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THE WATER RESOURCES OF SOMERSET, WICOMICO AND WORCESTER COUNTIES

THE GROUND-WATER RESOURCES

By William C. Rasmussen and Turbit H. Slaughter

WITH A SECTION ON THE SALISBURY AREA

By Rex R. Meyer and Robert R. Bennett

THE SURFACE-WATER RESOURCES

By Arthur E. Hulme

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THE WATER RESOURCES OF SOMERSET, WICOMICO AND WORCESTER COUNTIES

The Ground-Water Resources

BY

WILLIAM C. RASMUSSEN AND TURBIT H. SLAUGHTER

Abstract

Somerset, Wicomico, and Worcester Counties, the lower three counties of the Eastern Shore, have abundant ground water available for development. A conservative estimate indicates 360 million gallons per day of water suitable for most purposes available for an indefinite period from water-bearing beds within the uppermost 500 feet of the sedimentary sequence. This is about 30 times as much as the current use, estimated at 12.4 million gallons a day. Many million more gallons of somewhat mineralized water are available for restricted uses or for general purposes after treatment.

The water occurs in 14 aquifers, which range in depth from the surface to more than 7,700 feet below the surface. Four of these aquifers are used extensively down to depths of 300 feet. Eight of the aquifers are used to a slight extent in most of the area but to an important extent locally, and wells in them produce from depths as great as 1,706 feet. Two of the aquifers lie at depths of several thousand feet and have not been tapped for water.

Somerset, Wicomico, and Worcester Counties are part of the Atlantic Coastal Plain. The land forms of the Coastal Plain have an important effect upon the retention and infiltration of rainfall, the retardation of runoff, and the discharge of ground water by evapotranspiration. Remnants of six coastal marine terraces account for the flatness of the landscape and the low stream gradients. Poorly drained oval-shaped depressions, ranging in size from 7 acres to over 17,000 acres, bounded by sandy rims of low relief are the most important minor land form. Meandering tidal streams, rejuvenated headwaters, older remnant barrier beaches, dunes, and periglacial soils are other land forms that control the entrance and discharge of ground water.

Above the basement, at depths ranging from 4,000 to 7,850 feet, brown shales, intercalated gray sands and shales, red and bottle-green sandstones, and an indurated basal conglomerate comprise 135 to 585 feet of rock which forms a doubtful aquifer, probably containing warm, highly mineralized water. It is correlated with the Triassic system. Overlying the Triassic rocks is a series

of thick sands and thin shales, 600 to 2300 feet in thickness, correlated with the Patuxent formation of Early Cretaceous age. These are overlain by more than 3000 feet of thick sands and shales of the Patapsco, Arundel, and Raritan formations of Late Cretaceous age, which generally contain salty and brackish water. One well yields a large flow of usable water from the Raritan formation at Smith Island, Somerset County.

The Raritan formation is overlain by the Magothy formation, also of Late Cretaceous age, consisting of lignitic sand and shale, 30 to 120 feet thick, representing a transition from underlying non-marine sediments to overlying marine sediments. The Magothy formation is a persistent aquifer, encountered at depths ranging from 760 feet below sea level on the west to 2,400 feet below sea level on the east. Large to moderate yields of usable water are obtained from flowing wells at Crisfield and Smith Island in southwestern Somerset County.

Overyling the Raritan formation are the Matawan and Monmouth formations, the uppermost units of the Upper Cretaceous series. They are dark-green glauconitic sands and lead-gray clays, containing marine shells and Foraminifera. They function as an aquiclude.

The Cretaceous system is succeeded by the Tertiary system, predominantly marine sands and clays, divided from oldest to youngest into the Paleocene, Eocene, Miocene, and Pliocene series.

The Paleocene series consists of alternate beds of gray, green, and brown clay and gray glauconitic sand. The sand yields water to a few wells of moderate to large capacity at depths of about 1,000 feet at Crisfield in Somerset County.

The Eocene series represented chiefly by a white quartz sand and glauconitic greensand, equivalent of the Jackson group, yields moderate quantities of slightly saline water to wells on Deal Island and Rumbley, Somerset County, at depths of 588 and 726 feet, respectively, and to a well on the Isle of Wight, Worcester County, which has been flowing for 40 years, yielding a highly mineralized warm water from 1,706 feet depth. A deep city well at Crisfield derives a large quantity of potable water in part from this group.

The Miocene series contains the important artesian aquifers which are, in general, reached within 1,000 feet of the land surface in Somerset, Wicomico, and Worcester Counties.

The lowermost formation of the Miocene series is the Calvert, composed of gray diatomaceous silts and clays, containing lenses of gray sand, shell beds and Foraminifera. It is generally an aquiclude, about 400 feet thick, but it does contain the Nanticoke aquifer, named for production of water in the tributary area of the Nanticoke River, at Sharptown and Mardela Springs in Wicomico County, and Vienna in Dorchester County. The aquifer is a gray sand, about 40 feet thick, at the top of the formation, between 200 and 500 feet below land surface. According to a short aquifer test at Fruitland, central Wicomico County, it has a coefficient of transmissibility of 5,500 gpd/ft. and a coefficient of storage of .00011. The water is soft, high in sodium bicarbonate, and low in iron.

Overlying the Calvert formation is the Choptank formation, a gray and brown sand and clay containing shell marl and Foraminifera. The Choptank averages about 120 feet thick, and functions as an extensive aquifer, but it yields water high in dissolved solids.

The St. Marys formation, overlying the Choptank formation, is an extensive clayey-silt aquiclude. It is not known to yield water from wells, but it performs a useful function by preventing the brackish waters of the underlying Choptank formation from contaminating the waters of the overlying Yorktown and Cohansey formations(?).

The Yorktown and Cohansey formations(?) contain two important aquifers and two aquicludes. The basal unit, the Manokin aquifer, is extensively developed in the environs of the Manokin River, Somerset County. It is overlain by a clayey silt, called the lower aquiclude. The Pocomoke aquifer, extensively developed in the tributary area of the Pocomoke River, is a persistent sand above the lower aquiclude. The Pocomoke aquifer is overlain by a bed of sandy clay called the upper aquiclude.

The Manokin aquifer is the principal water-bearing source for Princess Anne, Snow Hill, and Ocean City and provides large to small quantities of water to many wells over much of the tri-county area. Its intake belt is 6 to 8 miles wide, lying beneath a relatively thin mantle of the formations of Pleistocene and Pliocene(?) age in western Wicomico County. It dips southeast about 10 feet to the mile to depths of more than 300 feet below sea level in the southeast corner of the area. It is a gray, coarse to fine sand, about 80 feet thick. The water is suitable for most purposes in the northern three-quarters of the area, but it has a high chloride content, over 250 ppm, and high dissolved solids in the southern fourth of the area.

The Pocomoke aquifer is the principal aquifer at Pocomoke City, and an important source for Ocean City. It is a gray, predominantly medium-grained sand, with an average thickness of 45 feet, which yields fairly large quantities of water to a few wells and moderate to small quantities to many wells, chiefly in Worcester County. The quality of water is suitable for most purposes. The intake zone, covered by a permeable mantle of Pleistocene and Pliocene(?) deposits, crosses Somerset, Wicomico, and Worcester Counties as a diagonal belt, 6 to 7 miles wide, from the mouth of the Big Annemessex River through Pittsville into the State of Delaware. The aquifer slopes southeasterly to a depth of more than 200 feet below sea level beneath Assateague Island.

The Miocene series is overlain by a red gravelly sand, deposited as a valley fill, and found in wells beneath most of the area. It does not contain fossils but is correlated by lithology with the Brandywine and Bryn Mawr formations of Pliocene(?) age, which occupy high-level terraces on the edge of the Piedmont. The red gravelly sand is the aquifer of highest permeability and locally of highest yield in the tri-county area. It is the principal aquifer for the city of Salisbury where tests show it to have an average coefficient of transmissibility of 100,000 gpd/ft. and a coefficient of storage of 0.15. The red gravelly sand functions with overlying sands of Pleistocene age as a single aquifer under water-table conditions. The waters are slightly irony and low in pH (6.3), but in other respects are the purest waters in the area.

The Quaternary system overlies the Tertiary system, with deposits of the Pleistocene and Recent epochs. The Pleistocene deposits form the most important aquifer in Somerset, Wicomico, and Worcester Counties. They are capable of large yields of ground water and supply about 72 percent of the wells inventoried. Berlin, Worcester County, has large municipal wells in the Pleistocene series. The Pleistocene deposits are predominantly sand, have an average thickness of 50 feet, and cover the entire area. The water is slightly irony to irony, but otherwise good.

In general the quality of the waters is good, but iron is a problem. There is the possibility of salt-water contamination in the coastal areas, particularly bordering Chesapeake Bay. The deeper aquifers are brackish to highly mineralized.

The problems of well construction, particularly the high screen loss which increases the pumping lift and thereby reduces the yield of wells, are described and illustrated, because it appears to place a special limitation on high capacity wells which have only 40 or 50 feet of available drawdown, such as those of the city of Salisbury. A hydrograph analysis of 14 years of record on Beaverdam Creek enabled determination of an average ground-water runoff of 602,000 gallons a day per square mile.

INTRODUCTION

LOCATION OF AREA AND PURPOSE OF INVESTIGATION

Somerset, Wicomico, and Worcester Counties are in the southern part of the Eastern Shore, in the southeastern corner of the State (fig. 1). These three counties are in the approximate center of the Delmarva Peninsula, with Salisbury, the county seat of Wicomico County, 100 miles south of Wilmington, Delaware, and 100 miles north of Cape Charles, Virginia.

Somerset County has an area of 597.10 square miles, of which 334.89 square miles is land and 262.21 square miles is water. Wicomico County has an area of 397.98 square miles, of which 378.37 square miles is land and 19.61 square miles is water. Worcester County has an area of 586.92 square miles, of which 482.54 square miles is land and 104.38 square miles is water. Total area for the three counties is 1,582.00 square miles: land area 1,195.80 square miles, and water area 386.20 square miles (Gazetteer of Md., 1941, p. 239). The use of sur-

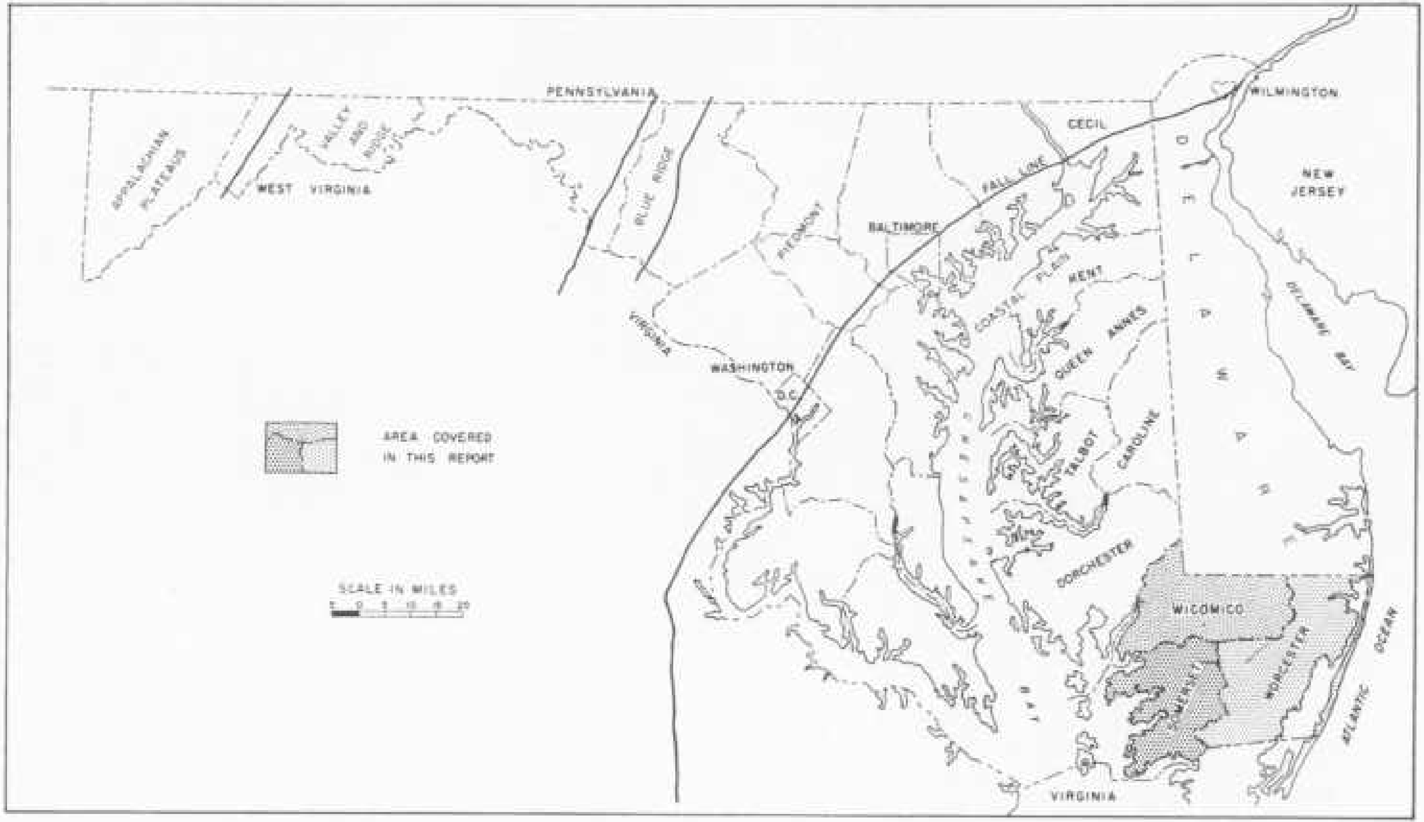

FIGURE 1. Map of Maryland showing Physiographic Provinces and Area covered by this Report

face water in the area is confined to a few pumping installations on the creeks or on excavated ponds fed by ground water, which use the water for supplemental irrigation.

A cooperative study of ground-water resources on the Eastern Shore was begun in July, 1947, by Robert R. Bennett and Rex R. Meyer with an investigation of the Salisbury area, Wicomico County, for the City of Salisbury. In July, 1949, a systematic cooperative investigation of the ground-water resources of the nine Eastern Shore Counties was initiated under a five-year program. The work in the Salisbury area was extended to include the three counties covered in this report. A preliminary report by Bennett and Meyer, giving the principal conclusions of the Salisbury study, was released in mimeographed form in 1948. A later unpublished detailed report by Bennett and Meyer was drawn on freely in this report, and portions of its text and numerous illustrations are used. The remainder of it, in modified form, is included in this report as a section on the Salisbury area under the names of Bennett and Meyer.

The investigation of the ground-water resources of the three counties was made under the general supervision of Dr. A. Nelson Sayre, Chief of the Ground Water Branch of the U. S. Geological Survey, and under the immediate supervision of William C. Rasmussen, Area Geologist of the U. S. Geological Survey in charge of cooperative ground-water investigations on the Eastern Shore, assisted by Turbit H. Slaughter, Assistant Geologist of the Maryland Department of Geology, Mines and Water Resources. Other members of the Eastern Shore cooperative ground-water staff who participated in some parts of the investigation are Gordon E. Andreasen, Reginald P. Bailey, Durward H. Boggess, Joseph W. Brookhart, Glenn G. Collins, O. Jack Coskery, Leonard H. Larsen, Brice M. Sumner, and Louis P. Vlangas.

SCOPE OF INVESTIGATION

The investigation included a systematic canvass of 1,668 water wells—industrial, public supply, and domestic—constituting an estimated 10 percent of the wells in the area but a much larger percentage of the high-capacity wells. A total of 323 well logs were compiled from completion reports submitted to the Department of Geology, Mines and Water Resources between 1945 and 1953 by well drillers. Additional well logs, totaling 154, were collected from well drillers, water superintendents, consulting engineers, and others (Tables 41, 42, and 43).

To obtain additional hydrologic and lithologic data, 48 test holes totaling 3,361 feet were drilled or power augered, 17 holes averaging 115 feet deep were drilled by jetting, and 31 holes averaging 45 feet deep were bored with a power auger. In Wicomico County 111 holes averaging 10 feet deep were augered by hand. In addition to the samples obtained from the test holes, samples were obtained from wells being drilled, collected either by the ground-water staff or by the drillers. From the three counties a total of 4,475 samples, representing 16,830 feet of hole, were collected. Descriptive logs were prepared on 29 wells in Wicomico County, with an aggregate depth of 3,381 feet, but such work was discontinued because the results did not appear to justify the effort involved. Instead, 288 graphic strip logs, 105 sand logs, and 77 peg logs were made.

To determine fluctuations of water levels in the three counties, ten drilled wells were established as observation wells and observation wells were driven at 6 other locations. Measurements on one drilled well at Ocean City were subsequently discontinued. Two of the drilled wells were equipped with automatic water-stage recorders. One drilled well was measured daily by tape. One driven well and two drilled wells were measured weekly. Four drilled wells and five driven wells were measured monthly. Observations are being continued on most of these wells. More than 500 water levels were measured in the course of the well canvass, and about 5,200 water levels were measured in the infiltration studies.

Thirteen well-field tests were conducted at 11 sites: 7 in the Salisbury area, 4 at Ocean City, 1 at Pocomoke City, and 1 at Princess Anne. The coefficients of transmissibility and storage were determined for 5 aquifers: the Pleistocene and Pliocene aquifers (7 tests), the Manokin aquifer (2 tests), the Pocomoke aquifer (3 tests), and a stringer sand of Miocene age (1 test).

Microfossils, chiefly Foraminifera, with a few Mollusca, were identified for stratigraphic correlation in 11 wells, comprising samples from 5,568 feet of hole. Stratigraphic correlations based on microfossils by oil geologists and others were available for 7 other wells. The total microfossil study made in this tri-county area, including the work by oil geologists and others, was thus brought to 18 wells, comprising samples from 29,792 feet of hole.

Detailed hydrologic and infiltration studies were made of the Beaverdam Creek and the Rewastico Creek basins in Wicomico County. For these studies 66 observation wells were driven to depths ranging from 10 to 30 feet and the water levels in them were measured weekly for periods of 1 to 2 years; 18 rain gages, 8 staff gages, and 6 soil-moisture stations were established; and records from stream gaging stations on the two basins were utilized. A standard class A evaporation station was built at the Salisbury office at which daily observations were made.

The gravels of western Wicomico and northwestern Somerset Counties were investigated for possible evidence of a former river channel. Numerous other sand pits, gravel pits, brick yards, road cuts, soil profiles, sand dunes, and clay-based dunes were examined in studying the surficial Pleistocene features. Good natural vertical exposures are rare in the three counties, only 27 having been found. Three short Pleistocene sections were measured.

Water samples collected from 52 wells were analyzed by the U. S. Geological Survey. Complete analyses were made on 34 and partial analyses on 18. Analyses of the water from 55 wells were compiled from other sources.

Sizable areas occur within these three counties where productive wells have not been drilled, where driven wells predominate, and records of wells are lacking, meager or inaccurate. Furthermore many wells penetrate only the uppermost 100 or 200 feet. The description of ground-water conditions involves, therefore, considerable interpolation and extrapolation. However, the quantitative estimates, though based on few and widely scattered aquifer tests and incompletely defined ground-water reservoirs, are believed to be of the right order of magnitude. The water analyses, averaging only about 10 for each aquifer, or one analysis for each 11 square miles of land area, are only generally indicative of the regional and local quality of the ground water.

ACKNOWLEDGMENTS

The authors wish to thank the well drillers, consulting engineers, city water superintendents and operators, industrialists, farmers, and many other citizens for their assistance in providing information. Particular thanks are due to Clarke Gardner, former city engineer of Salisbury; Philip Cooper, city engineer of Salisbury; Earl Pierce, city manager of Ocean City; J. Elton Mason, councilman, and Arthur Brittingham, chief of police of Pocomoke City; and E. J. Revelle, chief of police, of Princess Anne for cooperation in well-field tests.

Kendall P. Jarvis, engineering specialist, William S. Ott, area conservationist, Morris R. Nichols, work unit conservationist of Wicomico County, Paul E. Sigrist, work unit conservationist of Somerset County, and Francis O. Leh, work unit conservationist of Worcester County, cooperated in many ways. Frank Z. Hutton, Sr., soil scientist, and Merle F. Hershberger, state soil scientist, were consulted on the physiography of soils. These men are all members of the Soil Conservation Service, U. S. Department of Agriculture.

WELL-NUMBERING SYSTEM

The locations of the wells listed in this report are plotted on county maps which are divided into 5-minute quadrangles of latitude and longitude (Pls. 6, 7, and 8). Beginning at the top of the map and extending downward, uppercase letters designate 5-minute segments of latitude; and beginning at the left and extending to the right side of the map, lowercase letters designate 5-minute segments of longitude. Each county has its own series of quadrangle letters which do not correspond with the overlapping or adjacent quadrangle letters of adjoining counties.

The wells are listed by coordinate letters and consecutive numbers. For example, in Wicomico County, a well in Fruitland is located in the De quadrangle. The first well canvassed in that quadrangle is De 1; other wells in the quadrangle are assigned consecutive numbers in the order canvassed. The county abbreviation is used with a hyphen before the coordinate letters and number. The Dulany well is Wi-De 1, to distinguish it from Som-De 1, and Wor-De 1, which are other wells in separate quadrangles of those counties.

GEOGRAPHY

Physical Features

Somerset, Wicomico, and Worcester Counties are part of the Coastal Plain province of Maryland and of the Atlantic Coast. Essentially the area is a low-lying, very gently rolling plain. It is divided into three major drainage areas: on the west the Nanticoke-Tangier Sound system, including the Wicomico, Manokin, and Annemessex tributaries; centrally, the Pocomoke River and Sound, with its tributaries, Dividing Creek and Nassawango Creek; and a relatively narrow strip on the east, the Atlantic Ocean watershed, composed of St. Martin River, and numerous small creeks which run into Chincoteague, Sinepuxent, and Assawoman Bays, behind the barrier islands, which in turn discharge by tidal flow through the Chincoteague and Ocean City inlets to the open sea.

The topographic maps reveal a divide ridge in Wicomico County between the Nanticoke and the Pocomoke drainage basins, although the countryside appears so flat that the ridge would be recognized only by experienced observers. This broad, low ridge trends approximately north and south and stands at an elevation ranging from 60 to 85 feet above sea level, with the town of Parsonsburg on the crest, at the highest elevation in the area. From the Parsonsburg divide the land slopes almost imperceptibly towards the north, east, south, and west. About two-thirds of the tri-county area is less than 40 feet above sea level, and almost half is less than 20 feet above sea level.

Within the last three centuries small dams have been installed at places where the valleys narrow, creating numerous small fresh-water ponds. Spillway heights are 10 to 20 feet. These were originally mill ponds to provide water power to grind grain. Examples in Wicomico County are Schumaker and Parker Ponds on Beaverdam Branch of the Wicomico River; Johnson and Leonard Ponds near the head of the Wicomico River; Tonytank Pond at Fruitland; Adkins Pond at Powellville; Barren and Mockingbird Ponds near Mardela Springs; and Rewastico Pond on Rewastico Creek. In Somerset County ponds are rare, although there are two ponds at the head of Wicomico Creek near Allen. In Worcester County ponds are rare, although there are two mill ponds on Swanscut Creek near Welbourne and Trappe Mill Pond near Berlin.

Salt marshes are common along the tidal rivers. In western Wicomico County along the Nanticoke River is a salt marsh approximately 20 square miles in area. In Somerset County, South Marsh Island and Smith Island are almost entirely salt marshes; and Deal Island, Fairmount Neck, and Crisfield Neck are bordered by large salt marshes. Worcester County has only a few small salt marshes adjacent to Chincoteague, Sinepuxent, and Assawoman Bays.

Fresh-water swamps are also common. Poplar Hill swamp in southwestern Wicomico County covers about a dozen square miles. The Pocomoke River has its headwaters in the great Cedar swamp, which is principally in Delaware, but extends into Worcester and Wicomico Counties. Cypress Swamp is a large swamp in southwestern Worcester County, and numerous smaller swamps are tributary to the Pocomoke River. Dublin Swamp in Somerset County covers a large area.

The rivers and many of the creeks are meandering tidal streams for several miles from their mouth: the Nanticoke River is tidal for over 35 miles to Seaford, Delaware; the Pocomoke River is tidal for more than 23 miles, from Pocomoke Sound to a short distance above Snow Hill; the Wicomico River is tidal for about 24 miles, from Tangier Sound to Salisbury. Because these tidal rivers were the chief routes of transportation when the area was settled, the head of the tides became the site of many of the cities and towns: Salisbury on the Wicomico; Princess Anne on the Manokin; Snow Hill on the Pocomoke; and Quantico on Quantico Creek.

