sites are needed because large areas in the western part of the area lack suitable wells. A 5-year sampling interval is suggested.

Growth-Area Sampling

Urbanization can alter the quality and quantity of ground water. Changes in land use from predominantly forested to residential may involve installation of wells and septic systems, and an increase in impervious surfaces. Later, changes from low to high density development can involve construction of sewer systems, installation of deep, large-capacity wells, and reduction of aquifer recharge due to further increases in impervious surfaces (Summers and others, 1981).

A specialized water-table sampling network is needed for areas where land use is changing. For major developments, early sampling is needed to delineate background conditions before construction. As part of site preparation, new wells could be constructed and sampled for determination of major cations and anions, trace metals, organic compounds, and compounds identified by the land-use inventory. A 5-year sampling interval is suggested unless chemical concentrations appear to be increasing.

Salinity Networks

Heavy pumping of coastal aquifers can cause a landward movement of salty ground water. Saltwater encroachment progresses more rapidly when the cones of depression extend below sea level.

The U.S. Geological Survey maintains a saltwater monitoring network in New Jersey in cooperation with NJDEP, Division of Water Resources, to document and evaluate the movement of saline water into freshwater aquifers. This network has primarily focused on monitoring chloride concentrations in the confined aquifers. However, if a well screened in the Kirkwood-Cohansey aquifer system is affected by saltwater intrusion, the well is typically sampled annually. Wells in the Kirkwood-Cohansey aquifer system not affected by saltwater, or situated on the mainland, are sampled less frequently. Sampling usually occurs at the end of the summer recreational season.

Confined aquifers

The exact location of the saltwater-freshwater interface in the Potomac-Raritan-Magothy aquifer system is not known. Wells 29-453 and 29-626 are located north of the interface and well 29-19 is located south of it. These wells could be sampled at least once every 5 years to determine chloride concentrations, thus providing an indication of possible movement of the interface. Sampling of wells between these three would provide more data to help in determining the trend. Initially, it would be advantageous to have the wells sampled annually for 2 to 3 years to establish characteristic concentrations. Then, sampling frequency could decrease to a 5-year period. For this network, only temperature, specific conductance, pH, and chloride need to be determined. Water-level measurements at the time of sampling would provide additional useful information.

Breaks in well casings and improperly sealed wells and test holes may cause saltwater to move into confined aquifers. If sodium and chloride concentrations increase in water from any wells in the confined aquifers, it is advisable to check the well casing for breaks. If a break is detected, State officials should be contacted and proper remedial actions should be taken. If no break is detected, other nearby wells can be inspected and sampled in an attempt to determine the cause of the increased concentrations.

Water-table aquifer

Six wells with elevated chloride concentrations indicating possible saltwater intrusion are listed on page 59. They can be included in the water-table-aquifer saltwater-intrusion network proposed for the southeastern part of the study area (fig. 36). Other wells should be selected in areas where saltwater intrusion is a potential problem. For this network, only temperature, specific conductance, pH and chloride need to be determined. In areas of rapidly changing chloride concentration, sampling on a 6- to 12-month basis is suggested. If the chloride concentration levels off, a longer sampling period can be used. Monitoring the saltwater front and delineating its position in the water-table aquifer requires information on large-scale withdrawals near tidal streams, static water levels, and hydrogeology, in addition to chloride concentration data. Additional study would be required to determine aquifer flow dynamics and to anticipate probable saltwater movement.

SUMMARY AND CONCLUSIONS

This study evaluates regional ground-water quality in seven confined aquifers and the water-table aquifer in east-central New Jersey based on analyses of 462 samples from 339 wells. Analyses include field determination of water temperature, specific conductance, pH, and alkalinity; and laboratory determination of major cations and anions, nutrients, trace metals, and dissolved organic carbon.

A total of 70 chemical analyses from 29 wells screened in the Potomac-Raritan-Magothy aquifer system indicate that water in this aquifer system is suitable for human consumption and most other uses; only iron and manganese commonly exceed the U.S.

Environmental Protection Agency drinking-water standards. For the Englishtown aquifer, 59 analyses of water from 36 wells show that, of the trace metals, only iron and manganese exceed the drinking-water standards. Of the major ions, sodium exceeds the drinking-water standard in samples from three wells more than 800 feet deep. For the Wenonah-Mount Laurel aquifer, 25 analyses of samples from 21 wells show that water in this aquifer is generally satisfactory for drinking; only iron concentrations exceed the drinking-water standard. Based on 15 samples from 14 wells, water in the Vincentown aquifer is generally satisfactory for drinking. Manganese is the only constituent that exceeds the drinking-water standard. For the Manasquan aquifer, 19 analyses of water from 13 wells indicate that the water is generally satisfactory for drinking; however, 4 of 16 sodium concentrations exceed the 50 mg/L standard and 8 of 16 iron values exceed the 0.3 mg/L standard. For the Atlantic City 800-foot sand, 22 chemical analyses of water from 15 wells show that all 12 iron and 1 of 12 manganese determinations exceed the drinking-water standards. For the Rio Grande water-bearing zone, iron concentrations in four samples from two wells exceed the drinking-water standard.

The Kirkwood-Cohansey aquifer system was the most thoroughly sampled (249 samples from 209 wells). Dissolved solids, chloride, iron, nitrate, and manganese exceed drinking-water standards in some areas. The relationship between land use and ground-water quality was investigated using 158 analyses from 158 water-table wells. The results of chi-square tests of constituent distributions indicate that calcium is relatively high in industrial and commercial areas; and magnesium, chloride, and nitrate-plus-nitrite are relatively high in residential areas.

The results of this study suggest a need for continued sampling of ground water. Before a regional sampling network is started, however, an inventory of past, present, and potential ground-water contamination related to land use is needed. This information would be used to identify significant elements or compounds that would be added to the list of chemical constituents to be determined. The establishment of forest-area and growth-area networks is proposed so that future changes can be detected and the impact of land-use practices on ground-water quality can be monitored. Salinity networks are proposed for both the confined aquifers and the Kirkwood-Cohansey aquifer system.

SELECTED REFERENCES

American Public Health Association and others, 1976, Standard methods for the examination of water and wastewater (14th ed.): Washington, D.C., American Public Health Association, 1193 p.

Anderson, H. R., and Appel, C. A., 1969, Geology and ground-water resources of Ocean County, New Jersey: New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply Special Report 29, 93 p.

Back, William, 1966, Hydrochemical facies and ground-water flow patterns in the northern part of Atlantic Coastal Plain: U.S. Geological Survey Professional Paper 498-A, 42 p.

Barksdale, H. C., Greenman, D. W., Lang, S. M., Hilton, G. S., and Outlaw, D. E., 1958, Ground-water resources in the tri-state region adjacent to the lower Delaware River: New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply, Special Report 13, 190 p.

Brown, Eugene, Skougstad, M. W., and Fishman, M. J., 1970, Methods for collection and analysis of water samples for dissolved minerals and gases: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A1, 160 p.

Buxton, H. T., Soren, Julian, Posner, Alex, and Shernoff, P. K., 1981, Reconnaissance of the ground-water resources of Kings and Queens Counties, New York: U.S. Geological Survey Open-File Report 81-1186, 64 p.

Coombe, Debra, 1979, Polluted water plagues town: The Star Ledger, July 18, 1979, Newark, New Jersey, p. 10.

Davis, S. N. and DeWiest, J. M., 1966, Hydrogeology: New York, John Wiley and Sons, Inc., 463 p.

Disko, Michael, Nusser, Donald, and Doheny, Edward, 1978, Ground-water management planning: Report prepared for Ocean County 208 Water Quality Management Planning by M. Disko Associates, Union, New Jersey, 410 p.

Eccles, L. A. and Nicklen, R. R., 1978, Factors influencing the design of a ground water quality monitoring network in Everett, L. G. and Schmidt, K. D., eds., Establishment of water quality monitoring programs: American Water Resources Association, Minneapolis, Minnesota, p. 196-209.

Farlekas, G. M., Nemickas, Bronius, and Gill, H. E., 1976, Geology and ground-water resources of Camden County, New Jersey: U.S. Geological Survey Water-Resources Investigations 76-76, 146 p.

Fetter, C. W., Jr., 1980, Applied Hydrogeology: Columbus, Ohio, Charles E. Merrill Publishing Company, 488 p.

Freeze, R. A. and Cherry, J. A., 1979, Groundwater: Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 604 p.

Friedman, L. C. and Erdmann, D. E., 1982, Quality assurance practices for the chemical and biological analyses of water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A6, 181 p.

Fusillo, T. V., Schornick, J. C., Jr., Koester, H. E., and Harriman, D. A., 1980, Investigation of acidity and other water-quality characteristics of Upper-Oyster Creek, Ocean County, New Jersey: U.S. Geological Survey Water-Resources Investigations 80-10, 30 p.

Fusillo, T. V., and Voronin, L. M., 1981, Water-quality data for the Potomac-Raritan-Magothy aquifer system, Trenton to Pennsville, New Jersey, 1980: U.S. Geological Survey Open-File Report 81-814, 38 p.

Gill, H. E., and Farlekas, G. M., 1976, Geohydrologic maps of the Potomac-Raritan-Magothy aquifer system in the New Jersey Coastal Plain: U.S. Geological Survey Hydrologic Investigations Atlas HA-557, 2 sheets.

Goerlitz, D. F., and Brown, Eugene, 1972, Methods for analysis of organic substances in water: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A3, 40 p.

Guy, H. P., and Norman, V. W., 1970, Field methods for measurement of fluvial sediment: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter C2, 59 p.

Harbaugh, A. W., Luzier, J. E., and Stellerine, Flavian, 1980, Computer-model analysis of the use of Delaware River water to supplement water from the Potomac-Raritan-Magothy aquifer system in southern New Jersey: U.S. Geological Survey Water-Resources Investigations 80-31, 41 p.

Harbaugh, A. W., and Tilley, C. L., 1984, Steady-state computer model of the water-table aquifer of the Mullica River basin in the Pine Barrens, New Jersey: U.S. Geological Survey Water Resources Investigations Report, 84-4295, 38 p.

Harriman, D. A. and Voronin, L. M., 1984, Water-quality data for aquifers in east-central New Jersey 1981-82: U.S. Geological Survey Open-File Report 84-821, 39 p.

Hem, J. D., 1970, Study and interpretation of the chemical characteristics of natural water: U.S. Geological Survey Water-Supply Paper 1473, 269 p.

Imbrigiotta, T. E. and Martin, Angel, Jr., 1981, Hydrologic and chemical evaluation of the ground-water resources of northwest Elkhart County, Indiana: U.S. Geological Survey Water-Resources Investigations 81-53, 141 p.

Jablonski, L. A., 1968, Ground-water resources of Monmouth County, New Jersey: New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply Special Report 23, 117 p.

Keith, L. H. and Telliard, W. A., 1979, Priority Pollutants; I-a perspective view: Environmental Science and Technology, v. 13, no. 4, p. 416-423.

Kam, William, 1978, Effect of controlled land application of sludge on ground-water quality, Ocean County, New Jersey: U.S. Geological Survey Open-File Report 78-492, 87 p.

Kimmel, G. E., and Braids, O. C., 1980, Leachate plumes in ground water from Babylon and Islip Landfills, Long Island, New York: U.S. Geological Survey Professional Paper 1085, 38 p.

Langmuir, Donald, 1969, Iron in ground waters of the Magothy and Raritan Formations in Camden and Burlington Counties, New Jersey: New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply Water Resources Circular 19, 49 p.

Longbottom, J. E. and Lichtenberg, J. J., eds., 1982, Methods for organic chemical analysis of municipal and industrial waste water: U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, EPA- 600/4-82-057, July 1982.

Luzier, J. E., 1980, Digital-simulation and projection of head changes in the Potomac-Raritan-Magothy aquifer system, Coastal Plain, New Jersey: U.S. Geological Survey Water-Resources Investigations 80-11, 72 p.

Markewicz, Frank, 1969, Ilmenite deposits of the New Jersey Coastal Plain, in Subitzky, Seymour, ed., Geology of selected areas in New Jersey and eastern Pennsylvania and guidebook of excursions: Geological Society of America and Associated Societies, November 1969, Annual Meeting, Atlantic City, New Jersey, Rutgers University Press, New Brunswick, New Jersey, p. 13-20.

Meisler, Harold, 1980, Plan of study for the Northern Atlantic Coastal Plain Regional Aquifer System Analysis: U.S. Geological Survey Water-Resources Investigations 80-16, 27 p.

----- 1981, Preliminary delineation of salty ground-water in the Northern Atlantic Coastal Plain: U.S. Geological Survey Open-File Report 81-71, 12 p.

Mercer, M. W., and Morgan, C., O., 1981, Storage and retrieval of ground-water data at the U.S. Geological Survey: Groundwater, v. 19, no. 5, p. 543-551.

National Oceanic and Atmospheric Administration, 1982, Climatography of the United States No. 81, p. 7.

National Research Council, 1977, Drinking water and health: National Academy of Sciences, 939 p.

Nelson, J. D. and Ward, R. C., 1981, Statistical considerations and sampling techniques for ground-water quality monitoring, Groundwater, v. 19, no. 6, November-December, p. 617-625.

Nemickas, Bronius, 1976, Digital-simulation model of the Wenonah-Mount Laurel aquifer in the Coastal Plain of New Jersey: U.S. Geological Survey Open-File Report 75-672, 42 p.

New Jersey Department of Environmental Protection, 1982, Summary of community water purveyor responsibilities under State Interim Primary Drinking Water Regulations: New Jersey Department of Environmental Protection, Bureau of Potable Water, Trenton, New Jersey, revised January 1982.

Nichols, W. D., 1977a, Geohydrology of the Englishtown Formation in the northern Coastal Plain of New Jersey: U.S. Geological Survey Water-Resources Investigations 76-123, 62 p.

----- 1977b, Digital computer simulation model of the Englishtown aquifer in the northern Coastal Plain of New Jersey: U.S. Geological Survey Open-File Report 77-73, 101 p.

Ocean County Planning Board, 1982, Ocean County Comprehensive Master Plan: Toms River, New Jersey, 170 p.

Owens, J. P. and Sohl, N. F., 1969, Shelf and deltaic paleo-environments in the Cretaceous-Tertiary Formations of the New Jersey Coastal Plain, in Subitzky, Seymour, ed., Geology of selected areas in New Jersey and eastern Pennsylvania and guidebook of excursions: Geological Society of America and Associated Societies, November 1969, Annual Meeting, Atlantic City, New Jersey, New Brunswick, New Jersey, Rutgers University Press, p. 235-278.

Parker, G. G., Hely, A. G., Neighton, W. B., and Olmsted, F. H., 1964, Water Resources of the Delaware River Basin: U.S. Geological Survey Professional Paper 381, 200 p.

Piper, A. M., 1944, A graphic procedure in the geochemical interpretation of water analyses: American Geophysical Union Transactions, v. 25, p. 914-923.

Preczewski, John and Hayes, T. J., 1983, Beachwood Boro, Berkeley Township interim report (unpublished): New Jersey Department of Environmental Protection, Bureau of Ground-water Manage ment, 102 p.

Ragone, S. E., Katz, B. G., Linder, J. B. and Flipse, W. J., Jr., 1976, Chemical quality of ground water in Nassau and Suffolk Counties, Long Island, New York, 1952 through 1976: U.S. Geological Survey Open-File Report 76-845, 93 p.

Ray, A. A., ed., 1982a, Statistical analysis system user's guide: Basics: Raleigh, North Carolina, SAS Institute, 921 p.

----- 1982b, Statistical analysis system user's guide: Statistics: Raleigh, North Carolina, SAS Institute, 584 p.

Rhodehamel, E. C., 1970, A hydrologic analysis of the New Jersey Pine Barrens region: New Jersey Department of Environmental Protection Water Resources Circular 22, 35 p.

----- 1973, Geology and water resources of the Wharton Tract and the Mullica River basin in southern New Jersey: New Jersey Department of Environmental Protection, Division of Water Resources Special Report 36, 58 p.

Rush, F. E., 1968, Geology and ground-water resources of Burlington County, New Jersey: New Jersey Department of Conservation and Economic Development, Division of Water Policy and Supply Special Report 26, 65 p.

Sargent, F. O., and Sargent, B. P., 1979, Rural water planning: South Burlington, Vermont, F. O. Sargent, 199 p.

Schaefer, F. L., 1983, Distribution of chloride concentrations in the principal aquifers of the New Jersey Coastal Plain, 1977-1981: U.S. Geological Survey Water-Resources Investigations 83-4061, 56 p.

Seaber, P. R., 1962, Cation hydrochemical facies of ground water in the Englishtown Formation, New Jersey: U.S. Geological Survey Professional Paper 450-B, p. B124-B126.

----- 1963, Chloride concentrations of water from wells in the Atlantic Coastal Plain of New Jersey, 1923-61: New Jersey Department of Conservation and Economic Development Special Report 22, 250 p.

----- 1965, Variations in chemical character of water in the Englishtown Formation, New Jersey: U.S. Geological Survey Professional Paper 498-B, 35 p.

Sgambat, J. P., Porter, K. S., and Miller, D. W., 1978, Regional ground water quality monitoring, in Everett, L. G. and Schmidt, K. D., eds., Establishment of water quality monitoring programs, Minneapolis, Minnesota, American Water Resources Association, p. 181-195.

Skougstad, M. W., Fishman, M. J., Friedman, L. C., Erdmann, D. E., and Duncan, S. S., 1979, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A1, 626 p.

Skougstad, M. W., and Horr, C. A., 1963, Occurrence and distribution of strontium in natural water: U.S. Geological Survey Water-Supply Paper 1496-D, p. D55-D97.

Summers, K. V., Rupp, G. L., and Cherin, S. A., 1981, Management options for ground water in urbanizing areas, December, 125 p.

Todd, D. K., 1959, Ground water hydrology: New York, John Wiley and Sons, Inc., 336 p.

Tucker, R. K., 1981, Groundwater quality in New Jersey, an investigation of toxic contaminants: New Jersey Department of Environmental Protection, Office of Cancer and Toxic Substances Research, 1981, 60 p.

U.S. Environmental Protection Agency, 1976, National Interim Primary Drinking Water Regulations: U.S. Environmental Protection Agency, Office of Water Supply, Washington, D.C., EPA-570/9-76-003, 159 p.

----- 1979a, National Interim Secondary Drinking Water Regulations, Federal Register, Volume 44, No. 140, Thursday, July 19, 1979: Rules and Regulations, p. 42-195.

----- 1979b, Guidelines establishing test procedures for the analysis of pollutants; proposed regulations: Federal Register, 40 CFR Part 136, p. 69,464-69,575.

----- 1979c, Methods for chemical analysis of water and wastes: Environmental Monitoring and Support Laboratory, Office of Research and Development, Cincinnati, Ohio, 460 p.

Vowinkel, E. F., and Foster, W. K., 1981, Hydrogeologic conditions in the Coastal Plain of New Jersey: U.S. Geological Survey Open-File Report 81-405, 39 p.

Walker, R. L., 1983, Evaluation of water levels in major aquifers of the New Jersey Coastal Plain, 1978: U.S. Geological Survey Water Resources Investigations 83-4077, 56 p.

White, J. M., Wingo, J. G., Alligood, L. M., Cooper, G. R., Gutridge, J., Hydaker, W. Benack R. T., Dening, J. W., and Taylor, F. B., 1967, Sodium ion in drinking water. I. Properties, analysis, and occurrence: Journal of the American Dietetics Association, v. 50, p. 32-36.

Whitehead, R. L., and Parliman, D. J., 1979, A proposed ground water quality monitoring network for Idaho: U.S. Geological Survey Open-File Report 79-1477, 54 p.

Winograd, I. J. and Farlekas, G. M., 1974, Problems in ^{14}C dating of water from aquifers of deltaic origin, in Isotope Techniques in Groundwater Hydrology, Vol. II, p. 69-93.

Woll, R. C., 1978, Maryland ground-water information: Chemical quality data: Maryland Geological Survey Water Resources Basic Data Report No. 10, 125 p.

Wood, W. W., 1976, Guidelines for collection and field analysis of ground-water samples for selected unstable constituents: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 1, Chapter D2, 24 p.

Zapecza, O. S., 1984, Hydrogeologic framework of the New Jersey Coastal Plain: U.S. Geological Survey Open-File Report 84-730, 61 p.

GLOSSARY

Aquifer: A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian aquifer: An aquifer containing water under sufficient pressure to rise above the top of the aquifer when penetrated by a well; also called confined aquifer.

Confining bed: A body of relatively impermeable material stratigraphically adjacent to one or more aquifers. The hydraulic conductivity may range from nearly zero to some value distinctly lower than that of the aquifer.

Detection limit or minimum detection limit: For a given type of sample and analytical procedure, is that concentration value below which the presence of the constituent being analyzed cannot be verified or denied.

Discharge, ground-water: The process by which water flows out of an aquifer to a surface water body.

Dissolved: The material in a water sample which passes through a 0.45 µm membrane filter. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Ground water, confined: Water under pressure significantly greater than atmospheric, and its upper limit is the bottom of a bed of distinctly lower hydraulic conductivity than that of the material in which the confined water occurs. Artesian, as used in this report, is synonymous with confined.

Ground water, unconfined: Water in an aquifer that has a water table.

Hydraulic gradient: The change in static head per unit of distance in a given direction. If not specified, the direction generally is understood to be that of the maximum rate of decrease in head.

Hydrochemical facies: Hydrochemical facies describe bodies of ground water which differ in their chemical composition. They are dependent upon the lithology, solution kinetics, and flow pattern of the aquifer.

Micrograms per liter (µg/L): A unit expressing the concentration of chemical constituents in solution as weight (micrograms) of solute per unit volume (liter) of water. One thousand micro grams per liter is equivalent to one milligram per liter.

Milliequivalents per liter (me/L): A unit for expressing the equivalent weight of a chemical constituent per unit volume of solution.

Milligrams per liter (mg/L): A unit for expressing the concentration of chemical constituents in solution by weight per unit volume of water.

Permeability: The ability of a rock or soil to transmit water.

Outcrop area: Regions where geologic units are exposed at or near the land surface.

Recharge: The process by which water infiltrates and is added to the zone of saturation.

Saltwater intrusion: Movement of saltwater so that it replaces fresh ground water.

Specific conductance: A measure of the ability of water to conduct an electrical current and is expressed in microsiemens per centimeter at 25°C.

Volatile organic compounds: A group of substances which, because of their volatile nature, can be stripped as a vapor from a water sample via the injection of an inert gas prior to analysis by gas chromatography.

Water table: That surface in an unconfined water body at which the pressure is atmospheric. It is the level at which water stands in wells that penetrate the uppermost part of an aquifer.

APPENDIX

SIGNIFICANCE OF CHEMICAL CONSTITUENTS AND PHYSICAL PROPERTIES

Field Measurements and Dissolved Solids

TEMPERATURE	The regional ground-water flow system may affect the ground-water temperature distribution. Recharge zones may have different temperatures than discharge zones (Freeze and Cherry, 1979). Ground-water recharge from surface-water bodies may also cause temperature fluctuations. Todd (1959) reports that at depths of 30 to 60 feet, the ground-water temperature generally exceeds the mean annual air temperature by 1 to 2°C. Below these depths, the earth's geothermal gradient is responsible for a temperature increase of approximately 1°C for each 100 ft increase in depth.
SPECIFIC CONDUCTANCE	Specific conductance is a measure of the ability of water to conduct an electric current. It is expressed in microsiemens per centimeter at 25°C. Specific conductance is a function of temperature, and therefore temperature must be specified when reporting conductance. Specific conductance increases with increasing concentration of ions in solution. Because of this relationship, specific conductance can be used to approximate the dissolved-solids concentration of water.
pH	The pH of a solution is a measure of its effective hydrogen ion concentration. Water having a pH of 7.0 is neutral; less than 7.0, acidic; and more than 7.0, alkaline. Because pH is based on a logarithmic scale, a one-unit change in pH indicates a ten-fold change in hydrogen-ion concentration.
ALKALINITY	Alkalinity is the capacity of a solution to neutralize acid. It is expressed as an equivalent quantity of calcium carbonate ($CaCO_3$). Field alkalinity determinations by the U.S. Geological Survey make use of an end-point pH of 4.5. Thus, water with a pH of 4.5 or less is assumed to have no alkalinity.

DISSOLVED SOLIDS — Dissolved solids provides an index of the total mineralization of water. It consists of inorganic salts, organic matter, and other residue remaining after evaporation of a water sample at 180°C. The U. S. Environmental Protection Agency Secondary Drinking-Water Standard for dissolved solids is 500 mg/L.

Nutrients and Organic Carbon

NITROGEN AS AMMONIA, NITRATE, NITRITE, AND ORGANIC NITROGEN — Four common compounds of nitrogen in water are ammonia, nitrate, nitrite, and organic nitrogen. In water of pH less than 9.3, ammonia nitrogen is predominantly in the form of the ammonium ion. Ammonification involves the conversion of organic nitrogen to ammonia. Under anaerobic conditions, ammonia may be the predominant nitrogen compound present. When conditions are aerobic, nitrogen compounds may be oxidized to nitrite and nitrate. Nitrate is the most common identifiable contaminant in ground water (Freeze and Cherry, 1979, p. 387). The U.S. Environmental Protection Agency (1976) Primary Drinking-Water Standard for nitrate has been set at 10 mg/L, to protect infants from a temporary blood disorder called methemoglobinemia.

PHOSPHORUS AND ORTHOPHOSPHATE — In natural water phosphorus is likely to be present as phosphate anions in complexes with metal ions, and in colloidal particulate material (Hem, 1970). The orthophosphate anion is the final dissociation product of phosphoric acid. The natural distribution of phosphorus is rather limited: It is commonly found only in one mineral, apatite (Fetter, 1980). Phosphorus is utilized by plants and may be adsorbed by metal oxides, especially ferric hydroxide. For these reasons concentrations greater than a few tenths of a milligram per liter are not usually found in natural waters (Hem, 1970).

ORGANIC CARBON — The organic carbon determination provides a measure of organic matter in solution. It does not, however, identify the specific organic compounds present.

Major Constituents

CALCIUM AND MAGNESIUM Together with sodium and potassium, calcium and magnesium are the major cations. Calcium and magnesium are slightly soluble in pure water, but water containing carbon dioxide can readily dissolve these elements from rocks and soils. In natural freshwater, calcium is usually the principal cation. Concentrations generally range from 1 to 1000 mg/L (Whitehead and Parliman, 1979). Magnesium ion is adsorbed more readily in rocks and in soil than the larger calcium ion. In natural fresh water the magnesium concentration is usually much lower than the calcium concentration (Hem, 1970).

SODIUM Once sodium is dissolved in water it tends to remain in solution, even at high concentrations. The New Jersey Department of Environmental Protection (1982) Secondary Drinking Water Standard for sodium is 50 mg/L. Sodium is not harmful to animal life in the usual concentrations (Woll, 1978). However, White and others (1967) report that a sodium concentration above 20 mg/L in potable water may be hazardous to people who must restrict their total sodium intake to 500 mg per day.

POTASSIUM Potassium concentrations in natural water are usually much lower than sodium concentrations. Potassium feldspar resists dissolution, and clay or mica mineral structures preferentially incorporate potassium. In waters where sodium concentration is below 10 mg/L, potassium concentration may be less than half of the sodium concentration (Hem, 1970).

CHLORIDE The major anions are chloride, sulfate, and bicarbonate. Chloride does not interact appreciably with other ions in ground water. The U.S. Environmental Protection Agency (1979a) Secondary Drinking-Water Standard for chloride is 250 mg/L. A typical value of seawater chloride concentration is 19,000 mg/L.

SULFATE

The element sulfur, when dissolved in water, generally occurs as the sulfate anion. Water containing more than 250 mg/L of sulfate may have a laxative effect when used for drinking (Woll, 1978). The U. S. Environmental Protection Agency Secondary Drinking-Water Standard for sulfate is 250 mg/L.