Above the head of the tides the rivers branch into creeks with a typical dendritic drainage pattern. The drainage is consequent upon the strike of Tertiary rocks, which is southwest, in combination with the initial Pleistocene sedimentary slope, which is south, so that the drainage, except for a narrow strip along the coast in Worcester County, is predominantly south and southwest. Despite abundant rainfall the land is not extensively dissected, due to the low elevations of the land, the fairly high permeability of the soil, and the rapid healing of gully scars by sandy wash. The valleys have a mature appearance which is probably due to the low resistance to erosion of the unconsolidated sediments and not to a long period of development.

More than one-third of the land area is wooded, in pine, oak, gum, cypress, and cedar. Several large forests cover central areas on the interstream divides. The soils are loams, loamy sands, sandy loams, silt loams, and clay loams. They are in general highly permeable.

Because of the abundant rainfall and of the presence of many local layers of fine-grained sediments at shallow depths, a high water table exists in many places, particularly in the wet seasons. Extensive drainage systems have been developed under public sponsorship, chiefly on the tributaries of the Pocomoke River.

The Maryland Eastern Shore has been terraced by the sea within fairly recent geological time, but terracing is not apparent except to the trained eye. Numerous dune and bar-like features at elevations from 0 to 85 feet above sea level give evidence of former shoreline conditions.

Eastern Worcester County has a beautiful ocean beach along the barrier islands, extending the length of the shore from Delaware to Virginia. The desert beach, with dunes and stunted trees, makes a picturesque landscape. The large bays behind the sand bar are shallow, seldom more than 4 feet deep, with a dredged inland waterway.

Climate

Precipitation

Table 1 presents precipitation records for Crisfield in Somerset County, Salisbury in Wicomico County, and Snow Hill in Worcester County, and the average of the three from 1932 to 1952. Records of the U. S. Weather Bureau for these stations are 33, 46, and 37 years, respectively, but with frequent gaps in the early years. Mean annual precipitation of the tri-county area over the selected period is 46.25 inches.

Rainfall is fairly evenly distributed through the year although the heaviest precipitation occurs when it is most needed during the growing season in July, August, and September. The autumn is the driest part of the year with October the driest month. Both surface runoff and ground-water levels usually reach a low at this time. The rain and the light snow that fall during the winter and spring recharge the water table, because evapotranspiration is at a minimum during these seasons and a larger percentage of the precipitation percolates down to the water table. Morever, the winter rainfall is steady and persistent, and of low average intensity, giving a "ground-soaker" for several hours, whereas much of the summer rainfall is of the intensive, thundershower type, that saturates the upper few inches of soil quickly, and then runs off.

Snow falls occasionally during the winter months, but it is light and generally does not remain long on the ground. When it thaws, it usually seeps in, and not much evaporates because there are none of the dry winds which are characteristic of the continental interior.

Temperature

Table 2 lists the average monthly, annual and mean temperatures at Salisbury, Crisfield, and Snow Hill for the consecutive years of record. The mean annual temperature of the tri-county area is 57.7° F. This is about the temperature measured in the coldest well waters in the area, which are those of the shallow water-table wells which receive recharge directly from infiltrating rainfall.

Evaporation and wind

Evaporation at Salisbury (Table 3), was determined at the Cooperative Ground-Water Office from a standard 4-foot pan as part of a Weather Bureau

TABLE 1

Monthly, Annual, and Mean Precipitation at Salisbury; Crisfield; and Snow Hill (in inches)

Year	January				February				March				April			
	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average
1932	5.45	5.63	5.43	5.50	2.05	1.92	1.81	1.93	5.75	3.61	4.07	4.48	2.64	4.14	3.01	3.26
1933	2.60	3.16	3.70	3.15	4.66	5.38	4.10	4.71	1.48	2.10	2.20	1.93	5.09	3.80	3.90	4.26
1934	1.71	1.69	1.90	1.77	5.74	6.59	5.00	5.78	7.10	6.72	7.00	6.94	1.48	1.38	2.20	1.69
1935	4.97	4.34	5.10	4.80	3.09	2.50	3.20	2.93	2.98	2.56	2.80	2.78	3.86	6.25	5.00	5.04
1936	7.12	7.98	7.40	7.50	5.31	5.70	5.40	5.47	4.80	5.00	5.30	5.03	2.71	3.56	3.30	3.19
1937	6.66	8.38	9.30	8.11	2.86	2.64	2.60	2.70	2.47	3.43	2.90	2.93	5.65	6.01	6.00	5.89
1938	3.57	2.95	3.90	3.47	2.60	3.10	3.00	2.90	4.00	3.58	3.60	3.73	2.10	1.71	2.20	2.00
1939	4.40	4.47	4.20	4.36	4.50	3.81	4.10	4.14	6.40	5.58	6.70	6.23	5.90	3.99	3.70	4.53
1940	3.90	2.51	3.15	3.19	2.90	1.97	3.50	2.79	4.10	2.73	3.80	3.54	4.20	4.98	5.40	4.86
1941	3.40	3.82	3.90	3.71	2.60	2.37	3.11	2.69	2.80	2.59	2.76	2.72	3.65	4.57	3.50	3.91
1942	—	3.23	3.55	—	—	0.97	1.82	—	—	7.91	10.42	—	—	0.92	0.85	—
1943	3.48	2.90	3.25	3.21	2.86	2.75	3.92	3.18	2.96	3.02	3.94	3.31	3.09	3.34	3.25	3.23
1944	3.88	3.61	5.96	4.48	3.66	4.50	5.10	4.42	5.91	6.00	7.57	6.49	3.00	5.11	5.92	4.68
1945	3.13	3.31	3.23	3.22	4.66	4.51	5.55	4.91	2.04	2.29	2.11	2.15	1.84	3.39	2.26	2.50
1946	1.89	2.38	2.80	2.36	2.16	2.69	2.89	2.58	2.71	2.64	3.12	2.82	3.32	3.27	4.43	3.67
1947	5.45	4.59	4.72	4.92	1.14	1.50	1.63	1.42	2.02	1.93	2.25	2.07	4.00	3.30	5.45	4.25
1948	6.67	4.54	6.39	5.87	2.61	2.97	3.77	3.12	3.68	4.81	4.67	4.39	2.66	4.02	3.36	3.35
1949	4.08	1.94	4.52	3.51	4.50	3.12	4.40	4.01	4.50	3.19	—	—	3.35	2.00	—	—
1950	1.99	2.53	2.15	2.22	2.62	2.10	2.86	2.53	4.62	3.60	4.65	4.29	2.13	2.50	2.09	2.24
1951	1.47	1.86	1.88	1.74	2.11	2.29	1.97	2.12	2.56	2.71	3.48	2.92	2.50	3.20	2.97	2.89
1952	5.19	4.11	5.02	4.77	3.11	3.80	3.28	3.40	5.16	5.61	5.86	5.54	3.30	3.85	3.06	3.40
Mean				4.09				3.39				3.91				3.62

Year	May				June				July			
	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average
1932	3.14	2.69	4.60	3.48	4.10	5.32	4.30	4.57	3.18	3.48	2.80	3.15
1933	4.87	7.26	4.40	5.51	1.56	0.58	2.10	1.41	6.07	7.94	7.90	7.30
1934	9.12	8.18	7.20	8.17	1.85	3.80	3.30	2.98	6.74	5.15	4.10	5.33
1935	5.85	5.77	3.80	5.14	5.32	3.87	2.80	4.00	5.70	3.85	5.40	4.98
1936	0.31	0.48	0.60	0.46	5.63	3.58	4.40	4.54	2.66	5.65	3.10	3.80
1937	1.53	3.40	2.60	2.51	—	3.55	3.50	—	3.39	4.78	2.90	3.69
1938	3.15	2.49	2.10	2.58	5.30	7.01	7.80	6.70	9.75	15.04	11.20	12.00
1939	0.80	0.80	1.20	0.93	2.85	5.02	1.20	3.02	7.65	3.98	5.80	5.81
1940	5.10	2.81	4.34	4.08	0.85	0.29	1.20	0.78	2.60	3.48	5.60	3.89
1941	1.80	3.80	2.90	2.83	3.35	1.01	4.70	3.02	6.20	7.95	8.22	7.46
1942	—	1.14	1.52	—	—	3.47	6.68	—	—	3.47	3.95	—
1943	4.16	6.44	4.22	4.94	2.03	1.65	2.41	2.03	0.88	1.20	3.75	1.94
1944	1.19	0.14	1.70	1.01	2.99	3.72	3.72	3.48	1.84	3.56	2.87	2.76
1945	3.10	4.77	4.64	4.17	5.73	5.87	6.46	6.02	9.81	12.80	10.98	11.20
1946	6.68	6.14	6.61	6.48	1.37	3.67	3.54	2.86	3.34	3.12	4.12	3.53
1947	2.71	2.33	3.60	2.88	2.56	5.66	4.99	4.40	2.17	2.80	2.48	2.48
1948	10.38	7.37	7.89	8.55	7.56	3.16	5.41	5.38	5.15	3.91	3.57	4.21
1949	3.59	3.92	—	—	1.27	1.86	—	—	2.04	4.74	—	—
1950	3.74	2.29	2.67	2.90	1.01	1.78	2.25	1.68	5.74	5.57	7.25	6.19
1951	3.84	5.33	4.19	4.45	6.14	5.20	6.69	6.01	2.83	4.15	5.14	4.04
1952	2.65	2.81	3.20	2.89	3.30	2.58	1.60	2.49	2.28	1.71	1.98	1.99
Mean				3.89				3.63				5.04

TABLE 1—*Continued*

Monthly, Annual, and Mean Precipitation at Salisbury; Crisfield; and Snow Hill (in inches)

Year	August				September				October				November				December				Annual			
	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average	Salisbury	Crisfield	Snow Hill	Average
1932	1.81	1.06	1.20	1.36	3.12	2.98	4.60	3.57	6.76	5.87	6.70	6.44	3.20	1.95	3.30	2.82	3.40	5.12	4.50	4.34	44.60	43.77	46.32	44.90
1933	13.03	10.74	12.00	11.92	2.31	3.06	3.70	3.02	1.19	1.11	1.20	1.17	1.77	2.17	2.00	1.98	2.92	2.60	3.00	2.84	47.55	49.90	50.20	49.22
1934	4.04	4.13	2.80	3.66	8.99	5.68	10.30	8.32	2.20	1.17	1.80	1.72	4.22	4.29	3.50	4.00	2.44	2.13	2.50	2.36	55.63	50.91	51.60	52.71
1935	4.75	5.65	5.00	5.13	14.83	6.28	7.10	9.40	2.49	1.92	3.15	2.52	4.26	5.14	5.70	5.03	2.40	2.24	2.80	2.48	60.50	50.37	51.85	54.24
1936	9.84	2.89	5.00	5.91	5.76	5.21	6.70	5.89	2.77	4.04	3.90	3.57	0.87	0.75	0.90	0.84	5.48	6.01	6.10	5.86	53.26	50.85	52.10	52.07
1937	9.51	10.84	12.10	10.82	1.46	1.88	2.10	1.81	4.09	4.78	3.90	4.26	4.64	5.16	3.00	4.27	1.42	1.80	2.35	1.86	—	56.65	53.25	—
1938	2.45	1.24	0.80	1.50	8.78	9.25	8.20	8.74	3.70	2.68	3.90	3.43	3.20	2.60	2.90	2.90	2.40	2.13	2.40	2.31	51.00	53.78	52.00	52.26
1939	4.72	3.65	5.90	4.76	4.05	1.63	2.80	2.83	4.10	4.72	4.30	4.37	2.10	1.58	1.70	1.79	1.30	1.47	1.07	1.28	48.77	40.70	42.67	44.05
1940	5.24	3.52	5.30	4.69	1.90	1.71	1.00	1.54	2.05	1.60	2.10	1.92	4.90	5.37	6.70	5.65	2.85	1.93	2.20	2.33	40.59	32.90	44.29	39.26
1941	—	3.02	2.90	—	—	0.41	0.50	—	—	0.89	1.34	—	—	0.88	0.80	—	—	3.47	3.43	—	—	34.78	38.06	—
1942	—	8.06	10.31	—	—	3.28	3.61	—	—	4.49	5.04	—	1.83	1.44	2.01	1.76	3.49	3.26	3.63	3.46	—	41.64	53.39	—
1943	3.34	1.69	3.01	2.68	4.21	4.98	6.25	5.15	6.18	7.06	5.79	6.34	1.29	1.31	2.22	1.61	1.26	1.10	1.72	1.36	35.74	37.44	43.73	38.97
1944	2.26	3.60	3.50	3.12	7.59	5.70	9.07	7.45	3.56	3.18	3.38	3.37	4.09	3.61	5.73	4.48	2.04	2.02	2.70	2.25	42.01	44.75	57.22	47.99
1945	3.11	1.78	3.56	2.82	4.44	3.99	6.72	5.05	2.86	3.09	4.30	3.42	3.70	4.34	4.26	4.10	8.12	5.33	8.53	7.33	52.54	55.47	62.60	56.87
1946	4.73	3.40	4.12	4.08	2.96	5.03	2.73	3.57	2.95	2.14	3.71	2.93	2.76	2.60	4.06	3.14	2.28	1.97	2.59	2.28	37.15	39.05	44.72	40.31
1947	3.27	2.36	4.92	3.52	3.61	3.62	3.11	3.45	2.06	3.43	3.24	2.91	4.63	5.31	5.66	5.20	2.80	2.07	3.21	2.69	36.42	38.90	45.26	40.19
1948	12.01	6.02	—	—	4.54	3.33	—	—	5.59	5.04	—	—	6.54	7.85	—	—	5.20	4.04	5.07	4.77	72.59	57.06	—	—
1949	6.41	9.55	5.28	7.08	5.70	4.41	4.47	4.86	4.13	2.78	3.47	3.46	3.54	2.99	3.53	3.35	1.16	1.29	3.36	1.94	44.27	41.79	—	—
1950	2.25	2.92	4.59	3.25	4.79	3.17	3.77	3.91	1.38	1.24	0.83	1.15	3.51	2.51	3.48	3.17	2.66	2.45	4.79	3.30	36.44	32.66	41.38	36.83
1951	5.53	5.26	3.29	4.69	4.00	2.12	6.36	4.16	2.42	3.15	2.86	2.81	5.54	4.90	5.65	5.36	3.79	3.80	4.98	4.19	42.73	43.97	49.46	45.39
1952	10.90	4.44	4.73	6.69	1.24	1.77	2.98	2.00	1.64	2.29	2.25	2.06	5.05	6.04	6.85	5.98	3.75	2.75	3.94	3.48	47.57	41.76	44.75	44.69
Mean				4.87				4.71				3.21				3.55				3.14				46.25

Class A Station. Although the record of 4 years is short, and is obtained at only one site, it is considered fairly representative of the entire area and of the monthly variation. Total evaporation in general follows the temperature in

TABLE 2

Average Monthly, Annual, and Mean Temperatures at Salisbury, Crisfield, and Snow Hill

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1932....	48.0	43.5	42.2	53.1	63.3	73.2	77.0	76.6	69.8	60.0	48.0	42.0	58.0
1933....	44.2	40.7	44.1	54.0	67.2	73.8	75.1	76.6	74.2	58.2	45.5	40.5	57.8
1934....	40.4	26.7	42.2	53.4	65.3	76.3	79.8	74.7	71.5	57.9	50.9	38.9	56.5
1935....	36.3	38.1	50.4	52.0	61.7	72.9	77.5	75.0	67.9	58.3	52.3	33.4	56.4
1936....	32.7	31.1	50.6	52.2	66.0	72.6	77.1	77.6	71.4	61.4	46.7	42.1	56.8
1937....	47.1[b]	38.4	42.4	53.8[d]	63.0[e]	74.5[b]	76.8	77.6	66.4	55.9	46.8	37.4	56.7
1938....	36.9	42.3	50.3	57.8	63.7	71.8	77.7	77.8	68.7	58.6	52.2	40.8	58.2
1939....	39.4	44.6	47.1	55.0	66.6	75.4	76.1	77.8	71.5	60.6	45.1	40.2	58.3
1940....	25.3	36.3	41.3	50.2	63.5	74.3	76.2	73.8	66.5	55.0	48.5	43.8	54.6
1941....	35.9	33.8	39.2	57.0	65.9	71.7	76.4	75.5[b]	72.1[b]	64.9[b]	50.7[b]	42.6[b]	57.1
1942....	34.4[b]	34.7[b]	46.1[b]	56.2[b]	68.6[b]	75.3[b]	79.2[b]	75.5[b]	72.1[b]	60.9[b]	50.2	36.7	57.5
1943....	39.0	39.8	45.5	52.2	67.3	79.1	78.8	77.7	69.1	57.7	48.1	37.8	57.6
1944....	38.7	39.4	44.4	54.9	70.3	74.6	78.0	76.4	71.5	59.0	49.0	36.9	57.7
1945....	33.6	40.1	55.6	60.5	63.8	75.6	77.4	75.5	74.6	59.8	52.7	35.5	58.7
1946....	39.4	42.0	52.9	55.7	66.1	71.8	76.1	73.7	71.1	62.5	54.1	44.6	59.2
1947....	44.6	35.1	40.7	56.9	66.3	72.0	76.3	78.7	71.9	65.0	47.3	37.7	57.7
1948....	32.2	39.2	48.9	55.3	64.9	73.8	78.1	78.8[c]	70.5[a]	57.7[a]	55.5[a]	42.7	58.1
1949....	44.0	45.5	48.7[a]	56.5[a]	66.9[a]	75.6[a]	81.9[a]	78.0	69.6	63.9	49.7	44.4[a]	60.4
1950....	49.2[a]	40.8	44.2	52.7	63.5	73.2	76.3	74.4	68.4	62.0	49.4	37.3	57.6
1951....	40.9	40.3	45.3	55.5	64.3	72.6	78.0	75.7	70.4	61.9	47.0	43.5	58.0
1952....	42.3	41.1	46.1[a]	58.1	64.5	77.1[a]	80.9[a]	76.9	70.6	57.5	50.5	41.4	58.9
Mean..	39.3	38.7	46.1	54.9	65.4	74.2	77.7	76.4	70.5	59.9	49.5	40.0	57.7

[a] Records only from Crisfield and Salisbury.
[b] Records only from Crisfield and Snow Hill.
[c] Records only from Crisfield.
[d] Records only from Salisbury and Snow Hill.
[e] Records only from Show Hill.

monthly trend. The lowest evaporation is recorded in December, 1.12 inches, and the highest in July, 8.20 inches. The high evaporation, coupled with a high transpiration rate of plants, prevents or reduces recharge and leads to a decline in the water table during the summer months, in spite of better-than-average precipitation during those months (fig. 27).

Although evaporation is governed principally by temperature, it is affected also by wind movement and relative humidity. Table 3 summarizes total wind

TABLE 3

Evaporation and Wind Movement at Salisbury

Evaporation is in inches of water. Wind is in miles of movement

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1950													
Evaporation	—	—	3.94[b]	4.95[b]	5.61[b]	7.89	7.07[b]	7.96	4.33	3.06[b]	2.39[b]	1.15[b]	—
Wind	—	—	—	2,870	1,821	1,553	1,477	1,453	1,489	1,292	1,979	1,985	—
1951													
Evaporation	—	2.94[b]	4.07	5.36	6.86	6.43	7.49	6.55	4.90	3.03	2.65	0.93	—
Wind	2,505	2,232	2,745	2,229	1,931	1,440	1,351	1,194	1,056	1,872	2,238	1,959	22,752
1952													
Evaporation	1.81	2.21	3.04	5.02	6.36	8.59	8.81	6.44	5.22	3.44	2.10	1.27	54.31
Wind	2,438	2,319	2,534	2,326	1,712	1,704	1,376	1,134	1,235	1,427	1,209	1,506	20,920
1953													
Evaporation	1.49	2.35	3.67	5.49	7.33	7.66	9.44	6.87	5.86	3.39	1.90	1.90	57.35
Wind	1,891	1,857	2,239	2,213	1,694	1,372	1,240	1,033	1,273	1,229	1,127	1,976	19,144
Average													
Evaporation	1.65	2.50	3.68	5.21	6.54	7.64	8.20	6.96	5.08	3.20	2.26	1.31	54.23
Wind	2,278	2,136	2,506	2,410	1,790	1,517	1,361	1,204	1,263	1,430	1,638	1,856	21,389

b indicates records adjusted to full month.

movement just above the pan and near the land surface by months over four years. March is the windiest month with an average of 81 miles per day and August is low with an average of 39 miles per day.

Humidity

The average percent relative humidity at Salisbury at 9:00 a.m. is given in Table 4 for 4 years of record. The morning reading is about the mean in the daily cycle, although because the time of reading is closer to dawn in the winter than in the summer, the true winter averages are probably a trifle higher and the true summer averages a trifle lower. There is a fairly well defined seasonal humidity cycle with December and January most humid, April least humid, March, May, June, and July moderately low humid, and August, September, October, November, and February moderately high humid.

TABLE 4

Average Percent Relative Humidity at Salisbury

(reading at 9:00 a.m.)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1950	—	—	67*	58	77	74	80	78	86	77	71	76	—
1951	83	78	70	62	63	72	70	72	73	76	71	79	72
1952	78	71	71	68	62	65	65	75	69	66	72	82	70
1953	80	70	71	63	70	68	62	71	71	73	80	74	71
Average	80	73	70	63	68	70	69	74	75	73	74	78	72

* only the last 16 days

Population

Since 1900 the total population of Somerset, Wicomico, and Worcester Counties has increased by approximately 13,700, the greatest increase having been in or near Salisbury, Wicomico County. Table 5 summarizes the population of Somerset, Wicomico, and Worcester Counties for the period 1900–1950 (U. S. Dept. Commerce, 1900–1950).

Somerset County, which is principally rural, has shown a small gradual decrease in population. Worcester County has shown a small increase, largely due to the development of Ocean City as a resort. Wicomico County has grown at an average rate of 12 percent a decade, reflecting growth at Salisbury.

Agriculture, Industry, and Transportation

Agriculture is the chief occupation and the chief impetus for industry and transport on the Maryland Eastern Shore. Of a total land area in Somerset, Wicomico, and Worcester Counties of 764,800 acres, 423,975 acres are in farms (Hamilton, 1951, p. 40, 46, 48). The principal crops are corn, wheat, soybeans, and Irish potatoes. Vegetables harvested for sale are snap beans, tomatoes, sweet corn, peas, and lima beans. Summer seasonal work is afforded many by tomato and vegetable canneries. Poultry production is the chief source of agricultural income (Table 6).

Worcester County ranked first among Maryland counties in broiler poultry production and first in the value of farm products sold (Hamilton, 1951, p. 48).

TABLE 5

Population of Somerset, Wicomico and Worcester Counties

1900–1950

Year	Somerset	Wicomico	Worcester
1900	25,923	22,852	20,865
1910	26,455	26,815	21,841
1920	24,602	28,165	22,309
1930	23,382	31,229	21,624
1940	20,965	34,530	21,245
1950	20,745	39,641	23,148

TABLE 6

Average Annual Value of Produce and Poultry for Farms in Somerset, Wicomico, and Worcester Counties in 1950

	Somerset	Wicomico	Worcester
Total produce sold per farm	$6,663	$7,230	$10,296
Poultry sold	$4,297	$4,861	$7,693
Poultry income to total income of farm	64%	67%	74%

Wicomico County ranked first in 1950 among Maryland counties in the production of vegetables and sweet potatoes, and it has become a primary center for dressing broiler poultry (Hamilton, 1951, p. 46).

The U. S. Forest Service estimated that in 1945 there were 279,000 acres of marketable forests in Somerset, Wicomico, and Worcester Counties. Loblolly pine is the principal wood marketed; however, some of the harder woods such as red gum, bald cypress, and southern white cedar are also cut.

The sea-food industry is a primary occupation for many people in all three counties. Crabbing is engaged in during the summer months and oystering during the winter months, with the catching of fish a year-round part of the sea-food industry.

Other industries employing several thousand persons in the tri-county area are shirt manufacturing, broiler dressing and freezing plants, fruit and vegetable canneries, fertilizer and feed distribution, and specialized industries making items such as gasoline and other dispensing pumps, knives, and small-craft shipbuilding and repair.

The Del-Mar-Va Division of the Pennsylvania Railroad serves the peninsula for passenger and freight service from Wilmington, Delaware, to Cape Charles, Virginia. From Cape Charles, freight is ferried across the Chesapeake Bay to Norfolk, Virginia. The main line of the railroad runs north and south through Wicomico County, passing through Delmar, Salisbury, Princess Anne, and Pocomoke. Other major towns are served by freight spurs.

The tri-county area has an excellent network of hard-surface roads. U. S. Route 13, a segment of the Ocean Highway between New York and Florida, crosses Wicomico, Somerset, and a small portion of southwest Worcester County in a general north-south direction. U. S. Route 50 connects Annapolis and Baltimore to the Eastern Shore and ends at Ocean City. It is the main artery for east-west travel and passes through Wicomico and Worcester Counties.

Water transportation, once a principal mode of travel and freight movement, now occupies a minor role. Nevertheless, the major tidal rivers, the Nanticoke, the Wicomico, and the Pocomoke, are still avenues for a variety of shipping.