SILICA

The element silicon in water is commonly reported in terms of an equivalent concentration of the oxide, silica (SiO_2). Except for oxygen, silicon is the most abundant element in the earth's crust. Silica and silicon compounds in water are primarily nonionic, and have relatively low solubility. Ground water commonly contains between 5 and 40 mg/L silica (Davis and DeWiest, 1966).

Trace Metals

BARIUM

Barium is an alkaline earth metal occurring in nature as insoluble salts. Although soluble barium salts are poisonous, the chronic effects of low concentrations of barium in drinking water have not been determined (National Research Council, 1977). The U. S. Environmental Protection Agency Primary Drinking-Water Standard for barium is 1 mg/L.

BERYLLIUM

Beryllium concentrations in natural waters are normally very low or not detectable. A drinking-water standard has not been established for this metal. However, beryllium is on the U. S. Environmental Protection Agency list of 129 Priority Pollutants.

CADMIUM

Cadmium is usually found in very small concentrations in natural water. Its solubility is influenced by pH and carbonate content. Cadmium concentrations in community water supplies of the United States were found to average 0.0013 mg/L (U.S. Environmental Protection Agency, 1976). Cadmium is physiologically nonessential to humans, and is an element of high toxic potential. The U.S. Environmental Protection Agency Primary Drinking-Water Standard for cadmium is 0.01 mg/L.

CHROMIUM

Chromium is a moderately abundant element in the earth's crust. However, it has low solubility in water, and therefore is generally present in low concentrations. Chromium has several different valence states, the hexavalent state being the most toxic (U.S. Environmental Protection Agency, 1976). The United States Environmental Protection Agency Primary Drinking Water Standard for chromium is 0.05 mg/L.

COPPER

Copper occurs in nature as a native metal and as various minerals and salts. It is usually present in low concentrations in ground water. The U. S. Environmental Protection Agency Secondary Drinking-Water Standard for copper is 1 mg/L. Above this level the water has a metallic taste.

IRON

Iron is a widespread constituent in rocks and soils (Hem, 1970). Iron concentrations in ground water range from near zero to tens of milligrams per liter. Dissolved oxygen in water oxidizes ferrous iron to the ferric form, which is relatively insoluble. Variables which influence iron solubility include pH, oxidation-reduction potential, and concentrations of dissolved carbon dioxide and sulfur species (Hem, 1970). The U. S. Environmental Protection Agency Secondary Drinking-Water Standard for iron, 0.3 mg/L, based on taste and staining problems associated with higher concentrations.

LEAD

Lead is well known for its toxicity. The U. S. Environmental Protection Agency Primary Drinking-Water Standard for lead is 0.05 mg/L, based especially on its toxicity to small children and its tendency to accumulate in the body. Usually lead concentrations in natural waters are less than 0.10 mg/L.

MANGANESE

Manganese is another widespread constituent, although it is less abundant than iron. Manganese oxide tends to form a coating on other mineral surfaces (Hem, 1970). Appreciable concentrations of manganese are often associated with ground waters that have high concentrations of iron. The U. S. Environmental Protection Agency Secondary Drinking-Water Standard for manganese is 0.05 mg/L.

SILVER	Silver occurs in nature in both the elemental form and as various salts. In low concentrations silver solutions are bactericidal and can be used to disinfect water. The U. S. Environmental Protection Agency Primary Drinking-Water Standard for silver is 0.05 mg/L because this metal has a tendency to accumulate in the body.
STRONTIUM	Strontium is a fairly common element. In minor amounts it replaces calcium and potassium in igneous rock. The chemistry of strontium is much like that of calcium. Skougstad and Horr (1963) found a median strontium concentration of 0.11 mg/L for large-scale public water supplies.
ZINC	Natural water usually contains small quantities of zinc. The concentration generally reflects its availability in the geologic unit through which the water has passed. Zinc is not considered harmful to human health, except at very high concentrations. However, because it can impart an undesirable taste to drinking water, the U. S. Environmental Protection Agency Secondary Drinking-Water Standard is 5 mg/L.

Table 11.--Records of wells.
[Wells grouped by aquifer]

Well Number	Local Well Identifier	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
				POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM				
05- 336	US AIR FORCE-MCGUIRE C	NEW HANOVER TWP	102	1036-1089	10	1953	W	T
05- 344	HOFFMAN-LA ROCHE CO 1974	NORTH HANOVER TWP	136	783- 814*	8	1974	W	N
05- 683	USGS-BUTLER PLACE 1 OBS	WOODLAND TWP	141	2102-2117		1964	O	U
25- 12	AVON WD 3 OBS	AVON-BY-THE-SEA B	29	916-1139*	6	1926	Z	P
25- 13 ‡	AVON-BY-THE-SEA WD 4	AVON-BY-THE-SEA B	29	1105-1165	10	1974	W	P
25- 62	ROKEACH AND SONS 1(4-DP)	FARMINGDALE BORO	75	831- 885	12	1961	W	C
25- 70 ‡	NJWC OCEAN CO MONTEREY 1	DOVER TWP	5	1375-1495	8	1967	W	P
25- 82	FREEHOLD TWP WD-KOENIG 1	FREEHOLD TWP	130	619- 670	8	1957	W	P
25- 85	3M COMPANY 1	FREEHOLD TWP	120	653- 700	8	1957	W	N
25- 175	ADELPHIA WC-HOVBILT CO 1	HOWELL TWP	100	681- 762	8	1969	W	P
25- 177	SCHROTH,EMIL	HOWELL TWP	95	781- 801	8	1969	W	N
25- 341	ASBURY PARK WD-AMER 2	NEPTUNE TWP	20	1130**		1946	Z	P
25- 362	ROOSEVELT BORO WD 1	ROOSEVELT BORO	198	442- 472	8	1956	W	P
29- 19	USGS-ISLAND BEACH 3 OBS	BERKELEY TWP	9	2736-2756	6	1962	O	U
29- 45	BRICK TWP MUA 9-73	BRICK TWP	8	1441-1779*	12	1973	W	P
29- 85	TOMS RIVER CHEM 84 OBS	DOVER TWP	67	1460-1480		1968	O	U
29- 100	NJWC OC CO DIV NORMNDY 3	DOVER TWP	8	1428-1479	4	1954	W	P
29- 118	LAKEHURST NAS 32-64	JACKSON TWP	90	1583**		1964	W	N
29- 132	JACKSON TWP MUA SCM-3	JACKSON TWP	95	1606-1728	8	1962	W	N
29- 133	CLAYTON SAND-GLIDDEN 2	JACKSON TWP	95	1320-1477	8	1961	Z	P
29- 134	CLAYTON SAND-GLIDDEN 1	JACKSON TWP	95	746- 962	8	1961	W	N
29- 135	CLAYTON SAND-GLIDDEN 4	JACKSON TWP	95	1342-1552	8	1962	W	N
29- 238 ‡	GREAT ADVENTURE PROD 1-74	JACKSON TWP	130	584- 648	8	1974	W	P
29- 440	NJWC LAKEWOOD DIV 10	LAKEWOOD TWP	72	1357-1602*	12	1972	W	P
29- 453	LAVALLETTE BORO WD 4	LAVALLETTE BORO	5	1358-1515	8	1960	W	P
29- 490	AM SMELT AND REF CO 2-72	MANCHESTER TWP	89	1436-1636	12	1972	W	N
29- 504	NJWC OC DIV MANTOLOKING 7	MANTOLOKING BORO	5	1263-1368*	12	1960	W	P
29- 524	PT PLEASANT BORO WD 7	PT PLSNT BORO	8	1260**		1967	W	P
29- 531	PT PLEASANT BORO WD 5	PT PLSNT BORO	18	1256-1342	10	1960	W	P
29- 575 ‡	JACKSON TWP MUA 9	JACKSON TWP	134	1276-1430		1978	W	P
29- 576	JACKSON TWP MUA 8	JACKSON TWP	140	1276-1462		1977	W	P
29- 581	JACKSON TWP MUA 10	JACKSON TWP	130	876- 976*		1977	W	P
29- 588	LAKEWOOD TWP MUA 7	LAKEWOOD TWP	30	1410-1620*	26	1978	W	P
29- 626	TOMS RIVER WC 30-81	DOVER TWP	9	1700-1875*	12	1981	W	P
				ENGLISHTOWN AQUIFER				
05- 328	US ARMY-FT DIX 9	NEW HANOVER TWP	100	417- 457	6	1943	W	P
05- 329	US ARMY FT DIX 10	NEW HANOVER TWP	100	449**		1943	W	P
25- 1	ALLENHURST BORO WD 4	ALLENHURST BORO	17	525- 565	12	1950	W	P
25- 27	MON CON WC-OCEAN GR 20	BRADLEY BCH BORO	20	570- 600	8	1949	W	P
25- 30	BRIELLE BORO WD 2	BRIELLE BORO	33	690- 750	12	1950	W	P
25- 83	FREEHOLD TWP WD-KOENIG 2	FREEHOLD TWP	130	307**		1966	W	P
25- 161	HOWELL TWP BD ED-KENT RD	HOWELL TWP	110	558- 582	6	1955	W	T
25- 371	SEA GIRT BORO WD 4	SEA GIRT BORO	18	685- 715	10	1949	W	P
25- 383	SPRING LAKE BORO WD 1	SPRING LAKE BORO	15	631- 711	10	1940	W	P
25- 428	WALL TWP WD-ALLENWOOD 1	WALL TWP	100	623- 740*	6	1959	W	P
25- 429	USGS-ALLAIRE ST PK OBS C	WALL TWP	98	623- 633	6	1963	O	U
25- 441	WALL TWP WD-RT 34	WALL TWP	120	549- 649	10	1968	W	P
25- 442	WALL TWP WD-IMPERIAL PK 2	WALL TWP	70	627- 657	8	1943	W	P
29- 5	OCEAN CO WC BAYHEAD 5	BAY HEAD BORO	10	750- 834	3	1947	W	P
29- 6	NJWC OC CO DIV BAYHEAD 6	BAY HEAD BORO	10	778- 818	8	1950	W	P
29- 138	USGS-COLLIERS MILLS TW1	JACKSON TWP	136	417- 427	6	1964	O	U
29- 228	JACKSON TWP MUA 3	JACKSON TWP	140	513- 559	10	1962	W	P
29- 229	JACKSON TWP MUA 1	JACKSON TWP	110	511- 557	8	1961	W	P
29- 236	JACKSON TWP MUA 2	JACKSON TWP	156	541- 577	8	1962	W	P
29- 237	GREAT ADVENT ELEPHNT HSE	JACKSON TWP	140	358- 388*	6	1974	W	S
29- 431	LAKEWOOD TWP MUA 2	LAKEWOOD TWP	40	680- 762*	8	1963	W	P
29- 433	LAKEWOOD TWP MUA 3-66	LAKEWOOD TWP	45	741**		1966	W	P
29- 434	NJWC LAKEWOOD DIV 7	LAKEWOOD TWP	85	697- 757	8	1964	W	P
29- 438	LAKEWOOD WC 8	LAKEWOOD TWP	78	600- 758*	8	1965	W	P
29- 445	LAKEWOOD WC 2	LAKEWOOD TWP	60	575- 625	8	1921	W	P
29- 447	LAKESHORE LAUNDRY	LAKEWOOD TWP	50	596- 612	6	1950	W	H
29- 449	NJWC LAKEWOOD DIV 9	LAKEWOOD TWP	55	698**		1968	W	P
29- 450	NJWC LAKEWOOD DIV 6	LAKEWOOD TWP	70	520- 582	8	1960	W	P
29- 452	LAVALLETTE BORO WD 3	LAVALLETTE BORO	7	1120-1180	8	1948	W	P
29- 454	LAVALLETTE BORO WD 2	LAVALLETTE BORO	5	1009-1136	6	1931	W	P

* Multiple screens
** Depth of well in ft below land surface datum (LSD). Screen setting not known.
‡ Shown in hydrogeologic section on plate 1. No analysis included in this report.

Well Number	Local Well Identifier	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
		ENGLISHTOWN AQUIFER--Continued						
29- 503	NJWC OC DIV MANTOLOKING 6	MANTOLOKING BORO	5	845- 906	8	1955	W	P
29- 505	NJWC OC DIV MANTOLOKING 4	MANTOLOKING BORO	5	900- 922	6	1924	W	P
29- 519	NEW EGYPT WC 1-1907	PLUMSTED TWP	65	214- 239	6	1907	W	P
29- 528	PT PLEASANT BORO WD 1	PT PLSNT BORO	20	745- 770	8	1936	W	P
29- 530	PT PLEASANT BORO WD 6	PT PLSNT BORO	20	730- 790	8	1965	W	P
29- 532	PT PLEASANT BORO WD 3	PT PLSNT BORO	10	748- 798	6	1946	W	P
		WENONAH-MOUNT LAUREL AQUIFER						
25- 11	AVON-BY-THE-SEA WD 2	AVON-BY-THE-SEA B	22	419- 501	9	1925	W	P
25- 14	AVON-BY-THE-SEA WD 1	AVON-BY-THE-SEA B	28	424- 504	9	1925	W	P
25- 164	ALDRICH W CO 1	HOWELL TWP	125	349- 370	10	1956	W	P
25- 336	MON CON WC-OCEAN GR 21	NEPTUNE TWP	20	395- 430	8	1954	W	P
25- 392	HOPKINS,RUSSELL	U FREEHOLD TWP	90	87**			W	H
25- 393	HERBERT,THOMAS	U FREEHOLD TWP	90	81**		1952	W	H
25- 397	MIKLAU,HANS	U FREEHOLD TWP	120	61- 64	4	1956	W	H
25- 402	CAROUSEL FARMS	U FREEHOLD TWP	165	102- 112	6	1966	W	H
25- 426	G THOMPSON MED HOME 2	WALL TWP	120	580**			W	T
25- 508	OSBORNE POULTRY FARM	U FREEHOLD TWP	135	175- 185	4	1973	W	H
29- 36	BRICK TWP BD ED HS	BRICK TWP	20	518- 548	8	1970	W	T
29- 140	USGS-COLLIERS MILLS TW 3	JACKSON TWP	135	257- 267	6	1964	O	U
29- 225	S WIND MOB H V OLMS 1-69	JACKSON TWP	98	343- 373	6	1969	W	T
29- 234	GREAT ADVENT ANIMAL CARE	JACKSON TWP	175	180- 200	6	1974	W	S
29- 619	NJWC OC DIV-BAYHEAD 3	BAY HEAD BORO	10	695**		1910	W	P
29- 630	JACKSON T MIDDLE SCHOOL	JACKSON TWP	125	297- 317	6	1968	W	T
29- 643	OAK GROVE MOBILE HOME PK	PLUMSTED TWP	145	210- 225	4	1977	W	H
29- 699	JACKSON T B ED GOETZ SCH	JACKSON TWP	160	214- 226	4	1973	W	T
29- 713	JACKSON TWP LIBRARY	JACKSON TWP	130	324**	4	1978	W	H
29- 740	OCEAN CO VOC S JACKSON 2	JACKSON TWP	105	340- 380	5	1976	W	T
29- 751	JACKSON MUNICIPAL BLDG	JACKSON TWP	130	300- 320	6	1973	W	H
		VINCENTOWN FORMATION						
25- 507	EX-CEL WOOD PRODUCTS	HOWELL TWP	130	219- 235	4	1963	W	N
25- 511	ALDRICH WC 3A-71	HOWELL TWP	110	140- 195	12	1971	W	P
29- 139	USGS-COLLIERS MILLS TW 2	JACKSON TWP	136	164- 174	6	1964	O	U
29- 240	JACKSON TWP MUA 5-72	JACKSON TWP	75	131- 191	12	1972	W	P
29- 636	LAND-O-PINES TRLR PK	JACKSON TWP	145	135**		1971	W	H
29- 654	SHADY LAKE TRLR PARK	JACKSON TWP	110	145- 155	6	1974	W	H
29- 658	JACKSON BAPTIST CHURCH	JACKSON TWP	115	202- 215	4	1977	W	H
29- 660	OAK TREE MOBILE HOME PK	JACKSON TWP	155	132- 138	4	1971	W	H
29- 698	JELLYSTONE PARK	JACKSON TWP	130	120- 132	4	1979	W	H
29- 700	BENNETT PLAZA	JACKSON TWP	155	168- 172	4	1979	W	C
29- 714	MINCEMOYER NURSERY IRRIG	JACKSON TWP	155	232- 250		1977	W	H
29- 715	R P PROFILES CORP	JACKSON TWP	130	136- 142	4	1979	W	H
29- 741	JACKSON 1 FIRE CO (NPR)	JACKSON TWP	155	175**		1963	W	H
29- 744	US ARMY FT DX BRINDLE LK	PLUMSTED TWP	80	94- 145		1953	W	T
		MANASQUAN FORMATION						
05- 676	USGS-COYLE AIRPORT 1 OBS	WOODLAND TWP	199	540**		1961	O	U
29- 4	BARNEGAT LIGHT BORO WD 2	BARNEGAT LT BORO	7	593- 646	8	1954	W	P
29- 18	USGS-ISLAND BEACH 2 OBS	BERKELEY TWP	8	474**		1962	O	U
29- 115	ISLAND HTS BORO WD 8	ISL HGTS BORO	12	115- 292	8	1963	W	P
29- 425	USGS-WEBBS MILLS OBS 2	LACEY TWP	128	348**		1962	O	U
29- 537	SEASIDE HTS BORO WD 2	SEASIDE HGTS BORO	4	400- 430	6	1941	W	P
29- 540	SEASIDE PARK BORO WD 3	SEASIDE PARK BORO	4	459- 503	10	1938	W	P
29- 541	SEASIDE PARK BORO WD 2	SEASIDE PARK BORO	10	525**		1947	W	P
29- 543	SEASIDE PARK BORO WD 5	SEASIDE PARK BORO	5	383- 425	9	1951	W	P
29- 547	‡ SHIP BOTTOM WD TEST 1973	SHIP BOTTOM BORO	7	1001**		1973	T	U
29- 583	‡ BARNEGAT LT WD TEST 1978	BARNEGAT LT BORO	5	639**		1978	T	U
29- 607	BARNEGAT LT BORO WD 4-80	BARNEGAT LT BORO	5	596- 661	10	1980	W	P
29- 616	OCEAN GATE BORO WD 2	OCEAN GATE BORO	7	340- 360	8		W	P
29- 723	NJ STATE GAME FARM 1912	LACEY TWP	10	509**		1912		
29- 739	OCEAN CO COLL REC FIELD	DOVER TWP	20	200- 220	6	1970	W	I

** Depth of well in ft below land surface datum (LSD). Screen setting not known.
‡ Shown in hydrogeologic section on plate 1. No analysis included in this report.

Well Number	Local Well Identifier	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
		ATLANTIC CITY 800-FOOT SAND						
29- 9	BEACH HAVEN BORO WD 8	BEACH HAVEN BORO	5	572- 656	10	1957	W	P
29- 12	BEACH HAVEN BORO WD 7	BEACH HAVEN BORO	5	572- 665*	10	1940	W	P
29- 111	HARVEY CEDARS BORO WD 4	HARVY CEDARS BORO	5	465- 500	8	1968	W	P
29- 457 ‡	LONG BEACH WC TERRACE 3	LONG BEACH TWP	8	465- 650	10	1970	W	P
29- 459	LONG BEACH WC-TERRACE 2	LONG BEACH TWP	5	523- 577	6	1949	W	P
29- 460	LONG BEACH WC-BRANT 2	LONG BEACH TWP	6	530- 580	8	1951	W	P
29- 461	LONG BEACH WC-BRANT 1	LONG BEACH TWP	9	534- 615	6	1946	W	P
29- 462	L EGG HARB MUA-MYSTIC 3	LTTLE EGG HRB TWP	8	509- 553	8	1969	W	P
29- 464	L EGG HARB MUA-MYSTIC 2	LTTLE EGG HRB TWP	25	485- 542	8	1963	W	P
29- 544	SHIP BOTTOM BORO WD 4	SHIP BOTTOM BORO	5	536- 578	9	1953	W	P
29- 557	STAFFORD WC 3	STAFFORD TWP	8	385- 428	9	1965	W	P
29- 559	SURF CITY BORO WD 3	SURF CITY BORO	5	516- 557	7	1947	W	P
29- 560	SURF CITY BORO WD 4	SURF CITY BORO	5	514- 554	8	1964	W	P
29- 563	TUCKERTON WW CO 4-26	TUCKERTON BORO	10	486**		1926	W	P
29- 565	TUCKERTON MUA 1-64	TUCKERTON BORO	10	462- 497	8	1964	W	P
29- 597	TUCKERTON MUA 5-79	TUCKERTON BORO	25	500**		1979	W	P
		RIO GRANDE WATER-BEARING ZONE						
29- 455	LONG BEACH TWP WD 2	LONG BEACH TWP	5	426- 451	8	1963	W	P
29- 465	L EGG HARB MUA-HOLLY LK	LTTLE EGG HRB TWP	20	308- 329	5	1956	W	P
		KIRKWOOD-COHANSEY AQUIFER SYSTEM						
25- 29	BRIELLE BORO WD 1	BRIELLE BORO	35	130- 150	12	1936	W	P
25- 504	YMCA - SHORE AREA	WALL TWP	60	41- 47	4	1973	W	H
25- 505	BENNETT SAND & GRAVEL CO	WALL TWP	100	118- 138	10	1959	W	N
25- 506	MANASQUAN RIVER GOLF CRS	BRIELLE BORO	10	118- 138	8	1963	W	I
25- 510	GSP HERBERTSVILLE 1-61	WALL TWP	80	40- 51	4	1961	W	H
29- 13	BEACHWOOD BORO WD 4	BEACHWOOD BORO	60	67- 99	8	1963	W	P
29- 17	USGS-ISLAND BEACH 1 OBS	BERKELEY TWP	8	377- 397	6	1962	O	U
29- 20	USGS-ISLAND BEACH 4 OBS	BERKELEY TWP	8	12**		1962	O	U
29- 22	SHORE WATER CO 1	BERKELEY TWP	10	175- 200	10	1954	W	P
29- 28	BRICK TWP MUA-SHORE AC 2	BRICK TWP	6	198- 213	8	1959	U	U
29- 52	BRICK TWP MUA-HOLLYWD 2	BRICK TWP	28	85- 100	10	1961	W	P
29- 55	TOMS RIVER WC 17	DOVER TWP	20	45- 55	12	1965	W	P
29- 58	TOMS RIVER WC 21	DOVER TWP	10	46- 56	12	1968	W	P
29- 80	OCEAN CO COLLEGE 2-70	DOVER TWP	20	66- 80	6	1970	W	T
29- 88	TOMS RIVER WC 20	DOVER TWP	40	66- 86	12	1966	W	P
29- 97	TOMS R WC-DUGANS 22	DOVER TWP	80	106- 126	12	1970	W	P
29- 99	NJWC OC DIV -NORMANDY 2	DOVER TWP	8	90- 110	8	1938	Z	P
29- 121	LAKEHURST NAS 26-60	JACKSON TWP	90	74**		1960	W	P
29- 122	LAKEHURST NAS 15-57	JACKSON TWP	85	71**		1957	W	F
29- 123	LAKEHURST NAS 4-42	JACKSON TWP	95	60- 80	10	1942	W	P
29- 126	LAKEHURST NAS 19-57	JACKSON TWP	100	45**		1957	W	P
29- 141	USGS-COLLIERS MILLS TW 4	JACKSON TWP	135	46- 71	6	1964	O	U
29- 149	USGS-COLLIERS MILLS 11E	JACKSON TWP	141	10- 20	4	1973	O	U
29- 150	USGS-COLLIERS MILLS 11D	JACKSON TWP	141	10- 20	4	1973	O	U
29- 155	USGS-COLLIERS MILLS 15B	JACKSON TWP	142	6- 16	4	1973	O	U
29- 156	USGS-COLLIERS MILLS 15A	JACKSON TWP	143	6- 16	4	1973	O	U
29- 157	USGS-COLLIERS MILLS 12E	JACKSON TWP	143	10- 20	4	1973	O	U
29- 160	USGS-COLLIERS MILLS 12D	JACKSON TWP	144	10- 20	4	1973	O	U
29- 165	USGS-COLLIERS MILLS 12C	JACKSON TWP	144	18**		1973	O	U
29- 166	USGS-COLLIERS MILLS 14C	JACKSON TWP	145	7- 17	4	1973	O	U
29- 167	USGS-COLLIERS MILLS 14B	JACKSON TWP	145	17**		1973	O	U
29- 174	USGS-COLLIERS MILLS 14A	JACKSON TWP	145	7- 17	4	1973	O	U
29- 176	USGS-COLLIERS MILLS 13E	JACKSON TWP	144	10- 20	4	1973	O	U
29- 181	USGS-COLLIERS MILLS 13D	JACKSON TWP	145	10- 20	4	1973	O	U
29- 186	USGS-COLLIERS MILLS 13C	JACKSON TWP	147	6- 16	4	1973	O	U
29- 196	USGS-COLLIERS MILLS 13A	JACKSON TWP	146	6- 16	4	1973	O	U
29- 197	USGS-COLLIERS MILLS 14E	JACKSON TWP	143	10- 20	4	1973	O	U
29- 198	USGS-COLLIERS MILLS 14D	JACKSON TWP	144	10- 20	4	1973	O	U
29- 204	USGS-COLLIERS MILLS 12B	JACKSON TWP	145	8- 18	4	1973	O	U
29- 211	USGS-COLLIERS MILLS 12A	JACKSON TWP	146	8- 18	4	1973	O	U

* Multiple screens
** Depth of well in ft below land surface datum (LSD). Screen setting not known.
‡ Shown in hydrogeologic section on plate 1. No analysis included in this report.

Well Number	Local Well Identifer	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
		KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29- 215	USGS-COLLIERS MILLS 11C	JACKSON TWP	142	7- 17	4	1973	O	U
29- 217	USGS-COLLIERS MILLS 11B	JACKSON TWP	144	7- 17	4	1973	O	U
29- 224	USGS-COLLIERS MILLS 11A	JACKSON TWP	145	7- 17	4	1973	O	U
29- 230	ST VLADIMIR CEM	JACKSON TWP	150	85- 100	8	1964	W	I
29- 293	WEBBS MILLS 14B	LACEY TWP	133	10- 20	4	1973	O	U
29- 315	WEBBS MILLS 13C	LACEY TWP	130	8- 18	4	1973	O	U
29- 331	WEBBS MILLS 12C	LACEY TWP	128	8- 18	4	1973	O	U
29- 337	WEBBS MILLS 14A	LACEY TWP	134	10- 20	4	1973	O	U
29- 347	WEBBS MILLS 23C	LACEY TWP	138	9- 19	4•	1973		
29- 351	WEBBS MILLS 24A	LACEY TWP	143	9- 19	4	1973	O	U
29- 360	WEBBS MILLS 13A	LACEY TWP	132	8- 18	1	1973	O	U
29- 367	WEBBS MILLS 22C	LACEY TWP	139	8- 18	4	1973	O	U
29- 373	WEBBS MILLS 12A	LACEY TWP	132	8- 18		1973	O	U
29- 383	WEBBS MILLS 23A	LACEY TWP	140	9- 19	4	1973	O	U
29- 394	WEBBS MILLS 21C	LACEY TWP	140	9- 19	4	1973	O	U
29- 395	WEBBS MILLS 22A	LACEY TWP	140	8- 18	4	1973	O	U
29- 416	WEBBS MILLS 15B	LACEY TWP	136	11- 21	4	1973	O	U
29- 427	WEBBS MILLS 21A	LACEY TWP	141	9- 19	4	1973	O	U
29- 428	LAKEHURST WD 1R	LAKEHURST BORO	64	26- 36	10	1954	W	P
29- 432	LAKEWOOD TWP MUA 6	LAKEWOOD TWP	25	40- 60	8	1971	W	P
29- 480	WM25C	MANCHESTER TWP	143	14- 24	4	1973	O	U
29- 481	WM25B	MANCHESTER TWP	144	10- 20	4	1973	O	U
29- 483	CRESTWOOD VIL WC 1-65	MANCHESTER TWP	115	122- 155	9	1965	W	P
29- 487	CRESTWOOD VIL WC 3-72	MANCHESTER TWP	180	61- 92	8	1972	W	P
29- 488	CEDAR GLEN LAKES WC 1-70	MANCHESTER TWP	170	123- 143	8	1970	W	P
29- 489	CEDAR GLEN LAKES WC 2-72	MANCHESTER TWP	150	140- 175	10	1972	W	P
29- 493	PINE ACRES TRLR PK 2-71	MANCHESTER TWP	82	77- 101	8	1971	W	P
29- 494	AMER GRAPHITE CO 1970	MANCHESTER TWP	60	53- 81	8	1970	W	F
29- 500	CEDAR GLEN WEST 1	MANCHESTER TWP	95	52- 66	6	1965	W	P
29- 502	CEDAR GLEN WEST 2-66	MANCHESTER TWP	105	82- 117	8	1966	W	P
29- 508	OCEAN GATE BORO WD 3	OCEAN GATE BORO	10	133- 153	10	1959	W	P
29- 509	INDIAN SURF BEACH 1-59	OCEAN TWP	8	133- 153	10	1959	W	P
29- 512	OCEAN TWP MUA 1-60	OCEAN TWP	5	140- 160	8	1960	W	P
29- 513	USGS-GARDEN ST PKWY OBS1	OCEAN TWP	44	21**		1962	O	U
29- 514	USGS-GARDEN ST PKWY OBS2	OCEAN TWP	44	317**		1962	O	U
29- 515	PINE BEACH WATER UTIL 1	PINE BEACH BORO	30	135- 197	8	1963	W	P
29- 521	PT PLEAS BCH BORO WD 9	PT PLEASANT BEACH	5	96- 134*	12	1949	W	P
29- 522	PT PLEAS BCH BORO WD 8	PT PLEASANT BEACH	0	142**		1942	W	P
29- 523	PT PLEAS BCH BORO WD 10	PT PLEASANT BEACH	5	87- 130*	12	1966	W	P
29- 533	PT PLEASANT BORO WD 4	PT PLSNT BORO	7	45- 75		1952	W	P
29- 536	SEASIDE HTS BORO WD 1	SEASIDE HGTS BORO	5	114- 164	6	1921	Z	P
29- 538	SEASIDE HTS BORO WD 1R	SEASIDE HGTS BORO	5	144- 175	12	1963	W	P
29- 539	SEASIDE HTS BORO WD 3	SEASIDE HGTS BORO	4	146- 156	6	1949	W	P
29- 553	TONNESON, EDWARD	STAFFORD TWP	5	280**		1925	W	C
29- 554	STAFFORD WC 2	STAFFORD TWP	5	219- 234	4	1957	W	P
29- 555	OCEAN CO UTL AUTH 1-75	STAFFORD TWP	15	120- 140	10	1975	W	N
29- 566	BARNEGAT WC FLOWING 1	BARNEGAT TWP	33	155**		1887	U	
29- 569	BARNEGAT WC 3-72	BARNEGAT TWP	120	252**		1972	W	P
29- 571	PINEWOOD ESTATES 1-64	BARNEGAT TWP	150	126- 146	6	1964	W	P
29- 578	BEACHWOOD BORO WD 5-75	BEACHWOOD BORO	60	207- 248*		1975	W	P
29- 594	OCEAN TWP MUA 4-78	OCEAN TWP	15	125- 150		1978	W	P
29- 596	MANCHESTER TWP MUA 3	MANCHESTER TWP	55	61- 85	16	1979	W	P
29- 608	JERSEY SHORE S AND L	MANCHESTER TWP	45	69- 80	4	1980	W	P
29- 611	MANCHESTER TWP MUA 1	MANCHESTER TWP	55	57- 77	4	1980	W	I
29- 612	BERKELEY WC-BAYVILLE	BERKELEY TWP	20	90**		1978	W	P
29- 613	BERKELEY WC-PINEWALL	BERKELEY TWP	45	200**		1978	W	P
29- 617	SEASIDE HTS BORO WD 5-78	SEASIDE HGTS BORO	5	175**		1978	W	P
29- 620	USGS-WEBBS MILLS SHALLOW	LACEY TWP	128	18**		1962	W	P
29- 629	CERAMIC TILE SUPPLY CO	BRICK TWP	25	57- 60	4	1977	W	I
29- 631	BERKELEY T LAW ENFORCE C	BERKELEY TWP	45	80- 90	8		W	P
29- 632	JACKSON TWP PUBLIC WORKS	JACKSON TWP	135	63- 67	4	1972	W	H
29- 633	N DOVER ELEM SCHOOL	DOVER TWP	80	67- 77	6	1955	W	H
29- 637	WHITING GRADE SCHOOL	MANCHESTER TWP	170	116**		1976	W	T
29- 638	GSP BARNEGAT TOLL GATE	OCEAN TWP	130	108**		1961	W	H
29- 639	EXECUTIVE GARDEN APTS	TUCKERTON BORO	15	70- 80		1971	W	H

* Multiple screens
** Depth of well in ft below land surface datum (LSD). Screen setting not known.

Well Number	Local Well Identifier	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
		KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29- 640	AMER TEL AND TEL CO	TUCKERTON BORO	60	205- 215	8	1962	W	N
29- 642	FLEMINGTON BLOCK CO	BARNEGAT TWP	155	187- 205	8	1973	W	N
29- 644	NJ MOTOR VEH INSPEC STA	STAFFORD TWP	70	73- 78	4	1971	W	H
29- 645	KLAMM, VICTOR (IRR)	DOVER TWP	50	30- 35	1	1977	W	I
29- 646	LACEY MOOSE LODGE	LACEY TWP	20	72- 75	3	1974	W	H
29- 648	ESTONIAN BOY SCOUT CAMP	JACKSON TWP	120	74- 80	4	1979	W	H
29- 649	FLUID PKG CO INC	LAKEWOOD TWP	50	43- 63	8	1972	W	H
29- 650	HOMESTEAD FENCE CO	EAGLESWOOD TWP	35	42- 46	3		W	H
29- 651	BAY BRIDGE INN	DOVER TWP	10	63- 69	4	1970	W	C
29- 652	MANAHAWKIN BAPTIST CH	STAFFORD TWP	20	90- 100	4	1980	W	T
29- 653	BURGER KING ROUTE 72	STAFFORD TWP	15	63- 70	2		W	C
29- 655	AMERICAN LEGION	BARNEGAT TWP	25	47- 50	4	1980	W	H
29- 656	OCEAN CO RES CENTER	LACEY TWP	15	187- 206	6	1963	W	P
29- 657	OCEAN TWP VOC SCHOOL	OCEAN TWP	50	68- 73	4	1971	W	T
29- 659	BERKELEY FED SAV LOAN	MANCHESTER TWP	55	60- 64	4	1978	W	H
29- 661	BARNEGAT BLVD ELEM SCH	BARNEGAT TWP	110	83- 91	4	1978	W	I
29- 662	BERKELEY TWP GOLF COURSE	BERKELEY TWP	35	57- 67	4	1975	W	H
29- 663	ST THOMAS CHURCH	BRICK TWP	20	35- 38	4	1976	W	I
29- 664	LAUREL BROOK CONDOMINIUM	BRICK TWP	30	135- 145	6	1969	W	H
29- 665	EAST DOVER VOL FIRE CO	DOVER TWP	5	49- 55	4	1970	W	H
29- 666	BNAI ISRAEL CONGREGATION	DOVER TWP	80	78- 88	4	1971	W	H
29- 667	SEBASTINAS, JANE	EAGLESWOOD TWP	15	50- 53	2	1976	W	H
29- 668	NJ STATE FOREST TREE NUR	JACKSON TWP	110	56- 62	4	1963	W	H
29- 669	SAM AND SAMMYS BARBER SH	JACKSON TWP	120	54- 60	4	1980	W	H
29- 670	BUTTERFLY CAMPGROUND 1	JACKSON TWP	110	23- 26	1	1972	W	R
29- 671	SUNRISE BEACH	LACEY TWP	20	50- 53	2	1978	W	H
29- 672	LANOKA HARBOR FIRST AID	LACEY TWP	20	40- 50	4	1981	W	H
29- 673	BICYCLES UNLIMITED	LAKEWOOD TWP	60	25- 28	1	1956	W	C
29- 674	BAKERS ACRES	LITTLE EGG HRB TWP	25	47- 65	4	1974	W	H
29- 675	FAIR OAKS SOUTH SCHOOL	MANCHESTER TWP	100	50- 56	4	1976	W	T
29- 676	MANCHESTER B E RDGWY SCH	MANCHESTER TWP	55	52- 63	6	1959	W	T
29- 677	EVANGELICAL CONG CHURCH	MANCHESTER TWP	160	79- 89	4	1979	W	I
29- 678	PT PLEASANT MEM SCHOOL	PT PLSNT BORO	20	60- 80	4	1979	W	I
29- 679	PT PLEASANT OCEAN RD SCH	PT PLSNT BORO	20	70- 90	4	1979	W	I
29- 680	NEW EGYPT SPEEDWAY (DOM)	PLUMSTED TWP	180	62- 66	4	1954	W	H
29- 681	HOLIDAY BEACH CLUB	OCEAN TWP	5	97- 100	1	1958	W	H
29- 682	MCDONALDS ROUTE 72	STAFFORD TWP	20	72- 78	4	1977	W	C
29- 683	MANAHAWKIN ELKS LODGE	STAFFORD TWP	15	50- 53	2	1976	W	H
29- 684	OCEAN CO TIP SEAMAN PARK	TUCKERTON BORO	20	80- 90	4	1980	W	H
29- 685	BERKELEY T WORTH EL SCH	BERKELEY TWP	40	157- 177	8	1962	W	T
29- 686	VISITATION CHURCH	BRICK TWP	10	164- 184	8	1963	W	T
29- 688	HEFFERON, JOHN	BRICK TWP	10	33- 38	1	1981	W	I
29- 689	PETERSONS RESTAURANT	BRICK TWP	10	121- 131	4	1972	W	C
29- 690	BRICK TWP MEM HS	BRICK TWP	50	127- 142	6	1979	W	I
29- 691	TOMS RIVER EAST HS	DOVER TWP	50	98- 108	6	1978	W	I
29- 692	INSULITE INC	DOVER TWP	20	113- 123	4	1967	W	H
29- 694	EAST DOVER FIRST AID	DOVER TWP	10	52- 58	4	1970	W	H
29- 695	SESCO/BAY MACHINE CO	DOVER TWP	90	72- 76	4	1980	W	H
29- 696	WHITESVILLE V FIRE 1980	JACKSON TWP	120	56- 62	4	1980	W	H
29- 701	NJ ST FORKED RIV MARINA	LACEY TWP	10	137- 147	6	1960	W	H
29- 702	ST PIUS CATHOLIC CH 1-54	LACEY TWP	20	67- 75	2	1954	W	H
29- 703	ISLAND BEACH ST PARK	LACEY TWP	20	271- 291	8	1958	W	H
29- 704	LAKEHURST PRESBY CHURCH	LAKEHURST BORO	70	21- 25	1	1977	W	I
29- 705	FAIRWAY VILLAGE	LAKEWOOD TWP	30	90- 110	3	1980	W	I
29- 706	COMMUNITY REFORM CHURCH	MANCHESTER TWP	110	84- 94	4	1977	W	H
29- 707	MULLER, HENRY (IRR)	MANCHESTER TWP	150	85- 95	4	1979	W	I
29- 708	READE MFG 1981 (2910979)	MANCHESTER TWP	60	54- 60	6	1981	W	H
29- 709	BERKELEY TWP REC FIELD	BERKELEY TWP	40	58- 76	4	1974	W	I
29- 710	JCP&L PINEWALD & KES RD	BERKELEY TWP	55	96- 100	4	1978	W	N
29- 711	DOVER T SEW AU STUART DR	DOVER TWP	50	47- 53	6	1979	W	H
29- 712	CRYSTALS FOODS INC	DOVER TWP	120	86- 89	4	1977	W	H
29- 716	LACEY TWP HIGH SCHOOL	LACEY TWP	40	120- 140	8	1980	W	T
29- 717	OCEAN LANES BOWL ALLEY	LAKEWOOD TWP	20	105**	6	1960	W	H
29- 718	OCEAN GATE YACHT BASIN	OCEAN GATE BORO	3	73- 79	4	1959	W	H
29- 719	US ARMY FT DX BIVOUAC 22	PLUMSTED TWP	170	125**	6	1967	W	H

* Multiple screens
** Depth of well in ft below land surface datum (LSD). Screen setting not known.

Well Number	Local Well Identifier	Municipality	Altitude of Land Surface (Ft)	Screen Setting (Ft Below LSD)	Screen Diameter (In.)	Year Completed	Use of Site[1]	Use of Water[2]
		KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29- 721	CRESTWOOD VIL WC 10	MANCHESTER TWP	150	148- 168	12	1978	W	P
29- 722	DOVER TWP PUB WORKS GARG	DOVER TWP	50	55- 65	4	1972	W	N
29- 724	LACEY TWP MIDDLE SCHOOL	LACEY TWP	30	130- 150	8	1980	W	T
29- 725	READE MFG MAIN OFC 1960	MANCHESTER TWP	60	46- 49	4	1960	W	H
29- 726	BRICK TWP MUA 5-70	BRICK TWP	20	42- 67	12	1970	W	P
29- 727	HOLIDAY CITY-BERKELEY	BERKELEY TWP	40	40- 60	4	1979	W	I
29- 728	WATERSIDE GARDENS	BRICK TWP	5	86- 96	4	1979	W	H
29- 729	NJDOT MAINT YARD RT 70	DOVER TWP	70	68- 78	4	1966	W	H
29- 730	GSP STAFFORD FORGE PIC A	EAGLESWOOD TWP	20	54- 64	4	1961	W	H
29- 731	GSP OYSTER C PIC AREA	LACEY TWP	30	53- 63	4	1961	W	H
29- 732	NJ HWY A FORKED R SER 1	LACEY TWP	40	65- 90	8	1954	W	H
29- 733	MAPLE GLEN MOB H PK 2-75	JACKSON TWP	110	46- 56	6	1975	W	P
29- 735	CRESTWOOD VIL WC 7	MANCHESTER TWP	167	148- 173	12	1977	W	P
29- 736	GSP POLHEMUS C PIC AREA	LAKEWOOD TWP	80	54- 65	4	1961	W	H
29- 737	OCEAN CO UTL AUTH BS-1	BARNEGAT TWP	50	38- 48	4	1979	W	Z
29- 738	BERKELEY T CENTRL REG HS	BERKELEY TWP	70	90- 100	8	1961	W	T
29- 742	OCEAN CO UTL AUTH TR-1	MANCHESTER TWP	50	43- 48	4	1979	W	Z
29- 743	NOAHS ARK DAY SCHOOL	OCEAN TWP	20	60**	3	1980	W	H
29- 745	NEW EGYPT SPEEDWAY (IRR)	PLUMSTED TWP	185	79- 84	4	1980	W	I
29- 746	NJ BELL TEL WORK CENTER	LAKEWOOD TWP	110	110- 120	6	1980	W	H
29- 747	OCEAN CO UTL AU CWPCF-2	BERKELEY TWP	40	107- 117	10	1978	W	P
29- 749	OCEAN CO MEM PK CEMETARY	DOVER TWP	50	54- 69	5	1981	W	I
29- 750	DOVER TWP DOG POUND	DOVER TWP	70	50- 54	3	1980	W	H
29- 752	GREENBRIAR I BRYANT RD	BRICK TWP	50	50- 60	4	1981	W	I
29- 753	JACKSON NO 1 FIRE CO A	JACKSON TWP	125	36- 40	4	1977	W	H
29- 754	GREENBRIAR I BARKER ST	BRICK TWP	40	35- 55	4	1981	W	I
29- 755	ALLYN MANUFACTURING CO	MANCHESTER TWP	150	74- 80	5	1981	W	N
29- 756	ISLAND BEACH S P TRT PLT	SEASIDE PARK BORO	5	297- 331	8	1965	W	Z
29- 757	MANCHESTER T MUA H OKS 1	MANCHESTER TWP	80	67- 82	8	1978	W	P
29- 759	UNITED STATES SAV BANK	MANCHESTER TWP	65	55- 59	4	1980	W	H
29- 760	DOVER TWP RIVERWOOD PARK	DOVER TWP	70	53- 59	4	1982	W	R
29- 761	DOVER TWP SHELTER COVE P	DOVER TWP	5	66- 70	4	1982	W	R
29- 762	CEDAR GLEN HOMES 4-79	MANCHESTER TWP	40	51- 61	8	1979	W	H
29- 763	OCEAN CO UTL AUTH SPS-2	EAGLESWOOD TWP	10	128- 148	8	1977	W	P
29- 764	OCEAN CO UTL AUTH NPS-2	PT PLSNT BORO	5	97- 107	6	1976	W	P
29- 765	STAFFORD WC FAWN LAKES 1	STAFFORD TWP	125	257**	12	1974	W	P
29- 767	OCEAN COUNTY MEDICAL PAR	BRICK TWP	30	55- 62	4	1980	W	I
29- 768	STAFFORD TWP SCHOOL 2-80	STAFFORD TWP	75	144- 154	6	1980	W	T
29- 769	OCEAN CO AIRPARK 1981	BERKELEY TWP	75	77- 80	4	1981	W	T

* Multiple screens
** Depth of well in ft below land surface datum (LSD). Screen setting not known.

EXPLANATION

[1]Use of Site

O - OBSERVATION
T - TEST
U - UNUSED
W - WITHDRAWAL
Z - DESTROYED

[2]Use of Water

C - COMMERCIAL
F - FIRE PROTECTION
H - DOMESTIC
I - IRRIGATION
N - INDUSTRIAL
P - PUBLIC SUPPLY
R - RECREATION
S - STOCK
T - INSTITUTION
U - UNUSED
Z - OTHER

Table 12.--Chemical analyses of well-water samples.
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (as CaCO3)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO2 + NO3 (as N)
	POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM										
05-336	US AIR FORCE-MCGUIRE C	16MAR55	-	-	-	-	76	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	23MAR59	20.0	-	-	-	82	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	24FEB60	18.0	-	-	-	87	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	01MAR61	-	-	-	-	82	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	20NOV61	-	-	-	-	75	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	09OCT63	18.0	-	-	-	85	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	17MAR64	19.0	-	-	-	82	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	18MAR65	20.0	-	-	-	87	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	04MAY66	18.0	-	-	-	92	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	23MAY67	19.0	-	-	-	90	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	14MAY68	20.0	-	-	-	85	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	17JUN69	20.0	-	-	-	85	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	08JUN71	-	-	-	-	97	-	-	-	-
05-336	US AIR FORCE-MCGUIRE C	08JAN74	-	-	-	-	70	-	-	-	-
05-344	HOFFMAN-LA ROCHE CO 1974	19MAY82	14.5	380	7.9	144	223	<.05	<.01	.10	.04
05-683	USGS-BUTLER PLACE 1 OBS	30SEP64	24.5	155	8.1	71	106	-	-	-	-
05-683	USGS-BUTLER PLACE 1 OBS	19APR72	19.0	150	8.4	-	94	-	-	-	-
25- 12	AVON WD 3 OBS	17SEP26	-	-	-	31	64	-	-	-	-
25- 12	AVON WD 3 OBS	23JUL58	20.0	92	6.0	28	58	-	-	-	-
25- 62	ROKEACH AND SONS 1(4-DP)	05JUN69	20.0	82	7.4	-	52	-	-	-	-
25- 62	ROKEACH AND SONS 1(4-DP)	15OCT71	18.0	80	6.1	-	49	-	-	-	-
25- 82	FREEHOLD TWP WD-KOENIG 1	05JUN69	17.0	47	7.5	-	34	-	-	-	-
25- 85	3M COMPANY 1	17JUL69	16.0	47	6.6	-	41	-	-	-	-
25-175	ADELPHIA WC-HOVBILT CO 1	08JUN70	17.0	73	6.6	-	59	-	-	-	-
25-175	ADELPHIA WC-HOVBILT CO 1	14OCT71	16.0	54	6.1	-	31	-	-	-	-
25-177	SCHROTH,EMIL	29JUL71	18.0	71	7.3	-	43	-	-	-	-
25-341	ASBURY PARK WD-AMER 2	08APR58	22.0	88	6.4	27	63	-	-	-	-
25-341	ASBURY PARK WD-AMER 2	23APR69	-	91	7.1	-	58	-	-	-	-
25-362	ROOSEVELT BORO WD 1	10APR72	16.5	75	6.1	25	48	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	21SEP62	30.0	2750	7.3	154	1430	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	23NOV62	-	2680	7.7	161	-	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	01DEC62	22.5	2680	7.8	153	-	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	28FEB63	-	2670	7.8	153	-	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	09JUL63	20.0	2640	7.8	157	-	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	22OCT63	22.0	2660	7.4	153	1370	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	26MAY64	21.0	2730	7.5	153	1480	-	-	-	-
29- 19	USGS-ISLAND BEACH 3 OBS	28AUG68	16.0	2620	8.0	-	1420	-	-	-	-
29- 45	BRICK TWP MUA 9-73	12NOV81	22.5	180	7.3	42	96	.70	<.01	.70	.05
29- 85	TOMS RIVER CHEM 84 OBS	05MAY72	19.0	249	7.9	120	140	-	-	-	-
29-100	NJWC OC CO DIV NORMNDY 3	01SEP54	24.0	164	7.3	75	-	-	-	-	-
29-100	NJWC OC CO DIV NORMNDY 3	19JUN58	22.0	167	7.6	75	105	-	-	-	-
29-100	NJWC OC CO DIV NORMNDY 3	01SEP81	24.5	170	6.9	77	105	.23	<.01	-	<.01
29-118	LAKEHURST NAS 32-64	03JUL67	23.5	89	7.7	-	57	-	-	-	-
29-118	LAKEHURST NAS 32-64	12OCT71	23.0	81	6.6	-	51	-	-	-	-
29-118	LAKEHURST NAS 32-64	13APR82	23.0	130	6.8	44	70	.17	.01	.17	.02
29-132	JACKSON TWP MUA SCM-3	20FEB62	-	111	7.4	39	72	-	-	-	-
29-132	JACKSON TWP MUA SCM-3	24JUL69	25.0	131	7.8	-	87	-	-	-	-
29-132	JACKSON TWP MUA SCM-3	12APR72	24.0	111	6.8	39	71	-	-	-	-
29-133	CLAYTON SAND-GLIDDEN 2	24JUL69	24.0	79	7.6	-	56	-	-	-	-
29-134	CLAYTON SAND-GLIDDEN 1	24JUL69	21.0	152	7.9	-	103	-	-	-	-
29-134	CLAYTON SAND-GLIDDEN 1	12APR72	20.0	150	6.8	64	94	-	-	-	-
29-135	CLAYTON SAND-GLIDDEN 4	24JUL69	24.0	76	7.7	-	58	-	-	-	-
29-135	CLAYTON SAND-GLIDDEN 4	12APR72	23.0	77	6.5	25	52	-	-	-	-
29-135	CLAYTON SAND-GLIDDEN 4	11JUL75	23.0	62	6.0	30	59	-	-	-	-
29-440	NJWC LAKEWOOD DIV 10	17MAY82	23.0	100	6.7	8	-	-	-	-	-
29-453	LAVALLETTE BORO WD 4	31AUG61	24.0	182	7.8	88	128	-	-	-	-
29-453	LAVALLETTE BORO WD 4	01SEP81	23.0	170	7.5	89	107	.26	<.01	-	.04
29-490	AM SMELT AND REF CO 2-72	14DEC81	24.5	108	6.8	46	72	<.10	.01	.10	.01
29-504	NJWC OC DIV-MANTOLOKING 7	31AUG61	24.0	158	7.3	72	111	-	-	-	-
29-504	NJWC OC DIV-MANTOLOKING 7	18SEP73	23.5	157	7.4	69	108	-	-	-	-
29-524	PT PLEASANT BORO WD 7	16JUL69	26.0	148	8.0	-	88	-	-	-	-
29-524	PT PLEASANT BORO WD 7	11APR72	23.5	145	6.8	57	95	-	-	-	-
29-531	PT PLEASANT BORO WD 5	16JUL69	26.0	139	8.0	-	85	-	-	-	-
29-531	PT PLEASANT BORO WD 5	11APR72	23.5	136	6.8	53	77	-	-	-	-
29-531	PT PLEASANT BORO WD 5	03SEP81	19.5	142	6.8	62	81	.09	<.01	-	.01
29-576	JACKSON TWP MUA 8	16NOV81	15.0	120	7.2	60	81	<.10	<.01	<.10	<.01
29-581	JACKSON TWP MUA 10	13MAY82	17.0	68	6.2	24	45	<.05	.01	<.05	<.01
29-588	LAKEWOOD TWP MUA 7	19NOV81	22.0	102	6.8	38	63	<.10	<.01	<.10	<.01
29-626	TOMS RIVER WC 30-81	31AUG81	26.0	120	6.8	48	79	.05	<.01	-	.04