Daily scheduled air passenger service is operated from Salisbury Municipal Airport to neighboring Atlantic and Midwestern states. Several private airports and companies provide charter service.

PREVIOUS INVESTIGATIONS

The geologic study of the Atlantic Coastal Plain in Maryland began during the summer of 1608 with the historical work of Captain John Smith, who first visited the shores of the Chesapeake Bay and noted the nature of the soil and the existence of fuller's earth, marl, clay, and gravel (Shattuck, 1906, p. 25).

Bibliographies on the general geology of Coastal Plain sediments are presented in the volumes of the Maryland Geological Survey on the Lower Cretaceous (Clark, Bibbins, and Berry, 1911), the Upper Cretaceous (Clark, 1916), the Eocene (Clark and Martin, 1901), the Miocene (Clark, Shattuck, and Dall, 1904), and the Pliocene and Pleistocene (Shattuck, 1906).

The first micropaleontologic work in the area was done by Woolman in 1894, who described diatoms and other small fossils from wells at Crisfield, Somerset County.

Darton, in 1896, wrote the first account on the ground-water conditions on the Eastern Shore of Maryland (p. 124–133, 148–150, 154–155). Fuller (1905, p. 114–123) summarized Darton's data. A well at Pocomoke City, Worcester County, is listed by Fuller and Sanford (1906, p. 90–91).

Shattuck (1906) made a detailed study of the Pleistocene and Pliocene formations of the Maryland Coastal Plain. The physiographic origin and relationship of the terrace formations were emphasized.

Singewald (1911) described two localities of bog iron ore in Wicomico County and one in Worcester County. These bog ores are formed by the leaching of iron by ground waters and the deposition of iron hydrate in stagnant ponds through oxidation and hydration in the presence of humic acids. The ores are an indication of the prevalence of iron in the shallow waters of the area.

A report by Clark, Mathews, and Berry (1918) includes brief descriptions of the geology, surface waters, artesian, and nonartesian waters of Somerset, Wicomico, and Worcester Counties, and presents tables of well logs, water analyses, and general water supply of the area.

In 1925 D. G. Thompson made a brief investigation of the ground-water conditions at Salisbury. Subsequent test drilling resulted in the location of the first large-diameter, large-capacity wells for the city waterworks in the shallow sands along the artificial ponds on Beaverdam Creek. J. M. Given, Jr., representing the contractor, wrote a letter-memorandum to the city giving the results of the drilling. He concluded that the artesian sand (the Manokin aquifer in the present report) had too low a permeability to supply the large-capacity wells needed by the city.

Stephenson, Cooke, and Mansfield (1932) reviewed the geology of the Chesapeake Bay region, making important contributions to the areal stratigraphy. Cooke (1930–1952) extended the study of Pleistocene terraces, begun by Shattuck, along the entire Atlantic Coastal Plain, making observations pertinent to the Pamlico, Talbot, Penholoway, and Wicomico terraces which cover Somerset, Wicomico, and Worcester Counties.

Richards (1936) studied the marine fossils of the Pleistocene Pamlico formation (that forming the Pamlico or 25-foot terrace), which extends over much of western Wicomico and western Somerset Counties and eastern Worcester County. His study (1947) of "Invertebrate fossils from deep wells along the Atlantic Coastal Plain" includes specimens from Salisbury, Pocomoke City, Ocean City, and Crisfield. He has also published logs, cross sections (1945, 1948, 1950, 1953; Straley and Richards, 1948), and structure maps defining a synclinal trough in the sedimentary beds and a channel in the bedrock extending through Worcester, Wicomico, and Somerset Counties, which he has named the "Salisbury embayment".

Three oil companies drilled deep test holes during the period 1943–46 in Wicomico and Worcester Counties. A comprehensive report on the logs of the wells was made by Anderson and others (1948).

A magnetic survey of Worcester County and the eastern portion of Wicomico County was released in 1946 (Balsley and others; see also Kuehn and Dent, 1947). Two prominent magnetic highs in the vicinity of Show Hill and Girdletree were considered due to basic intrusives of high magnetic susceptibility in the basement complex about a mile below the land surface.

In 1948 Jensen made a reconnaissance of the gravels in western Wicomico County and northwestern Somerset County, in which he postulated the channel of a Pleistocene river from Vienna to Princess Anne with deposits of sand and gravel ranging from sea level to 18 feet above sea level. More detailed investigation indicates the alternate interpretation of a beach shingle in the Pamlico formation and stratified drift, composing the Parsonsburg sand.

Shifflett (1948) described the microfossils of the Bradshaw well, Som-Ea 2, at Ewell, Smith Island, Somerset County, and established correlations, with particular reference to the formations of Eocene age.

Spangler and Peterson (1950) reviewed the stratigraphic correlation of formations of the Atlantic Coastal Plain and presented a number of structure and isopach maps. Some of their conclusions have been challenged by Dorf (1952) and by Johnson and Richards (1952).

McLean (1950) described the microfossils in a deep well at Crisfield, Somerset County.

In 1951 the Transcontinental Gas Pipe Line Company, in search for gas reservoir storage structures, had three test holes (Wi-Cf 61, 62, and 63) drilled and electrically logged in Wicomico County, 2 to 4 miles east of Salisbury. No structure suitable for storing gas was indicated.

Data on fluctuations of water level in observation wells in Wicomico County date back to 1947 (R. R. Meyer, 1951, p. 189–193) and 1948 (Gerald Meyer, 1951, p. 174–176), in Worcester and Somerset Counties to 1949 (Brookhart, 1952, p. 181–186).

In 1952 Breitenbach and Carter published a preliminary study of the 25-foot (Pamlico) terrace in Maryland, in which they record 11 localities of that terrace in Worcester County.

COASTAL PLAIN GEOLOGY

Somerset, Wicomico, and Worcester Counties are on the coastal margin of the land portion of the Atlantic Coastal Plain. The Atlantic Coastal Plain is underlain by a large volume of sediment, in part carried by streams from the Appalachian Mountains and the Piedmont province. East of the Fall Line, the eastern boundary at the Piedmont province, the active erosion of the rivers decreased and deposition and aggradation occurred in extensive alluvial fans, in deltas, in estuaries and bays, and in deposits of the open sea.

STRATIGRAPHY

The huge wedge-shaped mass of sediments that underlies the Coastal Plain is illustrated in the cross-section in Plate 1. The sediments lie upon a sloping surface of hard crystalline rock of pre-Cambrian and Paleozoic age, called "the basement." They range in thickness from a few feet at the Fall Line to more than 8,500 feet beneath the Atlantic shore. Beneath Somerset, Wicomico, and Worcester Counties the sedimentary rocks range from a mile to more than a mile and a half in thickness. The Coastal Plain sediments are composed of sands, greensands, gravels, silts, clays, shales and shell beds. They are correlated into geologic formations of the Triassic, Cretaceous, Tertiary, and Quaternary systems (Table 9).

STRUCTURE

The structure of the Coastal Plain sediments is a huge homocline dipping in a southeasterly direction (Pl. 1). The strike of the sediments is in general northeasterly, approximately parallel to the Fall Line.

A cross section through the Coastal Plain sediments, approximately parallel to the Fall Line but 50 to 100 miles east of it (fig. 2), shows that the sediments occupy several troughs in the basement complex, separated by broad ridges. One of these troughs has been named the "Salisbury embayment" (Richards, 1948, p. 54) because the axis passes through Worcester and Wicomico Counties in the vicinity of Salisbury.

There has not been sufficient deep drilling to indicate the true centerline of the embayment. The structure maps by Anderson (1948, fig. 24) and by Spangler and Peterson (1950, fig. 12) on the configuration of the basement show the axis of the trough close to the Maryland-Virginia boundary, extending from Chincoteague, Virginia, to the mouth of the Potomac River. The successively higher structure maps by Spangler and Peterson (1950, figs. 13, 14, 15, and 16) show a shift in the axis of the trough northward during Cretaceous time, so that the axial line of the trough on the top of the Cretaceous system runs from Rehoboth, Delaware, toward Baltimore. By the close of the Eocene epoch the trough appears filled (op. cit., fig. 17), and sedimentation occurred thereafter along a uniform slope.

The "Salisbury embayment" may be a synclinal trough, or area of progressive gradual downwarp during the Cretaceous period, with a general trend and pitch from Washington, D. C., to Salisbury.

An alternate interpretation, suggested by Cederstrom (1945, p. 54), is that the "Salisbury embayment" is due to faulting during Cretaceous time. In conformity with this idea the embayment would be a fault block, or graben.

A third explanation would be that the embayment is simply a large valleyway on the old basement erosion surface. The coarse sediments, lenticular, nonfossiliferous, and probably non-marine, encountered in the lower parts of the three deep oil tests in Wicomico and Worcester Counties, have the appearance of an intermontane valley fill in keeping with this explanation.

Table 7 gives the rates of dip, in feet per mile, along the line AA′ in Plate 1. They indicate the prevailing southeastern dip of the beds and higher rates of dip at greater depths. Available subsurface information is not sufficiently accurate and closely enough spaced to disclose any minor structural features, such as small domes or faulting, in this area.

The structural control which has the greatest effect upon the recharge and

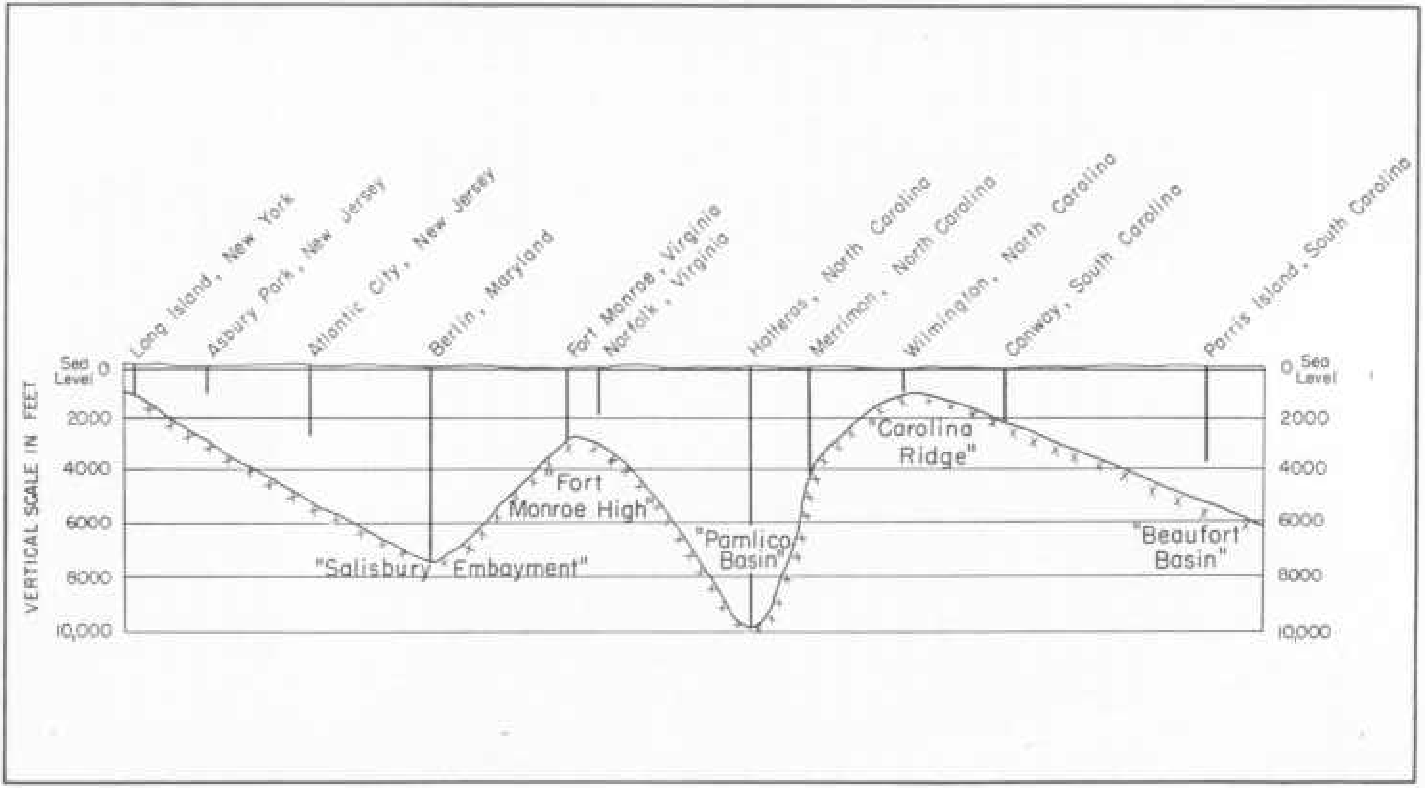

FIGURE 2. Section of the Coastal Plain Sediments from New York to South Carolina showing the Salisbury embayment (adapted from Richards, 1950)

storage of ground water, and upon the possibilities of salt-water contamination of the reservoirs, is the prevailing southeasterly homocline. The following examples illustrate this effect.

Cretaceous formations which cross the estuary of the Potomac River near Alexandria, Virginia, dip southeasterly towards Crisfield, Somerset County, where they occur at 1,060 feet below sea level, and provide water for the city of Crisfield. Present rates of pumpage at Crisfield are such that these wells are probably still deriving most of their water from storage in the aquifer. However, there is recharge opportunity along the intake belt which extends from near Richmond, Virginia, through Washington, D. C. and Baltimore, to Wilmington, Delaware. Where this intake belt crosses the head of the Chesapeake

TABLE 7

Rates of Regional Dip, Coastal Plain Series of Maryland

Southeast gradient on top of the series along the line A-A′ of Plate 1 (in feet per mile)

Series	Patapsco River to Wades Point 34 miles	Wades Point to Cambridge 20 miles	Cambridge to 6 miles east of Salisbury 33 miles	6 miles east of Salisbury to the Atlantic Ocean 23 miles
Pleistocene	—	0	0	3
Pliocene (?)	—	0	0.3	8
Miocene	—	0	1.5	10
Eocene	—	11	22	42
Paleocene	—	10	20	39
Upper Cretaceous	—	15	17	59
Lower Cretaceous	43	55	55	73
Basement	58	58	64	146

Bay, the waters are predominantly fresh. Higher fresh-water heads in adjacent highlands of the intake areas should, in general, protect these aquifers from salt-water encroachment. However, leaky wells and great pumpage in the Baltimore area have already caused serious salt-water contamination there (Bennett and Meyer, 1952, p. 1–4). At the slow rates of movement of ground water, it may take many years for the contamination to extend down dip, and fresh-water recharge from the highland areas may even prevent such extension. There is the possibility, however, of the advance of brackish waters up dip, from the direction of the ocean.

Another example of the influence of the regional homoclinal structure upon the intake of ground water and its discharge to wells are the Eocene formations, one of which provides water for Crisfield, and for Cambridge and many other wells in Dorchester County (Pl. 1). The Eocene formations have an intake area which crosses the Potomac River from Virginia to Maryland in the great bend, passing across Charles County, through Annapolis in Anne Arundel County, Chestertown in Kent County, and the Middletown area in New Castle County, Delaware. Water is capable of moving down dip, through a series of overlapping sands and greensands, from elevations of 55 feet or more above sea level (Overbeck, 1948, fig. 18) in Charles County to the Crisfield well, Som-Ec 4, which discharges water a few feet above sea level from an Eocene sand at the depth of 809 to 819 feet below sea level. The intake belt of Eocene rocks crosses the Chesapeake Bay in the vicinity of the Bay bridge. There has been concern over whether the brackish waters of the Bay would infiltrate the Eocene aquifers and move down dip on the homoclinal structure, but no evidence of extensive contamination has yet been found.

Additional examples of the influence of regional structure upon the recharge and movement of ground water are given in the discussions of the Manokin and Pocomoke aquifers of Miocene age.

The Pliocene(?) and Quaternary deposits have a channel structure which controls to a large degree the movement of ground water and, perhaps, affects the recharge of the artesian aquifers. This structure has developed by the filling of river valleys with coarse sandy detritus. Apparently the erosion of the continental land mass, which occurred as the Miocene seas withdrew, resulted in the excavation of valleys which had a relief of 100 to 200 feet. These valleys were filled with red gravelly sand, presumably during the Pliocene(?) epoch.

The history of the early Pleistocene is not well deciphered, although it was probably one of continued build up of an alluvial and littoral plain, culminating in swamps about middle Pleistocene time (Yarmouth interglacial stage). Extensive valley excavation began, probably in the Illinoian glacial stage. After the next interglacial inundation (Sangamon), with some terrace formation, the valleys were excavated once more during the last glaciation (Wisconsin stage). Since then, these valleys have been refilled with sandy wash. Consequently, several filled valley systems criss-cross the Eastern Shore and provide avenues for the movement of ground water.

Because the channel deposits are filled with ground water, their discharge or overflow is at present controlled chiefly by existing topography along present stream channels and drainage ditches. Should there be an intensive development of wells to provide irrigation or for industrial use, the channel structure would become the predominant control of the flow and movement of ground water and wells would tend to become concentrated in the areas over the buried channels.

GEOMORPHOLOGY

The Coastal Plain of the lower Maryland Eastern Shore appears monotonously level to the untrained eye. Actually, there are many surface features of diverse origin. There are terraces, stream channels, drowned valleys, peculiar basinlike depressions, swamps and marshes, remnant dunes, bar-like features, and disturbed soils, which have been formed during late geological time (Pleistocene and Recent epochs).

Terraces

The coastal margin of the Atlantic shore and the margins of tributary bays and estuaries are faced by plains of low gradient. These plains do not rise to the divides or to the Piedmont hills in a single sloping surface, but are inclined gently upward in a series of low steps, or terraces. The break between two terraces is indicated by features of micro-relief which are hard to observe, and which, because of recent erosion and vegetative cover, are in many places absent or obscure, so that even trained observers have engaged in controversy over whether there are 2 terraces or 7 (Flint, 1940; Cooke, 1941).

The terraces are evidence of recent higher stands of sea level, and their number and sequence must eventually be keyed (Cooke, 1930a, b; 1932, 1935) to the great advances and retreats of the continental ice mass, which has waxed and waned at least four times (Coleman, 1941), creating inverse low and high levels of the sea. These events may have had considerable influence upon the quality of much of the underground water stored not only in the terrace formation but also in the deeper aquifers whose intake areas were exposed to saline waters within this recent epoch.

Shattuck (1901, 1906) recognized and defined four terraces (in addition to the Recent) along the shores of Maryland and adjacent states. Cooke has affirmed Shattuck's basic ideas and increased the numbers of terraces to seven (1936a, 1937, 1939, 1943, 1945). Many other geologists have described the terraces of the Atlantic Coastal Plain, in places adding evidence of local intermediate terraces which have not been found to be regional in extent.

The terrace boundaries are parallel with the present-day sea level, demonstrating a remarkable stability of the Atlantic Coastal Plain since early Pleistocene time. There have been those who have doubted the horizontality of the terraces (Johnson, 1930; Dryden, 1935), but they have not adduced supporting evidence for their doubts (Cooke, 1936b). Much evidence has been accumulated, chiefly by semicontinuous tracing of contour groups, that the terraces maintain the same 'strand line' for almost the entire length of the Atlantic Coastal Plain. These strand lines represent eustatic changes of sea level attributed to the melting of the ice cap during interglacial stages.

Table 8 shows the terraces supposedly present in Somerset, Wicomico, and Worcester Counties. Some evidence exists for all these terraces in the three counties. There is especially good evidence, however, for the Talbot terrace in Wicomico County, the Pamlico terrace in Wicomico and Worcester Counties, and the Princess Anne terrace in Worcester and Somerset Counties.

Plate 2 illustrates west-to-east profiles of the three counties along each 5 minutes of latitude constructed from the U. S. Geological Survey 7½-minute quadrangles. Interpolated points along the drainageways and from the old quadrangles, with 10-foot contour interval, were used to improve the control along the low level necks of Somerset County. Elevations below sea level were taken from soundings on the charts of the U. S. Coast and Geodetic Survey. The profiles emphasize the terrace surfaces and scarps, and yet show many intermediate slopes. The terrace surfaces seem to have a more gentle profile than the near-shore portion of the present floor of the Atlantic Ocean.

Evidence of terraces is found also in a lineation of gravel pits, dunes, and bar-like features, with adjacent swales containing black, organic soils. Field work in Wicomico County substantiates the 40-foot Talbot terrace on this basis. Breitenbach and Carter (1952) have confirmed the presence of the Pamlico 25-foot terrace in Worcester County. Plate 2 indicates several surfaces about 10 to 15 feet above sea level with a scarp from 12 to 20 feet above sea level

TABLE 8

Terraces below the 100-foot Contour on the Atlantic Coastal Plain

Name	Range in elevation (in feet)	Elevation of upper limit (in feet)
Wicomico	70 to 100	90 to 100
Penholoway	40 to 70	70
Talbot	25 to 40	40
Pamlico	15 to 25	25
Princess Anne	6 to 15	15
Silver Bluff	0 to 6	6

which confirms and extends the Princess Anne terrace traced by Wentworth (1930) on the seaward side of the Virginia Eastern Shore.

The terrace surfaces have been assumed by some geologists to be associated with terrace deposits, which have been given formation names equivalent to the terrace under which they lie. Field work in Somerset, Wicomico, and Worcester Counties confirms the opinion of others that terrace deposits are primarily a veneer, and that the main mass of Pleistocene material is older than the terraces which truncate the surface.

Maryland Basins

The dominant secondary land forms of Somerset, Wicomico, and Worcester Counties are shallow oval basins bounded by low rims. Although these basins dot the entire countryside, their relief and figure are so subdued that many of the local residents are unaware of their existence, and others, though familiar with the "whale wallows," as they are locally known, do not realize their geographic importance.

Most of the first trails were blazed on the rims of these basins, because the low central areas were frequently too marshy to cross (Pl. 13). Primitive roads followed the trails, so that almost all the early county roads proceed in broad curves, passing from basin margin to basin margin. Rural cabins were built on the dry ground of the basin rims, and colonial mansions were usually constructed on the higher sandy hills where rims coalesced. The early pattern of cultivated fields followed the basin rims, and only encroached upon the centers of those basins which had natural drainage, or which could be drained by simple ditching. Extensive drainage works are required before the central areas of many of the basins can be farmed. The forestation and the value of timber have been dependent upon the basin form: the Virginia and short-leaf pines and the highland hardwoods grow more readily on the rims; the cedar, cypress, black gum, yellow poplar, and loblolly pines grow more readily in the basins. The soil in the basin is usually darker, thicker, and more organic than the sandy loams on the rim.

Although modern roadbuilding, land grading, drainage, and cultivation practices are tending to obliterate the basins, they will continue to exert an important influence upon the infiltration, storage, and movement of ground water. This will, in turn, affect the growth of industries and municipalities and will control, in part, the more favorable areas where supplemental irrigation from farm ponds and wells can be economically developed.

The location, distribution, orientation, and variation in size of these peculiar features are shown in Plate 3, derived by the coincident study of more than 1,000 aerial photographs of the three counties and the photo-index mosaics (U. S. Dept. of Agriculture, 1952), with the cultural pattern and topography on the county maps of the Department of Geology, Mines and Water Resources. The map shows 1,482 basins, about 15 of which were checked in the field to test the validity of the photo interpretation. These are probably not all the basins because some may be obscured in the heavily forested areas, and others are obscured by recent changes in cultivation, drainage, and roadbuilding.

The basins are predominantly oval in shape. They appear to have been formed by the deposition of rims of sand on the pre-existing plain. The rims rise 4 to 20 feet above the central area. The rim of a basin is not usually at the same altitude all the way around, but the crest line of the rim generally slopes in the same direction as the surrounding plain. The long axes of the basins range in length from about 0.15 mile to 7 miles, and the short axes range from 0.10 mile to 5 miles. The basins range in area from about 7 acres to over 17,000 acres. The larger basins may be likened to the "Carolina bays."

The rims are narrow, in general, ranging from a few tens of feet to a few hundred feet wide. They are wider and higher where two or more basins coalesce. Low stabilized dunes cap the sandier rims. They are imperfectly preserved and apparently were not developed uniformly around the perimeters of the basins. There appears to be no predominant direction for greater development.

There are also basins within basins. The rims of some of the basins overlap or cross over those of other basins, but most of them are self-contained. The orientation of the axes of the basins is diverse.

It is not within the scope of this report to delve into the relationship of these basins to "Carolina bays," New Jersey basins," or "oriented lakes of Alaska"; nor to develop any of the many hypotheses of origin: meteorite scars (Melton and Schriever, 1933; Prouty, 1952); solution sinkholes (Smith, 1931, LeGrand, 1953); rotating currents (Cooke, 1940); shoals of fish (Grant, 1945); complex artesian-solution-lacustrine-eolian processes (Johnson, 1942); periglacial ice-caving, and frost wedging (Black and Barksdale, 1949; Wolfe, 1953); or stranded icebergs (Kelly, 1951; Kelly and Dachille, 1953). The oval-shaped basins were studied because they have an important effect upon the capture of rainfall and its retention in the soil to provide optimal opportunity for infiltration, the retardation of runoff, and the discharge of soil moisture and ground water in large quantities by evaporation and transpiration.