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phosphorus	Orthophosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Silica (as SiO2)
POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM												
05-336	400150074342801	16MAR55	-	-	-	16	2.8	-	-	2.3	.10	3.6
05-336	400150074342801	23MAR59	-	-	-	15	2.9	-	-	2.6	10	12
05-336	400150074342801	24FEB60	-	-	-	16	2.8	4.8	3.7	2.4	10	11
05-336	400150074342801	01MAR61	-	-	-	16	2.6	6.0	3.8	2.5	8.2	8.3
05-336	400150074342801	20NOV61	-	-	-	16	2.8	6.1	4.0	2.6	8.2	9.9
05-336	400150074342801	09OCT63	-	-	-	17	2.4	4.5	3.8	2.2	8.0	10
05-336	400150074342801	17MAR64	-	-	-	16	2.7	4.8	2.2	2.4	10	9.5
05-336	400150074342801	18MAR65	-	-	-	15	3.9	5.3	3.5	2.6	11	9.5
05-336	400150074342801	04MAY66	-	-	-	16	1.7	7.0	3.8	4.8	13	10
05-336	400150074342801	23MAY67	-	-	-	16	2.2	6.0	3.6	2.5	11	9.5
05-336	400150074342801	14MAY68	-	-	-	16	2.5	5.0	4.0	2.6	11	9.3
05-336	400150074342801	17JUN69	-	-	-	16	2.3	4.6	4.0	1.8	11	9.2
05-336	400150074342801	08JUN71	-	-	-	15	2.6	4.5	4.0	4.0	8.3	8.2
05-336	400150074342801	08JAN74	-	-	-	17	2.5	5.2	4.2	3.3	3.5	7.1
05-344	400546074344601	19MAY82	.03	<.01	.30	67	2.9	2.0	5.6	1.0	33	-
05-683	395122074301701	30SEP64	-	-	-	12	3.9	15	6.0	3.2	9.0	10
05-683	395122074301701	19APR72	-	.01	-	13	2.3	14	7.0	2.8	9.4	11
25- 12	401137074012101	17SEP26	-	-	-	13	1.9	2.8	2.0	2.2	12	5.6
25- 12	401137074012101	23JUL58	-	-	-	10	2.4	1.9	3.1	1.2	12	9.8
25- 62	401134074101401	05JUN69	-	-	-	9.2	1.8	2.1	2.3	1.9	12	7.3
25- 62	401134074101401	15OCT71	-	-	-	8.8	1.7	1.7	1.9	1.7	12	7.8
25- 82	401412074160601	05JUN69	-	-	-	4.2	1.1	2.0	1.3	2.0	7.2	7.1
25- 85	401436074152501	17JUL69	-	-	-	3.8	1.0	1.7	1.1	3.0	9.2	7.3
25-175	401246074151601	08JUN70	-	-	-	.70	.20	13	2.5	3.5	5.9	7.3
25-175	401246074151601	14OCT71	-	-	-	5.4	1.2	1.6	1.3	1.6	7.2	7.6
25-177	401255074114701	29JUL71	-	-	-	6.1	2.0	2.8	6.0	3.9	3.8	3.9
25-341	401232074005401	08APR58	-	-	-	10	2.2	1.1	2.9	1.8	12	9.9
25-341	401232074005401	23APR69	-	-	-	10	2.1	1.5	2.1	2.7	11	8.4
25-362	401312074280201	10APR72	-	.02	-	6.8	2.5	2.1	1.9	1.9	5.1	9.8
29- 19	394829074053503	21SEP62	-	-	-	31	6.1	485	8.2	670	2.5	16
29- 19	394829074053503	23NOV62	-	-	-	-	-	526	-	755	22	-
29- 19	394829074053503	01DEC62	-	-	-	-	-	515	-	758	3.0	-
29- 19	394829074053503	28FEB63	-	-	-	-	-	510	-	750	3.0	-
29- 19	394829074053503	09JUL63	-	-	-	-	-	515	-	755	1.2	-
29- 19	394829074053503	22OCT63	-	-	-	31	5.8	470	14	740	1.6	15
29- 19	394829074053503	26MAY64	-	-	-	31	7.5	526	10	750	.60	13
29- 19	394829074053503	28AUG68	-	-	-	28	17	485	11	790	2.4	2.4
29- 45	400431074083201	12NOV81	<.01	<.01	1.2	16	2.8	5.0	11	1.0	19	-
29- 85	395930074142101	05MAY72	-	.01	-	27	6.1	12	9.6	1.6	3.7	13
29-100	395956074034402	01SEP54	-	-	-	-	-	-	-	1.2	12	-
29-100	395956074034402	19JUN58	-	-	-	14	3.4	13	8.0	1.8	9.3	14
29-100	395956074034402	01SEP81	-	.03	1.2	13	3.4	11	6.6	.90	8.8	11
29-118	400105074224401	03JUL67	-	-	-	11	2.0	2.4	2.3	1.9	4.7	9.6
29-118	400105074224401	12OCT71	-	-	-	10	1.7	1.6	1.9	1.7	7.2	9.3
29-118	400105074224401	13APR82	.02	.02	.30	11	1.8	2.1	2.2	1.0	12	-
29-132	400319074195701	20FEB62	-	-	-	11	2.8	6.8	2.2	4.4	8.8	11
29-132	400319074195701	24JUL69	-	-	-	12	1.6	9.5	2.8	7.0	9.0	8.4
29-132	400319074195701	12APR72	-	.00	-	9.8	1.8	7.6	2.8	3.8	8.6	9.8
29-133	400320074195201	24JUL69	-	-	-	10	1.5	1.5	1.8	2.0	7.6	8.4
29-134	400320074195401	24JUL69	-	-	-	19	3.2	2.4	5.0	3.0	7.2	8.4
29-134	400320074195401	12APR72	-	.01	-	18	3.5	2.6	5.2	1.4	8.0	8.9
29-135	400322074194901	24JUL69	-	-	-	10	1.4	1.6	1.7	2.0	6.8	9.2
29-135	400322074194901	12APR72	-	.00	-	8.6	1.6	1.8	1.8	1.9	7.4	9.1
29-135	400322074194901	11JUL75	-	-	-	9.5	1.3	1.4	1.8	2.6	5.6	9.2
29-440	400504074132401	17MAY82	-	-	-	-	-	-	-	-	-	-
29-453	395808074041601	31AUG61	-	-	-	7.8	2.1	27	6.5	1.4	5.9	11
29-453	395808074041601	01SEP81	-	.03	.80	7.9	2.1	25	6.2	1.0	6.2	11
29-490	395830074212001	14DEC81	.07	.07	<.30	12	1.6	1.8	2.3	<1.0	10	-
29-504	400210074031002	31AUG61	-	-	-	15	3.3	10	6.0	1.4	7.8	11
29-504	400210074031002	18SEP73	-	-	-	-	-	9.3	6.5	.60	7.5	11
29-524	400409074040601	16JUL69	-	-	-	16	4.1	4.1	3.9	.80	12	9.5
29-524	400409074040601	11APR72	-	.01	-	16	3.7	3.8	5.9	.90	12	10
29-531	400454074041401	16JUL69	-	-	-	16	4.0	3.5	3.9	4.0	12	9.8
29-531	400454074041401	11APR72	-	.01	-	15	3.1	3.2	5.4	.90	11	10
29-531	400454074041401	03SEP81	-	.01	1.4	15	3.2	1.9	4.7	1.1	12	11
29-576	400700074171401	16NOV81	<.01	<.01	<.30	14	.95	9.5	2.2	4.0	10	-
29-581	400821074263401	13MAY82	.07	.06	.40	4.6	.91	1.0	1.1	2.0	5.0	-
29-588	400421074102601	19NOV81	.11	.11	<.30	9.2	1.1	2.1	3.8	<1.0	8.0	-
29-626	395721074122902	31AUG81	-	.02	.30	14	2.4	1.9	5.1	1.1	11	12

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Date of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
						POTOMAC-RARITAN-MAGOTHY AQUIFER SYSTEM						
05-336	16MAR55	-	-	-	-	-	1000	-	-	-	-	-
05-336	23MAR59	-	-	-	-	-	-	-	-	-	-	-
05-336	24FEB60	-	-	-	-	-	-	-	-	-	-	-
05-336	01MAR61	-	-	-	-	-	-	-	-	-	-	-
05-336	20NOV61	-	-	-	-	-	-	-	-	-	-	-
05-336	09OCT63	-	-	-	-	-	-	-	-	-	-	-
05-336	17MAR64	-	-	-	-	-	-	-	-	-	-	-
05-336	t18MAR65	-	-	-	-	-	-	-	-	-	-	-
05-336	04MAY66	-	-	-	-	-	-	-	-	-	-	-
05-336	23MAY67	-	-	-	-	-	-	-	-	-	-	-
05-336	14MAY68	-	-	-	-	-	-	-	-	-	-	-
05-336	17JUN69	-	-	-	-	-	-	-	-	-	-	-
05-336	08JUN71	-	-	-	-	-	-	-	-	-	-	-
05-336	08JAN74	-	-	-	-	-	-	-	-	-	-	-
05-344	19MAY82	<100	<5	<5	<50	<20	<30	<100	16	<10	-	<5
05-683	30SEP64	-	-	-	-	-	-	-	-	-	-	-
05-683	19APR72	-	-	-	-	-	1400	-	60	-	790	-
25- 12	17SEP26	-	-	-	-	-	-	-	-	-	-	-
25- 12	23JUL58	-	-	-	-	-	-	-	-	-	-	-
25- 62	05JUN69	-	-	-	-	-	-	-	-	-	-	-
25- 62	15OCT71	-	-	-	-	-	-	-	-	-	-	-
25- 82	05JUN69	-	-	-	-	-	-	-	-	-	-	-
25- 85	17JUL69	-	-	-	-	-	-	-	-	-	-	-
25-175	08JUN70	-	-	-	-	-	-	-	-	-	-	-
25-175	14OCT71	-	-	-	-	-	-	-	-	-	50	-
25-177	29JUL71	-	-	-	-	-	-	-	-	-	-	-
25-341	08APR58	-	-	-	-	-	-	-	-	-	-	-
25-341	23APR69	-	-	-	-	-	-	-	-	-	-	-
25-362	10APR72	-	-	-	-	-	-	-	-	-	60	-
29- 19	21SEP62	-	-	-	-	-	-	-	-	-	-	-
29- 19	23NOV62	-	-	-	-	-	-	-	-	-	-	-
29- 19	01DEC62	-	-	-	-	-	-	-	-	-	-	-
29- 19	28FEB63	-	-	-	-	-	-	-	-	-	-	-
29- 19	09JUL63	-	-	-	-	-	-	-	-	-	-	-
29- 19	22OCT63	-	-	-	-	-	-	-	-	-	-	-
29- 19	26MAY64	-	-	-	-	-	-	-	-	-	-	-
29- 19	28AUG68	-	-	-	-	-	-	-	-	-	-	-
29- 45	12NOV81	<100	-	6	<50	<20	600	<100	95	<10	-	10
29- 85	05MAY72	-	-	-	-	-	-	-	-	-	-	-
29-100	01SEP54	-	-	-	-	-	-	-	-	-	-	-
29-100	19JUN58	-	-	-	-	-	-	-	-	-	-	-
29-100	01SEP81	30	5	6	<1	<10	890	<10	20	-	500	3
29-118	03JUL67	-	-	-	-	-	-	-	-	-	-	-
29-118	12OCT71	-	-	-	-	-	6400	-	200	-	-	-
29-118	13APR82	<100	<5	<5	<50	<20	5500	<100	160	<10	-	<5
29-132	20FEB62	-	-	-	-	-	-	-	-	-	-	-
29-132	24JUL69	-	-	-	-	-	-	-	-	-	-	-
29-132	12APR72	-	-	-	-	-	-	-	-	-	-	-
29-133	24JUL69	-	-	-	-	-	-	-	-	-	-	-
29-134	24JUL69	-	-	-	-	-	-	-	-	-	-	-
29-134	12APR72	-	-	-	-	-	-	-	-	-	-	-
29-135	24JUL69	-	-	-	-	-	-	-	-	-	-	-
29-135	12APR72	-	-	-	-	-	-	-	-	-	-	-
29-135	11JUL75	-	-	-	-	-	-	-	-	-	-	-
29-440	17MAY82	<100	<5	<5	<50	-	-	<100	-	<10	-	20
29-453	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-453	01SEP81	<2	.5	2	<1	<10	650	<10	10	-	280	<3
29-490	14DEC81	<100	<5	<5	<50	<20	2800	<100	120	<10	-	6
29-504	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-504	18SEP73	-	-	-	-	-	-	-	-	-	-	-
29-524	16JUL69	-	-	-	-	-	-	-	-	-	-	-
29-524	11APR72	-	-	-	-	-	-	-	-	-	-	-
29-531	16JUL69	-	-	-	-	-	-	-	-	-	-	-
29-531	11APR72	-	-	-	-	-	-	-	-	-	-	-
29-531	03SEP81	70	<.5	<1	<1	<10	3000	<10	53	-	390	14
29-576	16NOV81	<100	<5	<5	-	<20	710	<100	53	<10	-	<5
29-581	13MAY82	<100	<5	<5	<50	<20	4900	<100	74	<10	-	10
29-588	19NOV81	170	<5	<5	<50	<20	4900	<100	130	<10	-	<5
29-626	31AUG81	10	<.5	2	<1	<10	810	<10	63	-	700	<3

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (μS/cm at 25°C)	pH (units)	Alkalinity (as $CaCO_3$)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO_2 + NO_3 (as N)
				ENGLISHTOWN AQUIFER							
05-328	US ARMY-FT DIX 9	05JUN51	-	-	-	-	107	-	-	-	-
05-328	US ARMY-FT DIX 9	12AUG69	18.0	-	-	-	115	-	-	-	-
05-329	US ARMY FT DIX 10	25MAY66	12.0	-	-	-	100	-	-	-	-
25- 1	ALLENHURST BORO WD 4	01MAR57	16.5	205	7.8	72	125	-	-	-	-
25- 27	MON CON WC-OCEAN GR 20	24JUL57	18.0	191	7.3	75	113	-	-	-	-
25- 30	BRIELLE BORO WD 2	01MAR57	18.5	188	7.8	85	109	-	-	-	-
25- 30	BRIELLE BORO WD 2	12SEP73	20.0	183	8.4	86	111	-	-	-	-
25- 30	BRIELLE BORO WD 2	29APR82	20.0	185	8.0	86	110	.11	<.01	.44	<.01
25- 83	FREEHOLD TWP WD-KOENIG 2	05JUN69	15.0	244	8.5	-	147	-	-	-	-
25-161	HOWELL TWP BD ED-KENT RD	18MAY82	15.0	144	7.0	-	88	<.05	<.01	<.05	<.01
25-371	SEA GIRT BORO WD 4	01MAR57	19.0	185	8.2	84	122	-	-	-	-
25-383	SPRING LAKE BORO WD 1	01MAR57	15.5	178	8.1	82	114	-	-	-	-
25-428	WALL TWP WD-ALLENWOOD 1	15JUL69	20.0	177	8.2	-	105	-	-	-	-
25-429	USGS-ALLAIRE ST PK OBS C	30DEC63	-	169	7.1	80	105	-	-	-	-
25-441	WALL TWP WD-RT 34	15JUL69	18.0	183	8.0	-	107	-	-	-	-
25-442	WALL TWP WD-IMPERIAL PK 2	15JUL69	19.0	195	7.2	-	116	-	-	-	-
29- 5	OCEAN CO WC BAYHEAD 5	27APR48	-	280	7.4	126	-	-	-	-	-
29- 6	NJWC OC CO DIV BAYHEAD 6	13MAR57	20.5	208	7.9	96	128	-	-	-	-
29- 6	NJWC OC CO DIV BAYHEAD 6	19JUN58	20.5	207	7.2	97	125	-	-	-	-
29- 6	NJWC OC CO DIV BAYHEAD 6	31JUL69	21.0	209	7.8	-	128	-	-	-	-
29- 6	NJWC OC CO DIV BAYHEAD 6	01SEP81	20.0	206	7.4	98	113	.41	<.01	-	.05
29-138	USGS-COLLIERS MILLS TW1	31JAN64	14.0	166	7.5	79	103	-	-	-	-
29-138	USGS-COLLIERS MILLS TW1	06SEP77	14.5	178	7.9	79	95	-	-	-	-
29-138	USGS-COLLIERS MILLS TW1	26APR82	14.5	167	8.3	84	90	.16	<.01	.20	.06
29-228	JACKSON TWP MUA 3	01JUL70	15.5	160	7.8	-	100	-	-	-	-
29-228	JACKSON TWP MUA 3	16NOV81	14.0	174	8.1	86	110	.60	<.01	.60	<.01
29-229	JACKSON TWP MUA 1	17NOV81	15.0	155	8.0	74	98	.30	<.01	.30	.02
29-236	JACKSON TWP MUA 2	16NOV81	15.0	150	7.8	74	102	<.10	<.01	.30	<.01
29-237	GREAT ADVENT ELEPHNT HSE	13MAY82	14.0	151	7.7	64	101	.85	<.01	.85	.01
29-431	LAKEWOOD TWP MUA 2	05AUG69	20.0	229	8.2	-	128	-	-	-	-
29-431	LAKEWOOD TWP MUA 2	19NOV81	17.0	175	8.0	76	105	.10	.01	.10	.11
29-433	LAKEWOOD TWP MUA 3-66	19NOV81	21.0	138	7.5	52	83	<.10	<.01	.10	.02
29-434	NJWC LAKEWOOD DIV 7	22JUL69	25.0	185	8.1	-	107	-	-	-	-
29-434	NJWC LAKEWOOD DIV 7	09DEC81	17.0	175	8.3	88	-	.20	<.01	.20	<.01
29-438	LAKEWOOD WC 8	22JUL69	21.0	189	8.3	-	108	-	-	-	-
29-445	LAKEWOOD WC 2	13MAR57	16.0	177	8.2	80	120	-	-	-	-
29-447	LAKESHORE LAUNDRY	09OCT57	17.5	172	7.6	79	122	-	-	-	-
29-449	NJWC LAKEWOOD DIV 9	09DEC81	17.0	184	8.2	98	-	<.10	<.01	.20	.02
29-450	NJWC LAKEWOOD DIV 6	22JUL69	18.0	173	8.0	-	109	-	-	-	-
29-450	NJWC LAKEWOOD DIV 6	09DEC81	16.0	160	8.2	80	-	<.10	<.01	<.10	<.01
29-452	LAVALLETTE BORO WD 3	29AUG49	-	355	7.8	181	-	-	-	-	-
29-452	LAVALLETTE BORO WD 3	19JUL61	21.5	351	7.5	179	218	-	-	-	-
29-452	LAVALLETTE BORO WD 3	30JUL69	21.0	356	8.5	-	222	-	-	-	-
29-454	LAVALLETTE BORO WD 2	18SEP45	-	-	-	176	-	-	-	-	-
29-454	LAVALLETTE BORO WD 2	13MAR57	21.0	342	8.6	173	210	-	-	-	-
29-454	LAVALLETTE BORO WD 2	30JUL69	22.0	344	8.4	-	217	-	-	-	-
29-454	LAVALLETTE BORO WD 2	01SEP81	21.0	382	7.9	201	233	.40	<.01	-	.03
29-503	NJWC OC DIV-MANTOLOKING 6	01SEP55	20.5	250	7.7	115	-	-	-	-	-
29-503	NJWC OC DIV-MANTOLOKING 6	24JUL57	20.0	239	7.0	117	146	-	-	-	-
29-503	NJWC OC DIV-MANTOLOKING 6	18SEP73	21.0	203	7.9	94	122	-	-	-	-
29-505	NJWC OC DIV-MANTOLOKING 4	19JUN58	18.5	290	7.8	151	185	-	-	-	-
29-519	NEW EGYPT WC 1-1907	05JAN82	13.0	153	7.9	82	105	.40	<.01	.40	.02
29-528	PT PLEASANT BORO WD 1	13MAR57	18.0	248	7.8	121	163	-	-	-	-
29-530	PT PLEASANT BORO WD 6	16JUL69	22.0	196	8.2	-	110	-	-	-	-
29-530	PT PLEASANT BORO WD 6	18SEP73	21.0	190	8.0	89	118	-	-	-	-
29-530	PT PLEASANT BORO WD 6	03SEP81	20.0	186	7.7	92	103	.17	.04	-	.06
29-532	PT PLEASANT BORO WD 3	21MAY47	-	-	7.7	94	-	-	-	-	-
29-532	PT PLEASANT BORO WD 3	19JUN58	20.0	193	7.2	90	120	-	-	-	-
29-532	PT PLEASANT BORO WD 3	31AUG61	20.0	193	8.0	89	120	-	-	-	-
				WENONAH-MOUNT LAUREL AQUIFER							
25- 11	AVON-BY-THE-SEA WD 2	28JUL71	18.0	219	8.1	-	141	-	-	-	-
25- 14	AVON-BY-THE-SEA WD 1	24JUL57	16.5	233	7.9	80	146	-	-	-	-
25- 14	AVON-BY-THE-SEA WD 1	28JUL71	18.0	224	8.1	-	143	-	-	-	-
25-164	ALDRICH W CO 1	18MAY82	15.0	155	7.0	-	91	<.05	<.01	.30	<.01
25-336	MON CON WC-OCEAN GR 21	30AUG61	16.5	236	8.1	87	151	-	-	-	-
25-336	MON CON WC-OCEAN GR 21	28JUL71	18.5	184	8.0	-	127	-	-	-	-

Table 12.--Chemical anslyses of well-water samples.--Continued
[All conatituents are dissolved. Concentrations in milligrams per liter.]
[A dash indioates that constituent was not determined.]

Well number	WATSTORE identifier	Dste of sample	Phos-phorus	Ortho-phosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfste	Silica (ss SiO2)
						ENGLISHTOWN AQUIFER						
05-328	395941074324701	05JUN51	-	-	-	24	4.9	-	-	1.0	8.0	12
05-328	395941074324701	12AUG69	-	-	-	24	4.0	3.0	6.0	2.0	7.5	9.8
05-329	395945074324801	25MAY66	-	-	-	23	4.0	2.3	4.3	1.0	7.0	11
25- 1	401401074002501	01MAR57	-	-	-	28	4.5	3.1	4.8	1.2	26	15
25- 27	401223074010401	24JUL57	-	-	-	27	4.3	2.0	5.6	.90	21	10
25- 30	400645074034501	01MAR57	-	-	-	22	5.7	4.0	9.0	1.2	7.3	11
25- 30	400645074034501	12SEP73	-	-	-	-	-	4.5	6.4	1.00	5.6	11
25- 30	400645074034501	29APR82	.15	.15	.90	16	6.7	4.9	5.7	1.0	6.0	-
25- 83	401412074160602	05JUN69	-	-	-	45	3.2	3.1	2.9	6.0	3.7	9.8
25-161	400745074133301	18MAY82	<.01	-	.40	18	2.0	1.7	3.3	1.0	4.0	-
25-371	400800074023101	01MAR57	-	-	-	22	5.2	3.7	6.3	1.4	7.9	14
25-383	400849074020701	01MAR57	-	-	-	22	5.1	3.2	6.0	1.2	8.1	14
25-428	400825074050201	15JUL69	-	-	-	23	5.0	3.0	3.9	1.3	7.7	9.8
25-429	400832074082101	30DEC63	-	-	-	24	3.9	2.4	3.8	2.2	7.2	10
25-441	401028074063801	15JUL69	-	-	-	26	4.1	2.9	3.0	1.4	10	10
25-442	401053074034101	15JUL69	-	-	-	27	5.2	3.4	4.0	.80	18	10
29- 5	400405074024201	27APR48	-	-	-	-	-	-	-	1.5	11	-
29- 6	400405074024401	13MAR57	-	-	-	17	5.8	12	11	1.2	9.2	12
29- 6	400405074024401	19JUN58	-	-	-	-	-	12	-	-	-	-
29- 6	400405074024401	31JUL69	-	-	-	18	5.5	11	9.8	2.0	8.7	11
29- 6	400405074024401	01SEP81	-	.04	<.30	16	6.1	11	8.6	.90	8.5	11
29-138	400416074270101	31JAN64	-	-	-	24	3.4	2.2	4.0	2.4	5.8	10
29-138	400416074270101	06SEP77	-	-	3.9	26	3.2	2.3	4.4	1.9	5.9	10
29-138	400416074270101	26APR82	.10	.08	.40	25	3.6	3.0	3.8	1.0	4.0	-
29-228	400657074171501	01JUL70	-	-	-	24	3.0	2.0	4.6	1.9	4.4	13
29-228	400657074171501	16NOV81	.07	.07	.50	23	4.5	2.4	7.5	<1.0	6.0	-
29-229	400712074151201	17NOV81	.10	.10	.50	31	2.6	2.6	3.5	<1.0	6.0	-
29-236	400823074152001	16NOV81	.04	.04	.40	26	.04	3.1	3.5	2.0	6.0	-
29-237	400824074253601	13MAY82	.44	.44	.40	18	.96	.93	6.2	3.0	5.0	-
29-431	400250074104401	05AUG69	-	-	-	23	6.8	9.5	9.0	2.0	4.1	10
29-431	400250074104401	19NOV81	.04	.03	.30	16	3.9	4.3	1.6	3.0	6.0	-
29-433	400312074112301	19NOV81	.01	.01	.50	20	2.0	2.8	3.2	4.0	7.0	-
29-434	400354074131001	22JUL69	-	-	-	22	6.2	3.8	4.0	1.7	7.2	9.3
29-434	400354074131001	09DEC81	.58	.09	2.6	23	5.4	2.9	5.2	<1.0	2.0	-
29-438	400443074135201	22JUL69	-	-	-	22	6.4	3.8	4.0	1.6	6.4	9.5
29-445	400516074125502	13MAR57	-	-	-	20	4.4	3.1	7.2	1.8	5.8	12
29-447	400540074123001	09OCT57	-	-	-	23	4.5	2.3	4.9	1.7	8.4	12
29-449	400614074115701	09DEC81	.07	.05	<.30	22	5.1	3.6	4.0	1.0	4.0	-
29-450	400622074134901	22JUL69	-	-	-	24	4.8	3.2	3.0	5.0	7.7	9.5
29-450	400622074134901	09DEC81	.09	.05	<.30	25	3.4	2.5	3.4	1.0	4.0	-
29-452	395741074043701	29AUG49	-	-	-	-	-	-	-	3.2	4.0	-
29-452	395741074043701	19JUL61	-	-	-	4.9	4.4	72	8.0	3.0	4.2	11
29-452	395741074043701	30JUL69	-	-	-	6.0	3.6	64	8.0	3.0	2.5	11
29-454	395808074042101	18SEP45	-	-	-	-	-	-	-	2.0	3.0	-
29-454	395808074042101	13MAR57	-	-	-	5.8	.60	67	9.0	2.2	3.8	12
29-454	395808074042101	30JUL69	-	-	-	15	1.7	60	8.2	1.8	2.2	11
29-454	395808074042101	01SEP81	-	.06	1.3	5.2	2.1	80	7.4	2.0	3.2	11
29-503	400210074031001	01SEP55	-	-	-	-	-	-	-	1.5	14	-
29-503	400210074031001	24JUL57	-	-	-	11	3.7	31	11	1.4	8.8	6.9
29-503	400210074031001	18SEP73	-	-	-	-	-	14	8.4	.50	7.0	12
29-505	400211074031101	19JUN58	-	-	-	5.6	1.9	58	8.8	3.0	.00	15
29-519	400401074320002	05JAN82	.08	.07	.80	27	2.3	2.3	3.6	2.5	6.0	-
29-528	400450074041002	13MAR57	-	-	-	20	5.5	24	11	1.6	6.0	17
29-530	400454074041301	16JUL69	-	-	-	21	6.9	6.2	6.9	3.0	7.7	9.6
29-530	400454074041301	18SEP73	-	-	-	-	-	6.3	7.5	.50	6.5	11
29-530	400454074041301	03SEP81	-	.04	.70	19	6.4	4.6	7.3	.90	8.2	11
29-532	400459074035901	21MAY47	-	-	-	-	-	-	-	1.4	7.0	-
29-532	400459074035901	19JUN58	-	-	-	20	5.7	6.5	8.4	1.5	7.7	13
29-532	400459074035901	31AUG61	-	-	-	20	6.1	6.0	7.0	1.1	7.6	12
						WENONAH-MOUNT LAUREL AQUIFER						
25- 11	401136074012001	28JUL71	-	-	-	28	6.0	5.4	8.2	2.1	28	10
25- 14	401138074012501	24JUL57	-	-	-	31	6.0	2.4	7.2	2.0	32	15
25- 14	401138074012501	28JUL71	-	-	-	30	6.0	4.8	7.9	2.1	35	9.7
25-164	400856074142001	18MAY82	<.01	-	.60	19	2.5	1.7	3.3	1.0	2.0	-
25-336	401216074010801	30AUG61	-	-	-	32	5.5	3.1	6.0	2.2	29	13
25-336	401216074010801	28JUL71	-	-	-	26	4.6	4.2	6.0	1.7	24	9.5