Because the rims of the basins are composed of stratified sand and gravel, with occasional erratic cobbles and boulders, they are considered to be a stratified drift which is called the Parsonsburg sand in this report. The view adopted here is that the rims were formed by sedimentation around icebergs which were stranded against the Eastern Shore land mass during some short-term higher stand of the sea in late Pleistocene time. Whether the sediments were deposited as a littoral marine drift, or whether the waters receded and the sediments were deposited chiefly under subaerial conditions, is not known. The erratic cobbles and boulders would thus have been rafted to their present site by the icebergs. Floe ice may be considered an alternative to bergs of deeper draft, but, in either method of rafting, water levels more than 85 feet above present sea level would have been necessary to beach the icebergs on the highest divide. The freshness of the rims on the higher as well as the lower slopes suggests that the basins were almost contemporaneous. The basins are thus kettleholes, in the broader sense, developed on a marine plain.

Regardless of mode of origin, the basins have an important function in retaining rainfall on the land to provide a large percentage of recharge to the ground-water reservoirs, and in providing sheltered and well-watered areas for luxuriant plant growth which serve as avenues of discharge from the soil and from the water table by evapotranspiration.

Stream Channels and Drowned Valleys

The lower portion of the streams in Somerset, Wicomico, and Worcester Counties (Pls. 6, 7 and 8) is meandering, whereas the upper stem and branches are relatively straight. The meandering portions are chiefly below the 25-foot contour. The Pocomoke River is typical, with broad meanders in a swampy flood plain, although the old stream channel is now partially obscured because of the drainage canals.

The meandering streams are entrenched at tide level and form meandering estuaries. Campbell stated (1927) that the meanders in the sea-level course of a river must have been formed when the river bed was above sea level; that a stream flowing at tide level does not corrade its banks nor impinge on the outer curve, but tends to follow a median channel; and that a tidal stream has no power to cut off its meanders. The meanders of the Nanticoke, Wicomico, Manokin, Annemessex, and Pocomoke Rivers, as well as those of Barren, Rewastico, Quantico, Wetipquin, Swanscut, and Trappe Creeks, were probably formed shortly after the Pamlico terrace plain emerged from the sea. Runoff from the headwater creeks discharged upon the relatively flat emergent marine plain and developed the typical meander bends, cut-off meanders, and oxbow lakes of streams in old age. Sea level was probably about 25 feet below the sea level today. Soundings, recorded on charts of the U. S. Coast and Geodetic Survey, outline a terrace scarp in many of the rivers tributary to the Chesapeake Bay at depths of 20 to 30 feet below mean low water.

It is probable that a higher grade in the lowest course of these streams formed a rapids zone which migrated headward in the unconsolidated sediments and entrenched the meanders. Later, when sea level rose to its present datum, the entrenched meanders in the lower portion of the streams were submerged. Under the reduced gradient created by raising the base-level of erosion, the streams backfilled their meanders in the range from sea level to the 25-foot elevation, developing the choked, swampy flood plains prevalent in the lower reaches.

The profile of Beaverdam Creek (fig. 3), the east branch of the Wicomico River, from the tidal dam in the city park at Salisbury to the headwaters along the Parsonsburg divide, shows three knick points, or changes in gradient, one about 13 feet, a second about 28 feet, and a third about 42 feet above sea level. These three altitudes coincide approximately with the upper limits of the Princess Anne, Pamlico, and Talbot terraces. The well developed flat above 42 feet, in contrast to the slope above 28 feet, may indicate that the stream had a longer period to come to grade during Talbot time than it did during Pamlico time. One may conclude, therefore, that the stream established a more mature grade during the Princess Anne sea stand than during Pamlico time. There is a faint knick-point on the profile at about 61 feet which may be the headward remnant of the Penholoway submarine terrace, which has been almost obliterated by erosion since Penholoway time.

It would be desirable to have many profiles of streams of the Eastern Shore in order to determine the physiographic history of terraces and rejuvenation of grade. Unfortunately, profiles, such as in figure 3, require detailed surveying. The topographic maps on a 20-foot contour interval are too coarse to use beyond the most pronounced stream and terrace features.

The valleys of the lower Eastern Shore are geomorphically mature, in contrast to the intervening terrace plains, which are youthful. The maturity is probably due more to the ease of erosion of the unconsolidated sands, silts, and clays than to any extensive period of time or intensive mode of weathering. The one profile available indicates that the streams have been affected by at least four incomplete erosion cycles, and have been rejuvenated three times.

The most recent episode, the creation of the "basins," undoubtedly had an additional effect upon the stream channels and drowned valleys. Not only the headwaters, but also the main courses of the streams, show some control by basin rims. In many of the lower portions of the streams the outline of a basin

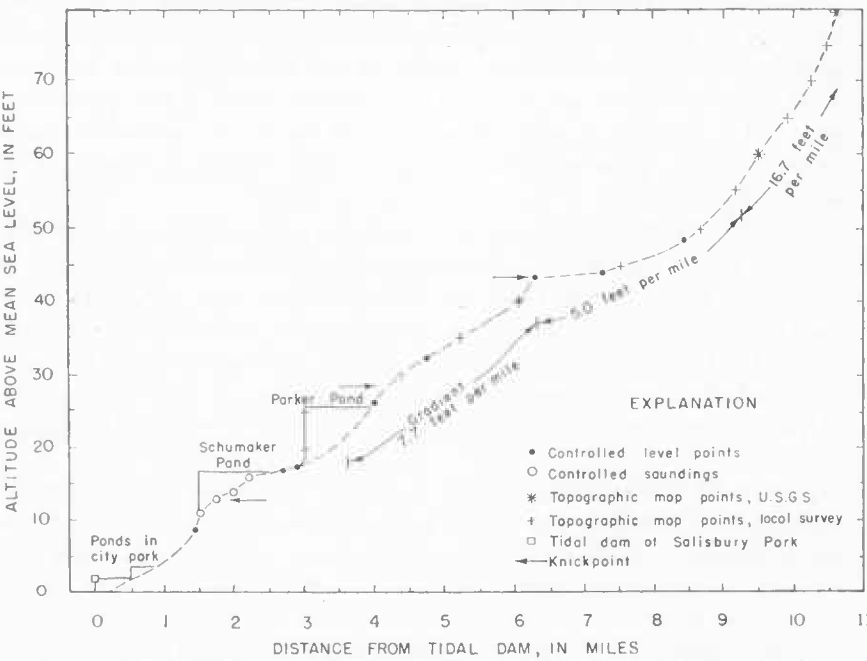

FIGURE 3. Altitude Profile of Beaverdam Creek, East Branch of Wicomico River, Wicomico County

can be traced athwart the main axis of the stream, and some of the complex meandering could be attributed to the presence of the basins.

Barriers and Swales

The plains of Somerset, Wicomico, and Worcester Counties have numerous dunes and bar-like features with elongated swales alongside them, which have been given the name "barriers," and which are like the barrier beach and barrier islands along the Atlantic Coast today (see Shepard, 1952, for restricted definitions of "barriers" as opposed to the loose usage of "bars" and "offshore bars"). The broad lowlands behind the barriers form broad swales which are part of the major valley systems.

Fenwick and Assateague Islands are the barrier of the modern shoreline; and Chincoteague, Sinepuxent, Isle of Wight, and Assawoman bays form the back-bay swale. The exposed barrier ranges from 0.14 mile to 1.5 miles wide, and the submerged bays range from 0.4 mile to 6 miles wide. Altitudes on the islands range from sea level to 25 feet above sea level on the crest of the dunes.

Across Sinepuxent Bay is a remnant barrier of Lower and Upper Sinepuxent Necks, 11 miles long, and 0.3 to 1 mile wide. Altitude ranges from sea level to 11 feet above sea level. Behind these necks is a broad swale, 0.5 mile to 2 miles wide, formed by the valleys and brackish marshes of Trappe, Ayer, and Herring Creeks. This barrier and swale may have been active in the Silver Bluff (6-foot) or Princes Anne (15-foot) seas, possibly bearing a dune cap 20 feet above the present sand base.

Another probable former barrier island in Worcester County is a broad ridge that passes north from Stockton through Girdletree, Scarboro, Spence, Cedartown, Newark, Ironshire, Berlin, St. Martin, and Pine Ridge. This ridge stands 30 to 45 feet above sea level, and probably served as a barrier island in the Pamlico (25-foot) sea. The ridge ranges from 3 miles to 6 miles wide above the 25-foot contour line. The swale behind this barrier ridge is now the valley and marshland of the Pocomoke River, in general, 1 to 3 miles wide (below the 25-foot altitude). This barrier ridge is the watershed divide between the Pocomoke drainage basin and the short tributaries to the Atlantic Ocean.

There is no true barrier island for the Talbot sea-level (42 feet). The Worcester County barrier, described above, may have existed in Talbot time as a shallow offshore bar or reef, with waves breaking over its crest. There was a landmass above 42 feet altitude comprising central and eastern Wicomico County, the Pocomoke forest area of western Worcester County, and a narrow margin of northeastern Somerset County. This landmass rose to about 85 feet above present sea level or 43 feet above the Talbot sea as the southern end of a narrow Delmarva Peninsula. No prominent swales are identifiable, although upper Nassawango Creek and upper Wicomico Creek probably trenched the surface.

The Parsonsburg divide area, 60 to 85 feet above sea level, may have existed as a narrow barrier key island at the southern tip of the Delmarva peninsular keys in the Penholoway sea (70 feet above modern sea level). This low sandy island, rising only about 15 feet above sea level at that time, was about 1 mile wide and 3.5 miles long, trending south to north.

Dunes

The dunes of Somerset, Wicomico, and Worcester Counties are scattered over the landscape, from sea level to the top of the Parsonsburg divide. Their form, orientation, and size may be significant details in the late Pleistocene and Recent history.

The most active and prominent dunes range from high tide to 25 feet above sea level along the Atlantic seashore, on Fenwick and Assateague Islands. Most of these dunes are bare sand, slowly growing or decreasing in response to changes in the direction and volume of windblown sand. They appear to be wasting as fast as they grow, and are not migrating except on the northern end of Assateague Island, where the waves have caused the barrier island to retreat landward about one-quarter mile along a 5-mile stretch of bare beach. In general the long axes of these dunes trend along the barrier. The dunes which front on the ocean shore are bare of vegetation, but those behind the first protective line, and particularly those on the back-bay side, have been stabilized by coarse grass and scrub pine. No "Maryland basins" have been positively identified along the modern barrier islands, although several ovoid features appear in the back-bay marsh—for example, the semi-oval formed by the Pirate Islands and Whittington Point, near Green Run Lodge, on Assateague Island. These features are imperfect in outline and may be formed by modern tides and currents, which are capable of forming semi-oval lunate bars and cusps.

The former barrier island represented by Sinepuxent Neck is peculiarly devoid of dunes comparable to those along the modern barrier. It would appear as though they had been washed away by storm or tidal waves. Instead, only low (5-foot) stabilized dunes on the rims of the Maryland "basins" are recognizable. The presence of the basins shows that this fairly recent barrier was formed before basin formation.

Along the Nanticoke River banks, in Wicomico County, many dunes are found at about the 10- to 20-foot altitudes, from Sharptown, Athels Neck, Wetipquin, and Tyaskin to Nanticoke. Numerous blow-outs are marked by hachured contour lines on the topographic maps.

Low-level dunes are much less common in Somerset County along the Tangier Sound. A few appear about the 10-foot contour in Fairmount and Revels Necks.

There are many stabilized dunes in the 10- to 40-foot range on the mainland of Worcester County. They do not seem to have a prevailing orientation, their long axes trending in random directions. They cap the crest of basin rims, and are particularly high where rims cross or coalesce.

Dunes and bar-like features in the range of altitude from 35 to 55 feet in Wicomico, Somerset, and Worcester Counties are not entirely random, but, in general, parallel present water courses, and have a cross-county lineation which may mark the zone of the shore and beach of the Talbot 42-foot sea level. They lie on the rims of "basins" and do not appear to have migrated.

Dunes in the 60- to 75-foot altitude range appear to be random in orientation. The Parsonsburg divide ridge, from 70 to 84 feet above sea level, stands like an ancient barrier key with sand dunes on its crest which have the north-south alinement of the ridge.

An unusual feature of some of the dunes in the range from 45 to 70 feet above sea level is that they have a silt-clay base, 6 to 12 feet high, with a sand cap 1 to 5 feet thick. One of these clay-based dunes, 5 miles northwest of Salisbury and 1.5 miles northeast of Hebron, is called Spring Hill, because springs issued from the clay contact of the perched water table on its cap and flowed intermittently following soaking rains. They have not been flowing in recent years, possibly because the people living on the hill have cultivated much of the surface in lawn and garden. Another clay-based dune, 70 feet in top elevation, is 1 mile east of the Salisbury municipal airport. Still another group of clay-based dunes are sectioned in roadcuts along State Highway 350, 1 to 2 miles west of Powellville. The silt-clay at the base of one of these hills has scattered quartz sand grains interspersed through the matrix.

A combination of two explanations is offered for these clay-based dunes. The first explanation is that part of them were actually formed as dunes composed of clay pellets, the way clay dunes are forming near Corpus Christi, Texas (Huffman and Price, 1949). This idea is supported by the scattered sand grain-clay matrix texture. However, test augering through the dunes and into an underlying medium- to fine-grained sand and the structure in the roadcuts indicate that the clay layers are erosional remnants of the once extensive Pleistocene Walston silt. These erosional remnants served as wind-breaks, on which a cap of dune sand was deposited.

The age of the dune deposits which are found at almost all elevations above sea level may prove to be an additional key to the Pleistocene and Recent geological history. However, probably the vast majority of the dunes, particularly those of random orientation, merely mark the rim of a Maryland "basin," where loose sand has received some sorting by the wind, but was anchored by vegetation without migrating.

Periglacial Soils

The aerial photographs of northeastern Wicomico County and northwestern Worcester County (U. S. Dept. Agriculture, 1952, ANM-2K-22 to 34, and ANN-2K-12 to 19), in the vicinity of Willards and Whaleysville, show a peculiar mottled appearance in the soils, with irregular black patches encircled by white irregular rings (Pl. 14). The black patches are areas of peaty soil, 30 to 600 feet in diameter, whereas the white rings are sandy loam rims 50 to 350 feet wide. The rims merge with the larger and more pronounced rims of the "Maryland basins."

This type of soil is similar to soils described on the spotted tundra of Siberia (Sochava, 1944). The particular large spotted pattern shown in Plate 14 may have formed by the development of "pingos," or hydrolaccoliths, interspersed with "sand-medallions."* "Pingos" are described by Poiré as large, swelling

* Official letter 1950 from I. V. Poiré to W. C. Rasmussen describing Russian tundra forms.

hummocks, often 250 feet or more in diameter and 26 to 130 feet high; the slope of the sides is 40° or less. The cross section of a "pingo" is: peat, 1.5 to 3 feet thick, permanently frozen below 11 to 16 inches; underlain by clay or sand 3.1 to 4.6 feet thick; underlain by a huge, convex, lens-shaped mass of ground ice. This ice cupola contained ground water, and the "pingo" is stated to have formed by the hydrostatic pressure of ground-water from below the permafrost layer or from artesian water in general. The melting of the ice would leave the black peaty depressions seen in the photograph.

The intervening loamy sand rims may have formed by fluvial deposition between "pingos," or, in the late phases of periglacial activity, after the general decline or disappearance of swollen hummocks; or the rims may have been groups of "sand medallions," which are round spots of exposed ground in tundra bogs. They may also be related to the earth mounds or "palsen" described for arctic and alpine environments of Europe (Smith, 1949). Similar, though smaller-scale, phenomena are described as tussock groups and peak rings on the Seward Peninsula in Alaska (Hopkins and Sigafoos, 1950).

This area in the Pocomoke River drainage basin has remained boggy ground to this day. Only recent drainage practices have opened the area to more extensive cultivation. During the most recent ice stage, when the huge continental glacier lay only 150 miles north of here, this area may have experienced tundra climate, with bogs and perenially frozen subsoil. Since this soil forms part of the large "Maryland basins", it must have formed subsequent to or during basin development. If the basins do record stranded icebergs, the periglacial soils must have formed as, or after, the icebergs melted away.

The consideration of this soil pattern as a relict of frozen ground is somewhat speculative. However, other, more direct, evidence of frozen ground are the involutions and filled wedges seen in shallow sandpits and roadcuts, similar to those recognized by Wolfe on the coastal plain of New Jersey (1953, Pls. 2 and 3), and by Horberg (1951, p. 10) in the Lake Agassiz beach deposits of North Dakota. A roadcut two miles west of Powellville, Wicomico County, shows (Pl. 15, fig. 1) involutions of a silt-and-clay layer in sand buried under about 3 feet of undisturbed fine sand, which is apparently a postglacial dune cap. Such involutions are accepted as definitive evidence of frozen ground.

The significance of periglacial soils in regard to ground-water infiltration is similar on a smaller scale to that of the "Maryland basins." The cup-shaped hollows retain rainfall and retard runoff, affording opportunity for local infiltration. The silt-clay layers that have been contorted by frost wedges are presumably more premeable because of this disturbance. The opportunity for perched watertable conditions above the silt layers is correspondingly diminished.

PRINCIPLES OF GROUND-WATER OCCURRENCE

ORIGIN AND RECHARGE OF GROUND WATER

The major part of the ground water is derived from precipitation that filters through the soil zone, or seeps in from the bottom of streams, lakes, or ponds, providing recharge to the ground-water reservoirs. Part of the ground water may be residual in the underground reservoirs, water left by the ancient seas, lakes, or rivers in which the sediments accumulated. Such water is called "connate" water. Ground water may come also from hot springs and magmatic liquids of the interior of the earth, but such water is negligible in the Coastal Plain sedimentary deposits.

Along the coast, water may enter the ground-water reservoirs from the sea. It can be detected because of its high salt content. In general, fresh water beneath the land holds back the salty water because the water level beneath the land is above sea level. In areas of heavy pumping near the coast, or with the dredging of sea-connected canals, sea water may encroach landward and endanger the fresh-water reservoirs.

Encroachment of salt water is a menace which should bear continued observation, in order that a basis will exist for remedial action when necessary.

The portion of ground water derived by replenishment from the atmosphere is governed by the natural laws of the hydrologic cycle. These natural laws are partly summarized in the equation of hydrologic balance

$$P = R + ET + S$$

in which:

P is precipitation—rain, snow, hail, sleet, dew, or frost;

R is surface and ground-water runoff from the land;

ET is evapotranspiration, combining evaporation of water and transpiration by plants; and

S comprises the changes in storage (usually small increments of the equation) of the surface reservoirs, the soil reservoirs, or the ground-water reservoirs. These changes may be positive or negative at any particular time, but over a long period under natural conditions they tend to cancel out.

In summary, then, ground water may be placed in storage at the time of formation of the underground reservoirs, or it may come from the sky, the sea, or the interior of the earth. The principal part used by man, however, is derived from precipitation.

STORAGE OF GROUND WATER

After satisfying deficiencies of moisture in the soil zone, the portion of the rainfall or snow melt that filters into the ground percolates by gravity through the small opening between sediment grains, or through fissures in the rocks, to the water table, the top of the zone of saturation. The water table may be defined as that surface in the ground below which openings are saturated with water that is free to move into wells. The water table thus is represented by the water level in free, open wells penetrating an unconfined body of ground water.

A fringe of moist sand or rock a few inches to a few feet above the water table is often encountered in drill holes. This moist zone is called the capillary fringe, since it is caused by the capillary attraction or capillary retention of some water above the saturated zone. The capillary water does not flow into wells.

The water table rises fairly rapidly in response to infiltration, and falls gradually as the water seeps away to lower points (wells) or areas (valley bottoms or channels) of discharge. The amount the water level will rise in response to infiltration depends upon the available pore space within the ground. If the pore spaces are few or small, the water level will rise higher than if they are numerous or large.

The ability of the ground to store water is approximately equal to the amount it will yield. A measure of this storage is called the "specific yield." It is the ratio of the volume of water a saturated sample will yield by gravity to the volume of the sample. For example, the statement that the specific yield of a sample is 25 percent means that the saturated sample will yield a volume of water equal to 25 percent of its total volume. One inch of water filtering into such a material would cause a 4-inch rise in ground-water level.

Another measure of the storage of ground water is called the "coefficient of storage." This coefficient may be defined as the volume of water, measured as a fraction of a cubic foot, released from storage in each column of the water-bearing bed having a base 1 foot square and a height equal to the thickness of the water-bearing bed when the water level is lowered 1 foot.

The coefficient of storage, usually determined by a controlled well-field test, is approximately equal to the specific yield in unconfined ground-water reservoirs, in which the water surface is represented by the water table. In confined or artesian water-bearing beds the coefficient of storage is usually a few hundredths to a few thousandths of 1 percent, owing to the fact that the water is derived not from emptying the crevices in the underground reservoir, but from the shrinkage or contraction of the water-bearing bed and its confining layers, and slight expansion of the water itself, under the decrease in pressure around the well. The reason the coefficient of storage is not exactly equal to the specific yield under water-table conditions is that, in the field, the specific yield would apply only to the topmost foot below the water table, whereas the coefficient of storage includes also the small (artesian) coefficient of storage for the rest of the aquifer below the topmost foot.

Available ground water is stored in water-yielding bodies of rock called aquifers. In Somerset, Wicomico, and Worcester Counties the aquifers are usually of fine to medium-grained sand, with occasional layers of gravelly sand, silty sand, or shell beds. The aquifers are underlain or overlain by confining beds which contain water but yield it slowly. Those beds are called aquicludes because they include water, but retain it; they are usually composed of silt or clay.

Aquifers serve as ground-water reservoirs, retaining water in storage; as conduits, acting as a multitude of pipes, many of filament size, for the slow movement of ground water; and as filters, clarifying muddy waters from the intake areas, and in the sand aquifers often purifying bacterially polluted waters within a few tens of feet. In general, aquifers do not act as chemical filters and are not capable of materially altering high acid, high alkaline, or saline waters, although over great distances of ground-water percolation some chemical change may take place. Such a change is seldom an improvement, although natural softening (p. 157) is a decided exception.

Water-bearing beds are separated into two groups, the unconfined aquifers and the confined aquifers. These groups are distinct in theory, but in fact they grade into one another. Unconfined ground water occurs under water-table conditions; confined ground water occurs under artesian conditions. The production of water from wells, the quantity derived from storage, and the area of influence of falling water levels is different for water-table conditions than for artesian conditions.

Water-Table Aquifers

Unconfined aquifers are those in which infiltration water has free access to the water surface below. The water surface is a water table, marking the zone of saturation beneath a zone of aeration. Wells pumping from the zone of saturation depress the water table toward them, as shown in figure 33, and derive water directly from storage by dewatering part of the zone of saturation. The sources of recharge are infiltering rainfall, or the influent seepage of a nearby stream.

In this tri-county area the water table is usually 2 to 20 feet below the land surface, with an average, areally and year around, of about 4 feet; and the bottom of the unconfined reservoir is seldom more than 100 feet below land surface. The saturated thickness for large producing wells is usually only 50 to 100 feet, so there is not a great deal of available "drawdown" or available "reservoir" which can be dewatered. However, because the coefficient of storage for water-table aquifers is usually large, in the range of 1 to 30 percent, water-table wells are often capable of large yields, without great drawdown, or without having a radius of influence greater than a few thousand feet. Wells close to ponds or streams usually have the highest yield, deriving recharge from the surface-water source, as do the wells of the city of Salisbury.

Artesian Aquifers

Confined aquifers are those water-bearing beds enclosed above and below by impermeable or semipermeable beds. Confined reservoirs are artesian in that the water level in wells rises above the top of the producing sand. Often the water overflows the surface in the early period of development of the aquifers, particularly in wells drilled in valleys at the lower elevations. As the artesian head falls, many such wells cease to flow. All wells penetrating confined aquifers are artesian.

The height to which water rises in wells drilled to an artesian aquifer indicates the pressure of the water in the confined water-bearing zone. The imaginary surface to which the water would rise in wells drilled to the aquifer is called the piezometric surface.

Artesian aquifers usually show low coefficients of storage, in the range from 0.001 to 0.00001. The area of influence of falling water levels in artesian aquifers often is found to extend several miles from the producing well or well fields, usually to much greater distances than from comparable water-table well fields in aquifers of about the same productivity.

Most of the artesian aquifers in the tri-county area are sheet sands, overlain by sheet silts and clays. They underlie areas ranging from a few square miles to several tens of square miles, and are usually 10 to 50 feet thick. They have a regional dip to the southeast of 10 to 20 feet to the mile.