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Date of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
						ENGLISHTOWN AQUIFER						
05-328	05JUN51	-	-	-	-	-	-	-	-	-	-	-
05-328	12AUG69	-	-	-	-	-	-	-	-	-	-	-
05-329	25MAY66	-	-	-	-	-	-	-	-	-	-	-
25- 1	01MAR57	-	-	-	-	-	-	-	-	-	-	-
25- 27	24JUL57	-	-	-	-	-	-	-	-	-	-	-
25- 30	01MAR57	-	-	-	-	-	-	-	-	-	-	-
25- 30	12SEP73	-	-	-	-	-	-	-	-	-	-	-
25- 30	29APR82	<100	<5	<5	<50	<20	110	<100	42	<10	-	<5
25- 83	05JUN69	-	-	-	-	-	-	-	-	-	-	-
25-161	18MAY82	<100	<5	<5	<50	<20	190	<100	32	<10	-	<5
25-371	01MAR57	-	-	-	-	-	-	-	-	-	-	-
25-383	01MAR57	-	-	-	-	-	-	-	-	-	-	-
25-428	15JUL69	-	-	-	-	-	-	-	-	-	-	-
25-429	30DEC63	-	-	-	-	-	-	-	-	-	-	-
25-441	15JUL69	-	-	-	-	-	-	-	-	-	-	-
25-442	15JUL69	-	-	-	-	-	-	-	-	-	-	-
29- 5	27APR48	-	-	-	-	-	-	-	-	-	-	-
29- 6	13MAR57	-	-	-	-	-	-	-	-	-	-	-
29- 6	19JUN58	-	-	-	-	-	-	-	-	-	-	-
29- 6	31JUL69	-	-	-	-	-	-	-	-	-	-	-
29- 6	01SEP81	<2	<.5	3	<1	<10	81	<10	40	-	440	<3
29-138	31JAN64	-	-	-	-	-	-	-	-	-	-	-
29-138	06SEP77	-	-	-	-	-	20	-	30	-	-	-
29-138	26APR82	<100	<5	<5	<50	<20	230	<100	26	<10	-	10
29-228	01JUL70	-	-	-	-	-	400	-	40	-	-	-
29-228	16NOV81	<100	<5	7	-	<20	200	<100	10	<10	-	140
29-229	17NOV81	200	<5	<5	-	<20	240	<100	34	<10	-	<5
29-236	16NOV81	<100	<5	<5	-	<20	<30	<100	13	<10	-	10
29-237	13MAY82	<100	<5	<5	<50	<20	700	<100	26	<10	-	20
29-431	05AUG69	-	-	-	-	-	-	-	-	-	-	-
29-431	19NOV81	<100	<5	<5	<50	<20	30	<100	<10	<10	-	<5
29-433	19NOV81	200	<5	<5	<50	<20	<30	<100	10	<10	-	<5
29-434	22JUL69	-	-	-	-	-	-	-	-	-	-	-
29-434	09DEC81	<100	<5	<5	<50	<20	160	<100	34	<10	-	<5
29-438	22JUL69	-	-	-	-	-	-	-	-	-	-	-
29-445	13MAR57	-	-	-	-	-	220	-	-	-	-	-
29-447	09OCT57	-	-	-	-	-	280	-	-	-	-	-
29-449	09DEC81	<100	<5	<5	<50	<20	90	<100	31	<10	-	20
29-450	22JUL69	-	-	-	-	-	-	-	-	-	-	-
29-450	09DEC81	<100	<5	<5	<50	<20	270	<100	33	<10	-	10
29-452	29AUG49	-	-	-	-	-	-	-	-	-	-	-
29-452	19JUL61	-	-	-	-	-	-	-	-	-	-	-
29-452	30JUL69	-	-	-	-	-	-	-	-	-	-	-
29-454	18SEP45	-	-	-	-	-	-	-	-	-	-	-
29-454	13MAR57	-	-	-	-	-	-	-	-	-	-	-
29-454	30JUL69	-	-	-	-	-	-	-	-	-	-	-
29-454	01SEP81	<2	<.5	2	<1	<10	56	<10	4	-	160	<3
29-503	01SEP55	-	-	-	-	-	-	-	-	-	-	-
29-503	24JUL57	-	-	-	-	-	-	-	-	-	-	-
29-503	18SEP73	-	-	-	-	-	-	-	-	-	-	-
29-505	19JUN58	-	-	-	-	-	-	-	-	-	-	-
29-519	05JAN82	<100	<5	<5	<50	<20	260	<100	30	<10	-	<5
29-528	13MAR57	-	-	-	-	-	-	-	-	-	-	-
29-530	16JUL69	-	-	-	-	-	190	-	60	-	-	-
29-530	18SEP73	-	-	-	-	-	-	-	-	-	-	-
29-530	03SEP81	<2	<.5	3	<1	<10	48	<10	51	-	480	3
29-532	21MAY47	-	-	-	-	-	-	-	-	-	-	-
29-532	19JUN58	-	-	-	-	-	-	-	-	-	-	-
29-532	31AUG61	-	-	-	-	-	-	-	-	-	-	-
						WENONAH-MOUNT LAUREL AQUIFER						
25- 11	28JUL71	-	-	-	-	-	-	-	-	-	-	-
25- 14	24JUL57	-	-	-	-	-	-	-	-	-	-	-
25- 14	28JUL71	-	-	-	-	-	-	-	-	-	-	-
25-164	18MAY82	<100	<5	<5	<50	<20	120	<100	<10	<10	-	<5
25-336	30AUG61	-	-	-	-	-	-	-	-	-	-	-
25-336	28JUL71	-	-	-	-	-	-	-	-	-	-	-

Table 12.--Chemical analyaes of well-water aamples.--Continued
[All constituents are disaolved. Concentrations in milligrams per liter.]
[A daah indicatea that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (aa $CaCO_3$)	Diaaolved aolida	Ammonie (aa N)	Nitrite (as N)	Ammonia + organic N (as N)	$NO_2 + NO_3$ (aa N)
					WENONAH-MOUNT LAUREL AQUIFER--Continued						
25-392	HOPKINS,RUSSELL	03AUG71	20.5	160	8.0	-	120	-	-	-	-
25-393	HERBERT,THOMAS	03AUG71	19.0	172	8.2	-	113	-	-	-	-
25-397	MIKLAU,HANS	03AUG71	16.0	290	8.2	-	195	-	-	-	-
25-402	CAROUSEL FARMS	06AUG71	16.5	249	8.1	-	164	-	-	-	-
25-426	G THOMPSON MED HOME 2	10JUN69	18.0	180	8.2	-	110	-	-	-	-
25-508	OSBORNE POULTRY FARM	22JUN82	14.0	165	7.8	88	108	-	.006	.25	<.05
29- 36	BRICK TWP BD ED HS	05JAN82	15.0	215	8.1	100	128	.45	<.01	.45	.07
29-140	USGS-COLLIERS MILLS TW 3	29JAN64	13.0	161	8.1	80	100	-	-	-	-
29-140	USGS-COLLIERS MILLS TW 3	06SEP77	13.5	168	7.8	82	88	-	-	-	-
29-140	USGS-COLLIERS MILLS TW 3	20APR82	14.0	178	8.5	82	92	.14	<.01	.24	.02
29-225	S WIND MOB H V OLMS 1-69	17DEC81	14.0	175	8.2	82	98	<.10	.02	.10	.06
29-234	GREAT ADVENT ANIMAL CARE	13MAY82	13.0	163	8.1	72	101	.16	<.01	.16	<.01
29-619	NJWC OC DIV-BAYHEAD 3	19JUN58	17.0	200	7.6	97	120	-	-	-	-
29-630	JACKSON T MIDDLE SCHOOL	23DEC81	13.5	173	8.1	88	114	<.05	<.01	.22	<.01
29-643	OAK GROVE MOBILE HOME PK	17MAR82	12.5	158	8.2	76	108	<.05	<.01	.16	.06
29-699	JACKSON T B ED GOETZ SCH	27MAY82	13.5	198	8.2	82	104	<.05	<.01	.15	.01
29-713	JACKSON TWP LIBRARY	04MAY82	13.0	195	8.2	88	109	.34	<.01	.34	<.01
29-740	OCEAN CO VOC S JACKSON 2	17DEC81	14.0	180	8.2	98	98	.10	<.01	.20	.06
29-751	JACKSON MUNICIPAL BLDG	04MAY82	15.5	180	8.1	90	107	.19	<.01	.25	.02
					VINCENTOWN FORMATION						
25-507	EX-CEL WOOD PRODUCTS	10MAY82	14.0	148	8.2	58	95	.18	<.01	.18	<.01
25-511	ALDRICH WC 3A-71	18MAY82	13.0	200	6.8	-	108	<.05	<.01	<.05	<.01
29-139	USGS-COLLIERS MILLS TW 2	16JAN64	12.5	165	8.0	79	107	-	-	-	-
29-139	USGS-COLLIERS MILLS TW 2	20APR82	12.5	129	8.8	64	85	.18	<.01	.18	.03
29-240	JACKSON TWP MUA 5-72	16NOV81	13.0	140	8.2	58	93	<.10	<.01	.20	.04
29-636	LAND-O-PINES TRLR PK	17DEC81	13.0	140	8.2	76	92	<.10	<.01	<.10	<.01
29-654	SHADY LK T PARK	22MAR82	12.0	160	8.2	80	101	.48	<.01	.48	<.01
29-658	JACKSON BAPTIST CHURCH	22MAR82	12.0	153	8.3	72	84	.52	<.01	.52	<.01
29-660	OAK TREE MOBILE HOME PK	30DEC81	15.0	160	8.0	68	106	.05	<.01	<.05	.02
29-698	JELLYSTONE PARK	22APR82	12.0	106	8.3	56	78	<.05	<.01	<.05	.02
29-700	BENNETT PLAZA	18MAY82	12.5	164	6.8	-	99	<.05	<.01	<.05	<.01
29-714	MINCEMOYER NURSERY IRRIG	19APR82	12.0	146	8.2	64	96	<.05	<.01	.10	<.01
29-715	R P PROFILES CORP	10MAY82	13.0	174	8.2	74	109	.05	<.01	.10	.04
29-741	JACKSON 1 FIRE CO (NPR)	28APR82	13.5	136	8.2	58	87	<.05	<.01	.35	.05
29-744	US ARMY FT DX BRINDLE LK	26MAY82	14.0	167	8.1	-	116	.15	<.01	.20	.04
					MANASQUAN FORMATION						
05-676	USGS-COYLE AIRPORT 1 OBS	25JUL62	14.0	-	-	-	30	-	-	-	-
29- 4	BARNEGAT LIGHT BORO WD 2	15AUG63	16.5	338	8.2	171	233	-	-	-	-
29- 18	USGS-ISLAND BEACH 2 OBS	17SEP62	16.5	365	7.4	157	238	-	-	-	-
29-115	ISLAND HTS BORO WD 8	27APR82	13.5	112	6.7	40	73	<.05	<.01	.21	2.1
29-425	USGS-WEBBS MILLS OBS 2	15AUG61	13.0	158	7.7	64	110	-	-	-	-
29-425	USGS-WEBBS MILLS OBS 2	29MAY62	-	189	7.8	80	121	-	-	-	-
29-425	USGS-WEBBS MILLS OBS 2	20MAY82	13.5	167	8.6	66	97	<.05	<.01	<.05	<.01
29-537	SEASIDE HTS BORO WD 2	22JUN61	16.0	231	8.2	108	177	-	-	-	-
29-537	SEASIDE HTS BORO WD 2	31AUG61	15.5	234	8.6	112	160	-	-	-	-
29-537	SEASIDE HTS BORO WD 2	14SEP73	-	225	9.2	105	150	-	-	-	-
29-537	SEASIDE HTS BORO WD 2	28AUG81	14.5	223	7.8	100	142	.13	<.01	-	.04
29-540	SEASIDE PARK BORO WD 3	18SEP45	-	-	8.3	119	-	-	-	-	-
29-541	SEASIDE PARK BORO WD 2	18SEP45	-	-	8.0	97	-	-	-	-	-
29-541	SEASIDE PARK BORO WD 2	28AUG81	14.0	205	7.7	92	140	.12	<.01	-	.03
29-543	SEASIDE PARK BORO WD 5	29AUG51	-	234	8.2	105	-	-	-	-	-
29-607	BARNEGAT LT BORO WD 4-80	03SEP81	17.0	340	8.3	166	211	.18	<.01	-	.06
29-616	OCEAN GATE BORO WD 2	25AUG81	14.0	163	7.1	71	115	.11	<.01	-	.03
29-723	NJ STATE GAME FARM 1912	19APR82	10.5	410	8.2	220	269	.22	<.01	.22	<.01
29-739	OCEAN CO COLL REC FIELD	05MAY82	12.5	68	6.6	20	64	<.05	.01	.10	<.01
					ATLANTIC CITY 800-FOOT SAND						
29- 9	BEACH HAVEN BORO WD 8	15AUG63	16.5	60	6.0	13	58	-	-	-	-
29- 9	BEACH HAVEN BORO WD 8	13SEP73	17.0	73	6.6	11	68	-	-	-	-
29- 12	BEACH HAVEN BORO WD 7	24AUG81	17.0	64	6.3	14	55	.07	<.01	-	.08
29-111	HARVEY CEDARS BORO WD 4	03SEP81	16.5	68	6.7	23	-	.04	<.01	-	.01
29-459	LONG BEACH WC-TERRACE 2	15AUG63	16.5	51	6.0	7	50	-	-	-	-
29-459	LONG BEACH WC-TERRACE 2	24AUG81	17.0	60	6.3	12	56	.05	<.01	-	1.6
29-460	LONG BEACH WC-BRANT 2	15AUG63	16.5	52	6.1	11	86	-	-	-	-
29-461	LONG BEACH WC-BRANT 1	24AUG81	16.0	60	6.2	14	49	.05	<.01	-	.07
29-462	L EGG HARB MUA-MYSTIC 3	03DEC81	16.0	58	6.7	18	63	<.10	<.01	<.10	<.01
29-464	L EGG HARB MUA-MYSTIC 2	26JUN70	15.5	57	6.3	-	50	-	-	-	-
29-464	L EGG HARB MUA-MYSTIC 2	03DEC81	15.0	65	6.7	20	-	<.10	<.01	<.10	<.01
29-544	SHIP BOTTOM BORO WD 4	24AUG81	16.0	60	6.5	16	60	.05	<.01	-	.06
29-557	STAFFORD WC 3	26JUN70	14.5	43	6.9	-	42	-	-	-	-
29-557	STAFFORD WC 3	02DEC81	15.0	52	6.1	16	52	<.10	<.01	<.10	.02
29-559	SURF CITY BORO WD 3	28APR48	-	130	6.7	30	-	-	-	-	-
29-559	SURF CITY BORO WD 3	28AUG51	-	57	6.2	14	-	-	-	-	-
29-559	SURF CITY BORO WD 3	15AUG63	15.5	56	6.3	14	85	-	-	-	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phos- phorus	Ortho- phosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Silica (as SiO2)
WENONAH-MOUNT LAUREL AQUIFER--Continued												
25-392	400615074303401	03AUG71	-	-	-	28	1.7	1.8	4.9	2.7	6.3	15
25-393	400620074305801	03AUG71	-	-	-	30	2.1	1.6	5.7	2.4	5.2	7.2
25-397	400735074312701	03AUG71	-	-	-	50	3.0	2.4	5.7	6.0	14	25
25-402	400918074281201	06AUG71	-	-	-	43	3.0	2.2	5.7	3.3	4.9	17
25-426	400817074074401	10JUN69	-	-	-	20	5.6	3.6	8.8	1.3	6.4	9.6
25-508	400845074292501	22JUN82	-	.38	1.0	29	1.8	1.5	3.5	2.3	7.0	13
29- 36	400410074091501	05JAN82	.02	.02	.60	12	5.1	14	7.4	<1.0	14	-
29-140	400416074270103	29JAN64	-	-	-	24	2.9	1.7	4.6	2.6	1.8	11
29-140	400416074270103	06SEP77	-	-	4.0	24	3.2	2.0	4.9	2.3	2.8	11
29-140	400416074270103	20APR82	.02	<.01	1.0	23	3.6	2.1	5.2	1.0	4.0	-
29-225	400548074183601	17DEC81	.03	.03	.50	18	3.8	2.4	4.2	2.0	2.0	-
29-234	400745074254201	13MAY82	.22	.21	1.4	19	.85	1.4	2.7	2.0	4.0	-
29-619	400405074024301	19JUN58	-	-	-	19	5.8	9.5	9.2	1.5	5.7	10
29-630	400627074204001	23DEC81	.03	.03	.30	28	2.1	1.4	2.5	2.0	3.0	-
29-643	400457074293301	17MAR82	.04	<.01	1.0	27	1.7	1.8	3.4	2.0	8.0	-
29-699	400903074235201	27MAY82	<.01	<.01	.60	31	.93	1.2	2.5	2.0	1.0	-
29-713	400636074210201	04MAY82	<.01	<.01	.60	31	2.3	2.1	3.9	2.0	6.0	-
29-740	400352074214502	17DEC81	.02	.02	3.0	20	7.0	4.4	9.6	1.0	<1.0	-
29-751	400641074210701	04MAY82	<.01	<.01	1.1	34	2.0	1.5	2.3	1.0	4.0	-
VINCENTOWN FORMATION												
25-507	400843074133201	10MAY82	.07	.04	.90	16	2.5	2.9	3.9	3.0	7.0	-
25-511	400953074140501	18MAY82	.28	-	.80	-	-	-	-	-	-	-
29-139	400416074270102	16JAN64	-	-	-	25	3.9	2.2	5.3	2.5	8.6	9.6
29-139	400416074270102	20APR82	<.01	<.01	.70	13	1.9	2.1	5.9	1.0	8.0	-
29-240	400850074151501	16NOV81	.12	.12	.70	23	1.3	3.0	3.6	3.0	16	-
29-636	400901074213201	17DEC81	.15	.15	<.30	22	.34	1.5	1.9	3.0	4.0	-
29-654	400847074191801	22MAR82	.04	.04	1.8	30	1.5	1.3	1.5	2.0	8.0	-
29-658	400700074184601	22MAR82	.06	.06	.60	22	3.0	1.8	5.1	2.0	5.0	-
29-660	400851074221401	30DEC81	.17	.17	.60	34	.62	1.6	1.1	4.0	10	-
29-698	400613074233401	22APR82	.07	.07	1.3	21	.82	2.4	2.1	3.0	5.0	-
29-700	400949074174501	18MAY82	.10	-	.60	22	.82	1.5	2.6	2.0	4.0	-
29-714	400818074155001	19APR82	.09	.09	.40	22	1.7	2.6	2.8	3.0	10	-
29-715	400859074210201	10MAY82	.15	.13	.40	-	.73	1.4	1.5	2.0	6.0	-
29-741	400854074161001	28APR82	.06	.03	.20	17	1.0	3.4	1.4	2.0	8.0	-
29-744	400207074303001	26MAY82	.07	.03	1.5	17	3.2	1.9	3.5	1.0	3.0	-
MANASQUAN FORMATION												
05-676	394914074254401	25JUL62	-	-	-	3.3	1.00	4.8	1.2	3.2	7.1	1.1
29- 4	394524074063201	15AUG63	-	-	-	2.0	5.1	71	5.8	1.8	13	12
29- 18	394829074053502	17SEP62	-	-	-	4.8	1.9	74	7.3	8.2	16	34
29-115	395639074085401	27APR82	.46	.34	.60	2.2	.41	21	3.5	4.0	2.0	-
29-425	395323074225501	15AUG61	-	-	-	22	2.2	5.0	4.5	3.6	12	16
29-425	395323074225501	29MAY62	-	-	-	31	2.2	4.8	4.0	3.4	14	11
29-425	395323074225501	20MAY82	.20	.20	.40	16	1.0	3.8	.41	1.0	12	-
29-537	395636074043902	22JUN61	-	-	-	5.3	1.2	47	5.0	2.5	10	19
29-537	395636074043902	31AUG61	-	-	-	5.3	1.0	47	4.5	2.0	11	18
29-537	395636074043902	14SEP73	-	-	-	-	-	48	4.8	.90	8.5	17
29-537	395636074043902	28AUG81	-	.26	1.3	5.3	.75	43	4.3	2.0	8.8	18
29-540	395452074045501	18SEP45	-	-	-	-	-	-	-	1.5	8.0	-
29-541	395452074045901	18SEP45	-	-	-	-	-	-	-	1.2	12	-
29-541	395452074045901	28AUG81	-	.26	1.9	4.7	2.5	35	5.1	1.0	11	20
29-543	395607074044301	29AUG51	-	-	-	-	-	-	-	4.0	13	-
29-607	394454074065502	03SEP81	-	.04	4.4	7.3	3.1	62	5.6	1.9	16	12
29-616	395528074082001	25AUG81	-	.17	.60	18	1.6	12	4.3	2.9	9.4	31
29-723	395024074102501	19APR82	<.01	<.01	2.0	4.2	2.6	95	6.5	<1.0	10	-
29-739	400039074094501	05MAY82	.74	.74	.70	3.1	1.9	6.2	1.2	3.0	7.0	-
ATLANTIC CITY 800-FOOT SAND												
29- 9	393346074143001	15AUG63	-	-	-	2.4	1.5	5.5	2.5	3.4	8.4	26
29- 9	393346074143001	13SEP73	-	-	-	-	-	7.0	3.4	7.4	8.5	25
29- 12	393346074143401	24AUG81	-	<.01	1.7	2.1	1.1	3.4	3.0	3.0	9.2	28
29-111	394134074083201	03SEP81	-	.05	.30	4.0	1.6	3.0	2.8	3.2	8.2	34
29-459	393510074133002	15AUG63	-	-	-	1.6	1.5	4.0	2.5	3.6	8.8	24
29-459	393510074133002	24AUG81	-	<.01	.60	1.6	.92	2.2	3.1	3.0	9.0	26
29-460	393724074115101	15AUG63	-	-	-	2.8	1.2	3.5	3.0	3.3	8.2	24
29-461	393725074115001	24AUG81	-	<.01	.70	1.9	1.0	2.6	3.0	3.1	7.6	27
29-462	393253074230801	03DEC81	.07	.06	<.30	1.5	.74	4.7	.24	2.0	6.0	-
29-464	393428074220201	26JUN70	-	-	-	2.7	1.2	4.5	3.7	3.4	8.4	24
29-464	393428074220201	03DEC81	.07	.06	1.3	2.7	.88	3.2	2.9	2.0	6.0	-
29-544	393839074105201	24AUG81	-	<.01	1.0	2.3	1.2	2.7	3.1	3.1	6.9	29
29-557	394042074141101	26JUN70	-	-	-	1.9	.80	3.0	3.1	4.5	5.1	34
29-557	394042074141101	02DEC81	.02	.02	.30	1.9	.74	2.8	.18	3.0	4.0	-
29-559	393923074101601	28APR48	-	-	-	-	-	-	-	24	12	-
29-559	393923074101601	28AUG51	-	-	-	-	-	-	-	9.0	17	-
29-559	393923074101601	15AUG63	-	-	-	3.2	1.0	4.2	3.0	3.3	7.0	26