Since the artesian aquifers in the tri-county area lie deeper than the water-table aquifers, and some have an initial piezometric surface as high as or higher than the overlying water table, there is usually greater available drawdown. The artesian aquifers receive recharge from the water-table aquifers in broad belts where the sheet sands directly underlie the mantle of Pleistocene and Pliocene(?) deposits. It is probable also that some recharge is received through the confining beds, which may be leaky, permitting the passage of water at a slow rate, but possibly contributing substantial quantities over a large area.

Aquicludes

The confining materials above and below the artesian aquifers in Somerset, Wicomico, and Worcester Counties, are chiefly silt, with minor amounts of clay and very fine sand. Although these materials are porous, the pores are so small that the capillary forces hold the water to the grains, or allow it to move only very slowly in response to high hydraulic gradients—that is, under great differences of pressure. These porous materials have a low permeability, but where they are extensive they have an appreciable, though small, vertical transmissibility. Moreover, they contain a large quantity of water in storage.

A confining bed of low permeability can yield appreciable water to an aquifer over a broad area when the hydraulic gradient into the aquifer is steepened by the large drawdowns and extensive cone of depression resulting from high rates of pumping. It is likely that some of the water considered to be taken from storage in the aquifer is actually coming from storage in the aquiclude.

MOVEMENT AND DISCHARGE OF GROUND WATER

Most ground water moves by laminar flow. Exceptions are the flow of water in some cavernous limestones, in some fissured volcanic rocks, or in the immediate vicinity of a high-capacity well. The natural rate of movement of ground water is usually only a few feet a day, although in granular materials the rate may vary from infinitesimal to several hundred feet a day (Meinzer and Wenzel, 1942, p. 449).

The rate of movement of ground water is governed by Darcy's law, which may be conveniently rewritten in the form (Wenzel, 1942, p. 3–11):

$$Q = PIA$$

in which Q is the quantity of water discharged in a unit of time, P is the coefficient of permeability, which depends on the character of the material, I is the hydraulic gradient, and A is the cross-sectional area through which the water percolates.

Wenzel (1942, p. 4) states:

> This formula serves as a basis for determining the quantities of ground water that percolate from areas of recharge to areas of discharge, and consequently it is used for determining the safe yield of underground reservoirs.

The coefficient of permeability has been expressed (Wenzel, 1942, p. 7) as:

> ... the number of gallons of water that would be conducted were the temperature of the water 60° F., through each mile of water-bearing bed under investigation (measured at right angles to the direction of the flow) for each foot of thickness of the bed and for each foot per mile of hydraulic gradient.

The coefficient of permeability is supplemented by the coefficient of transmissibility, T, which is the product of the average field coefficient of permeability and the saturated thickness, m (Theis, 1935, p. 520)

$$T = P_f \cdot m.$$

The coefficient of permeability denotes a characteristic of the material; the coefficient of transmissibility represents the analogous characteristic of the aquifer as a whole.

Ground water is transmitted through the earth from points of recharge to points of discharge. Ground water is discharged from a given area or aquifer as ground-water runoff into surface-water bodies, ground-water evapotranspiration, subterranean leakage or underflow, and yield to wells.

Ground-water runoff is the lateral movement of ground water, flowing from ground-water mounds to areas of surface seepage—that is, to springs, to channels, or to open bodies of water. Much of it eventually flows down creeks and rivers to the sea. Some of it eventually returns to the atmosphere through evaporation, or through transpiration. Ground-water runoff is high in the tri-county area.

Ground-water evapotranspiration is the discharge of ground water as water vapor, either directly from the soil or indirectly via plant tissues. Where the water table stands very close to the surface—that is, within 3 to 5 feet—the capillary fringe may extend from the water table to the land surface. As rays of the sun evaporate water from the soil, the water is replenished by capillary movement of water from the water table to the soil zone. Also, plant roots commonly extend to the water table or to the capillary fringe and take in water through the rootlets to the stems which discharge it as water vapor from the stomata of the leaves. This is transpiration. The discharge of ground-water by evapotranspiration in the tri-county area is high.

The discharge of ground water to wells is an artificial discharge imposed upon ground-water reservoirs. In the eastern shore of Maryland it is the principal means by which ground water is withdrawn for human use.

HYDRAULICS OF WELLS AND CONCEPT OF "SAFE" YIELD

Wells discharge water by artesian flow or by pumping, extracting water from the saturated materials surrounding the well bore and causing water from distant areas to move toward the well. The water table or the pressure surface surrounding the well is lowered, creating a cone of depression, so that there is a hydraulic gradient from the limit of the area of influence to the mouth of the well. This lowered water level is usually maintained as long as the well is operating. When the well is shut down the water level rises, but it may not return to its initial level for a considerable period of time.

A typical cross section of a cone of depression is shown in figure 33. This figure also shows the Theis (1935) formula used to determine the rate of fall of water levels in response to pumping, for given distances, and coefficients of transmissibility and storage.

Pumping of water from wells decreases the ground-water runoff and, with a near-surface water table, may decrease evapotranspiration. Insofar as this runoff and evapotranspiration served no useful purpose, but was simply discharged as wasted water to the sea or to the atmosphere, the pumpage represents excess water diverted to use. The amount of ground water discharged to waste represents the maximum amount salvable for use without interference with existing uses, and thus constitutes one of several values to which the term "perennial" or "safe" yield can be applied.

Wells developed and pumped in the same formation mutually affect water levels in each other in amounts depending upon their rate and duration of pumping and distance apart. If the water levels in the formation become stabilized, at practical depths, after the wells or well fields have been completely developed, the discharge is considered within the "safe" yield of the formation. If, however, the water levels continue to decline persistently even after the pumping rate has become stable, so that the limit of practical pumping lift is approached, or if the pumping induces encroachment of inferior water, the "safe" yield is considered to have been exceeded.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

The geologic formations of Somerset, Wicomico, and Worcester Counties, their range in thickness and in depth, their character and water-bearing properties, are summarized in Table 9.

The contour map of the basement, figure 4, serves as an isopach, or thickness, map of the Coastal Plain sediments.

TRIASSIC SYSTEM

The deepest and oldest sedimentary rocks known in the tri-county area are indurated basal conglomerates, red-brown and bottle-green sandstones, and chocolate-brown and apple-green shales, with intercalated gray sands and shales. These rocks were found between 5,363 and 5,498 feet in the Salisbury oil test (Wi-Cg 37) and between 6,566 and 7,251 feet in the Berlin oil test (Wor-Ce 12).

The electrical logs (Pl. 4) of the Salisbury and Berlin tests show some thin zones 10 to 20 feet thick of moderately high self potential and low third-curve resistivity, indicating they contain highly mineralized water. It is not likely that water produced from these zones would be usable, except for limited purposes. Coming from such great depths the water would be hot, above 140°F. (Collins, 1925).

CRETACEOUS SYSTEM

The top of the Cretaceous system ranges in depth from 740 feet at Smith Island on the west to 2,100 feet at Fenwick Island on the east (fig. 5). The thickness ranges from about 3,000 feet on the west to 5,700 feet on the east (fig. 6). The lowest strata of the Cretaceous rocks lie about 7,800 feet below sea level beneath Fenwick Island.

The sediments are chiefly sands and tough clays, shales, and shell marls containing glauconite, lignite, feldspar and heavy minerals in recognizable zones. The water-bearing capacity of the Cretaceous sediments is large, since sands predominate. According to the electric logs, however, many of the sands contain water high in dissolved solids.

TABLE 9

The Geologic Formations and their Water-bearing Properties in Somerset, Wicomico, and Worcester Counties

System	Series (Group)	Formation (Range in depth to top, in feet)	Range in thickness and average t ickness (feet)	General character, probable origin, and boundaries	Water-bearing properties ("Small" indicates yields up to 500 gpd; "moderate" indicates yields between 500 and 5,000 gpd; "fairly large" indicates yields above 5,000 gpd; "large" means wells capable of sustained yields up to 300 gpm; "very large" means wells capable of 300 to over 1,000 gpm
	Recent	0	0–25 (5)	Loam soil, alluvial sand and silt, dune sand, and peat. Disconformable lower boundary.	Provides water to vegetation and possibly to a few coastal shallow wells, of small yield.
Quaternary	Pleistocene (Columbia)	Parsonsburg sand and Pamlico and Talbot formations Walston silt Beaverdam sand (0–25) See Table 17 for subdivision	0–159 (50±)	Unconsolidated, stratified, lenticular deposits of buff sand and silt, with small amounts of gravel and clay. Occur as stratified drift, with a few erratic boulders; as stabilized dunes; as marsh mud; as fluviatile thinly stratified, crossbedded, channel fill; as massive, well-sorted beach sand, and possibly marine sand. Disconformable lower boundary.	Yields moderate to fairly large quantities of water to some wells, small quantities to many wells. Water-table conditions prevail. Artesian conditions exist beneath Parsonsburg ridge, and along the coastal margins. Water may be "irony."
Tertiary	Pliocene(?)	Brandywine, Bryn Mawr, and Beacon Hill gravels(?) (0–150)	0–69 (10±)	Slightly cemented, red, orange and brown, gravelly sand. Locally hard ledges, a few inches to 2 feet thick, usually at the base of the formation. Chiefly channel fill. Disconformable lower boundary.	Yields moderate to very large quantities of water to wells, frequently in conjunction with nearby surface streams, and with sands of overlying and underlying formations. Water-table conditions prevail.. Water may be "irony."

	Miocene	Yorktown and Cohansey formations(?), undifferentiated See Table 14 for subdivision (0–150)	0–400+ (250)	Gray sands, in gray or blue, clayey, silt; the sands predominantly fine- to medium-grained; locally coarse sand, grit, or fine gravel. Black sands, green sands and shell beds are reported locally. The clayey silts are occasionally brown or green. Generally nonfossiliferous. Deltaic(?) estuarine and marine. Disconformable lower boundary.	Yields small to moderate quantities of water to many wells; large quantities to a few municipal and industrial wells. Contains two extensive artesian aquifers (Manokin and Pocomoke), several local artesian aquifers, and usually one or more aquicludes.
		St. Marys formation (50–500)	33–200+ (130)	Predominantly clayey silt and silty clay with very fine sand, shells and Foraminifera. Conformable lower boundary.	An aquiclude, prevents brackish water of underlying Choptank formation from contaminating Yorktown and Cohansey formations(?). Not known to yield water to wells.
		Choptank formation (100–800)	35–260 (120)	Gray and brown sand and clay, containing shell marl and Foraminifera. Marine. Conformably lower boundary.	Yields small to moderate quantities of water locally to a few wells. Could probably yield more water over a wider area, but need for drilling this deep seldom arises. Water is high in dissolved solids.
		Calvert formation (200–1000)	204–680 (450)	Gray diatomaceous silts and clays, containing lenses and thin sheets of gray sand, shell beds and Foraminifera. Marine.	Generally a thick aquiclude, but contains two or three small aquifers. The Nanticoke aquifer occurs in western Wicomico County at depths ranging from 200 to 500 feet. A deeper aquifer yields water to a multiple screened well at Crisfield (Som-Ec 4). A basal sand may function as an aquifer with the Piney Point formation. The Calvert formation is largely unexplored, but the few holes drilled through it are not encouraging.

TABLE 9—*Continued*

System	Series (Group)	Formation (Range in depth to top, in feet)	Range in thickness and average thickness (feet)	General character, probable origin, and boundaries	Water-bearing properties ("Small" indicates yields up to 500 gpd; "moderate" indicates yields between 500 and 5,000 gpd; "fairly large" indicates yields above 5,000 gpd; "large" means wells capable of sustained yields up to 300 gpm; "very large" means wells capable of 300 to over 1,000 gpm
Tertiary—*Cont.*	Oligocene	None	0	An interval of erosion or non-deposition. Regional unconformity.	An uneven boundary between Miocene and Eocene strata, resulting in a variable permeable and impermeable discontinuity.
	Eocene	Chickahominy formation	80–170	Brown glauconitic clay.	Aquiclude
		Piney Point formation (500–1650)	55–220 (120)	A white, quartz sand and glauconitic greensand grading into brown shales. Marine. Foraminifera. Conformable lower boundary.	Yields moderate quantities of slightly saline waters to one well at Deal Island and another at Rumbley in Somerset County, and a moderate flow of warm salty water on the Isle of Wight, Worcester County. Supplies a large quantity to a city well at Crisfield, which is also screened in the Cretaceous and the Miocene. Otherwise unexplored in the three counties.
		Nanjemoy formation (800?–1400 not present extensively)	0–70	"Hard, brownish-white chalk with only a trace of glauconite" (Anderson and others, p. 17). Marine.	Reported only in Hammond oil test near Salisbury. Not known to yield water. Absent in Smith Island and Crisfield wells.
		Aquia greensand	0	Not recognized in any of the deep wells in the three counties. Represents an unconformably boundary.	
	Paleocene	Brightseat(?) formation (600–1900)	40–260 (161)	Alternate beds of gray, green, and brown clay and gray glauconitic sand. Marine. Regional unconformity.	Yields water only to a few wells of moderate to fairly large capacity at Crisfield.

Cretaceous	Upper Cretaceous	Monmouth formation (740–2100)	0–94 (45)	Dark-green glauconitic sand and lead-gray clay containing shells and Foraminifera. Marine. Lower boundary conformable.	Not known to yield water. Electric logs in 3 deep oil tests indicate low self-potential and low resistivity, suggesting low permeahility. Probably an aquiclude.
		Matawan formation (750–2200)	0–220	White, silty chalk; lead-gray, glauconitic clay; and basal fine sand and conglomerate. Marine. Generally conformable.	Not known to yield water. Probably an aquiclude, except the basal member which may function with the Magothy.
		Magothy formation (760–2400)	30–120	White, yellow and gray sand interlaminated with gray and hrown shale, containing lignite and carbonaceous matter, but no animal fossils. Non-marine. Unconformable lower boundary.	The deep producing aquifer at Crisfield and on Smith and South Marsh Islands. Fairly large to moderate yields obtained from flowing wells. The electrical logs of the 3 oil tests suggest high permeability, particularly in the uppermost and basal zones, but the water may he highly mineralized.
		Raritan formation (790–2500)	725–876 (817)	Intercalated thin sands and shales. The sands are generally gray, fine-grained, micaceous and lignitic. The shales are mottled pale-gray-brown and red in the upper section and gray-brown in the lower. A few beds containing Foraminifera and macro-fossils with glauconite are marine tongues; the formation is predominantly deltaic and estaurine. The lower boundary is unconformable.	Yields a fairly large flow of water to one well (Ea 9) at Tylerton, Smith Island. Uppermost sands may function with the Magothy aquifer. The electrical logs of the 3 oil tests indicate that permeable beds are present, but they probably contain brackish or salty water.

TABLE 9—*Continued*

System	Series (Group)	Formation (Range in depth to top, in feet)	Range in thickness and average thickness (feet)	General character, probable origin, and boundaries	Water-bearing properties ("Small" indicates yields up to 500 gpd; "moderate" indicates yields between 500 and 5,000 gpd; "fairly large" indicates yields above 5,000 gpd; "large" means wells capable of sustained yields up to 300 gpm; "very large" means wells capable of 300 to over 1,000 gpm
Cretaceous—*Cont.*		Patapsco formation and Arundel clay (1400–3400)	2,070–2,111 (2,095)	Thick sands and shales. Sands are medium- to fine-grained in the upper part, but coarse and gravelly in the lower 600 feet. They are white in color. The clay shales and sandy shales are gray and brown in the upper part, variegated gray, red, brown and green in the middle part, and olive-green and gray in the lower part. Generally non-fossiliferous, but one brackish-water Cenomanian fauna was identified in a core from the lower part of the Ocean City test (Wor-Bh 11). Probably deltaic. Lower boundary not conformable.	Not known to yield good water. The low resistivity opposite high self-potential on the electrical logs suggests that the sands contain brackish and salty water.
	Lower Cretaceous	Patuxent formation (3400–5400)	939–2,310 (1,646)	Thick sands and thin shales. Sands are fine to very coarse and gravelly, poorly sorted. They are white, occasionally limy and feldspathic. Shales are varicolored gray, red, brown, yellow, lavender, purple and green. Possibly fluviatile and alluvial fan. Not fossiliferous. Lower boundary not conformahle.	A potential aquifer, but the electrical logs suggest that the water may be too highly mineralized for most uses, particularly in the upper part. Temperature of the water probahly ranges between 100° F. and 175° F.

Triassic	Upper (Newark)	Brunswick(?) shale Brunswick(?) conglomerate of Miller (1914) Stockton(?) formation (4,000–7,850)	135–585 (360)	Upper chocolate-brown shales, with intercalated gray, sands and shales; medial red-brown, bottle-green sandstones; indurated basal conglomerate. Lower boundary unconformable.	A doubtful aquifer. The electric logs indicate that the basal conglomerate and sandstones contain brackish or salty water. The upper beds probably are an aquiclude.
Paleozoic and pre-Cambrian crystalline complex		Baltimore(?) gabbro Wissahickon(?) schist Setters(?) formation Baltimore(?) gneiss (4,000–8,500)	48 to 70 feet penetrated in oil test holes)	In the Salisbury oil test (Wi-Cg 37) a weathered schist and a mica gneiss, cut by veins of pegmatite. In the Berlin oil test (Wor-Ce 12) serpentine and metamorphosed gabbro.	At the depths penetrated, probably an aquifuge (hard, dense rock that neither contains nor transmits ground water).

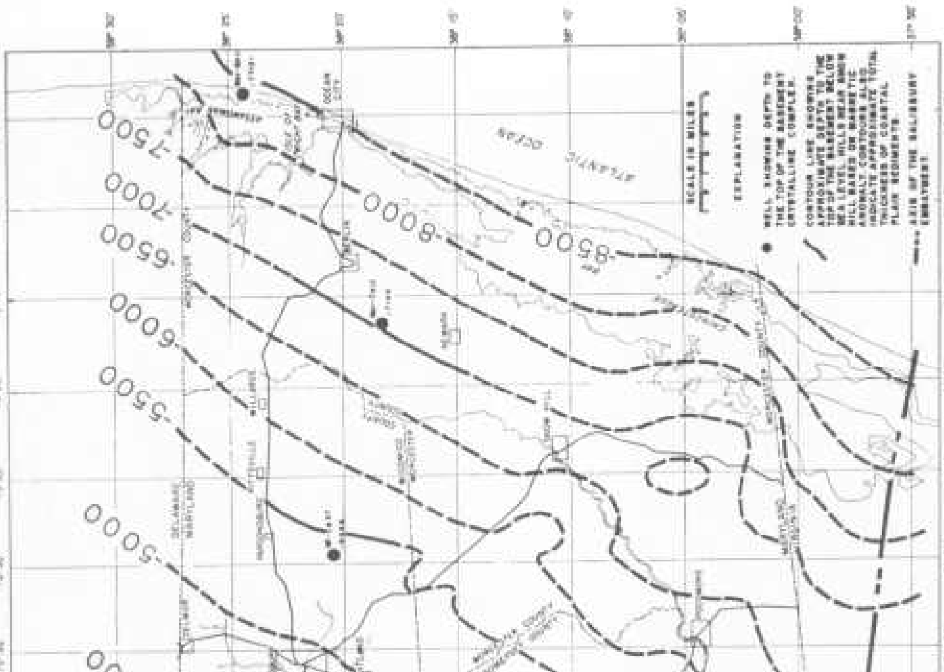

FIGURE 4. Map of Somerset, Wicomico, and Worcester Counties, showing the Approximate Depth to the Top of the Basement Complex and Approximate Thickness of Coastal Plain Sediments

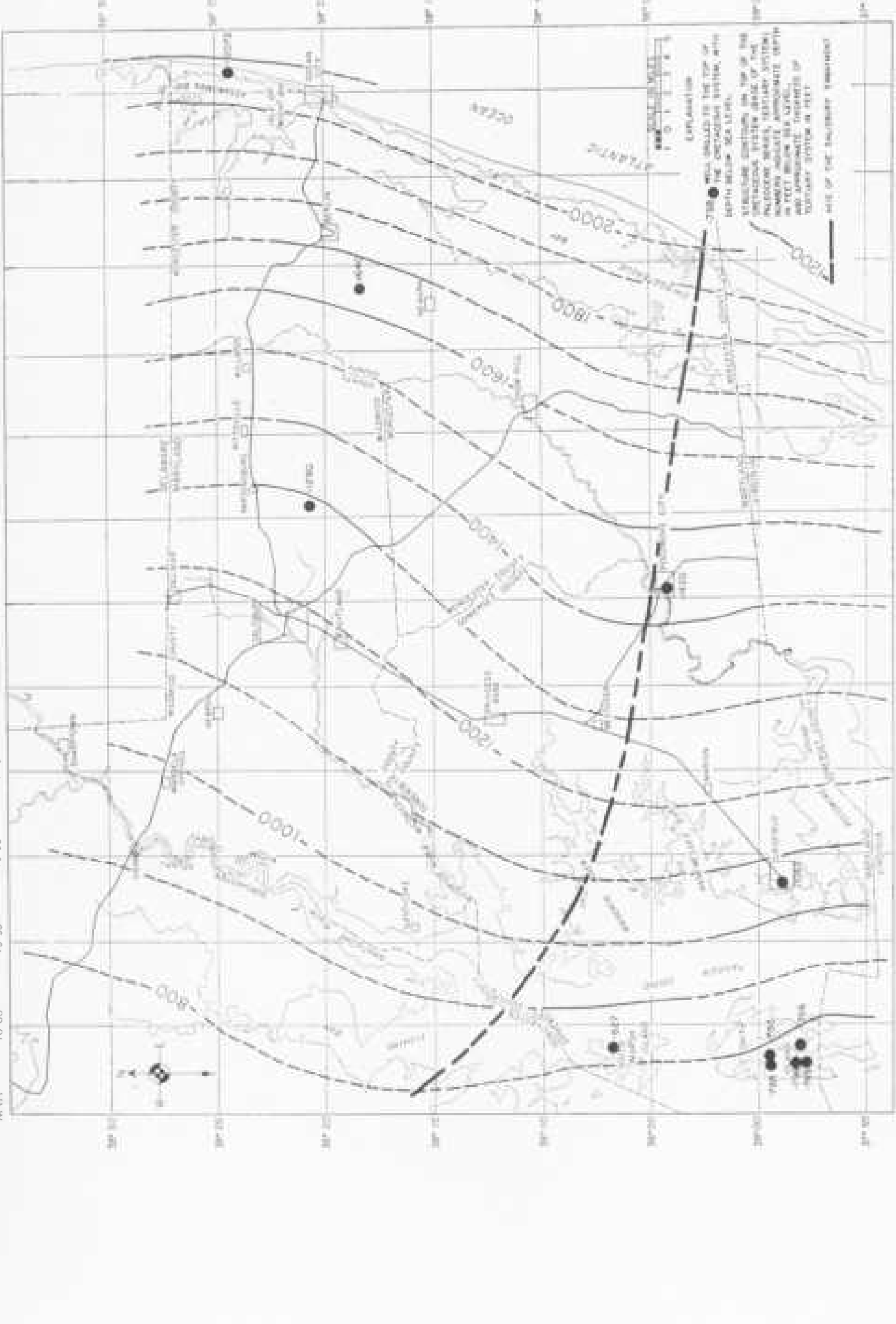

FIGURE 5. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Cretaceous System or the Base of Tertiary System and the Approximate Thickness of the Tertiary System

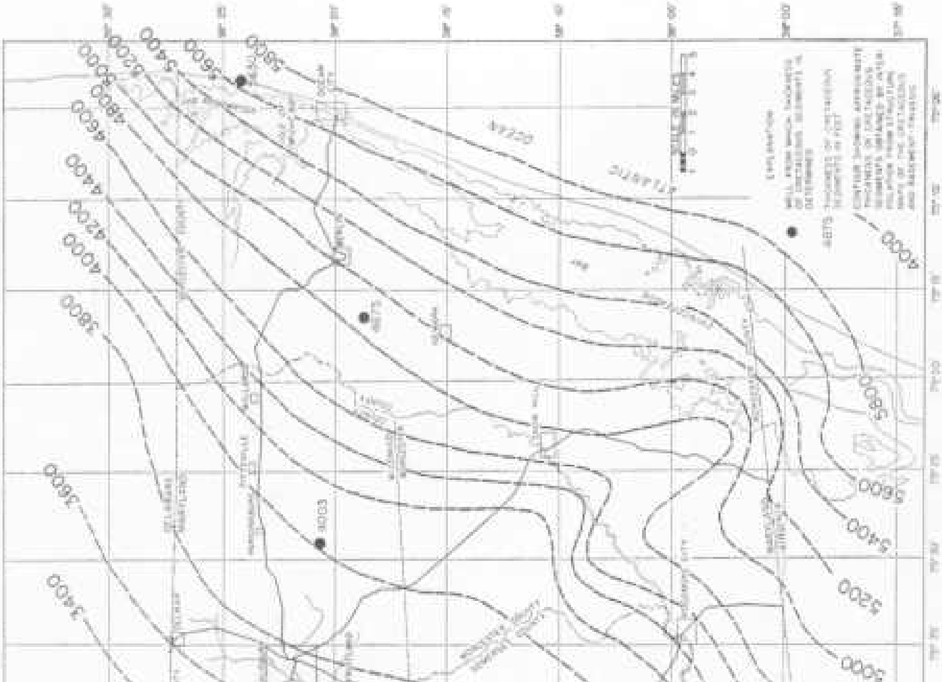

FIGURE 6. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Cretaceous System

Lower Cretaceous Series

Patuxent formation. The Patuxent formation occurs so deep that it has been penetrated only in the three deep oil tests in Wicomico and Worcester Counties. It contains much highly mineralized water.

In the oil test east of Salisbury (Wi-Cg 37), Anderson (Bull. 2, p. 14) describes the formation as "fine to very coarse and at times gravelly, soft, white, occasionally limy, arkosic sands," he adds, "poorly sorted," with "shales and sandy shales. . .usually lead-gray in color, hard, compact and frequently mottled red, brown, yellow, purple and green." The mottled coloring of the shales is a common feature of the Patuxent, Patapsco, and Raritan formations, and serves to distinguish them from other formations. Lignite and carbonaceous matter were also reported but fossils were not. In this well the Patuxent formation is believed to extend from 4,424 to 5,363 feet below land surface, a thickness of 939 feet.

In the oil test southwest of Berlin (Wor-Ce 12), the lithologic description is the same, but shales are subordinate to the sands. The formation was logged from 4,876 feet to 6,566 feet, a thickness of 1,690 feet.

In the oil test north of Ocean City (Wor-Bh 11), the "section revealed by the electric log is composed of thick bodies of sand with subordinate intercalated shales. . . . " (Bull. 2, p. 93). Kaolinized feldspars are reported from the sidewall cores. The formation extends from 5,400 feet to the bottom of the hole at 7,710 feet, therefore it is at least 2,310 feet thick at this site.

The top of the Patuxent formation slopes from 3,400 feet below sea level along the western boundary of Somerset and Wicomico Counties to 5,400 feet below sea level along the barrier islands which separate Worcester County from the Atlantic Ocean, a dip of about 95 feet per mile southeast. The sheaf of thick sands and thin shales thickens from about 600 feet on the west to about 2,300 feet on the east.

The character of the sediments, both in the outcrop area (Bennett and Meyer, 1952, p. 41), and in the Salisbury and Berlin oil tests on the Eastern Shore, indicates a continental origin. Anderson (Bull. 2, p. 101) suggests that a progressive overlapping of Patuxent sediments in the Ocean City oil test may indicate "marine or near marine shore conditions" in that vicinity.

Upper Cretaceous Series

Patapsco and Arundel formations. The Patapsco and Arundel formations in Somerset, Wicomico, and Worcester Counties are known only in the three deep oil tests near Salisbury, Berlin, and Ocean City.

In the Salisbury oil test (Wi-Cg 37) the Patapsco and Arundel section is considered 2,111 feet thick, extending from 2,313 to 4,424 feet. It comprises thick sands containing thin shales alternating with thick shales containing thin sands. The sands are white, predominantly quartz, and contain few kaolinized feldspars. The shales are brown, gray, black, and highly variegated. Sporadic carbonaceous matter and one 5-foot bed of glauconite complete the description.

In the Berlin oil test (Wor-Ce 12) the top of the Patapsco and Arundel section is difficult to place, but Anderson (Bull. 2, p. 84) has picked it at 2,770 feet on lithologic grounds. The section is thus 2,105 feet thick, extending to 4,875, the top of the Patuxent formation. The lithology is similar to that in the Salisbury test, but individual sands or shales cannot be traced from one well to the other, a distance of only 12 miles.

In the Ocean City oil test (Wor-Bh 11) the top of the Patapsco and Arundel section is placed at 3,330 feet, and the base at 5,400, a thickness of 2,070 feet. The lithology is similar to that of the other two oil tests; zones can be traced but individual beds cannot.

One hundred miles west, the thickness along the outcrop is about 300 feet, over an intake belt about 6 miles wide. Although opportunities for fresh-water recharge are good along most of the intake belt in the Baltimore area, a large part of the recharge is undesirable because of brackish water contamination caused by heavy pumping (Bennett and Meyer, 1952, p. 124–173).

The quality of ground water in the Patapsco and Arundel formations in Somerset, Wicomico, and Worcester Counties is not known, but the electrical logs (Pl. 4) of the three oil tests indicate the sands have low resistivities (high conductivities), indicating brackish or salty water.

Raritan formation. In the three deep oil tests of Somerset, Wicomico, and Worcester Counties, the Raritan formation consists of alternating thin sands and shales, which range in thickness from an estimated 600 feet on the west to about 900 feet on the east. The top of the formation slopes from about 800 feet below land surface at Smith Island to 2,800 feet below land surface on Fenwick and Assateague Islands. An upper sand in the formation yields a large flow of water to one well (Som-Ea 9) at Tylerton, Smith Island, from a total depth of 915 feet. The formation has been penetrated also, but not developed for water, at Crisfield (Som-Ec 4).

At Smith Island most of the wells produce from the overlying Magothy formation, but in Som-Ea 9 the Magothy interval is logged as a clay, and production is about 100 feet deeper from a sand probably in the Raritan formation. The lithologic log shows production from 45 feet of white sand beneath pink and blue clays. The water flows with a head 20 feet above land surface (altitude 2 feet), which is somewhat higher than the flowing heads in the other wells on Smith Island, which are drilled to the Magothy; since these are flowing heads, not static, they cannot be directly compared. The overflow pipe was discharging about 2.5 gallons a minute. The chemical analysis of the water is similar to the analyses of the other wells at Smith Island, showing soft non-saline, slightly alkaline bicarbonate water with about 500 ppm of dissolved solids.

About 124 feet of variegated clay and brown sand was logged in the lowest part of the Crisfield city well, Som-Ec 4, which was assigned to the Raritan on the basis of the mottled colors and the red coloration. This section did not yield sufficient water to warrant development, and the well was developed in three sands in younger formations.

The potentialities of the Raritan formation for producing ground water are only sketchily outlined by the five wells penetrating into the formation. A producing horizon in the upper part of the Raritan is in use at Smith Island, beneath mottled red and blue clays (Som-Ea 9). It is thus probable that the Raritan formation in western Wicomico and the western edge of Somerset Counties contains productive sands with the water not too highly mineralized, particularly in the upper part of the formation. Farther east is a belt of the Raritan formation represented by the Salisbury and Berlin oil tests, in which the sands are poor and thin, shales are prominent, and the formation probably contains predominantly brackish and salty water as shown by low resistivity on the electric logs (Pl. 4). Along the eastern margin of Worcester County, the electric log of the Ocean City well indicates there are probably thick sands in the basal Raritan section but they also contain water that is probably highly mineralized.

Field coefficients of permeability in the Raritan formation are little known. On the basis of gross similarity to the sands of the Potomac group (Bennett and Meyer, 1952, p. 51, 52, and 67) a range from 140 to 1,400 gpd/ft is probable. The coefficient of storage might likewise be approximated to range from 10^{-4} to 10^{-3}.

The outcrop belt may be interpreted as a zone of intake. Not all this intake may be desirable, since the belt crosses the Delaware River estuary, the tidal C. & D. Canal, and over 33 miles of the Chesapeake Bay estuary.

Magothy formation. The Magothy formation is the most persistent water-bearing bed of the Cretaceous system in Maryland. It consists of white, yellow, and gray, "sugary" sands with irregular lenses of dark clay containing lignite.

The Magothy formation yields large quantities of water to 11 wells in southwestern Somerset County, and has been penetrated but found nonproductive in one well, Som-Ea 9. It has been penetrated also in the three deep oil tests in Wicomico and Worcester Counties. On the basis of these 15 wells, it is believed to underlie all three counties.

It has been encountered about 760 feet below land surface at Rhodes Point, Smith Island, on the west, and apparently slopes progressively downward to about 2,400 feet below land surface beneath the Atlantic shore on the east. The average thickness of the formation recorded in the wells is 92 feet.

One of the producing wells is on South Marsh Island (Som-Ca 1). The formation is described as a soft gray sand, 41 feet thick, from 830 to 871 feet below land surface (altitude of well, 3 feet above sea level). The sand is assumed to be Magothy chiefly on the basis of lithology and structural relation to the nearby wells on Smith Island. The well was reported by the driller as flowing about 10 gpm when completed in October 1951.

Eight of the producing wells are on Smith Island: Som-Ea 1 to -Ea 6 at Ewell; Som-Ea 7 and 8 at Rhodes Point. These wells are flowing, with heads observed 1 to 15 feet above land surface in November 1953; flow rates were several gallons a minute, with the wells supplying groups of houses. The formation is probably not completely penetrated in these wells. The description of the section in the logs of wells Som-Ea 1, -Ea 2, and -Ea 7 is a light-yellow medium- to fine-grained micaceous sand, and a white sand and clay.

The other two producing wells are those of the city of Crisfield, Som-Ec 3 and -Ec 4. Som-Ec 4 has multiple screens, producing also from the Piney Point and the Calvert formations. The initial head on this well was reported at 4 feet above land surface in 1948, and the reported production rate when the well was pumped was about 300 gpm. The description of the formation is:

	Thickness (feet)	Bottom Depth (feet)
Clay aggregates, coarse rounded granular	58	1,125
Sand, fine to medium, 10 percent glauconite	17	1,142
Clay aggregates, coarse, rounded, granular, gray	37	1,179

McLean (1950, p. 136) assigned this interval, and the underlying 124 feet (down to the bottom of the hole) to the Monmouth formation. Since no fossils were recognized, the correlation was based on lithology, and was probably influenced by the 10 percent of glauconite present in the sand. Although this correlation may be correct, the underlying clays, described by McLean as "vari-colored sandy clay with pink and red shades in the lower part", are typical of the Raritan formation. The small percentage of glauconite in the sand could be a drill-cutting contaminant from the overlying greensand-rich basal sand of the Paleocene series.

In the oil test near Salisbury (Wi-Cg 37) the Magothy formation is described as 90 feet of "lead-gray, brownish black, and dark cinnamon-brown clay shales with interlaminated very fine-grained sands" (Anderson, Bull. 2, p. 16). Lignitized vegetable fragments, including wood, were identified. The formation was topped at 1,498 feet (or 1,428 feet, sea level datum).

In the Berlin (Wor-Ce 12) and Ocean City (Wor-Bh 11) oil tests the Magothy formation is difficult to identify because the well samples are not good. However, the top is placed at 1,800 feet below land surface (1,770 feet sea level datum) and 2,360 feet below land surface (2,352 feet sea level datum), with thicknesses 94 and 120 feet, respectively.

The Magothy formation appears extensive, and has an intake belt 1 to 4 miles wide extending from Raritan Bay, New Jersey, to the Potomac River.

The transmissibility and storage coefficients of the aquifer are unknown. The coefficients within the range obtained from other Cretaceous units in Maryland may be used for a first approximation (see the range suggested for the Raritan formation, p. 53). The quality of the water is questionable.

Matawan formation. The Matawan formation is an aquiclude in Maryland, being predominantly a clay with sandy-clay facies.

In Somerset, Wicomico, and Worcester Counties the formation was penetrated in only 4 wells, and was missing in 12 wells drilled to the Magothy formation in southwestern Somerset County, on Smith Island, South Marsh Island, and at Crisfield. The old deep water test at Pocomoke City (Wor-Fb 19) is believed to penetrate 26 feet of the Matawan identified on the basis of lithology. The three deep oil tests pass through the Matawan section.

In the oil test near Salisbury (Wi-Cg 37), the Matawan section was cored and is divided by Anderson (Bull. 2, p. 17) into two units:

> The upper unit is 30 feet thick and is composed of hard, white, silty chalk containing a small amount of glauconite and fish remains. The lower unit is a lead-gray glauconitic clay shale containing badly mashed sporadic fossils. In the lowermost 20 feet fine sand appears and becomes conglomeratic as the basal part of the unit is reached. The top of the formation is placed at 1,393 feet (1,323 feet sea level datum), and the thickness is 105 feet.

In the oil tests near Berlin (Wor-Ce 12) and Ocean City (Wor-Bh 11), the Matawan formation was not readily separated from the rest of the Upper Cretaceous. The tops are placed respectively at 1,710 feet and 2,122 feet below sea level (Pl. 4). The thickness of the Matawan formation in the test near Berlin is only 60 feet, but the thickness increases to 230 feet in the test near Ocean City.

In the outcrop belt the Matawan formation thins from a broad and thick unit, almost 8 miles wide and over 300 feet thick in New Jersey and Delaware, to a featheredge in Prince Georges County, Maryland.

The Matawan formation, together with the Monmouth, provides a protective aquiclude for the Magothy and Raritan aquifers, at least over the eastern half of the area, and possibly over all of the area except the southwestern corner of Somerset County. Structurally it appears to dip easterly from about 750 feet below sea level beneath the Nanticoke River estuary, on the west, to about 2,200 feet below sea level along the Atlantic shore on the east.

Monmouth formation. The Monmouth formation is not known to yield potable water in Somerset, Wicomico, and Worcester Counties. It has been logged with certainty only in the three deep oil tests, and on simple lithology in the old water test at Pocomoke City (Wor-Fb 19). It is composed of dark-green to gray glauconitic sand, lead-gray clay, and shell marl.

The section ascribed to the Monmouth formation in the Pocomoke City well is 94 feet thick, from 1,420 to 1,514 feet below land surface. It has four beds of clay, two beds of sand, and one ledge of rock. The driller reports flowing salty water from the upper bed of gray sand, 15 feet thick. The lower bed of sand, 13 feet thick, is not described.

Only 33 feet, from 1,360 to 1,393 feet below land surface (altitude 70 feet), has been correlated with the Monmouth formation in the oil test near Salisbury (Wi-Cg 37), where it is described as a dark-green clayey, glauconitic sand (Pl. 4).

In the oil test near Berlin (Wor-Ce 12), the Monmouth is logged as 70 feet thick, from 1,640 to 1,710 feet below sea level. The core contained a lead-gray shale with abundant dark-green rounded glauconite grains and ditch samples are described as dark earthy-gray clay with Foraminifera, shell fragments and glauconite (Bull. 2, p. 413, 418).

In the oil test near Ocean City (Wor-Bh 11), the Monmouth is not distinctly separated from the Matawan formation, but is restricted to a thickness of 50 feet, from the depths of 2,072 to 2,122 below sea level. Overbeck (Bull. 2, p. 432) described the ditch samples as composed of weak-brown clay, yellowish-gray calcite, glauconite, and abundant Foraminifera.

The Monmouth formation is considered to function in this area chiefly as an aquiclude, in conjunction with the Matawan formation. Although structural control is poor, with only four wells in the three counties, the structure map on top of the Cretaceous system (fig. 5) illustrates the top of the Monmouth over most of the area, with the exception of the southwestern corner, where neither it nor the Matawan is present, and where the Magothy formation represents the top of the Cretaceous system. The average thickness of the Monmouth formation in the four wells is 62 feet.

TERTIARY SYSTEM

The most important group of aquifers, and the thickest aquicludes, of Somerset, Wicomico, and Worcester Counties are embraced in the sequence of unconsolidated, stratified sediments of the Tertiary system. The Tertiary system in these three counties consists of glauconitic green sands and clays, buff and tan sandstones, gray diatomaceous silts, yellow shell marls, gray sands, and red gravelly sands.

The largest yields of ground water are obtained from the red gravelly sands (Pliocene ?) under water-table conditions. Moderate to large yields of ground water are obtained from two near-surface artesian gray sands, the Manokin aquifer and the Pocomoke aquifer in the Yorktown and Cohansey formations (?). Small to large yields are also obtainable from the Choptank formation and the Nanticoke aquifer in the Calvert formation, the Piney Point formation (Eocene), and the Brightseat formation (Paleocene). Almost every locality in the three counties has from 4 to 7 water-bearing beds of Tertiary age, with the probability that one or more of them will yield substantial quantities of ground water.

The quality of water in many of these aquifers is not entirely satisfactory at some localities. The presence of brackish water in outcrops beneath Chesapeake Bay has affected them in southwestern Somerset County, rendering some of unusable for any purpose except cooling and restricting the use of all of them for some purposes. Although little is known about the quality of water in the deeper Tertiary aquifers in Wicomico and Worcester Counties, it is probable that they contain waters which are highly mineralized.

The deeper Tertiary aquifers are largely untested. The Tertiary formations form a wedge which ranges from 900 feet in thickness on the west, beneath the bay islands (Smith Island and South Marsh Island), to 2,000 feet in thickness beneath the ocean barrier islands (Fenwick Island and Assateague Island). Few wells drilled to the Tertiary aquifers are more than 500 feet deep.

The aquicludes of the Tertiary system are thick and protect the aquifers from further contamination. There are at least two aquicludes in the Yorktown and Cohansey formations(?), one between the Manokin and Pocomoke aquifers, and one above the Pocomoke aquifer. Locally these aquicludes enclose stringer sands which yield small to moderate quantities of water to wells. The St. Marys formation (Miocene) appears to function entirely as an aquiclude. The Calvert formation (Miocene) is in general a thick aquiclude (average thickness 500 feet), although it does contain the Nanticoke aquifer, used in the northwest corner of the area, and a deep sand used by Crisfield. The lower part of the Piney Point formation and the Nanjemoy formation, both of Eocene age, probably serve together as an aquiclude. Much of the Brightseat formation (Paleocene) is a glauconitic silt or clay, and probably functions as an aquiclude. The Paleocene and Eocene series lie so deep that they have not been tested in most of the area.

The aquicludes are not entirely impermeable. They are predominantly of sandy silt with only small quantities of clay. Over broad areas they will transmit large quantities of ground water to the sands if an appreciable difference in head is established between the aquifers and the aquicludes. The leakage would come initially from storage in the aquiclude. The quality of this storage water may not be entirely desirable, since these formations are regarded as lagoonal, estuarine, and marine in origin, and much of the contained water may still be connate.

Tables 10, 11, 12, 13 summarize the systematic paleontology. Tables 10, 11, and 12 are summaries by counties, and Table 13 gives the distribution of Foraminifera in four wells in the southern half of the area.

Paleocene Series

Six wells in Crisfield, Somerset County, produce or have produced water from sand of Paleocene age. Seventeen other wells and test holes have penetrated the formation in the three counties. In no wells deep enough to en-

TABLE 10

Paleontology of Samples from Wells in Somerset County

	Depth (feet)	Series or System	Remarks
Well Som-Bb 1	0–40	Recent and Pleistocene series	No Foraminifera.
Location—Deal Island	40–330	Miocene series Undifferentiated	Pyrite. Miocene formations difficult to identify because of mixing of fauna. Forams weathered and ironstained.
Paleontologist—Collins	330–540	Calvert formation	Foraminifera scarce to common.
	540–580	Eocene (?) series	Between 560–580 feet Foraminifera identified: *Bolivinopsis curta* (Cushman) *Plecto frondicularia cookei* Cushman
	580–690	Piney Point formation	Foraminifera common, typical Jackson age.
	690–814	Paleocene series	Foraminifera common.
Well Som-Ca 1	0–40	Recent and Pleistocene series	No foraminifera.
Location—South Marsh Island	40–270	Miocene series Undifferentiated	Pyrite. Foraminifera common.
	270–540	Calvert formation	Foraminifera abundant.
Paleontologist—Collins	540–620	Eocene series Piney Point formation	Foraminifera abundant, typical Jackson age. Identified: *Cibicides cocoaensis* (Cushman) *Angulogerina cooperensis* Cushman
	620–830	Paleocene series	Foraminifera abundant to very abundant.
	830–870	(Upper) Cretaceous series	Unfossiliferous but may be marine.
Well Som-Cf 6	0–120	Recent and Pleistocene series	No foraminifera. (On basis of lithology, Miocene contact placed at 30 feet.)
Location—Westover	120–240	Miocene series Undifferentiated	Pyrite. Foraminifera scarce to common, iron-stained and weathered.
Paleontologist—Collins			
Well Som-Ea 8	0–60	Recent and Pleistocene series:	Few shell fragments.
Location—Rhodes Point, Smith Island	60–530	Miocene series Undifferentiated	Foraminifera scarce to abundant.
Paleontologist—Collins	530–630	Eocene series Piney Point formation	Foraminifera identified: *Marginulina cocoaensis* Cushman *Gyroidina soldanii* d'Orbigny, var. *octocamerata* Cushman and G. D. Hanna *Cibicides* cf. *C. ouachitaensis* Howe and Wallace
	630–800	Paleocene series	Foraminifera abundant.
	800–870	(Upper) Cretaceous series	Unfossiliferous.

TABLE 10—*Continued*

	Depth (feet)	Series or System	Remarks
Well Som-Ea 2 Location—Ewell, Smith Island	0–840	Miocene to Cretaceous series.	See Shifflett, 1948, p. 26–28.
Well Som-Ec 4 Location—Crisfield	0–1303	Pleistocene series to Cretaceous system:	See McLean, 1950.

counter it has it been absent. The unit is encountered at depths close to 600 feet below sea level on the west (Smith Island) and more than 1,800 feet below sea level on the east (Fenwick Island) (fig. 7). The formation is a green or black glauconitic, quartz sand and a gray or green glauconitic foraminiferal clay.

In these wells the Paleocene series ranges from 40 to 260 feet in thickness. In 10 scattered wells it has an average thickness of 175 feet. However, the isopach map, figure 8, derived by point difference between the structure on the top of the Paleocene (fig. 7) and the structure on the top of the Cretaceous (fig. 5), indicates a trough filled with more than 500 feet of Paleocene sediments beneath Assateague Island, Worcester County, and a basin filled with more than 300 feet of Paleocene sediments beneath Fairmount and Mongrel Necks, Somerset County. Also, the Paleocene series seems to wedge out in the vicinity of Delmar. The trough, basin, and wedge-out are interpretive and may not actually exist because of the scanty control on the two structure maps.

At Crisfield four wells (Som-Ec 1, 2, 5, and 7) are yielding water from a sand of Paleocene age at a depth of about 1,000 feet. The aquifer is a gray quartz sand and glauconitic greensand. The wells are pumped at moderate to large rates, and have rated capacities between 100 and 300 gpm. The static head of water in the formation was still above land surface (altitude 2 to 5 feet) in 1950, although operating heads were reported as low as 150 feet below land surface after a 24-hour pumping test at 300 gpm in 1938 (Som-Ec 2). Two of the wells are standby wells for the city of Crisfield. The regular city wells (Som-Ec 3 and 4) were drilled through the Paleocene and derive water from the Cretaceous rocks below (Som-Ec 4 has multiple screens and derives water also from the Piney Point formation of Eocene age and the Calvert formation of Miocene age). An oyster-packing house and the local ice company are the other users. The ice company also has two abandoned wells (Som-Ec 8 and 9) in this formation. The water level was 10.37 feet below land surface in January 1954 in

TABLE 11

Paleontology of Samples from Wells in Wicomico County

	Depth (feet)	Series or System	Remarks
Well Wi-Bd 11 Location—Mardela High School Paleontologist—Collins	180–190	The samples in the upper section of this well are scrambled and do not agree with the driller's log nor with samples from test hole Wi-Bd 45, drilled as a check about 100 feet away. The section below 250 feet is considered Calvert.	Medium gray clay. No Foraminifera.
	190–250		Very light gray silty clay. No Foraminifera.
	250–260		Light-gray sand with sponge spicules and shell fragments. *Textularia gramen* d'Orbigny *T. candeiana* d'Orbigny *Cibicides lobatulus* (Walker and Jacob) *Discorbis* sp.
	260–270		Light-gray sand with hardshell and shell fragments. Sponge spicules continue to 300 feet. Forams similar to sample 250–260.
	270–300		Lithology and fossils similar to sample 250–260.
Test hole Wi-Bg 12 Location—north of Parsonsburg Paleontologist—Cushman		Miocene series	Mollusca, Arthropoda, and Foraminifera are described by Clark, W. B., Mathews, E. B. and Berry, E. W., 1918, p 316–318.
	315–455	St. Marys formation	
	455–618	Choptank formation	
	618–1130	Calvert formation	
	1130–1186	Missing, but possibly Eocene series on basis of structure and Wi-Cg 37	
Test hole Wi-Cd 33 Location—Hebron Paleontologist—Gardner	185–190	Miocene series St. Marys formation	Mollusca identified: Indeterminate bivalves, possibly *Crassinella* *Parvilucina crenulata* (Conrad) *Parvilucina* sp. *Montacuta mariana* Dall *Chione* sp. ind. *Donax* sp. possibly *Donax* n. sp. *Ensis ensiformis* Conrad? *Mactra clathrodon* Isaac Lea Mactroids mostly juveniles *Dentalium caduloide* Dall? *Teinostoma nanum* (Isaac Lea) "*Circulus*": sp. *Crepidula* sp. juv. *Calyptraea centralis* (Conrad)

TABLE 11—*Continued*

	Depth (feet)	Series or System	Remarks
Test hole Wi-Cd 33 (Cont'd)	185–190	Miocene series St. Marys formation (Cont'd)	Mollusca identified: (Cont'd) Naticoids juvenile *Uzita peralta* (Conrad) "*Mangelia*" *parva* (Conrad) *Acteon* sp. cf. *A. shilhensis* (Whitfield)
	205–210		*Nucula simaria* Dall *Yoldia laevis* (Say) *Andara* sp. juv. *Parvilucina crenulata* (Conrad) *Chione* sp. juv. *Tellina producta* Conrad? *Ensis ensiformis* Conrad? *Mactra clathrodon* Isaac Lea *Mulinia* sp.? *Dentalium caduloide* Dall? *Epitonium sayanum* Dall? *Chrysallida*? sp. *Turbonilla* (*Pyrgiscus*) sp. *Crepidula* sp. juv. *Calyptraea centralis* (Conrad) Naticoids *Uzita peralta* (Conrad) *Busycon* (*Sycotypus*) *rugosum* (Conrad) "*Mangelia*" *parva* (Conrad)
Test hole Wi-Cf 61	0–60	Recent and Pleistocene series	No fossils.
	60–102	Pliocene(?) series	No fossils.
Location—3 miles east of Salisbury		Miocene series	
	102–307	Yorktown and Cohansey formations (?)	Foraminifera scarce to none.
Paleontologist —Collins	307–409	St. Marys formation	Foraminifera scarce to common. Identified: *Pyrgo subsphaerica* (d'Orbigny)
	409–512	Choptank formation	Foraminifera rare to common. Identified: *Uvigerina carmeloensis* Cushman and Kleinpell Some Choptank forms were found between 368–379 feet, however the position of the sample is questionable.