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Date of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
						WENONAH-MOUNT LAUREL AQUIFER--Continued						
25-392	03AUG71	-	-	-	-	-	-	-	-	-	-	-
25-393	03AUG71	-	-	-	-	-	-	-	-	-	-	-
25-397	03AUG71	-	-	-	-	-	-	-	-	-	-	-
25-402	06AUG71	-	-	-	-	-	-	-	-	-	-	-
25-426	10JUN69	-	-	-	-	-	-	-	-	-	-	-
25-508	22JUN82	-	-	<1	10	<1	440	3	17	-	-	68
29- 36	05JAN82	<100	<5	<5	<50	<20	50	<100	10	<10	-	<5
29-140	29JAN64	-	-	-	-	-	-	-	-	-	-	-
29-140	06SEP77	-	-	-	-	-	160	-	<10	-	-	-
29-140	20APR82	<100	<5	<5	<50	<20	2400	<100	<10	<10	-	<5
29-225	17DEC81	<100	5	<5	<50	<20	<30	<100	<10	<10	-	<5
29-234	13MAY82	<100	<5	<5	<50	<20	280	<100	12	<10	-	10
29-619	19JUN58	-	-	-	-	-	-	-	-	-	-	-
29-630	23DEC81	<100	<5	<5	<50	<20	170	<100	14	<10	-	<5
29-643	17MAR82	<100	<5	<5	<50	<20	120	<100	14	<10	-	10
29-699	27MAY82	<100	5	<5	<50	<20	140	<100	<10	<10	-	<5
29-713	04MAY82	<100	<5	<5	<50	<20	340	<100	14	<10	-	<5
29-740	17DEC81	<100	<5	<5	<50	<20	40	<100	<10	<10	-	40
29-751	04MAY82	<100	<5	<5	<50	<20	310	<100	12	<10	-	<5
						VINCENTOWN FORMATION						
25-507	10MAY82	<100	<5	<5	<50	<20	50	<100	<10	<10	-	-
25-511	18MAY82	<100	<5	<5	<50	<20	270	<100	138	<10	-	<5
29-139	16JAN64	-	-	-	-	-	-	-	-	-	-	-
29-139	20APR82	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	<5
29-240	16NOV81	<100	<5	<5	-	<20	<30	<100	13	<10	-	20
29-636	17DEC81	<100	5	<5	<50	<20	40	<100	23	<10	-	6
29-654	22MAR82	<100	<5	<5	<50	<20	130	<100	12	<10	-	<5
29-658	22MAR82	<100	<5	<5	<50	<20	80	<100	<10	<10	-	<5
29-660	30DEC81	<100	<5	<5	<50	<20	<30	<100	58	<10	-	40
29-698	22APR82	<100	<5	<5	<50	<20	60	<100	30	<10	-	10
29-700	18MAY82	<100	<5	<5	<50	<20	30	<100	13	<10	-	<5
29-714	19APR82	<100	<5	<5	<50	<20	110	<100	<10	<10	-	20
29-715	10MAY82	<100	<5	<5	<50	<20	280	<100	30	<10	-	-
29-741	28APR82	<100	<5	<5	<50	<20	80	<100	73	<10	-	<5
29-744	26MAY82	<100	5	<5	<50	<20	250	<100	28	<10	-	10
						MANASQUAN FORMATION						
05-676	25JUL62	-	-	-	-	-	-	-	-	-	-	-
29- 4	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29- 18	17SEP62	-	-	-	-	-	-	-	-	-	-	-
29-115	27APR82	<100	<.5	<5	<50	<20	1600	<100	30	<10	-	8
29-425	15AUG61	-	-	-	-	-	-	-	-	-	-	-
29-425	29MAY62	-	-	-	-	-	-	-	-	-	-	-
29-425	20MAY82	<100	<5	<5	<50	<20	110	<100	46	<10	-	<5
29-537	22JUN61	-	-	-	-	-	-	-	-	-	-	-
29-537	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-537	14SEP73	-	-	-	-	-	-	-	-	-	-	-
29-537	28AUG81	<2	<.5	<1	1	<10	22	<10	3	-	43	4
29-540	18SEP45	-	-	-	-	-	-	-	-	-	-	-
29-541	18SEP45	-	-	-	-	-	-	-	-	-	-	-
29-541	28AUG81	<2	<.5	3	4	<10	280	<10	3	-	52	<3
29-543	29AUG51	-	-	-	-	-	-	-	-	-	-	-
29-607	03SEP81	<2	<.5	4	2	<10	11	<10	<1	-	100	6
29-616	25AUG81	<2	<.5	2	<1	<10	930	<10	20	-	120	3
29-723	19APR82	<100	<5	<5	<50	<20	170	<100	10	<10	-	10
29-739	05MAY82	<100	<5	<5	<50	<20	1200	<100	19	<10	-	6
						ATLANTIC CITY 800-FOOT SAND						
29- 9	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29- 9	13SEP73	-	-	-	-	-	-	-	-	-	-	-
29- 12	24AUG81	10	<.5	3	3	<10	1800	<10	40	-	38	13
29-111	03SEP81	<2	<.5	2	<1	<10	830	<10	38	-	62	10
29-459	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-459	24AUG81	30	<.5	1	3	<10	2400	<10	40	-	33	22
29-460	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-461	24AUG81	20	<.5	<1	1	<10	2400	<10	40	-	34	11
29-462	03DEC81	<100	<5	<5	<50	<20	1800	<100	29	<10	-	<5
29-464	26JUN70	-	-	-	-	-	4300	-	80	-	-	-
29-464	03DEC81	<100	<5	<5	<50	<20	2500	100	45	<10	-	10
29-544	24AUG81	10	<.5	2	1	<10	1700	<10	43	-	41	17
29-557	26JUN70	-	-	-	-	-	2600	-	40	-	-	-
29-557	02DEC81	<100	<5	<5	-	<20	2000	<100	31	<10	-	10
29-559	28APR48	-	-	-	-	-	-	-	-	-	-	-
29-559	28AUG51	-	-	-	-	-	-	-	-	-	-	-
29-559	15AUG63	-	-	-	-	-	-	-	-	-	-	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (as CaCO3)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO2 + NO3 (as N)
				ATLANTIC CITY 800-FOOT SAND--Continued							
29-560	SURF CITY BORO WD 4	24AUG81	16.5	62	6.5	18	-	.05	<.01	-	.06
29-563	TUCKERTON WW CO 4-26	15AUG63	14.5	52	6.0	10	55	-	-	-	-
29-563	TUCKERTON WW CO 4-26	13SEP73	15.0	51	6.7	8	57	-	-	-	-
29-565	TUCKERTON MUA 1-64	07JAN82	15.0	67	6.3	12	65	.06	<.01	.24	.01
29-597	TUCKTN MUA5-79(TMUA2-79)	07JAN82	15.0	70	6.5	16	-	.22	<.01	.24	.02
				RIO GRANDE WATER-BEARING ZONE							
29-455	LONG BEACH TWP WD 2	15AUG63	15.5	141	7.2	64	142	-	-	-	-
29-455	LONG BEACH TWP WD 2	27JUL72	16.0	138	7.3	-	-	-	-	-	-
29-455	LONG BEACH TWP WD 2	27JUL72	16.0	137	8.2	61	139	-	-	-	-
29-465	L EGG HARB MUA-HOLLY LK	03DEC81	14.0	56	6.4	16	-	<.10	<.01	<.10	<.01
				KIRKWOOD-COHANSEY AQUIFER SYSTEM							
25- 29	BRIELLE BORO WD 1	09APR58	12.0	49	6.3	10	41	-	-	-	-
25- 29	BRIELLE BORO WD 1	12SEP73	12.5	51	5.5	2	44	-	-	-	-
25- 29	BRIELLE BORO WD 1	29APR82	14.0	112	6.8	34	80	<.05	<.01	.09	.02
25-504	YMCA SHORE AREA WALL TWP	05MAY82	15.0	76	5.1	4	45	<.05	<.01	<.05	2.0
25-505	BENNETT SAND & GRAVEL CO	29APR82	13.0	58	4.8	1	48	<.05	<.01	.32	<.01
25-506	MANASQUAN RIVER GOLF CRS	29APR82	13.5	60	5.8	7	55	-	-	-	-
25-510	GSP HERBERTSVILLE 1-61	24JUN82	12.0	160	6.0	12	110	-	-	.5	-
29- 13	BEACHWOOD BORO WD 4	25AUG81	14.0	53	4.3	0	28	.01	.01	-	.04
29- 17	USGS-ISLAND BEACH 1 OBS	21SEP62	16.5	179	7.4	57	115	-	-	-	-
29- 17	USGS-ISLAND BEACH 1 OBS	17NOV77	15.5	227	-	-	147	-	-	-	-
29- 20	USGS-ISLAND BEACH 4 OBS	28OCT77	-	290	6.8	16	195	-	-	-	-
29- 22	SHORE WATER CO 1	28AUG81	13.0	56	6.2	10	48	.02	<.01	-	.05
29- 28	BRICK TWP MUA-SHORE AC 2	01SEP54	-	164	7.3	75	-	-	-	-	-
29- 28	BRICK TWP MUA-SHORE AC 2	22JUN61	13.0	126	7.1	54	110	-	-	-	-
29- 52	BRICK TWP MUA-HOLLYWD 2	22JUN61	13.5	41	5.2	3	40	-	-	-	-
29- 55	TOMS RIVER WC 17	31AUG81	12.0	45	4.8	1	34	.08	<.01	-	.17
29- 58	TOMS RIVER WC 21	31AUG81	13.0	143	6.0	21	82	.32	<.01	-	.09
29- 58	TOMS RIVER WC 21	29JUN82	13.5	136	5.6	14	85	-	.005	.20	<.05
29- 80	OCEAN CO COLLEGE 2-70	05MAY82	13.5	57	4.6	0	28	<.05	<.01	<.05	1.5
29- 88	TOMS RIVER WC 20	31AUG81	13.0	102	5.0	2	61	<.01	<.01	-	3.4
29- 97	TOMS R WC-DUGANS 22	31AUG81	12.5	107	5.0	3	70	.02	<.01	-	2.5
29- 99	NJWC OC DIV-NORMANDY 2	03SEP46	-	-	-	31	-	-	-	-	-
29- 99	NJWC OC DIV-NORMANDY 2	31AUG61	13.0	962	7.2	30	668	-	-	-	-
29-121	LAKEHURST NAS 26-60	13APR82	13.0	27	6.0	8	25	<.05	<.01	<.05	.02
29-122	LAKEHURST NAS 15-57	13APR82	14.5	123	6.2	52	74	.18	.01	.24	<.01
29-123	LAKEHURST NAS 4-42	08DEC48	11.5	17	5.5	3	11	-	-	-	-
29-123	LAKEHURST NAS 4-42	13APR82	13.5	27	5.2	2	21	<.05	<.01	.15	.57
29-126	LAKEHURST NAS 19-57	13APR82	13.0	23	5.1	4	19	.11	<.01	.11	.48
29-141	USGS-COLLIERS MILLS TW 4	20APR82	12.5	73	6.8	20	60	.14	<.01	.14	.02
29-149	USGS-COLLIERS MILLS 11E	15JUN73	-	52	4.8	1	38	-	-	-	-
29-150	USGS-COLLIERS MILLS 11D	15JUN73	-	55	4.8	2	40	-	-	-	-
29-155	USGS-COLLIERS MILLS 15B	23APR73	-	53	4.5	1	27	-	-	-	-
29-155	USGS-COLLIERS MILLS 15B	08MAR74	-	51	4.3	1	-	-	-	-	-
29-156	USGS-COLLIERS MILLS 15A	06APR73	-	76	6.0	8	54	-	-	-	-
29-157	USGS-COLLIERS MILLS 12E	15JUN73	-	47	4.7	1	31	-	-	-	-
29-160	USGS-COLLIERS MILLS 12D	15JUN73	-	58	4.5	1	34	-	-	-	-
29-165	USGS-COLLIERS MILLS 12C	23APR73	-	53	4.1	1	30	-	-	-	-
29-166	USGS-COLLIERS MILLS 14C	06APR73	-	62	5.5	5	46	-	-	-	-
29-166	USGS-COLLIERS MILLS 14C	23APR73	-	64	4.7	1	33	-	-	-	-
29-167	USGS-COLLIERS MILLS 14B	23APR73	-	62	4.8	1	34	-	-	-	-
29-174	USGS-COLLIERS MILLS 14A	23APR73	-	64	4.5	1	33	-	-	-	-
29-176	USGS-COLLIERS MILLS 13E	15JUN73	-	49	4.6	1	34	-	-	-	-
29-181	USGS-COLLIERS MILLS 13D	15JUN73	-	54	4.7	2	40	-	-	-	-
29-186	USGS-COLLIERS MILLS 13C	06APR73	-	90	6.2	17	-	1.1	-	-	-
29-186	USGS-COLLIERS MILLS 13C	23APR73	-	56	4.3	1	34	-	-	-	-
29-196	USGS-COLLIERS MILLS 13A	23APR73	-	50	4.7	1	33	-	-	-	-
29-197	USGS-COLLIERS MILLS 14E	15JUN73	-	51	4.7	2	27	-	-	-	-
29-198	USGS-COLLIERS MILLS 14D	23APR73	-	53	4.1	1	30	-	-	-	-
29-198	USGS-COLLIERS MILLS 14D	15JUN73	-	52	4.8	1	42	-	-	-	-
29-204	USGS-COLLIERS MILLS 12B	23APR73	-	59	4.4	1	31	-	-	-	-
29-211	USGS-COLLIERS MILLS 12A	06APR73	-	67	5.4	4	42	-	-	-	-
29-211	USGS-COLLIERS MILLS 12A	23APR73	-	63	4.4	1	30	-	-	-	-
29-215	USGS-COLLIERS MILLS 11C	06APR73	-	59	5.0	2	38	-	-	-	-
29-215	USGS-COLLIERS MILLS 11C	23APR73	-	58	4.9	2	29	-	-	-	-
29-217	USGS-COLLIERS MILLS 11B	23APR73	-	70	4.8	2	36	-	-	-	-
29-217	USGS-COLLIERS MILLS 11B	09AUG73	-	34	4.6	1	-	-	-	-	-
29-224	USGS-COLLIERS MILLS 11A	23APR73	-	59	3.9	1	32	-	-	-	-
29-230	ST VLADIMIR CEM	17DEC81	11.0	125	7.6	44	69	<.10	<.01	<.10	<.01
29-293	WEBBS MILLS 14B	24APR73	-	32	5.1	2	22	-	-	-	-
29-293	WEBBS MILLS 14B	09AUG73	-	37	4.6	1	-	-	-	-	-
29-315	WEBBS MILLS 13C	24APR73	-	43	4.6	1	22	.97	-	-	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phos-phorus	Ortho-phosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Silica (as SiO2)
ATLANTIC CITY 800-FOOT SAND--Continued												
29-560	393938074100601	24AUG81	-	<.01	.70	2.4	1.2	3.5	2.8	3.2	7.4	31
29-563	393610074203101	15AUG63	-	-	-	3.2	1.5	3.3	2.2	3.8	8.8	27
29-563	393610074203101	13SEP73	-	-	-	-	-	2.8	3.2	3.2	7.6	27
29-565	393610074203103	07JAN82	.09	.08	.60	2.2	.84	3.3	2.1	2.0	10	-
29-597	393610074202101	07JAN82	.44	.44	1.4	2.8	.70	2.7	1.5	1.0	9.0	-
RIO GRANDE WATER-BEARING ZONE												
29-455	393206074154801	15AUG63	-	-	-	5.6	2.9	19	3.0	1.8	6.4	6.3
29-455	393206074154801	27JUL72	-	-	-	-	-	-	-	2.2	-	-
29-455	393206074154801	27JUL72	-	-	-	7.1	2.3	20	3.8	1.5	5.8	62
29-465	393509074204801	03DEC81	.49	.48	<.30	2.3	.99	3.2	2.6	2.0	7.0	-
KIRKWOOD-COHANSEY AQUIFER SYSTEM												
25-029	400644074034401	09APR58	-	-	-	2.7	.20	4.5	1.8	7.8	2.1	13
25-029	400644074034401	12SEP73	-	-	-	-	-	4.8	1.8	7.9	5.5	13
25-029	400644074034401	29APR82	.26	.25	.70	8.5	2.3	5.1	2.9	7.0	9.0	-
25-504	400730074075701	05MAY82	<.01	<.01	.30	2.7	1.4	6.3	.85	8.0	7.0	-
25-505	400652074044501	29APR82	<.01	<.01	.30	.70	.48	4.8	1.4	8.0	8.0	-
25-506	400611074035001	29APR82	-	-	.30	-	-	-	-	8.0	6.0	-
25-510	400722074073901	24JUN82	-	-	.40	6.7	2.5	21	2.8	34	13	4.4
29-013	395527074122101	25AUG81	-	<.01	-	.40	.43	2.1	1.4	5.8	7.0	11
29-017	394829074053501	21SEP62	-	-	-	16	1.5	12	4.2	7.0	12	29
29-017	394829074053501	17NOV77	-	-	8.4	26	.30	18	5.2	5.7	9.7	11
29-020	394829074053504	28OCT77	-	-	13	10	5.5	30	3.4	57	21	10
29-022	395422074045801	28AUG81	-	.03	.40	1.5	.50	4.6	1.9	4.7	7.0	17
29-028	400121074060201	01SEP54	-	-	-	-	-	-	-	1.2	12	-
29-028	400121074060201	22JUN61	-	-	-	9.0	2.3	12	6.0	3.6	5.5	32
29-052	400614074070602	22JUN61	-	-	-	1.2	.70	3.2	2.5	5.2	5.9	17
29-055	395607074124002	31AUG81	-	<.01	.90	.30	.45	2.6	1.3	6.5	5.3	7.3
29-058	395715074123101	31AUG81	-	<.01	.90	5.9	1.9	11	2.2	22	13	7.0
29-058	395715074123101	29JUN82	-	<.01	1.6	5.8	1.8	14	1.3	21	16	6.0
29-080	395920074105902	05MAY82	<.01	<.01	.60	.46	.59	4.4	.54	7.0	2.0	-
29-088	395933074131201	31AUG81	-	<.01	1.8	2.0	2.8	7.9	1.4	15	3.8	6.2
29-097	395945074122201	31AUG81	-	<.01	.90	2.7	2.3	8.8	2.1	17	5.7	5.2
29-099	395956074034401	03SEP46	-	-	-	-	-	-	-	13	2.0	-
29-099	395956074034401	31AUG61	-	-	-	73	21	65	10	264	13	24
29-121	400138074242801	13APR82	<.01	<.01	1.0	1.4	.19	2.4	.61	3.0	3.0	-
29-122	400154074205001	13APR82	<.01	<.01	2.6	.18	.18	2.1	.54	2.0	10	-
29-123	400207074194701	08DEC48	-	-	-	.40	.50	-	-	3.2	.80	3.5
29-123	400207074194701	13APR82	<.01	<.01	.50	.51	.18	2.1	.21	3.0	1.0	-
29-126	400208074234401	13APR82	<.01	<.01	.50	.19	.12	2.2	.35	3.0	<1.0	-
29-141	400416074270104	20APR82	.24	.13	.40	4.8	.44	3.1	1.9	2.0	11	-
29-149	400438074270501	15JUN73	-	-	-	-	-	2.3	1.6	3.0	12	4.1
29-150	400438074270601	15JUN73	-	-	-	-	-	2.7	3.0	4.0	12	4.3
29-155	400438074270801	23APR73	-	-	-	-	-	2.8	.40	4.3	9.5	3.5
29-155	400438074270801	08MAR74	-	<.01	-	.80	.50	-	-	3.7	9.4	2.8
29-156	400438074270901	06APR73	-	.01	-	3.2	1.0	8.0	1.0	4.8	19	3.1
29-157	400439074270501	15JUN73	-	-	-	-	-	1.6	.30	2.2	7.0	3.7
29-160	400439074270601	15JUN73	-	-	-	-	-	2.9	.40	3.4	13	4.0
29-165	400439074270701	23APR73	-	-	-	-	-	1.4	.20	3.6	12	3.2
29-166	400439074270801	06APR73	-	.00	-	3.7	1.4	3.2	1.1	4.2	14	3.3
29-166	400439074270801	23APR73	-	-	-	-	-	3.4	.80	6.1	11	4.1
29-167	400439074270901	23APR73	-	-	-	-	-	3.4	1.1	5.7	10	4.8
29-174	400439074271001	23APR73	-	<.01	-	2.8	1.1	3.0	1.2	5.2	12	4.9
29-176	400440074270701	15JUN73	-	-	-	-	-	1.6	.30	3.0	7.0	3.6
29-181	400440074270801	15JUN73	-	-	-	-	-	2.5	.50	3.5	12	4.2
29-186	400440074270901	06APR73	-	.30	-	-	.30	17	.90	3.0	26	1.9
29-186	400440074270901	23APR73	-	<.01	-	2.8	.80	2.3	.40	3.4	14	4.0
29-196	400440074271101	23APR73	-	<.01	-	2.2	.70	1.9	.40	3.4	10	4.2
29-197	400441074270601	15JUN73	-	-	-	-	-	2.2	.80	3.0	12	4.2
29-198	400441074270701	23APR73	-	.00	-	.70	.30	1.4	.20	3.6	12	3.2
29-198	400441074270701	15JUN73	-	-	-	-	-	2.7	.50	4.0	6.9	4.0
29-204	400441074270801	23APR73	-	<.01	-	1.8	.50	2.4	.30	3.5	12	3.5
29-211	400441074270901	06APR73	-	<.01	-	4.7	1.4	5.2	1.0	4.3	15	3.2
29-211	400441074270901	23APR73	-	<.01	-	1.6	.40	2.7	1.2	4.2	12	3.5
29-215	400442074270701	06APR73	-	<.01	-	3.2	1.3	3.2	1.5	4.0	13	3.2
29-215	400442074270701	23APR73	-	-	-	-	-	2.3	1.7	3.8	12	3.9
29-217	400442074270801	23APR73	-	<.01	-	2.0	.60	4.9	.40	8.0	11	3.9
29-217	400442074270801	09AUG73	-	-	-	-	-	1.5	.30	2.0	5.6	5.5
29-224	400442074270901	23APR73	-	<.01	-	2.0	.70	2.1	.30	3.6	12	3.5
29-230	400724074234201	17DEC81	.02	.02	1.7	15	.33	2.1	1.0	4.0	4.0	-
29-293	395317074230601	24APR73	-	<.01	-	1.7	1.0	1.7	.50	3.0	6.5	3.5
29-293	395317074230601	09AUG73	-	-	-	-	-	1.5	.6	2.5	6.5	3.4
29-315	395317074240201	24APR73	-	<.01	-	2.3	.50	1.6	.4	2.5	12	2.8

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Date of semple	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
						ATLANTIC CITY 800-FOOT SAND--Continued						
29-560	24AUG81	4	<.5	<1	<1	<10	1700	<10	40	-	44	41
29-563	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-563	13SEP73	-	-	-	-	-	-	-	-	-	-	-
29-565	07JAN82	<100	<5	<5	<50	<20	2300	<100	45	<10	-	<5
29-597	07JAN82	<100	<5	<5	<50	<20	-	<100	39	<10	-	9
						RIO GRANDE WATER-BEARING ZONE						
29-455	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-455	27JUL72	-	-	-	-	-	-	-	-	-	-	-
29-455	27JUL72	-	-	-	-	-	220	-	20	-	-	-
29-465	03DEC81	<100	<5	<5	<50	<20	1200	<100	16	<10	-	<5
						KIRKWOOD-COHANSEY AQUIFER SYSTEM						
25-029	09APR58	-	-	-	-	-	-	-	-	-	-	-
25-029	12SEP73	-	-	-	-	-	-	-	-	-	-	-
25-029	29APR82	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	<5
25-504	05MAY82	<100	<5	<5	<50	250	40	<100	<10	<10	-	10
25-505	29APR82	<100	<5	<5	<50	<20	580	<100	<10	<10	-	10
25-506	29APR82	-	-	-	-	-	-	-	-	-	-	-
25-510	24JUN82	-	-	<1	<10	-	1400	8	32	-	-	360
29-013	25AUG81	40	<.5	3	-	120	37	<10	15	-	11	210
29-017	21SEP62	-	-	-	-	-	-	-	-	-	-	-
29-017	17NOV77	-	-	-	-	-	100	-	<10	-	-	-
29-020	28OCT77	-	-	-	-	-	12000	-	100	-	-	-
29-022	28AUG81	30	<.5	4	1	<10	1200	<10	10	-	16	6
29-028	01SEP54	-	-	-	-	-	-	-	-	-	-	-
29-028	22JUN61	-	-	-	-	-	-	-	-	-	-	-
29-052	22JUN61	-	-	-	-	-	-	-	-	-	-	-
29-055	31AUG81	<2	<.5	1	<1	49	280	<10	9	-	7	25
29-058	31AUG81	<2	<.5	3	1	<10	660	<10	59	-	26	8
29-058	29JUN82	-	-	1	<10	5	5900	1	43	-	-	10
29-080	05MAY82	<100	<5	<5	<50	22	90	<100	<10	<10	-	20
29-088	31AUG81	20	<.5	3	<1	16	16	<10	30	-	20	59
29-097	31AUG81	8	<.5	4	<1	<10	30	<10	27	-	16	93
29-099	03SEP46	-	-	-	-	-	-	-	-	-	-	-
29-099	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-121	13APR82	<100	<5	<5	<50	<20	450	<100	53	<10	-	<5
29-122	13APR82	<100	<5	<5	<50	<20	27000	<100	33	<10	-	30
29-123	08DEC48	-	-	-	-	-	20	-	0	-	-	-
29-123	13APR82	<100	<5	<5	<50	57	<30	<100	10	<10	-	20
29-126	13APR82	<100	<5	<5	<50	<20	50	<100	<10	<10	-	10
29-141	20APR82	<100	<5	<5	<50	<20	130	<100	69	<10	-	20
29-149	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-150	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-155	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-155	08MAR74	-	-	-	-	-	-	-	-	-	-	-
29-156	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-157	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-160	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-165	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-166	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-166	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-167	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-174	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-176	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-181	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-186	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-186	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-196	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-197	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-198	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-198	15JUN73	-	-	-	-	-	-	-	-	-	-	-
29-204	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-211	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-211	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-215	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-215	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-217	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-217	09AUG73	-	-	-	-	-	-	-	-	-	-	-
29-224	23APR73	-	-	-	-	-	-	-	-	-	-	-
29-230	17DEC81	<100	7	<5	<50	<20	<30	<100	19	<10	-	110
29-293	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-293	09AUG73	-	-	-	-	-	-	-	-	-	-	-
29-315	24APR73	-	-	-	-	-	-	-	-	-	-	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (as CaCO3)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO2 + NO3 (as N)
				KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued							
29-315	USGS-WEBBS MILLS 13C	09AUG73	-	44	4.4	1	-	-	-	-	-
29-331	USGS-WEBBS MILLS 12C	24APR73	-	40	5.1	1	21	-	-	-	-
29-337	USGS-WEBBS MILLS 14A	06APR73	-	37	4.3	1	30	-	-	-	-
29-347	USGS-WEBBS MILLS 23C	24APR73	-	38	4.9	2	21	-	-	-	-
29-347	USGS-WEBBS MILLS 23C	09AUG73	-	37	4.7	1	-	-	-	-	-
29-351	USGS-WEBBS MILLS 24A	06APR73	-	35	5.5	4	24	-	-	-	-
29-360	USGS-WEBBS MILLS 13A	06APR73	-	36	4.8	2	33	-	-	-	-
29-367	USGS-WEBBS MILLS 22C	09AUG73	-	38	4.7	1	-	-	-	-	-
29-373	USGS-WEBBS MILLS 12A	06APR73	-	49	5.1	2	82	-	-	-	-
29-383	USGS-WEBBS MILLS 23A	06APR73	-	46	5.1	4	25	-	-	-	-
29-383	USGS-WEBBS MILLS 23A	24APR73	-	36	4.5	1	21	-	.00	-	<.10
29-394	USGS-WEBBS MILLS 21C	24APR73	-	43	5.2	1	25	-	-	-	-
29-395	USGS-WEBBS MILLS 22A	06APR73	-	41	5.1	3	27	-	-	-	-
29-395	USGS-WEBBS MILLS 22A	24APR73	-	40	4.8	1	23	-	-	-	-
29-416	USGS-WEBBS MILLS 15B	06APR73	-	33	5.0	4	21	-	-	-	-
29-416	USGS-WEBBS MILLS 15B	08MAR74	-	40	4.7	2	-	-	-	-	-
29-427	USGS-WEBBS MILLS 21A	06APR73	-	41	5.0	2	36	-	-	-	-
29-428	LAKEHURST WD 1R	07DEC81	13.0	85	5.0	2	48	<.10	<.01	<.10	1.5
29-432	LAKEWOOD TWP MUA 6	19NOV81	17.0	152	7.6	64	86	.10	.01	.10	.05
29-480	USGS-WEBBS MILLS 25C	06APR73	-	43	6.0	4	39	-	-	-	-
29-480	USGS-WEBBS MILLS 25C	24APR73	-	43	4.4	1	23	-	.00	-	-
29-481	USGS-WEBBS MILLS 25B	06APR73	-	43	6.0	4	39	-	-	-	-
29-483	CRESTWOOD VIL WC 1-65	29MAR82	13.0	32	4.9	2	18	.18	<.01	.20	.13
29-487	CRESTWOOD VIL WC 3-72	29MAR82	12.5	49	4.9	2	26	.16	<.01	.16	1.4
29-488	CEDAR GLEN LAKES WC 1-70	24NOV81	12.0	28	5.0	4	17	.20	<.01	.20	.03
29-489	CEDAR GLEN LAKES WC 2-72	24NOV81	12.0	38	5.1	3	20	<.10	<.01	<.10	<.01
29-493	PINE ACRES TRLR PK 2-71	07DEC81	12.0	37	5.1	2	16	<.10	<.01	<.10	.53
29-494	AMER GRAPHITE CO 1970	07DEC81	13.0	45	5.2	2	27	<.10	<.01	<.10	.38
29-500	CEDAR GLEN WEST 1	10MAR82	13.0	109	5.4	4	51	<.05	<.01	<.05	2.4
29-502	CEDAR GLEN WEST 2-66	10MAR82	14.0	85	5.3	4	-	.30	<.01	.30	2.4
29-508	OCEAN GATE BORO WD 3	25AUG81	12.5	50	5.7	4	-	.02	<.01	-	.02
29-509	INDIAN SURF BEACH 1-59	30JUN70	13.5	56	4.2	-	40	-	-	-	-
29-512	OCEAN TWP MUA 1-60	12JUN61	12.5	60	4.3	0	45	-	-	-	-
29-512	OCEAN TWP MUA 1-60	25AUG81	13.0	52	4.6	0	-	.01	<.01	-	.05
29-513	USGS-GARDEN ST PKWY OBS1	23OCT61	14.5	35	5.8	4	23	-	-	-	-
29-513	USGS-GARDEN ST PKWY OBS1	20JAN77	11.0	17	-	5	24	-	-	-	-
29-513	USGS-GARDEN ST PKWY OBS1	14APR82	10.0	45	5.9	8	35	<.05	<.01	<.05	.04
29-514	USGS-GARDEN ST PKWY OBS2	15MAR62	12.5	51	5.9	5	40	-	-	-	-
29-514	USGS-GARDEN ST PKWY OBS2	14APR82	13.0	53	5.8	8	46	<.05	<.01	.10	<.01
29-515	PINE BEACH WATER UTIL 1	25AUG81	12.0	64	4.7	0	-	.02	<.01	-	.03
29-521	PT PLEAS BCH BORO WD 9	05SEP50	-	111	7.0	36	-	-	-	-	-
29-521	PT PLEAS BCH BORO WD 9	22JUN61	14.0	113	6.9	33	88	-	-	-	-
29-521	PT PLEAS BCH BORO WD 9	01SEP81	13.5	422	6.6	52	290	.33	.01	-	.08
29-522	PT PLEAS BCH BORO WD 8	30AUG49	-	111	6.5	34	-	-	-	-	-
29-523	PT PLEAS BCH BORO WD 10	10JUL75	14.0	320	6.6	18	267	-	-	-	-
29-523	PT PLEAS BCH BORO WD 10	01SEP81	13.5	955	6.4	28	569	.40	<.01	-	.01
29-533	PT PLEASANT BORO WD 4	03APR53	12.0	95	4.6	1	-	-	-	-	-
29-533	PT PLEASANT BORO WD 4	31AUG61	13.0	118	5.2	4	80	-	-	-	-
29-533	PT PLEASANT BORO WD 4	14NOV62	13.0	122	5.0	7	71	-	-	-	-
29-533	PT PLEASANT BORO WD 4	18SEP73	13.5	156	5.8	7	96	-	-	-	-
29-533	PT PLEASANT BORO WD 4	03SEP81	14.5	215	6.4	40	138	.25	.01	-	4.7
29-536	SEASIDE HTS BORO WD 1	22JUN61	14.5	88	6.5	30	80	-	-	-	-
29-536	SEASIDE HTS BORO WD 1	31AUG61	14.0	86	6.7	28	84	-	-	-	-
29-538	SEASIDE HTS BORO WD 1R	28AUG81	13.0	480	6.0	26	296	.08	<.01	-	<.01
29-539	SEASIDE HTS BORO WD 3	29AUG49	-	75	5.9	20	-	-	-	-	-
29-539	SEASIDE HTS BORO WD 3	30AUG50	-	73	6.1	18	-	-	-	-	-
29-553	TONNESON, EDWARD	28AUG51	-	116	3.9	0	-	-	-	-	-
29-553	TONNESON, EDWARD	24APR52	-	112	4.0	0	-	-	-	-	-
29-553	TONNESON, EDWARD	15AUG63	13.5	159	4.0	0	80	-	-	-	-
29-553	TONNESON, EDWARD	10DEC81	13.0	204	-	-	139	<.10	<.01	.10	<.01
29-554	STAFFORD WC 2	02DEC81	13.0	44	5.5	2	56	<.10	<.01	.10	<.01
29-555	OCEAN CO UTL AUTH 1-75	15DEC81	14.5	31	6.3	5	-	<.10	<.01	<.10	.01
29-566	BARNEGAT WC FLOWING 1	15APR46	-	-	4.5	0	-	-	-	-	-
29-566	BARNEGAT WC FLOWING 1	15AUG63	13.5	55	4.4	0	35	-	-	-	-
29-566	BARNEGAT WC FLOWING 1	25AUG81	12.0	50	4.4	0	35	.02	.01	-	.08
29-569	BARNEGAT WC 3-72	25AUG81	12.0	36	5.0	1	33	.02	<.01	-	.03
29-571	PINEWOOD ESTATES 1-64	15DEC81	5.5	27	6.4	5	17	<.10	<.01	<.10	<.01
29-578	BEACHWOOD BORO WD 5-75	25AUG81	12.5	49	5.4	2	-	.03	<.01	-	.04
29-594	OCEAN TWP MUA 4-78	15DEC81	13.0	56	4.8	1	37	<.10	<.01	<.10	<.01