TABLE 11—*Continued*

	Depth (feet)	Series or System	Remarks
Test hole Wi-Cf 61 (Cont'd)	409–512	Miocene series: Choptank formation (Cont'd)	Identified: *Cancris sagra* (d'Orbigny) var. *communis* Cushman and Todd; *Cassidulina crassa* d'Orbigny; *Uvigerina carmeloensis* Cushman and Kleinpell
	512–1025	Calvert formation	Foraminifera and diatoms scarce to abundant. Identified Foraminifera: *Bolivina calvertensis* Dorsey; *Robulus americanus* (Cushman) var. *spinosus* (Cushman)
Test hole Wi-Cf 63	0–82	Recent and Pleistocene series	No fossils.
	82–113	Pliocene(?) series	No fossils.
Location—2 miles southeast of Salisbury		Miocene series	
	113–297	Yorktown and Cohansey formations(?)	—
	297–389	St. Marys formation	Upper Foraminifera weathered, lower ones fresh.
Paleontologist—Collins	389–503	Choptank formation	Foraminifera common. Identified: *Uvigerina carmeloensis* Cushman and Kleinpell. Interval between 410–462 feet lithologically similar to deeper Calvert formation carrying diatoms and Calvert fauna,—position of samples questionable.
	503–626		Foraminifera scarce, contact tentative.
	626–1024	Calvert formation	Foraminifera common. Diatoms, echinoid fragments and Mollusca fragments present. Foraminifera identified: *Robulus americanus* (Cushman) var. *spinosus* (Cushman); *Bolivina calvertensis* Dorsey; *Textularia* cf. *T. foliacea* Heron-Allen and Earland; *Cassidulina crassa* d'Orbigny; *Uvigerina auberiana* d'Orbigny; *Marginulina* sp.

TABLE 11—*Continued*

	Depth (feet)	Series or System	Remarks
Test hole Wi-Cg 34 Location—Waste Gate Paleontologist—Collins	181–187	Miocene series: Choptank formation (In the well log table, this interval is assigned to the Yorktown and Cohansey formations(?): If this is truly Choptank, it would require a structure, either a dome or a fault of about 350 feet arch or throw, to account for it. These are probably reworked fossils, redeposited in the Yorktown formation. Another possibility is that these forms persisted into Yorktown time.)	Mollusca identified: *Turbonilla (Chemnitzia) nivea* Stimpson var. *Teinostoma greensboroënse* Martin *Teinostoma calvertense* Martin *Seila adamsii* (H. C. Lea) *Spisula (Hemimactra) subparilis* (Conrad) *Astarte obruta* Conrad
Test hole Wi-Cg 37 Location—6 miles southeast of Salisbury	0–5568	Pleistocene series to Pre-Cambrian(?) system	See Bull. 2, for the following: Tertiary Mollusca by Gardner. Tertiary and Cretaceous Mollusca by Stephenson. Middle Miocene diatoms by Lohman. Ostracoda by Swain. Foraminifera by Cushman.

Som-Ec 8. The nearby well, Som-Ec 7, may have been pumping while this measurement was being made.

The water is mineralized. It is soft, but high in sodium bicarbonate and dissolved solids (see analysis of Som-Ec 1). The iron is 1.8 ppm.

On Smith Island (wells Som-Ea 1 to 9) and South Marsh Island (Som-Ca 1), the Paleocene series was drilled but the wells were continued into the Cretaceous sands. The Paleocene sands were quite glauconitic. Glauconite is a soft micaceous mineral which crushes easily and has a greasy feel, suggesting a fat clay, so that the Paleocene may have been considered too clayey for successful development of wells.

TABLE 12

Paleontology of Samples from Wells in Worcester County

	Depth (feet)	Series or System	Remarks
Well Wor-Dd 26 Location—Snow Hill Paleontologist—Collins	0–70	Recent and Pleistocene series	No Foraminifera.
	70–140	Miocene series	No Foraminifera. Pleistocene-Miocene contact is placed at 70 feet on the basis of sample lithology (driller's log indicates contact at 67 feet).
	140–338		Miocene micro- and megafossils begin at 140 feet.
Test hole Wor-Dg 1 Location—Ocean Beach, Assateague Island Paleontologist—Collins	0–4	Recent and Pleistocene series	No Foraminifera.
	4–9		Foraminifera identified: *Elphidium incertum* (Williamson), var. *clavatum* Cushman *Rotalia beccarii* (Linnaeus), var. *parkinsoniana* (d'Orbigny) *Elphidium incertum* (Williamson) *Nonion pompilioides* (Fichtel and Moll)
	9–14	Pleistocene and Miocene series (Choptank or Calvert forms may be reworked)	Pleistocene fauna: *Elphidium incertum* (Williamson), var. *clavatum* Cushman *Elphidium incertum* (Williamson) *Rotalia beccarii* (Linnaeus), var. *parkinsoniana* (d'Orbigny) *Elphidium discoidale* (d'Orbigny) *Eponides frigida* (Cushman), var. *calida* Cushman and Cole Miocene fauna: *Robulus americanus* (Cushman) *Bolivina obliqua* Barbat and Johnson *Nonion grateloupi* (d'Orbigny) *Uvigerina subperigrina* Cushman and Kleinpell
	14–19		Fauna and lithology similar to 9–14 feet.
	19–24		Pleistocene fauna noted and additional Miocene fauna identified: *Bolivinia calvertensis* Dorsey *Robulus branneri* Cushman and Kleinpell *Globigerina* sp. *Globigerina altispira* Cushman and Jarvis *Textularia* sp. *Uvigerina kernensis* Barbat and von Estorff

TABLE 12—*Continued*

	Depth (feet)	Series or System	Remarks
Test hole Wor-Dg 1 (Cont'd)	19–24	Pleistocene and Miocene series (Cont'd)	Pleistocene fauna noted and additional Miocene fauna identified: (Cont'd) *Valvulineria floridana* Cushman *Nonion medio-costatus* (Cushman) *Lagena* sp. *Globorotalia menardii* (d'Orbigny) *Bolivina paula* Cushman and Cahill
	24–29		Plant debris and Pleistocene Foraminifera common. Miocene fauna addition: *Bulimina inflata* Seguenza
	29–34		Plant debris and Pleistocene Foraminifera common. Miocene fauna additions: *Siphogenerina lamellata* Cushman *Cibicides concentricus* (Cushman) *Uvigerina auberiana* d'Orbigny *Siphogenerina spinosa* (Bagg) *Planularia vaughani* (Cushman) *Nonion pizarrense* W. Berry
	34–39		Plant debris and Pleistocene Foraminifera common. Miocene fauna additions: *Nodogenerina advena* Cushman and Laiming *Textularia* cf. *T. agglutinans* d'Orbigny
	39–44		Plant debris less common. Pleistocene Foraminifera common. Miocene fauna additions: *Textularia gramen* d'Orbigny *Bolivina floridana* Cushman *Cassidulina crassa* d'Orbigny *Buliminella elegantissima* (d'Orbigny) *Sigmomorphina marylandica* Cushman
	44–48		Pleistocene and plant debris common. Miocene fauna addition: *Buliminella curta* Cushman
	48–59		Pleistocene and Miocene fauna. *Elphidium* sp. very abundant
	59–79		Pleistocene and Miocene fauna. Plant debris rare.
Test hole Wor-Bh 11 Location—Ocean City, Fenwick Island	0–7710	Pleistocene to Lower Cretaceous series	See Bull. 2, fig. 20 and Cretaceous mollusca by Vokes, p. 126–150; also Cretaceous macrofossils by Richards, 1948, p. 51–53.

TABLE 12—*Continued*

	Depth (feet)	Series or System	Remarks
Test hole Wor-Ce 12 Location—Berlin	0–7178	Pleistocene series to Pre-Cambrian(?) system	See Bull. 2, fig. 20, Cretaceous foraminifera by Cushman and Cretaceous mollusca by Stephenson; also Richards, 1948, p. 50–51.

TABLE 13

Distribution of Foraminifera in Four Wells in Somerset and Worcester Counties
By Glenn G. Collins

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Miocene series	Deal Island	South Marsh Island	West-over	Snow Hill
Spiroplectammina mississippiensis (Cushman)	X	X	—	—
Spiroplectammina spinosa Dorsey	X	X	—	—
Textularia consecta d'Orbigny	X	X	—	—
Textularia cf. *T. foliacea* Heron-Allen and Earland	X	X	—	—
Textularia gramen d'Orbigny	X	X	—	—
Textularia mayori Cushman	X	X	—	—
Textularia obliqua Dorsey	X	—	X	—
Quinqueloculina seminula (Linnaeus)	X	X	—	X
Massilina mansfieldi Cushman and Cahill	X	—	—	—
Sigmoilina tenuis (Czjzek)	—	X	—	—
Pyrgo cf. *P. magnacaudata* Smith	X	X	—	—
Triloculina cf. *T. trigonula* (Lamarck)	—	X	—	—
Robulus branneri Cushman and Kleinpell	X	X	—	—
Robulus americanus (Cushman)	X	X	—	X
Robulus americanus (Cushman), var. *spinosus* (Cushman)	X	X	—	—
Planularia vaughani (Cushman)	—	X	—	—
Marginulina sp.	—	X	—	—
Dentalina communis d'Orbigny	—	X	—	—
Dentalina consobrina d'Orbigny, var. *emaciata* Reuss	—	X	—	—
Lagena clavata (d'Orbigny)	X	—	—	—
Lagena acuticostata Reuss	X	X	—	—
Lagena laevis (Montagu)	—	X	—	—
Lagena tenuis (Bornemann)	—	X	—	—
Guttulina problema d'Orbigny	—	X	—	—
Guttulina elegans Dorsey	—	X	—	—
Guttulina rectiornate Dorsey	—	X	—	—
Globulina rotundata (Bornemann)	—	X	—	—
Pseudopolymorphina decora (Reuss)	X	X	—	—
Pseudopolymorphina striata (Bagg)	—	X	—	—

TABLE 13—*Continued*

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Miocene series	Deal Island	South Marsh Island	West-over	Snow Hill
Pseudopolymorphina rutila (Cushman)	X	X	—	—
Sigmoidella kagaensis Cushman and Ozawa	—	X	—	—
Sigmomorphina marylandica Cushman	X	X	—	—
Nonion advenus (Cushman)	X	—	—	—
Nonion medio-costatus (Cushman)	X	X	X	X
Nonion grateloupi (d'Orbigny)	X	X	X	X
Nonion pizarrense W. Berry	X	X	X	X
Nonion marylandicus Dorsey	—	—	X	X
Nonionella auris (d'Orbigny)	X	X	—	X
Elphidium poeyanum (d'Orbigny)	—	—	X	X
Elphidium insertum (Williamson)	—	X	—	—
Nodogenerina advena Cushman and Laiming	X	X	—	—
Buliminella elegantissima (d'Orbigny)	X	X	X	X
Buliminella curta Cushman	X	—	—	X
Bulimina elongata d'Orbigny	X	X	X	X
Bulimina inflata Seguenza	X	X	—	—
Entosolenia lucida Williamson	X	X	—	—
Virgulina fusiformis Cushman	X	X	—	—
Virgulina (Virgulinella) miocenica Cushman and Ponton	X	X	—	—
Virgulina pontoni Cushman	—	X	—	—
Siphogenerina lamellata Cushman	X	X	—	—
Siphogenerina spinosa (Bagg)	X	X	—	—
Bolivina floridana Cushman	X	X	X	X
Bolivina marginata Cushman	X	X	—	—
Bolivina marginata Cushman, var. *multicostata* Cushman	X	X	—	—
Bolivina calvertensis Dorsey	X	X	—	—
Bolivina plicatella Cushman	X	X	—	—
Bolivina plicatella Cushman, var. *mera* Cushman and Ponton	X	X	—	—
Bolivina obliqua Barbat and Johnson	X	X	—	—
Bolivina paula Cushman and Cahill	X	X	X	X
Uvigerina kernensis Barbat and von Estorff	X	X	—	—
Uvigerina subperegrina Cushman and Kleinpell	X	X	—	—
Uvigerina auberiana d'Orbigny	—	X	—	—
Discorbis candeiana (d'Orbigny)	X	—	X	—
Discorbis floridana Cushman	—	X	—	—
Discorbis valvulata (d'Orbigny)	—	—	X	—
Discorbis warreni Dorsey	—	—	—	X
Valvulineria floridana Cushman	X	X	X	—
Gyroidina marylandica Cushman	X	—	—	—
Eponides mansfieldi Cushman	X	X	X	X
Rotalia bassleri Cushman and Cahill	X	X	X	—
Rotalia beccarii (Linnaeus), var. *tepida* Cushman	—	X	X	X

TABLE 13—*Continued*

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Miocene series	Deal Island	South Marsh Island	West-over	Snow Hill
Cancris sagra (d'Orbigny), var. *communis* Cushman and Todd	—	X	—	—
Pulvinulinella pontoni Cushman	X	X	X	X
Cassidulina crassa d'Orbigny	X	X	—	—
Cassidulina laevigata d'Orbigny, var. *carinata* Cushman	X	X	X	X
Pullenia sp.	X	X	—	—
Globigerina sp.	X	X	—	—
Globigerina altispira Cushman and Jarvis	X	X	—	—
Globigerinoides sp.	X	X	—	—
Candorbulina universa Jedlitschka	—	X	—	—
Globorotalia menardii (d'Orbigny)	X	X	—	—
Cibicides americanus (Cushman)	X	—	—	—
Cibicides concentricus (Cushman)	X	X	—	—
Cibicides lobatulus (Walker and Jacob)	X	X	X	X
Cibicides lobatulus (Walker and Jacob), var. *ornatus* (Cushman)	X	X	—	—
Cibicides floridanus (Cushman)	X	X	—	—
Dyocibicides biserialis Cushman and Valentine	X	X	—	—
Cibicidella variabilis (d'Orbigny)	—	X	—	X
Eocene series, rocks of Jackson age				
Spiroplectammina alabamensis (Cushman)	X	—	—	—
Textularia hannai Davis	X	—	—	—
Quinqueloculina sp.	X	X		
Robulus alato-limbatus (Gümbel)	X	X	—	—
Robulus limbosus (Reuss)	X	—	—	—
Astacolus danvillensis (Howe and Wallace)	X	X	—	—
Saracenaria sp.	X	—	—	—
Marginulina cocoaensis Cushman	X	X	—	—
Marginulina triangularis d'Orbigny, var. *danvillensis* Howe and Wallace	X	—	—	—
Nodosaria fissicostata (Gümbel)	X	—	—	—
Nodosaria latejugata Gümbel, var. *carolinensis* Cushman	—	X	—	—
Dentalina bevani Cushman and Cederstrom	X	X	—	—
Dentalina cooperensis Cushman	X	—	—	—
Dentalina soluta Reuss	X	—	—	—
Frondicularia tenuissima Hantken	X	—	—	—
Lagena costata (Williamson)	X	—	—	—
Legena laevis (Montagu)	X	—	—	—
Guttulina irregularis (d'Orbigny)	X	X	—	—
Guttulina problema d'Orbigny	X	X	—	—
Guttulina spicaeformis (Roemer)	X	—	—	—
Globulina gibba d'Orbigny	X	—	—	—

TABLE 13—*Continued*

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Eocene series, rocks of Jackson age	Deal Island	South Marsh Island	West-over	Snow Hill
Globulina gibba d'Orbigny, var. *punctata* d'Orbigny	X	X	—	—
Globulina rotundata (Bornemann)	X	X	—	—
Sigmomorphina semitecta (Reuss), var. *terquemiana* (Fornasini)	X	—	—	—
Sigmomorphina jacksonensis (Cushman)	X	X	—	—
Sigmoidella plummerae Cushman and Ozawa	—	X	—	—
Nonion planatus Cushman and Thomas	X	X	—	—
Nonion inexcavatus (Cushman and Applin)	X	—	—	—
Nonionella hantkeni (Cushman and Applin)	X	—	—	—
Bolivinopsis curta (Cushman)	X	—	—	—
Plectofrondicularia cookei Cushman	X	—	—	—
Buliminella basistriata Cushman and Jarvis	X	—	—	—
Robertina moodyensis Cushman and Todd	X	X	—	—
Bulimina ovata d'Orbigny	X	—	—	—
Bolivina jacksonensis Cushman and Applin	X	—	—	—
Bolivina rectifera Bandy	X	—	—	—
Virgulina danvillensis Howe and Wallace	X	—	—	—
Virgulina recta Cushman	X	—	—	—
Uvigerina cookei Cushman	X	—	—	—
Uvigerina gardnerae Cushman, var. *texana* Cushman and Applin	X	—	—	—
Uvigerina glabrans Cushman	X	—	—	—
Uvigerina cocoaensis Cushman	X	—	—	—
Uvigerina dumblei Cushman and Applin	—	X	—	—
Angulogerina cooperensis Cushman	X	X		
Discorbis alveata Cushman	X	—	—	—
Discorbis hemisphaerica Cushman	X	—	—	—
Discorbis assulata Cushman	—	X	—	—
Discorbis globulo-spinosa Cushman	—	X	—	—
Lamarckina ocalana Cushman	X	—	—	—
Eponides jacksonensis (Cushman and Applin)	X	X	—	—
Eponides lotus (Schwager)	—	X	—	—
Valvulineria texana Cushman and Ellisor	X	—	—	—
Gyroidina soldanii d'Orbigny, var. *octocamerata* Cushman and G. D. Hanna	X	X	—	—
Gyroidina obesa Bandy	X	—	—	—
Siphonina jacksonensis Cushman and Applin	X	—	—	—
Alabamina wilcoxensis Toulmin	X	X	—	—
Cassidulina globosa Hantken	X	—	—	—
Pulvinulinella danvillensis Howe and Wallace	X	X	—	—
Globigerina bulloides d'Orbigny	X	—	—	—
Globigerina dissimilis Cushman and Bermudez	X	—	—	—
Globorotalia cocoaensis Cushman	X	—	—	—
Globorotalia inconspicua Howe	X	—	—	—

TABLE 13—*Continued*

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Eocene series, rocks of Jackson age	Deal Island	South Marsh Island	West-over	Snow Hill
Anomalina umbonifera (Schwager)	X	—	—	—
Cibicides lobatulus (Walker and Jacob)	X	X	—	—
Cibicides americanus (Cushman)	X	X	—	—
Cibicides sculpturatus Cushman and Cederstrom	X	—	—	—
Cibicides cocoaensis (Cushman)	X	X	—	—
Cibicides ocalanus Cushman	X	X	—	—
Cibicides pseudoungerianus (Cushman)	X	—	—	—
Cibicides pseudowuellerstorfi (Schwager)	X	X	—	—
Cibicides ouachitaensis Howe and Wallace	X	X	—	—
Cibicides westi Howe				
Cibicidina danvillensis (Howe and Wallace)	X	—	—	—
Dyocibicides danvillensis Howe and Wallace	—	X	—	—
Paleocene series				
Spiroplectammina plummerae Cushman	X	X	—	—
Gaudryina rudita Sandidge	X	—	—	—
Clavulinoides midwayensis Cushman	X	—	—	—
Triloculina natchitochensis Howe	X	X	—	—
Robulus midwayensis (Plummer)	X	—	—	—
Robulus midwayensis (Plummer), var. *carinatus* (Plummer)	—	X	—	—
Robulus insulsus Cushman	X	—	—	—
Robulus alabamensis Cushman	X	—	—	—
Robulus wilcoxensis Cushman and Ponton	X	—	—	—
Marginulina tuberculata (Plummer)	X	X	—	—
Marginulina toulmini Cushman	X	—	—	—
Marginulina longiforma (Plummer)	X	—	—	—
Dentalina colei Cushman and Dusenbury	X	X	—	—
Lagena acuticostata Reuss	—	X	—	—
Chrysalogonium eocenicum Cushman and Todd	X	—	—	—
Saracenaria midwayensis Kline	X	—	—	—
Guttulina hantkeni Cushman and Ozawa	X	X	—	—
Guttulina irregularis (d'Orbigny)	—	X	—	—
Guttulina problema d'Orbigny	—	X	—	—
Ramulina sp.	X	—	—	—
Nonion planatus Cushman and Thomas	—	X	—	—
Nonionella soldadoensis Cushman and Renz	X	X	—	—
Pseudouvigerina naheolensis Cushman and Todd	X	X	—	—
Siphogeneroides eleganta (Plummer)	X	—	—	—
Bulimina cacumenata Cushman and Parker	X	X	—	—
Bulimina arkadelphiana Cushman and Parker, var. *midwayensis* Cushman and Parker	X	—	—	—

TABLE 13—*Continued*

Species of Foraminifera	Som-Bb 1	Som-Ca 1	Som-Cf 6	Wor-Dd 26
Paleocene series	Deal Island	South Marsh Island	West-over	Snow Hill
Bulimina kugleri Cushman and Renz	X	—	—	—
Bulimina ovata d'Orbigny	—	X	—	—
Entosolenia crumenata Cushman	X	—	—	—
Entosolenia laevigata (Reuss)	—	X	—	—
Virgulina naheolensis Cushman	X	—	—	—
Bolivina crenulata Cushman	X	X	—	—
Bolivina midwayensis Cushman	X	—	—	—
Angulogerina virginiana Cushman	X	X	—	—
Ellipsonodosaria paleocenica Cushman and Todd	X	X	—	—
Lamarckina naheolensis Cushman and Todd	X	—	—	—
Valvulineria allomorphinoides (Reuss)	X	X	—	—
Gyroidina soldanii d'Orbigny, var. *octocamerata* Cushman and G. D. Hanna	—	X	—	—
Gyroidina subangulata (Plummer)	X	X	—	—
Eponides plummerae Cushman	X	—	—	—
Eponides lotus (Schwager)	X	—	—	—
Siphonina prima Plummer	X	X	—	—
Asterigerina primaria Plummer	X	X	—	—
Ceratobulimina sp.	—	X	—	—
Alabamina wilcoxensis Toulmin	—	X	—	—
Pullenia quinqueloba (Reuss), var. *angusta* Cushman and Todd	X	—	—	—
Globigerina compressa Plummer	X	X	—	—
Globigerina pseudobulloides Plummer	X	X	—	—
Globigerina triloculinoides Plummer	X	X	—	—
Globigerina inconspicua Howe	—	X	—	—
Globorotalia wilcoxensis Cushman and Ponton	—	X	—	—
Globorotalia wilcoxensis Cushman and Ponton, var. *acuta* Toulmin	X	X	—	—
Globorotalia crassata (Cushman)	X	—	—	—
Globorotalia crassata (Cushman), var. *aequa* Cushman and Renz	X	—	—	—
Anomalina midwayensis (Plummer)	X	X	—	—
Anomalina acuta Plummer	X	—	—	—
Cibicides blanpiedi Toulmin	X	—	—	—
Cibicides praecursorius (Schwager)	X	X	—	—
Cibicides howelli Toulmin	X	X	—	—

At Deal Island (Som-Bb 1) the driller did not penetrate the entire Paleocene section but did go through 129 feet of Paleocene clay (Table 10). Since at Crisfield only the lowermost 30 to 50 feet of the greater than 200-foot section yields water, the well may not have gone deep enough to show the potentialities