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phosphorus	Orthophosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Silica (as SiO2)
					KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued							
29-315	395317074240201	09AUG73	-	-	-	-	-	1.3	.50	2.3	7.9	2.8
29-331	395318074230001	24APR73	-	<.01	-	4.1	.40	1.3	.50	2.4	10	2.6
29-337	395318074230701	06APR73	-	.02	-	1.5	.70	1.6	.40	2.4	9.0	3.4
29-347	395318074233301	24APR73	-	<.01	-	3.0	.80	1.8	.40	3.4	8.0	3.0
29-347	395318074233301	09AUG73	-	-	-	-	-	1.9	.50	2.6	6.2	3.3
29-351	395318074233601	06APR73	-	<.01	-	2.0	.50	2.8	.40	2.4	7.0	3.4
29-360	395319074230401	06APR73	-	.00	-	2.0	.70	1.6	.40	2.0	8.0	3.3
29-367	395319074233101	09AUG73	-	-	-	-	-	1.5	.50	2.2	7.2	3.1
29-373	395320074230201	06APR73	-	<.01	-	2.4	.90	3.6	.90	4.1	12	3.6
29-383	395320074233501	06APR73	-	<.01	-	2.0	.60	1.8	.20	3.0	8.5	3.1
29-383	395320074233501	24APR73	-	<.01	-	3.1	.90	1.9	.40	3.0	8.4	3.1
29-394	395321074233001	24APR73	-	<.01	-	3.0	1.1	1.8	.50	3.2	10	3.1
29-395	395321074233301	06APR73	-	<.01	-	3.0	.70	1.6	.40	2.5	9.0	3.3
29-395	395321074233301	24APR73	-	<.01	-	2.5	.80	1.7	.50	3.1	8.7	3.0
29-416	395322074230601	06APR73	-	.01	-	1.2	.60	1.4	.20	1.7	7.0	3.0
29-416	395322074230601	08MAR74	-	<.01	-	1.7	1.0	1.6	.70	3.2	7.7	2.9
29-427	395323074233201	06APR73	-	.02	-	4.1	.60	3.2	.50	3.1	9.0	3.8
29-428	400039074193001	07DEC81	.02	<.01	.50	3.7	.63	8.5	1.0	12	5.0	-
29-432	400309074093501	19NOV81	.03	.02	.60	27	2.7	2.9	4.4	3.0	6.0	-
29-480	395324074233201	06APR73	-	.00	-	1.2	.40	5.5	.60	3.8	13	4.3
29-480	395324074233201	24APR73	-	<.01	-	2.2	.70	1.8	.20	2.8	10	3.0
29-481	395324074233202	06APR73	-	-	-	-	-	5.5	.60	3.0	13	4.3
29-483	395646074211001	29MAR82	<.01	<.01	.90	.37	.23	2.1	1.3	1.3	4.0	1.0
29-487	395722074222901	29MAR82	<.01	<.01	.40	.78	.82	5.4	1.1	8.0	2.0	-
29-488	395722074231901	24NOV81	.02	.02	<.30	.26	.24	1.9	.54	3.0	<1.0	-
29-489	395723074235601	24NOV81	.01	.01	<.30	.67	.26	1.9	.65	3.0	3.0	-
29-493	400013074174601	07DEC81	.01	<.01	.60	.49	.41	1.4	.37	3.0	2.0	-
29-494	400059074183301	07DEC81	<.01	<.01	<.30	.88	.53	4.6	.42	8.0	2.0	-
29-500	400223074173601	10MAR82	.04	<.01	.80	3.3	1.1	8.9	2.6	15	3.0	-
29-502	400236074173901	10MAR82	.02	<.01	1.0	2.7	.35	5.9	2.7	8.0	8.0	-
29-508	395528074082601	25AUG81	-	<.01	.60	1.7	.61	2.1	1.5	5.7	7.8	15
29-509	394613074121501	30JUN70	-	-	-	.90	.50	3.5	2.5	6.6	15	12
29-512	394741074112201	12JUN61	-	-	-	.80	1.0	2.8	2.5	4.8	10	17
29-512	394741074112201	25AUG81	-	<.01	.70	.50	.40	1.6	1.9	4.3	10	16
29-513	394742074142001	23OCT61	-	-	-	.80	1.0	4.0	.80	7.6	0	5.8
29-513	394742074142001	20JAN77	-	-	-	.80	.40	3.4	.30	8.9	.90	6.5
29-513	394742074142001	14APR82	<.01	<.01	.50	.77	.25	4.6	.40	8.0	2.0	-
29-514	394742074142002	15MAR62	-	-	-	2.9	1.2	3.4	2.5	4.1	10	15
29-514	394742074142002	14APR82	.01	<.01	3.4	1.8	.39	2.7	2.2	4.0	10	-
29-515	395558074101301	25AUG81	-	<.01	.70	.80	.56	2.8	1.4	6.8	11	12
29-521	400536074025201	05SEP50	-	-	-	-	-	-	-	9.8	3.0	-
29-521	400536074025201	22JUN61	-	-	-	8.2	3.8	7.1	2.5	13	2.5	26
29-521	400536074025201	01SEP81	-	.03	<.30	33	12	27	2.4	90	.70	21
29-522	400536074025202	30AUG49	-	-	-	-	-	-	-	10	1.0	-
29-523	400551074024301	10JUL75	-	-	-	21	9.4	24	3.7	96	7.1	22
29-523	400551074024301	01SEP81	-	<.01	1.4	59	25	59	4.5	280	10	24
29-533	400501074045501	03APR53	-	-	-	-	-	-	-	11	7.8	-
29-533	400501074045501	31AUG61	-	-	-	3.3	2.2	10	2.0	15	11	4.9
29-533	400501074045501	14NOV62	-	-	-	4.0	1.9	9.4	2.4	12	15	6.5
29-533	400501074045501	18SEP73	-	-	-	-	-	14	3.3	16	17	5.1
29-533	400501074045501	03SEP81	-	<.01	1.2	14	3.9	15	5.6	16	13	8.8
29-536	395636074043901	22JUN61	-	-	-	2.4	1.5	12	4.0	4.2	8.8	20
29-536	395636074043901	31AUG61	-	-	-	2.0	1.7	11	3.5	4.4	8.6	18
29-538	395636074043903	28AUG81	-	.02	.70	13	10	55	5.3	140	20	18
29-539	395643074044301	29AUG49	-	-	-	-	-	-	-	4.0	18	-
29-539	395643074044301	30AUG50	-	-	-	-	-	-	-	4.5	4.0	-
29-553	394009074130401	28AUG51	-	-	-	-	-	-	-	22	6.0	-
29-553	394009074130401	24APR52	-	-	-	-	-	-	-	17	6.0	-
29-553	394009074130401	15AUG63	-	-	-	4.0	3.4	6.5	3.5	28	6.8	32
29-553	394009074130401	10DEC81	.01	<.01	<.30	5.4	5.1	9.2	3.5	47	4.0	-
29-554	394021074135101	02DEC81	.08	.08	<.30	.94	.65	2.3	1.5	3.0	6.0	-
29-555	394039074155101	15DEC81	.06	.04	<.30	.70	.32	2.9	.83	5.0	2.0	-
29-566	394444074121001	15APR46	-	-	-	-	-	-	-	4.6	8.0	-
29-566	394444074121001	15AUG63	-	-	-	1.3	.20	3.7	.50	5.2	7.2	18
29-566	394444074121001	25AUG81	-	<.01	.80	.60	.45	1.7	1.4	5.5	7.8	19
29-569	394527074144401	25AUG81	-	<.01	1.7	.40	.42	1.6	.70	4.7	4.0	11
29-571	394551074191801	15DEC81	<.01	<.01	<.30	.35	.38	2.7	.30	5.0	<1.0	-
29-578	395530074122001	25AUG81	-	<.01	-	.40	.45	2.1	1.7	5.8	6.0	11
29-594	394617074121601	15DEC81	<.01	<.01	<.30	.59	.11	3.3	.97	6.0	8.0	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Date of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
					KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued							
29-315	09AUG73	-	-	-	-	-	-	-	-	-	-	-
29-331	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-337	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-347	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-347	09AUG73	-	-	-	-	-	-	-	-	-	-	-
29-351	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-360	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-367	09AUG73	-	-	-	-	-	-	-	-	-	-	-
29-373	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-383	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-383	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-394	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-395	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-395	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-416	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-416	08MAR74	-	-	-	-	-	-	-	-	-	-	-
29-427	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-428	07DEC81	<100	<5	<5	<50	34	<30	<100	46	<10	-	70
29-432	19NOV81	140	<5	<5	<50	<20	<30	<100	<10	<10	-	20
29-480	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-480	24APR73	-	-	-	-	-	-	-	-	-	-	-
29-481	06APR73	-	-	-	-	-	-	-	-	-	-	-
29-483	29MAR82	<100	<5	<5	<50	<20	300	<100	<10	<10	-	10
29-487	29MAR82	<100	<5	<5	<50	<20	<30	<100	11	<10	-	10
29-488	24NOV81	<100	<5	<5	-	<20	180	<100	<10	<10	-	-
29-489	24NOV81	<100	<5	<5	-	<20	240	<100	<10	<10	-	10
29-493	07DEC81	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	<5
29-494	07DEC81	<100	<5	<5	-	<20	160	<100	11	<10	-	120
29-500	10MAR82	<100	<5	<5	<50	<20	<30	<100	18	<10	-	20
29-502	10MAR82	<100	<5	<5	<50	20	400	<100	43	<10	-	30
29-508	25AUG81	40	<.5	1	<1	<10	1800	<10	16	-	19	80
29-509	30JUN70	-	-	-	-	-	990	-	30	-	-	-
29-512	12JUN61	-	-	-	-	-	-	-	-	-	-	-
29-512	25AUG81	80	<.5	2	<1	<10	750	<10	13	-	13	53
29-513	23OCT61	-	-	-	-	-	-	-	-	-	-	-
29-513	20JAN77	-	-	-	-	-	440	-	20	-	-	-
29-513	14APR82	<100	<5	<5	<50	<20	1400	<100	18	<10	-	640
29-514	15MAR62	-	-	-	-	-	-	-	-	-	-	-
29-514	14APR82	<100	<5	<5	<50	<20	3100	<100	33	<10	-	10
29-515	25AUG81	30	<.5	2	<1	<10	530	<10	9	-	13	26
29-521	05SEP50	-	-	-	-	-	-	-	-	-	-	-
29-521	22JUN61	-	-	-	-	-	-	-	-	-	-	-
29-521	01SEP81	170	1	4	<1	<10	2600	<10	100	-	170	11
29-522	30AUG49	-	-	-	-	-	-	-	-	-	-	-
29-523	10JUL75	-	-	-	-	-	-	-	-	-	-	-
29-523	01SEP81	290	<.5	5	<1	<10	11000	<10	480	-	360	9
29-533	03APR53	-	-	-	-	-	-	-	-	-	-	-
29-533	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-533	14NOV62	-	-	-	-	-	-	-	-	-	-	-
29-533	18SEP73	-	-	-	-	-	-	-	-	-	-	-
29-533	03SEP81	50	<.5	3	<1	55	76	13	60	-	310	220
29-536	22JUN61	-	-	-	-	-	-	-	-	-	-	-
29-536	31AUG61	-	-	-	-	-	-	-	-	-	-	-
29-538	28AUG81	<100	<5	2	4	<10	5000	<10	80	-	1	21
29-539	29AUG49	-	-	-	-	-	-	-	-	-	-	-
29-539	30AUG50	-	-	-	-	-	-	-	-	-	-	-
29-553	28AUG51	-	-	-	-	-	-	-	-	-	-	-
29-553	24APR52	-	-	-	-	-	-	-	-	-	-	-
29-553	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-553	10DEC81	400	<5	<5	<50	<20	7600	<100	110	<10	-	40
29-554	02DEC81	<100	<5	<5	-	<20	1800	<100	18	<10	-	70
29-555	15DEC81	<100	<5	<5	<50	<20	110	<100	21	<10	-	20
29-566	15APR46	-	-	-	-	-	-	-	-	-	-	-
29-566	15AUG63	-	-	-	-	-	-	-	-	-	-	-
29-566	25AUG81	40	<.5	2	1	<10	420	<10	11	-	11	17
29-569	25AUG81	20	<.5	<1	1	49	43	<10	5	-	6	130
29-571	15DEC81	<100	<5	<5	<50	30	140	<100	17	<10	-	40
29-578	25AUG81	60	<.5	<1	3	27	1800	<10	15	-	11	62
29-594	15DEC81	<100	5	<5	<50	<20	440	<100	<10	<10	-	50

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (as CaCO3)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO2 + NO3 (as N)
					KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29-596	MANCHESTER TWP MUA 3	23NOV81	11.0	30	5.5	3	16	<.10	<.01	<.10	.21
29-608	JERSEY SHORE S AND L	16DEC81	13.0	43	5.9	6	27	<.10	<.01	<.10	.18
29-611	MANCHESTER TWP MUA 1	23NOV81	12.0	45	5.4	4	26	.20	<.01	.20	.63
29-612	BERKELEY WC-BAYVILLE	28DEC81	14.5	97	4.3	0	54	-	-	-	-
29-613	BERKELEY WC-PINEWALL	28DEC81	13.0	55	5.3	2	25	-	-	-	-
29-617	SEASIDE HTS BORO WD 5-78	28AUG81	13.0	113	4.7	10	69	.07	<.01	-	.03
29-620	USGS-WEBBS MILLS SHALLOW	04AUG61	-	26	5.8	2	19	-	-	-	-
29-629	CERAMIC TILE SUPPLY CO	05JAN82	13.5	50	5.0	4	37	.21	<.01	.27	1.4
29-631	BERKELEY T LAW ENFORCE C	28DEC81	14.0	31	5.8	8	19	-	-	-	-
29-632	JACKSON TWP PUBLIC WORKS	30DEC81	13.5	122	8.3	54	86	<.05	<.01	<.05	<.01
29-633	N DOVER ELEM SCHOOL	07JAN82	17.0	126	5.6	4	100	.13	<.01	.25	6.1
29-637	WHITING GRADE SCHOOL	20JAN82	15.0	30	5.6	4	26	.26	<.01	.26	.14
29-638	GSP BARNEGAT TOLL GATE	21JAN82	11.0	45	5.3	4	31	.26	<.01	.26	.02
29-639	EXECUTIVE GARDEN APTS	16FEB82	11.0	40	5.5	4	-	.11	<.01	.33	.10
29-640	AMER TEL AND TEL CO	16FEB82	9.0	48	6.7	16	-	.24	.02	.45	<.01
29-642	FLEMINGTON BLOCK CO	16FEB82	12.0	19	5.5	2	-	.19	<.01	.26	.05
29-644	NJ MOTOR VEH INSPEC STA	17FEB82	11.0	-	5.8	4	17	-	<.01	.36	.03
29-645	KLAMM, VICTOR	13MAY82	13.5	102	5.5	8	58	<.05	<.01	.15	.51
29-646	LACEY MOOSE LODGE	22FEB82	9.5	76	5.6	4	41	<.05	<.01	.13	.03
29-648	ESTONIAN BOY SCOUT CAMP	20MAY82	14.0	96	5.0	2	49	<.05	<.01	.20	2.5
29-649	FLUID PKG CO INC	30MAR82	14.0	68	6.2	12	39	<.05	.02	.16	1.0
29-650	HOMESTEAD FENCE CO	10FEB82	11.0	53	5.5	4	44	.09	<.01	.13	.20
29-651	BAY BRIDGE INN	31MAR82	14.0	-	6.0	14	41	<.05	.01	.14	<.01
29-652	MANAHAWKIN BAPTIST CH	22FEB82	12.0	38	5.4	2	26	<.05	<.01	.31	.07
29-653	BURGER KING ROUTE 72	17MAR82	12.0	148	7.0	54	100	.18	.02	.38	.05
29-655	AMERICAN LEGION	17MAR82	15.0	43	5.3	4	31	<.05	<.01	.28	.15
29-656	OCEAN CO RES CENTER	15MAR82	12.0	47	5.5	4	36	<.05	<.01	.08	.31
29-657	OCEAN TWP VOC SCHOOL	08MAR82	15.0	112	9.1	42	96	<.05	<.01	<.05	.03
29-659	BERKELEY FED SAV LOAN	30MAR82	12.0	150	5.6	6	83	<.05	<.01	.06	1.0
29-661	BARNEGAT BLVD ELEM SCH	11MAY82	12.0	72	5.3	4	43	<.05	<.01	<.05	.45
29-662	BERKELEY TWP GOLF COURSE	21DEC81	8.0	48	6.1	10	32	<.10	<.01	<.10	.05
29-663	ST THOMAS CHURCH	03MAY82	14.5	63	5.0	2	30	<.05	<.01	<.05	1.5
29-664	LAUREL BROOK CONDOMINIUM	27MAY82	13.5	49	6.0	-	-	<.05	<.01	.20	.02
29-665	EAST DOVER VOL FIRE CO	18MAY82	13.5	91	5.3	6	43	<.05	<.01	.20	1.0
29-666	BNAI ISRAEL CONGREGATION	10MAY82	14.0	102	4.6	0	61	.08	<.01	.08	2.1
29-667	SEBASTINAS, JANE	17MAY82	13.0	45	5.6	4	-	-	-	-	-
29-668	NJ STATE FOREST TREE NUR	26MAY82	13.5	47	5.4	4	-	<.05	<.01	.10	2.6
29-669	SAM AND SAMMYS BARBER SH	26MAY82	15.5	97	5.0	4	63	.16	<.01	.16	4.0
29-670	BUTTERFLY CAMPGROUND 1	20MAY82	13.0	93	5.0	1	-	<.05	<.01	<.05	.32
29-671	SUNRISE BEACH	11MAY82	13.5	61	5.2	4	38	<.05	<.01	.11	.70
29-672	LANOKA HARBOR FIRST AID	12MAY82	11.5	69	4.8	2	42	<.05	<.01	.10	.67
29-673	BICYCLES UNLIMITED	25MAY82	15.0	163	5.3	1	101	.17	<.01	.17	2.1
29-674	BAKERS ACRES	17MAY82	14.0	50	4.9	2	35	<.05	<.01	.65	<.01
29-675	FAIR OAKS SOUTH SCHOOL	17MAY82	14.0	24	4.7	1	9	3.1	<.01	3.1	<.01
29-676	MANCHESTER B E RDGWY SCH	26MAY82	13.0	26	5.5	4	-	.15	<.01	.15	.26
29-677	EVANGELICAL CONG CH	26MAY82	14.0	36	4.2	0	31	.66	<.01	.66	.01
29-678	PT PLEASANT MEM SCHOOL	25MAY82	14.0	144	5.4	6	-	.41	<.01	.41	4.9
29-679	PT PLEASANT OCEAN RD SCH	25MAY82	13.5	81	6.9	24	48	.15	<.01	.25	.02
29-680	NEW EGYPT SPEEDWAY DOM	20MAY82	14.0	134	5.0	2	87	<.05	<.01	<.05	5.5
29-681	HOLIDAY BEACH CLUB	10MAY82	14.5	58	4.4	0	48	<.05	<.01	.10	<.10
29-682	MCDONALDS ROUTE 72	05MAY82	13.5	157	6.0	20	89	<.05	<.01	<.05	.13

Table 12.--Chemical analyses of well-wster samples.--Continued
[All constituents sre dissolved. Concentrations in milligrams per liter.]
[A dssh indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phosphorus	Orthophosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfste	Silica (ss SiO2)
					KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued							
29-596	400046074172101	23NOV81	<.01	<.01	<.30	.44	.48	3.6	.16	5.0	<1.0	-
29-608	395643074215101	16DEC81	<.01	<.01	.50	1.4	.44	3.3	.57	6.0	2.0	-
29-611	400051074165701	23NOV81	.01	<.01	<.30	2.0	.87	3.3	.49	7.0	<1.0	-
29-612	395454074090601	28DEC81	-	-	.80	1.2	1.1	6.7	.50	8.8	15	-
29-613	395248074101101	28DEC81	-	-	<.30	1.5	.44	3.5	1.0	5.0	8.0	-
29-617	395652074044201	28AUG81	-	.03	2.8	1.8	1.0	13	2.2	18	8.3	13
29-620	395323074225502	04AUG61	-	-	-	.80	1.0	1.9	.80	3.6	4.6	2.8
29-629	400342074082501	05JAN82	.05	.03	.40	.54	.38	4.8	.67	6.0	2.0	-
29-631	395418074140201	28DEC81	-	-	.60	.27	.09	2.5	.15	1.1	1.3	-
29-632	400641074211101	30DEC81	.14	.13	.50	21	.88	1.6	3.5	2.0	9.0	-
29-633	400105074115201	07JAN82	.03	.03	.70	7.0	4.8	6.3	2.7	12	8.0	-
29-637	395734074224101	20JAN82	.04	<.01	<.30	.44	.29	4.3	.47	5.0	1.0	-
29-638	394629074124201	21JAN82	.01	<.01	<.30	.51	.31	5.3	.67	5.0	8.0	-
29-639	393647074192301	16FEB82	<.01	<.01	.30	.32	.49	6.1	.38	7.0	1.0	-
29-640	393653074194501	16FEB82	<.01	<.01	<.30	.79	.24	4.1	1.9	4.0	12	-
29-642	394533074224001	16FEB82	<.01	<.01	.30	.36	.12	3.3	.38	3.0	<1.0	-
29-644	394242074171301	17FEB82	<.01	.01	<.30	.64	.18	4.4	.32	5.0	1.0	-
29-645	400134074102901	13MAY82	<.01	<.01	.70	3.1	1.2	8.8	.69	15	7.0	-
29-646	395020074114801	22FEB82	<.01	<.01	.70	3.3	.77	7.1	.27	8.0	14	-
29-648	400459074153501	20MAY82	<.01	<.01	1.2	.73	1.1	12	.88	16	2.0	-
29-649	400330074105201	30MAR82	<.01	<.01	1.0	1.1	1.1	5.2	.60	8.0	4.0	-
29-650	393955074165701	10FEB82	<.01	<.01	1.6	.94	1.1	5.7	.37	6.0	10	-
29-651	395656074065801	31MAR82	.01	<.01	<.30	1.8	.92	4.6	1.4	8.0	2.0	-
29-652	394153074150501	22FEB82	<.01	<.01	.50	.59	.55	5.5	.94	6.0	3.0	-
29-653	394118074143701	17MAR82	.15	.06	.90	4.7	1.2	20	.62	12	8.0	-
29-655	394600074125601	17MAR82	.03	<.01	1.1	.62	.19	3.7	.45	7.0	5.0	-
29-656	395026074110201	15MAR82	.03	.02	.30	1.4	.72	3.0	2.2	4.0	10	-
29-657	394744074145101	08MAR82	<.01	<.01	.50	.42	.15	24	.66	6.0	4.0	-
29-659	400121074161201	30MAR82	<.01	<.01	.80	4.8	.24	17	1.9	26	9.0	-
29-661	394453074143401	11MAY82	<.01	<.01	.60	.35	1.0	8.2	.46	16	2.0	-
29-662	395332074114801	21DEC81	.02	.01	.70	.18	.17	3.6	.18	8.0	2.0	-
29-663	400352074081301	03MAY82	<.01	<.01	.90	1.4	.96	4.8	.72	4.0	4.0	-
29-664	400453074084601	27MAY82	.14	.12	.30	1.6	.37	2.5	1.9	4.0	<1.0	-
29-665	395729074073001	18MAY82	<.01	-	.80	1.6	1.1	7.3	2.0	16	<1.0	-
29-666	400004074120601	10MAY82	<.01	<.01	1.2	2.4	2.2	6.8	.16	11	10	-
29-667	393844074181001	17MAY82	-	-	-	-	-	-	-	-	-	-
29-668	400557074185901	26MAY82	<.01	<.01	<.30	8.7	.86	1.0	.50	4.0	<1.0	-
29-669	400709074152201	26MAY82	<.01	<.01	<.30	.70	2.2	7.3	.92	12	<1.0	-
29-670	400603074181901	20MAY82	<.01	<.01	1.3	3.3	1.2	6.8	.49	12	14	-
29-671	395049074111001	11MAY82	<.01	<.01	1.0	1.3	2.1	4.0	2.4	7.0	6.0	-
29-672	395158074105201	12MAY82	<.01	<.01	.60	.73	2.4	4.0	1.6	8.0	8.0	-
29-673	400622074130701	25MAY82	<.01	<.01	.60	8.7	2.9	12	1.3	22	21	-
29-674	393805074185301	17MAY82	.03	.03	.60	.13	.48	4.8	.55	7.0	<1.0	-
29-675	395925074224001	17MAY82	<.01	<.01	.80	.12	.17	.94	.45	-	1.0	-
29-676	400113074160101	26MAY82	<.01	<.01	.80	.19	.23	2.3	.21	4.0	<1.0	-
29-677	405758074212801	26MAY82	<.01	<.01	.50	.20	.21	.72	.10	2.0	2.0	-
29-678	400444074042101	25MAY82	.02	<.01	.90	2.1	2.4	12	1.1	20	<1.0	-
29-679	400500074034501	25MAY82	.02	<.01	.30	3.7	1.1	6.9	.54	9.0	<.10	-
29-680	400413074280501	20MAY82	<.01	<.01	-	8.3	3.1	1.6	2.6	7.0	14	-
29-681	394802074104501	10MAY82	<.01	<.01	<.30	.58	.20	2.5	2.0	5.0	10	-
29-682	394122074151401	05MAY82	.01	.01	.70	6.1	4.5	12	.15	15	22	-

Table 12.--Chemical analyaes of well-water samples.--Continued
[All constituenta are disaolved. Concentrations in micrograms per liter.]
[A dash indicatea that constituent was not determined.]

Well number	Date of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
						KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29-596	23NOV81	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	20
29-608	16DEC81	<100	<5	<5	<50	54	1000	<100	12	<10	-	40
29-611	23NOV81	<100	<5	<5	<50	<20	<30	<100	26	<10	-	10
29-612	28DEC81	<100	<5	<5	<50	20	1100	<100	12	<10	-	40
29-613	28DEC81	<100	<5	6	<50	<20	530	<100	17	<10	-	<5
29-617	28AUG81	90	1	1	3	10	1900	<10	39	-	19	16
29-620	04AUG61	-	-	-	-	-	-	-	-	-	-	-
29-629	05JAN82	<100	<5	<5	<50	21	1700	<100	25	<10	-	6
29-631	28DEC81	<100	<5	<5	<50	130	1700	<100	61	<10	-	40
29-632	30DEC81	<100	<5	<5	<50	<20	90	<100	14	<10	-	<5
29-633	07JAN82	<100	<5	<5	<50	120	190	<100	18	<10	-	40
29-637	20JAN82	<100	<5	<5	<50	580	530	<100	18	<10	-	30
29-638	21JAN82	<100	<5	<5	<50	<20	570	<100	<10	<10	-	60
29-639	16FEB82	<100	<5	<5	<50	<20	30	<100	<10	<10	-	<5
29-640	16FEB82	<100	<5	<5	<50	<20	4000	<100	160	<10	-	<5
29-642	16FEB82	<100	<5	<5	<50	<20	70	<100	20	<10	-	20
29-644	17FEB82	<100	<5	<5	<50	130	50	<100	<10	<10	-	10
29-645	13MAY82	<100	<5	<5	<50	<20	850	<100	11	<10	-	80
29-646	22FEB82	<100	<5	<5	<50	200	1600	<100	26	<10	-	280
29-648	20MAY82	<100	<5	<5	<50	400	150	<100	<10	<10	-	10
29-649	30MAR82	<100	<5	<5	<50	<20	540	<100	45	<10	-	<5
29-650	10FEB82	<100	<5	<5	<50	130	160	<100	<10	<10	-	10
29-651	31MAR82	<100	<5	<5	<50	<20	1500	<100	210	<10	-	10
29-652	22FEB82	<100	<5	<5	<50	52	<30	<100	<10	<10	-	50
29-653	17MAR82	<100	<5	<5	<50	<20	2200	<100	50	<10	-	10
29-655	17MAR82	<100	<5	<5	<50	330	440	<100	<10	<10	-	60
29-656	15MAR82	<100	<5	<5	<50	<20	1100	<100	14	<10	-	10
29-657	08MAR82	<100	<5	<5	<50	42	740	<100	<10	<10	-	20
29-659	30MAR82	<100	<5	<5	<50	190	280	<100	140	<10	-	150
29-661	11MAY82	<100	<5	<5	<50	<20	140	<100	12	<10	-	-
29-662	21DEC81	<100	<5	<5	<50	100	1700	<100	36	<10	-	1200
29-663	03MAY82	<100	<5	<5	<50	<20	130	<100	25	<10	-	8
29-664	27MAY82	<100	<5	<5	<50	<20	840	<100	<10	<10	-	10
29-665	18MAY82	<100	<5	<5	<50	680	580	<100	18	<10	-	10
29-666	10MAY82	<100	<5	<5	<50	240	170	<100	34	<10	-	-
29-667	17MAY82	<100	<5	<5	<50	-	-	<100	-	<10	-	20
29-668	26MAY82	<100	<5	<5	<50	140	<30	<100	<10	<10	-	10
29-669	26MAY82	<100	<5	<5	<50	640	200	<100	24	<10	-	60
29-670	20MAY82	<100	<5	<5	<50	28	50	<100	12	<10	-	10
29-671	11MAY82	<100	<5	<5	<50	<20	630	<100	34	<10	-	-
29-672	12MAY82	<100	<5	<5	<50	64	<30	<100	20	<10	-	-
29-673	25MAY82	<100	<5	<5	<50	50	250	<100	33	<10	-	50
29-674	17MAY82	<100	<5	<5	<50	<20	520	<100	<10	<10	-	140
29-675	17MAY82	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	10
29-676	26MAY82	<100	<5	<5	<50	240	40	<100	<10	<10	-	<5
29-677	26MAY82	<100	<5	<5	<50	<20	370	<100	<10	<10	-	<5
29-678	25MAY82	<100	7	<5	<50	<20	<30	<100	70	<10	-	930
29-679	25MAY82	<100	<5	<5	<50	<20	320	<100	<10	<10	-	60
29-680	20MAY82	<100	<5	<5	<50	190	140	<100	22	<10	-	1200
29-681	10MAY82	<100	<5	<5	<50	<20	470	<100	<10	<10	-	-
29-682	05MAY82	<100	<5	<5	<50	<20	1500	<100	53	<10	-	8

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	Local well identifier	Date of sample	Temperature (°C)	Specific conductance (µS/cm at 25°C)	pH (units)	Alkalinity (as CaCO3)	Dissolved solids	Ammonia (as N)	Nitrite (as N)	Ammonia + organic N (as N)	NO2 + NO3 (as N)
				KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued							
29-683	MANAHAWKIN ELKS LODGE	04MAY82	14.5	123	7.3	46	82	.36	<.01	.36	<.01
29-684	OCEAN CO TIP SEAMAN PARK	17MAY82	14.0	35	5.1	4	-	.18	<.01	.18	<.01
29-685	BERKELEY T WORTH EL SCH	18MAY82	13.5	61	4.6	0	34	<.05	<.01	<.05	<.01
29-686	VISITATION CHURCH	12MAY82	13.5	111	7.0	44	87	<.05	<.01	.10	<.01
29-688	HEFFERON, JOHN	03MAY82	14.5	158	5.0	2	89	.68	<.01	.68	6.1
29-689	PETERSONS RESTAURANT	21APR82	14.5	64	6.8	20	55	.11	<.01	.11	<.01
29-690	BRICK TWP MEM HS	25MAY82	12.5	42	5.8	-	55	<.05	<.01	.20	<.01
29-691	TOMS RIVER EAST HS	28APR82	12.5	128	4.7	2	77	<.05	<.01	.05	5.1
29-692	INSULITE INC	05MAY82	14.5	121	5.0	4	67	<.05	<.01	<.05	4.0
29-694	EAST DOVER FIRST AID	03MAY82	15.5	110	5.3	4	51	<.05	<.01	<.05	1.8
29-695	SESCO/BAY MACHINE CO	27APR82	12.5	24	5.2	4	14	<.05	<.01	<.05	.37
29-696	WHITESVILLE V FIRE 1980	04MAY82	13.0	98	5.5	8	42	.29	.05	.29	.75
29-701	NJ ST FORKED RIV MARINA	12MAY82	12.5	54	4.4	0	31	<.05	<.01	<.05	<.01
29-702	ST PIUS CATHOLIC CH 1-54	22APR82	14.5	41	5.5	4	25	<.05	<.01	.14	.03
29-703	ISLAND BEACH ST PARK	20MAY82	16.0	72	6.6	4	32	<.05	<.01	<.05	.07
29-704	LAKEHURST PRESBY CHURCH	27APR82	14.5	165	5.1	4	90	<.05	<.01	.30	2.1
29-705	FAIRWAY VILLAGE	27APR82	12.5	73	6.3	16	59	<.05	<.01	<.05	.04
29-706	COMMUNITY REFORM CHURCH	04MAY82	12.0	27	5.3	4	18	.18	<.01	.18	.02
29-707	MULLER, HENRY IRR	21APR82	12.0	27	5.0	4	18	<.05	<.01	<.05	.37
29-708	READE MFG 1981 (2910979)	27APR82	13.5	135	5.5	4	-	5.6	.01	5.6	1.7
29-709	BERKELEY TWP REC FIELD	27APR82	14.0	61	5.6	6	33	<.05	<.01	.36	.16
29-710	JCP&L PINEWALD & KES RD	10MAR82	12.5	25	5.5	4	10	<.05	<.01	<.05	.01
29-711	DOVER T SEW AU STUART DR	19APR82	12.0	45	5.7	8	34	<.05	<.01	<.05	1.6
29-712	CRYSTALS FOODS INC	20JAN82	11.0	135	5.3	2	77	.25	<.01	.25	.10
29-716	LACEY TWP HIGH SCHOOL	31MAR82	12.0	35	5.3	4	25	<.05	<.01	.10	<.01
29-717	OCEAN LANES BOWL ALLEY	22MAR82	13.0	72	6.7	18	49	.64	<.01	.64	<.01
29-718	OCEAN GATE YACHT BASIN	12MAY82	14.0	100	7.6	36	68	<.05	<.01	.20	<.01
29-719	US ARMY FT DX BIVOUAC 22	26MAY82	13.0	18	5.0	0	-	<.05	<.01	.20	.03
29-721	CRESTWOOD VIL WC 10	29MAR82	12.0	26	4.6	2	13	.14	<.01	.16	.02
29-722	DOVER TWP PUB WORKS GARG	26APR82	13.0	128	4.8	4	60	.11	<.01	.11	8.4
29-724	LACEY TWP MIDDLE SCHOOL	31MAR82	12.0	55	4.5	0	31	.10	<.01	.10	<.01
29-725	READE MFG MAIN OFC 1960	27APR82	14.5	37	5.1	2	19	<.05	<.01	.30	.37
29-726	BRICK TWP MUA 5-70	12NOV81	12.0	1030	5.5	2	542	.90	<.01	.90	1.0
29-727	HOLIDAY CITY-BERKELEY	27MAY82	14.0	36	4.9	0	20	<.05	<.01	.15	.76
29-728	WATERSIDE GARDENS	24MAY82	13.0	114	5.2	4	89	.18	<.01	.18	5.8
29-729	NJDOT MAINT YARD RT 70	22JUN82	10.5	32	6.4	8	20	-	.006	.16	.66
29-730	GSP STAFFORD FORGE PIC A	24JUN82	15.0	32	-	-	22	-	-	<.05	-
29-731	GSP OYSTER C PIC AREA	24JUN82	13.5	46	-	-	38	-	-	.06	-
29-732	NJ HWY A FORKED R SER 1	21JAN82	11.0	35	5.3	2	19	.22	<.01	.22	.05
29-733	MAPLE GLEN MOB H PK 2-75	29JUN82	14.0	54	6.0	24	18	-	.004	<.05	<.05
29-735	CRESTWOOD VIL WC 7	29MAR82	11.0	66	6.2	12	42	.08	<.01	.16	.53
29-736	GSP POLHEMUS C PIC AREA	24JUN82	12.5	33	6.7	12	21	-	-	.09	-
29-737	OCEAN CO UTL AUTH BS-1	11MAY82	12.5	62	5.3	4	46	<.05	<.01	<.05	1.2
29-738	BERKELEY T CENTRL REG HS	21DEC81	13.5	175	6.0	12	130	<.10	<.01	<.10	10.5
29-742	OCEAN CO UTL AUTH TR-1	24MAY82	14.0	45	6.0	1	60	.10	<.01	.15	<.01
29-743	NOAHS ARK DAY SCHOOL	28APR82	15.0	59	6.1	12	47	<.05	<.01	.25	.13
29-745	NEW EGYPT SPEEDWAY (IRR)	20MAY82	13.5	170	5.0	-	102	<.05	<.01	<.05	7.5
29-746	NJ BELL TEL WORK CENTER	19MAY82	13.5	46	5.3	3	24	<.05	<.01	.10	.20
29-747	OCEAN CO UTL AU CWPCF-2	23FEB82	11.5	69	4.4	0	-	.24	<.01	.24	.02
29-749	OCEAN CO MEM PK CEMETARY	13MAY82	13.5	67	5.5	4	37	<.05	<.01	.10	.06
29-750	DOVER TWP DOG POUND	19MAY82	13.0	33	5.8	0	-	<.05	<.01	<.05	.58
29-752	GREENBRIAR I BRYANT RD	27MAY82	13.5	260	4.9	0	134	<.05	<.01	.15	.63
29-753	JACKSON NO 1 FIRE CO A	28APR82	13.0	30	5.6	6	15	<.05	<.01	.52	.12
29-754	GREENBRIAR I BARKER ST	27MAY82	14.0	162	4.7	0	92	.10	<.01	.25	1.7
29-755	ALLYN MANUFACTURING CO	28APR82	12.5	32	4.6	0	18	<.05	<.01	.23	.02
29-756	ISLAND BEACH SP TRT PLT	13MAY82	14.0	69	6.3	18	65	<.05	<.01	.15	<.01
29-757	MANCHESTER T MUA H OKS 1	23NOV81	11.0	20	5.5	3	12	.20	<.01	.20	.25
29-759	UNITED STATES SAV BANK	05MAY82	12.5	23	5.4	4	-	<.05	<.01	<.05	.03
29-760	DOVER TWP RIVERWOOD PARK	19MAY82	14.5	97	5.7	1	60	<.05	<.01	.15	5.4
29-761	DOVER TWP SHELTER COVE P	19MAY82	15.0	46	5.4	1	-	<.05	<.01	.20	.06
29-762	CEDAR GLEN HOMES 4-79	14DEC81	14.0	123	6.3	20	90	<.10	<.01	.10	.50
29-763	OCEAN CO UTL AUTH SPS-2	03MAR82	12.0	29	5.3	4	31	<.05	<.01	.06	.02
29-764	OCEAN CO UTL AUTH NPS-2	03MAR82	13.0	77	6.8	4	61	.08	<.01	.10	.01
29-765	STAFFORD WC FAWN LAKES 1	02DEC81	11.5	24	5.7	2	20	<.10	<.01	.10	.02
29-767	OCEAN COUNTY MEDICAL PAR	10MAY82	14.0	113	5.0	4	60	2.9	<.01	2.9	.52
29-768	STAFFORD TWP SCHOOL 2-80	06MAY82	12.0	29	5.7	4	19	<.05	<.01	.06	.03
29-769	OCEAN CO AIRPARK	10MAY82	13.5	23	5.3	4	20	.14	<.01	.14	.02

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in milligrams per liter.]
[A dash indicates that constituent was not determined.]

Well number	WATSTORE identifier	Date of sample	Phosphorus	Orthophosphate	Organic carbon	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulfate	Silica (as SiO2)
						KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued						
29-683	394134074091801	04MAY82	.04	.04	.30	7.0	3.7	6.0	.75	7.0	9.0	-
29-684	393608074210002	17MAY82	<.01	<.01	<.30	.36	.19	2.1	1.2	4.0	2.0	-
29-685	395326074095601	18MAY82	<.01	-	<.30	.82	.36	3.0	1.5	5.0	8.0	-
29-686	400259074071801	12MAY82	.72	.72	.50	5.7	1.0	9.9	4.1	2.0	5.0	-
29-688	400415074053001	03MAY82	<.01	<.01	1.2	2.4	6.3	9.0	.69	14	9.0	-
29-689	400549074051601	21APR82	.34	.32	.70	1.9	.38	5.8	3.5	4.0	6.0	-
29-690	400615074074901	25MAY82	.08	.03	.50	1.0	.18	2.9	1.6	4.0	4.0	-
29-691	395756074083401	28APR82	<.01	<.01	.70	2.0	1.7	14	2.0	20	<1.0	-
29-692	400102074085901	05MAY82	<.01	<.01	.90	1.7	3.1	11	.12	16	2.0	-
29-694	400214074080501	03MAY82	<.01	<.01	.80	-	-	16	-	15	<1.0	-
29-695	400242074131801	27APR82	<.01	<.01	.70	.10	.17	3.3	.17	4.0	2.0	-
29-696	400455074160301	04MAY82	<.01	<.01	.30	.42	1.4	9.7	.10	14	<1.0	-
29-701	395003074113401	12MAY82	<.01	<.01	1.6	.35	.19	1.9	1.4	3.0	8.0	-
29-702	395046074114701	22APR82	<.01	<.01	1.2	.26	.30	4.9	.35	8.0	1.0	-
29-703	395050074051901	20MAY82	<.01	<.01	4.8	.45	.13	9.5	2.6	2.0	7.0	-
29-704	400044074185901	27APR82	<.01	<.01	2.4	7.6	.50	17	.10	23	16	-
29-705	400511074102901	27APR82	.24	.24	1.1	3.3	.54	3.3	2.8	4.0	2.0	-
29-706	395615074205901	04MAY82	<.01	<.01	.20	.31	.18	2.3	.38	3.0	1.0	-
29-707	395748074215601	21APR82	<.01	<.01	.40	.36	.10	2.4	.10	4.0	1.0	-
29-708	400107074182101	27APR82	<.01	<.01	.90	1.5	1.0	6.3	.76	10	18	-
29-709	395431074100601	27APR82	-	-	.50	.60	.49	6.0	.80	8.0	8.0	-
29-710	395528074160001	10MAR82	.10	<.01	.50	.39	.04	1.9	.12	3.0	2.0	-
29-711	400204074150701	19APR82	.01	<.01	.30	.71	.50	3.9	1.1	5.0	1.0	-
29-712	400241074131901	20JAN82	<.01	<.01	<.30	.32	1.0	23	.80	34	1.0	-
29-716	395134074113201	31MAR82	<.01	<.01	.60	.42	.33	3.1	.58	6.0	2.0	-
29-717	400457074092601	22MAR82	.25	.25	.30	3.4	1.4	3.7	1.5	5.0	8.0	-
29-718	395550074072301	12MAY82	.22	.22	-	7.8	2.1	3.8	2.4	6.0	3.0	-
29-719	400228074275601	26MAY82	<.01	<.01	.50	.21	.22	.58	.10	2.0	<1.0	-
29-721	395704074222501	29MAR82	<.01	<.01	1.5	.28	.12	1.0	.42	3.0	2.0	-
29-722	400102074104802	26APR82	<.01	<.01	.40	2.2	3.3	7.2	3.1	13	<1.0	-
29-724	395204074115401	31MAR82	<.01	<.01	.80	.30	.24	1.9	2.0	4.0	9.0	-
29-725	400107074182501	27APR82	<.01	<.01	.70	.94	.48	2.0	.36	6.0	4.0	-
29-726	400432074083101	12NOV81	<.01	<.01	.50	9.8	.66	197	1.5	300	16	-
29-727	405832074154901	27MAY82	<.01	<.01	.40	.46	.58	2.3	.32	5.0	<1.0	-
29-728	400142074063101	24MAY82	<.01	<.01	.90	1.5	3.3	6.6	.84	11	2.0	-
29-729	400226074140001	22JUN82	-	<.01	<.30	.20	.70	2.7	.40	4.2	<1.0	5.1
29-730	394000074190401	24JUN82	-	-	.30	.25	.59	3.7	.40	5.6	3.0	4.4
29-731	394823074135801	24JUN82	-	-	<.30	.65	.27	2.3	1.4	3.9	11	13
29-732	395230074125302	21JAN82	.01	<.01	<.30	.65	.24	5.3	.22	5.0	1.0	-
29-733	400426074204201	29JUN82	-	<.01	.60	.06	.19	1.9	.20	2.9	1.0	9.1
29-735	395741074212701	29MAR82	<.01	<.01	.60	5.8	.16	3.4	.45	6.0	5.0	-
29-736	400029074104101	24JUN82	-	-	.30	.22	.47	3.4	.30	5.1	<1.0	5.1
29-737	394424074140301	11MAY82	<.01	<.01	2.6	.36	.42	10	.38	12	2.0	-
29-738	395325074121701	21DEC81	.02	.01	.40	9.8	3.8	9.5	3.2	12	1.0	-
29-742	400009074140501	24MAY82	.08	.01	1.0	1.5	.13	1.6	1.3	2.0	8.0	-
29-743	394728074120201	28APR82	<.01	<.01	.40	2.3	1.4	4.9	.69	8.0	2.0	-
29-745	400412074280901	20MAY82	<.01	<.01	.60	-	-	-	-	7.0	30	-
29-746	400426074145301	19MAY82	<.01	<.01	1.0	.61	1.0	3.2	1.0	5.0	2.0	-
29-747	395430074104901	23FEB82	<.01	<.01	1.5	.97	.28	4.2	.60	6.0	10	-
29-749	400124074104901	13MAY82	<.01	<.01	1.3	1.2	1.0	6.6	.78	12	2.0	-
29-750	400229074144101	19MAY82	<.01	<.01	.60	.18	.85	3.3	.94	4.0	2.0	-
29-752	400535074082301	27MAY82	.01	<.01	1.3	4.7	1.7	36	1.6	55	10	-
29-753	400710074171401	28APR82	.03	.03	.60	.34	.15	2.8	.39	4.0	2.0	-
29-754	400525074080701	27MAY82	.01	<.01	1.1	9.4	2.1	6.6	2.5	11	30	-
29-755	395654074233701	28APR82	<.01	<.01	.80	-	-	-	-	-	-	-
29-756	395048074051901	13MAY82	.05	.04	2.1	1.2	.53	6.7	2.1	3.0	10	-
29-757	400100074163701	23NOV81	<.01	<.01	<.30	.07	.36	2.3	.21	3.0	<1.0	-
29-759	400126074160301	05MAY82	<.01	<.01	.60	.06	.38	1.9	.10	4.0	<1.0	-
29-760	400106074140001	19MAY82	<.01	<.01	.50	1.5	3.0	6.1	1.8	10	<1.0	-
29-761	395809074070601	19MAY82	<.01	<.01	.60	.30	.49	5.0	.48	8.0	<1.0	-
29-762	400022074140501	14DEC81	.34	.34	-	8.7	3.8	5.0	2.2	6.0	22	-
29-763	393827074183001	03MAR82	<.01	<.01	1.1	.52	.08	2.2	.57	4.0	2.0	-
29-764	400356074041701	03MAR82	.04	.04	1.5	2.0	.41	7.9	2.3	13	2.0	-
29-765	394511074183001	02DEC81	<.01	<.01	<.30	.30	.20	2.5	.31	4.0	<1.0	-
29-767	400416074071801	10MAY82	.01	<.01	1.2	.53	.53	12	1.1	11	16	-
29-768	394205074165701	06MAY82	<.01	<.01	.20	.45	.16	2.5	.25	4.0	2.0	-
29-769	395554074173501	10MAY82	<.01	<.01	.30	.23	.15	1.8	.20	3.0	1.0	-

Table 12.--Chemical analyses of well-water samples.--Continued
[All constituents are dissolved. Concentrations in micrograms per liter.]
[A dash indicates that constituent was not determined.]

Well number	Dste of sample	Barium	Beryllium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Silver	Strontium	Zinc
KIRKWOOD-COHANSEY AQUIFER SYSTEM--Continued												
29-683	04MAY82	<100	<5	<5	<50	<20	3800	<100	100	<10	-	<5
29-684	17MAY82	<100	<5	<5	<50	180	<30	<100	10	<10	-	390
29-685	18MAY82	<100	<5	<5	<50	140	1400	<100	15	<10	-	20
29-686	12MAY82	<100	<5	<5	<50	<20	760	<100	14	<10	-	-
29-688	03MAY82	<100	<5	<5	<50	<20	100	<100	20	<10	-	40
29-689	21APR82	<100	<5	<5	<50	<20	1900	<100	13	<10	-	50
29-690	25MAY82	<100	<5	<5	<50	<20	1000	<100	<10	<10	-	200
29-691	28APR82	<100	<5	<5	<50	100	350	<100	20	<10	-	160
29-692	05MAY82	<100	<5	<5	<50	28	340	<100	20	<10	-	10
29-694	03MAY82	<100	<5	<5	<50	230	<30	<100	<10	<10	-	30
29-695	27APR82	<100	<5	<5	<50	<20	60	<100	<10	<10	-	6
29-696	04MAY82	<100	<5	<5	<50	25	210	<100	21	<10	-	1600
29-701	12MAY82	<100	<5	<5	<50	<20	440	<100	<10	<10	-	-
29-702	22APR82	<100	<5	<5	<50	480	420	<100	11	<10	-	110
29-703	20MAY82	<100	<5	<5	<50	<20	100	<100	20	<10	-	<5
29-704	27APR82	<100	<5	<5	<50	<20	210	<100	14	<10	-	20
29-705	27APR82	<100	<5	<5	<50	<20	1500	<100	25	<10	-	60
29-706	04MAY82	<100	<5	<5	<50	<20	770	<100	<10	<10	-	230
29-707	21APR82	<100	<5	<5	<50	39	<30	<100	<10	<10	-	10
29-708	27APR82	<100	<5	<5	<50	<20	1100	<100	88	<10	-	20
29-709	27APR82	<100	<5	<5	<50	<20	910	<100	26	<10	-	100
29-710	10MAR82	<100	<5	<5	<50	420	470	<100	10	<10	-	60
29-711	19APR82	<100	<5	<5	<50	25	550	<100	21	<10	-	10
29-712	20JAN82	<100	<5	<5	<50	310	490	<100	23	<10	-	40
29-716	31MAR82	<100	<5	<5	<50	54	240	<100	<10	<10	-	110
29-717	22MAR82	<100	<5	<5	<50	<20	1300	<100	15	<10	-	<5
29-718	12MAY82	<100	<5	<5	<50	<20	1300	<100	84	<10	-	-
29-719	26MAY82	<100	<5	<5	<50	200	<100	<100	<10	<10	-	10
29-721	29MAR82	<100	<5	<5	<50	<20	130	<100	<10	<10	-	20
29-722	26APR82	<100	<5	<5	<50	27	420	<100	33	<10	-	60
29-724	31MAR82	<100	<5	<5	<50	<20	410	<100	<10	<10	-	30
29-725	27APR82	<100	<5	<5	<50	<20	110	<100	26	<10	-	10
29-726	12NOV81	<100	-	-	-	-	1300	-	94	-	-	-
29-727	27MAY82	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	20
29-728	24MAY82	<100	<5	<5	<50	<20	200	<100	30	<10	-	20
29-729	22JUN82	-	-	<1	<10	2	71	4	7	-	-	60
29-730	24JUN82	-	-	1	<10	-	130	-	66	-	-	140
29-731	24JUN82	-	-	<1	<10	41	1900	2	21	-	-	44
29-732	21JAN82	<100	<5	<5	<50	140	130	<100	<10	<10	-	10
29-733	29JUN82	-	-	1	10	2	12000	1	26	-	-	700
29-735	29MAR82	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	<5
29-736	24JUN82	-	-	<1	<10	730	84	2	<10	-	-	440
29-737	11MAY82	<100	<5	<5	<50	160	<30	<100	<10	<10	-	-
29-738	21DEC81	100	<5	<5	<50	32	<30	<100	88	<10	-	20
29-742	24MAY82	<100	<5	<5	<50	<20	2000	<100	13	<10	-	10
29-743	28APR82	<100	<5	<5	<50	25	40	<100	<10	<10	-	50
29-745	20MAY82	<100	<5	<5	<50	33	40	<100	11	<10	-	10
29-746	19MAY82	<100	<5	<5	<50	64	70	<100	13	<10	-	380
29-747	23FEB82	<100	<5	<5	<50	20	470	<100	<10	<10	-	40
29-749	13MAY82	<100	<5	<5	<50	20	420	<100	13	<10	-	310
29-750	19MAY82	<100	<5	<5	<50	69	170	<100	13	<10	-	<5
29-752	27MAY82	<100	<5	<5	<50	<20	80	<100	70	<10	-	<5
29-753	28APR82	<100	<5	<5	<50	<20	1400	<100	70	<10	-	290
29-754	27MAY82	<100	<5	<5	<50	<20	90	<100	79	<10	-	10
29-755	28APR82	<100	<5	<5	<50	22	170	<100	<10	<10	-	10
29-756	13MAY82	<100	<5	<5	<50	<20	1100	<100	13	<10	-	10
29-757	23NOV81	<100	<5	<5	<50	<20	<30	<100	<10	<10	-	10
29-759	05MAY82	<100	<5	<5	<50	40	140	<100	<10	<10	-	8
29-760	19MAY82	<100	<5	<5	<50	95	30	<100	<30	<10	-	<5
29-761	19MAY82	<100	<5	<5	<50	52	360	<100	<10	<10	-	10
29-762	14DEC81	<100	<5	<5	<50	<20	1100	<100	63	<10	-	90
29-763	03MAR82	<100	<5	<5	<50	<20	160	<100	<10	<10	-	<5
29-764	03MAR82	-	<5	<5	<50	<20	600	<100	14	<10	-	30
29-765	02DEC81	<100	<5	<5	-	<20	70	<100	<10	<10	-	10
29-767	10MAY82	<100	<5	<5	<50	<20	480	<100	70	<10	-	-
29-768	06MAY82	<100	<5	<5	<50	<20	60	<100	<10	<10	-	-
29-769	10MAY82	<100	<5	<5	<50	<20	80	<100	<10	<10	-	-

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986-613-412