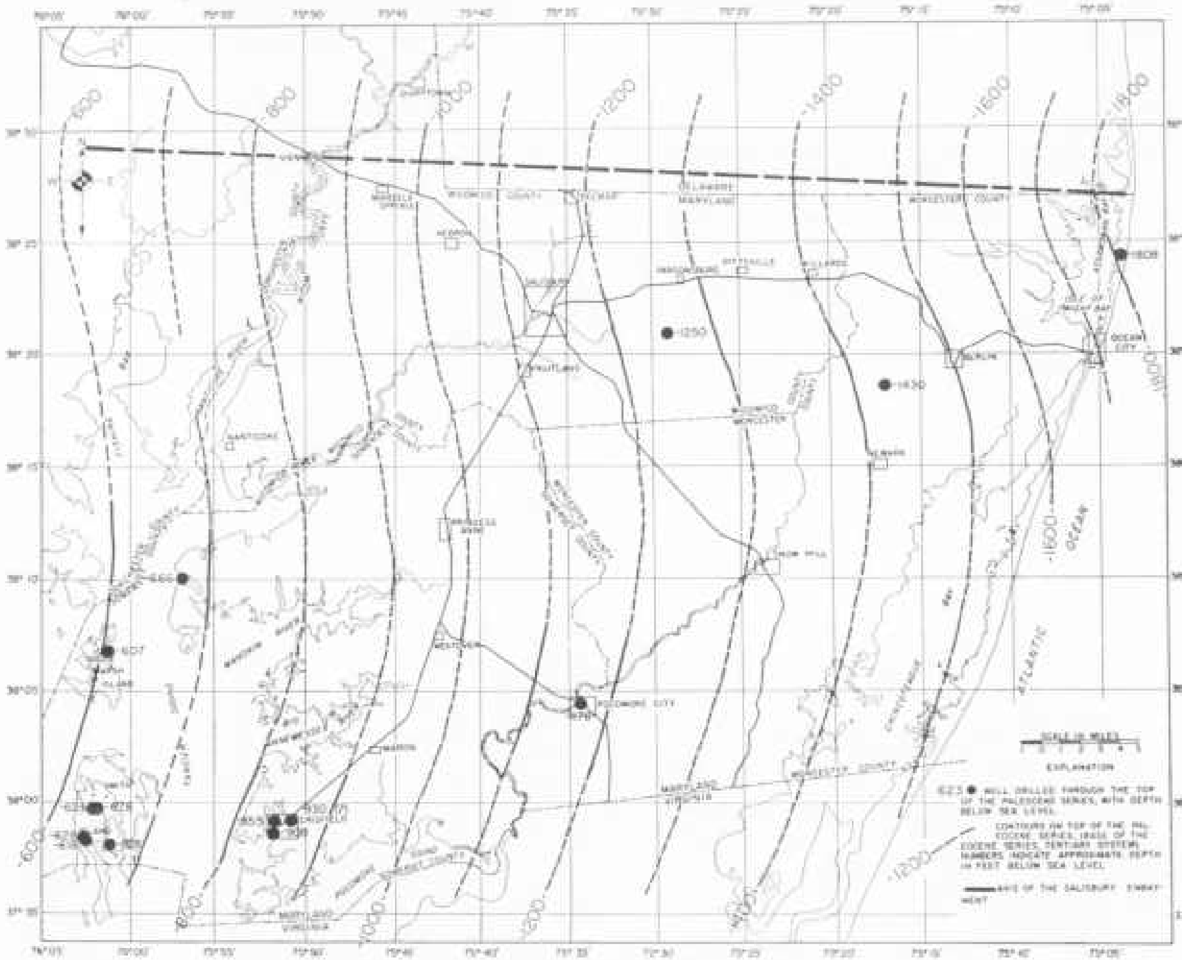

FIGURE 7. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Paleocene Series or the Base of the Eocene Series

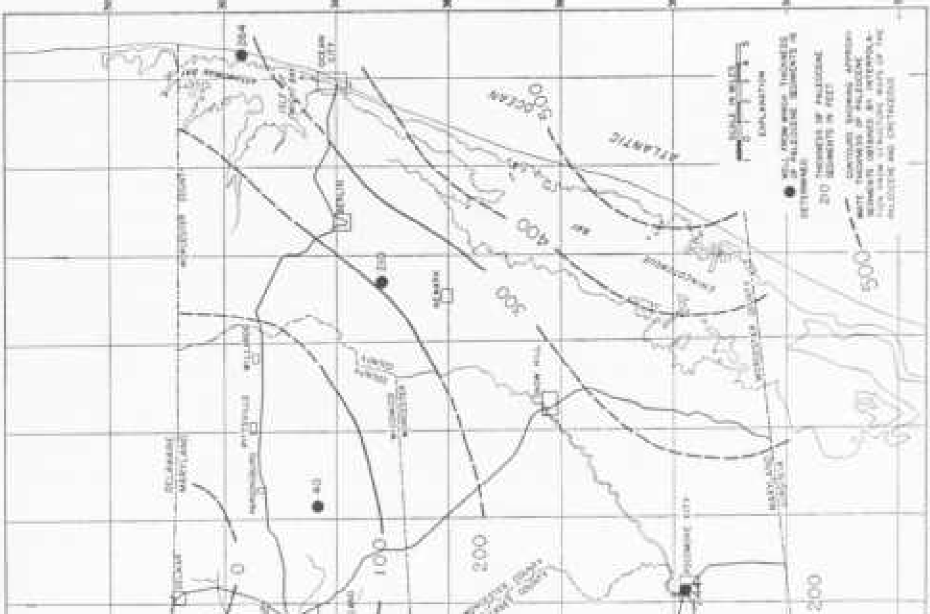

Figure 8. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Paleocene Series

of the Paleocene at Deal Island. The well was plugged back and completed in the Eocene sand.

In the old deep test at Pocomoke City (Wor-Fb 19), water, described as "not good," was found in the Paleocene section from 1,320 to 1,340 feet below land surface.

In the oil test near Salisbury (Wi-Cg 37), the thickness of the Paleocene seems to be in doubt (Bull. 2, fig. 20 and p. 18). It is at least 40 feet thick, between the depths of 1,320 and 1,360 feet, and Paleocene-type Foraminifera indicate that it may be 100 feet thick, extending as high in the well as 1,260 feet. Much of this doubtful section is described from the cores as a "hard brownish-white chalk with only a trace of glauconite" (this doubtful section is preferably placed in the Nanjemoy formation, Eocene series). The section from 1,320 to 1,360 is rich in glauconite, but is described as clayey and would probably not yield water to wells.

The Paleocene sections in the oil tests near Berlin and Ocean City (Wor-Ce 12 and Wor-Bh 11) were not definitely established by Anderson (Bull. 2, fig. 20). The interpretation in Plate 4, based on the Midway fauna found in the Ocean City test and correlation on the electrical logs to the Berlin test, places the top of the Paleocene at −1,430 (sea level datum) in Wor-Ce 12 and at −1,812 in Wor-Bh 11, with 210 feet and 260 feet thickness, respectively. These sections are predominantly silty glauconitic clay.

The Paleocene series is primarily an aquiclude in Somerset, Wicomico, and Worcester Counties but does function as an aquifer in the vicinity of Crisfield, where it yields large quantities of a soft water containing much sodium bicarbonate.

The significant hydrologic fact is that the aquifer of Paleocene age does not have a known intake belt, and so must be producing from storage or from leakage across formation boundaries. Moreover, the aquifer apparently shales out between Crisfield and Salisbury (29 miles). The Paleocene aquifer must be regarded as of low ultimate potential yield.

Eocene Series

Only four wells in the area produce from the Eocene formations. Three produce usable water in western Somerset County; the fourth flows highly mineralized water to waste on the Isle of Wight, northeastern Worcester County. The records of these 4 wells, with the records of 21 other wells or test holes drilled to or through the Eocene series, indicate that the Eocene series consists of equivalents of two lithologically and faunally distinct groups: the Pamunkey group of middle Eocene age and the Jackson group of late Eocene age. Equivalents of the Pamunkey group consist only of the Nanjemoy formation, which is a chalk in this area. Equivalents of the Jackson group are composed of the Piney Point formation, a glauconitic sand, and the Chickahominy formation, a fossiliferous brown shale.

The top of the Eocene series was encountered at 501 feet below land surface in a well (Som-Ca 1, altitude 3 feet) on South Marsh Island, at the western boundary of the area, and at 1,642 feet below sea level in a well (Wor-Bh 11) on Fenwick Island, on the eastern margin. The top of the series forms a fairly uniform homocline dipping at the rate of 27 feet per mile (fig. 9).

The isopach map, figure 10, shows a range in thickness of the Eocene series from zero in the southeastern corner of the area to more than 300 feet at the north along the Delaware boundary, based on the difference between the structure maps, figures 7 and 9. The Eocene thickens toward the north, suggesting that the sedimentation came from that direction, as the axial trough shown on top of the Paleocene series (fig. 7) became filled.

The well on Deal Island (Som-Bb 1, altitude 5 feet) is reported to produce a large quantity of water from the upper Eocene sediments, 83 feet of gray-black coarse sand between 588 and 671 feet below land surface. The aquifer is confined between clays of the overlying Calvert formation of Miocene age and the underlying sediments of Paleocene age. The water level was only 1 foot below land surface in June 1950, so the head remains high. The chemical analysis indicates a nonirony soft water containing much sodium bicarbonate and slightly salty (bicarbonate 948 ppm, chloride 250 ppm).

The 840-foot well at Rumbley (Som-Cc 1) was brought in with considerable difficulty, possibly because the medium to coarse "water" sand was only 9 feet thick, although the aquifer was drilled for 105 feet more in a silty, fine sand. The yield is small, and the total solids and chlorides are high (solids 1,530 ppm, chloride 242 ppm).

The city of Crisfield well, Som-Ec 4, is screened from 819 to 829 feet below land surface in the Piney Point formation of the Eocene series. The sand is very glauconitic. The well has a high capacity, but since it produces also from the Miocene series and the Cretaceous system, it is not known what yield is being derived from the Eocene. Similarly the water analysis, which indicates a nonirony, soft, sodium bicarbonate water, moderately high in dissolved solids (730 ppm), is a mixture of all three formation waters. Other well logs in the Crisfield area (Som-Ec 5 and 7) indicate a predominantly clay section for the Eocene and are difficult to correlate on lithology alone.

On Smith Island and South Marsh Island the Eocene series is logged as hard sandstone and clay with little water (Som-Ea 1, 2, 7, 9, and -Ca 1). The section is by-passed to produce water from the underlying Cretaceous system.

At Pocomoke City the Eocene series is also logged as a clay with green and black sand (Wor-Fb 19). In the oil test near Salisbury (Wi-Cg 37), the Eocene is described as "dull, brown waxy, clay shales rich in Foraminifera and with a subordinate amount of fine-grained, green, glauconitic sand" between 1,140 and 1,250 feet, and as "hard, brownish-white chalk with only a trace of glauconite" from 1,250 to 1,330 feet (Bull. 2, p. 17). In the oil test near Berlin (Wor-Ce 12) the Eocene series is described as "dark, grayish-brown clay with

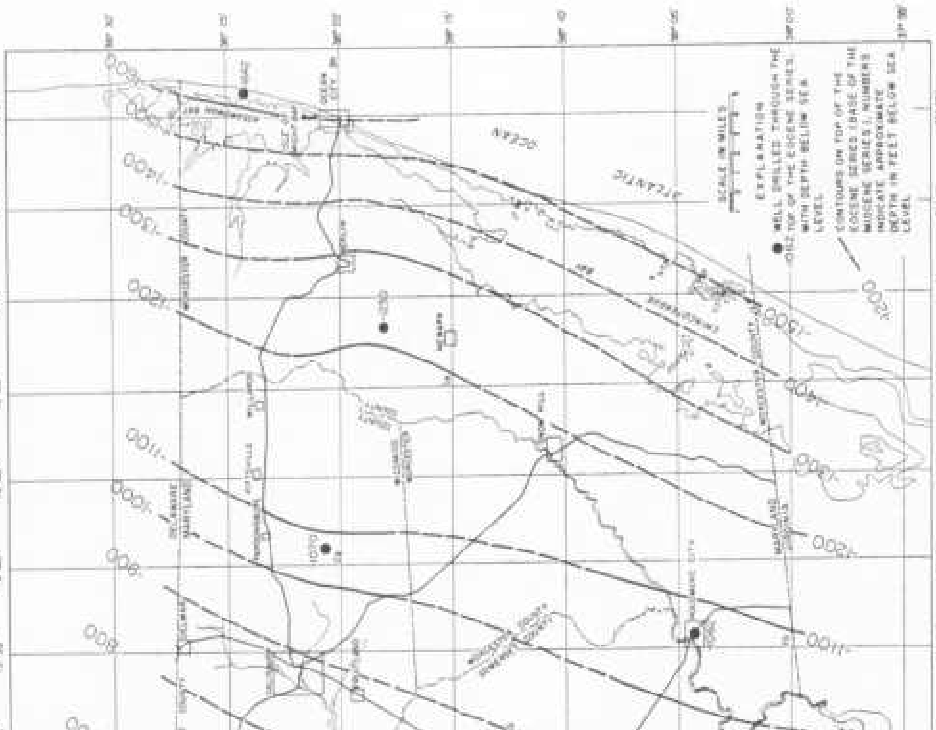

FIGURE 9. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Piney Point Formation, Eocene Series, and the Base of the Calvert Formation, Miocene Series

Figure 10. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Eocene Series

a small amount of fine sand" (Bull. 2, p. 86), between 1,230 and 1,430 feet. In the oil test near Ocean City (Wor-Bh 11), the Eocene lies somewhat deeper, between 1,642 and 1,812 feet, and is described as a "pale-brown, foraminiferal clay containing a subordinate amount of glauconite, and a small amount of fine to medium grained, rarely coarse, light-olive-gray sand" (Bull. 2, p. 94).

Well Wor-Bg 10, on the Isle of Wight about 4 miles north of Ocean City, was drilled to a depth of 1,706 feet as an oil test in 1914. No oil was found, but a strong salt-water flow was encountered, which was bottled and sold as mineral water. The well is still flowing a few gallons a minute of water having a chloride content of 2,550 ppm (Table 37).

In this tri-county area the Eocene series functions predominantly as an aquiclude, and only in isolated wells in western Somerset County and northern Worcester County does it perform as an aquifer—a poor one. This is in strong contrast to the Eocene series in Dorchester and Talbot Counties where it is the most important aquifer.

Pamunkey group

Nanjemoy formation. The Nanjemoy formation has been identified only in the Salisbury oil test (Wi-Cg 37) in the range from 1,250 to 1,320 feet below land surface (Bull. 2, p. 213–268). Even this correlation is not positive, for Cushman says: "A few species known elsewhere only from the Paleocene occur as high as 1,260 feet, indicating that the interval from 1,260 feet to 1,320 feet must remain somewhat in doubt as to its exact position in the Eocene section." Shifflett (1948, p. 33) says there is no indication of Aquia or Nanjemoy age Foraminifera in the Berlin oil test (Wor-Ce 12) or in the Ocean City oil test (Wor-Bh 11).

In the Salisbury oil test, the section probably referable to the Nanjemoy formation is described as a "hard, brownish-white chalk with only a trace of glauconite." This lithology is quite unlike that of the type locality, or of any known section of the Eocene outcrop in Maryland.

Jackson group equivalent

Piney Point formation. Rasmussen and Slaughter (1951) identified a sand aquifer of Jackson age in five counties of southern Maryland and two counties of northern Virginia in estimating the "safe" yield of the aquifer in the vicinity of the city of Cambridge, Dorchester County, for which Otton (1955) has proposed the name Piney Point formation.

The Piney Point formation is considered to be present at Deal Island, 83 feet thick in Som-Cb 1; at Rumbley, 114 feet thick in Som-Cc 1; on South Marsh Island, 106 feet thick in Som-Ca 1; on Smith Island, 55 to 100 feet thick (Som-Ea 1 to 9); at Crisfield, 100 feet thick in Som-Ec 4; and on the Isle of Wight (Wor-Bg 10), thickness unknown. The formation is presumed to interfinger with the Chickahominy formation in other wells at Crisfield (Som-Ec 1, 2, 3, 5, 7, 8, 9) and in the well at Pocomoke City (Wor-Fb 19), and to underlie a shale of Jackson age at the Ocean City oil test (Wor-Bh 11), where it is 90 feet thick (from 1,730 to 1,820 feet). It is apparently absent in the deep oil tests near Salisbury (Wi-Cg 37) and Berlin (Wor-Ce 12) where the shale dominates.

Hence, the Piney Point formation is sporadic in distribution in Somerset, Wicomico, and Worcester Counties, apparently lensing into a shale unit. It contains water of moderate to high mineralization and cannot be regarded as a reliable aquifer.

Chickahominy formation. The Chickahominy formation, shale unit of Jackson age, is a brown foraminiferal glauconitic clay which performs as an aquiclude, confining water of the Piney Point formation, where the two are in contact, and functioning with the upper clays of the Paleocene series as an aquiclude where the Piney Point is absent.

The Chickahominy formation is 110 feet thick in the oil test hole near Salisbury (Wi-Cg 37), and 170 feet thick in the oil test hole near Berlin (Wor-Ce 12). It is 80 feet thick in the oil test near Ocean City (Wor-Bh 11), occurring from 1,650 to 1,730 feet. The Chickahominy formation apparently interfingers with facies of the Piney Point formation at Pocomoke City (Wor-Fb 19), Crisfield (Som-Ec 1 to 3, 5, and 7 to 9) and possibly also on Smith Island (Som-Ea 1, 2, 7, 8, and 9) and South Marsh Island (Som-Ca 1).

Oligocene Series

Oligocene deposits are lacking in Somerset, Wicomico, and Worcester Counties. The hydrologic effect of the unconformity formed during Oligocene time, with the subsequent overlap by Miocene silts, was to deny the Piney Point formation an intake belt of its own. Recharge must move across bedding planes from the Aquia and Nanjemoy formations or from the Miocene basal sand in Talbot County.

Miocene Series

The Miocene series consists of thin to moderately thick sand aquifers separated by thick silt aquicludes. The aquifers are, in places, capable of moderate to large yields of water, which ranges in quality from good to poor. The aquicludes probably are leaky and yield some water from storage to the aquifers when the aquifers are pumped heavily.

Lower Miocene series

The lower Miocene is not recognized in Maryland. Spangler (1950, p. 121, fig. 7) indicates lower Miocene deposits between depths of 1,090 and 1,595 feet in the Ocean City oil test (Wor-Bh 11), and between about 1,100 and 1,360 feet in the Berlin oil test (Wor-Ce 12) but did not give lithologic or paleontologic evidence in support of the correlation.

Middle Miocene series—Chesapeake Group

Calvert formation and the Nanticoke aquifer. The Calvert formation is primarily a thick aquiclude which contains two or more thin aquifers. The top of the formation slopes gradually from a depth of 200 feet below land surface in northwestern Wicomico County to slightly more than 1,000 feet below land surface in southeastern Worcester County (fig. 11). The formation ranges in thickness from 204 feet in Som-Ca 4 on South Marsh Island to 630 feet in Wor-Bh 11 on Fenwick Island. The isopach map (fig. 12), derived from the structure maps (figs. 9 and 11), indicates general thickening toward the northeast, with a broad slightly thicker belt in the north-central part of the area, and an average thickness of about 450 feet.

The control for Calvert formation in this area consists of 35 wells or test holes which penetrate to or through it: 21 in Somerset County, 10 in Wicomico County, and 4 in Worcester County. Lithologic descriptions of the formation are available in 31 of these 35 wells; paleontology of the formation is available in 11; 6 wells produce water and provide some hydrologic knowledge; 21 wells penetrate through the formation and produce from deeper aquifers; 10 were test holes for oil, gas, or water.

The Calvert formation is predominantly a gray silt, slightly glauconitic in the upper part and diatomaceous in the lower part. The well drillers usually describe the Calvert as blue, brown, green, or gray clay. The few sands which they encounter are frequently described as crusty, hard, and cementlike.

The sands are generally fine and very fine, with occasional shell fragments. In western Wicomico County the sands in the upper part of the formation are sufficiently permeable to provide water from a bed which is named the Nanticoke aquifer. Some water is also produced from a well of the city of Crisfield, Som-Ea 4, from a sand screened between depths of 726 and 731 feet, near the base of the Calvert formation. Since this well is screened also in the Eocene and Cretaceous sands, it is difficult to determine what proportion of its yield comes from the Calvert.

One of the more careful driller's logs of the Calvert and overlying Miocene formations is recorded by Clark, Mathews, and Berry (1918, p. 316) for the oil test (Wi-Bg 12), about 3.5 miles northeast of Parsonsburg. The fossils from this well indicate that the section from 618 to 1,130 feet is Calvert. This section consists of light gray clay, gray diatomaceous earth, and gray quartz sand with shell fragments. The driller noted nine water sands in this oil test, of which the lowest two in the Calvert formation are:

Eighth water sand.	755–760 highly mineralized
Ninth water sand.	940–945 "a little sweet, as if it has some sugar in it"

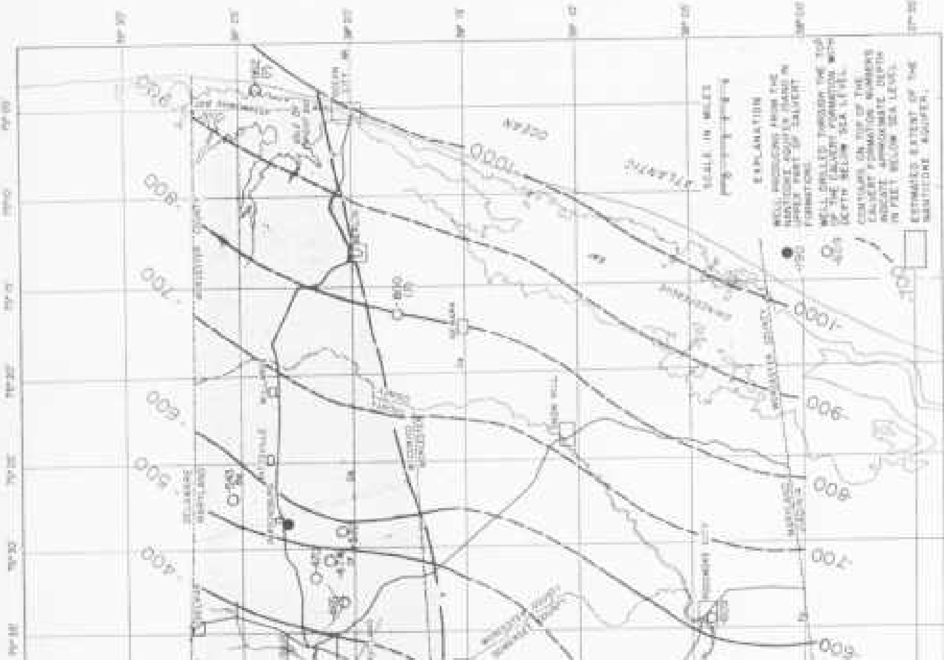

FIGURE 11. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Calvert Formation or the Base of the Choptank Formation

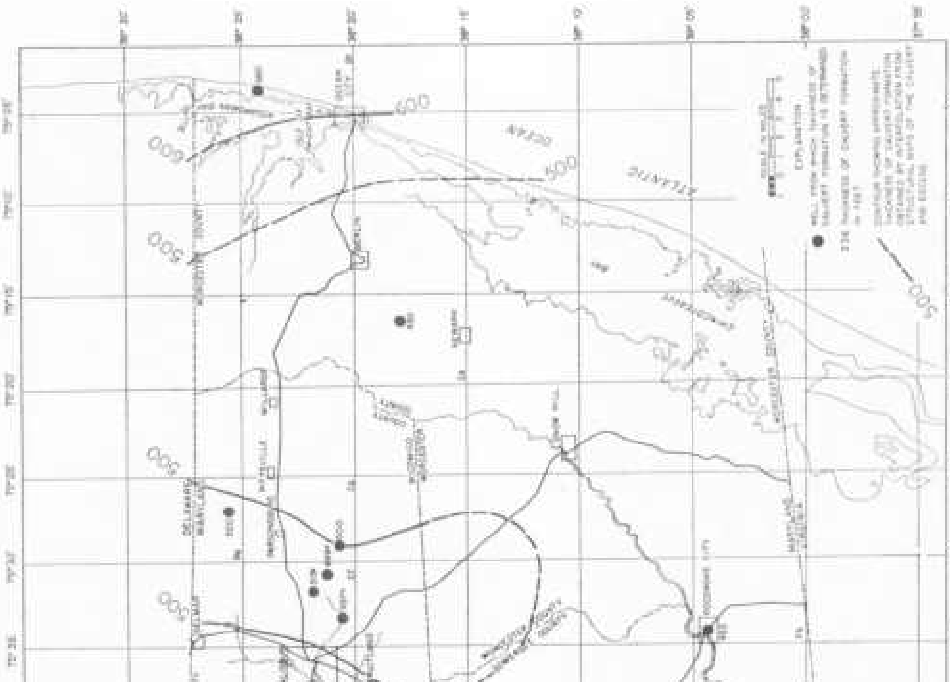

FIGURE 12. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Calvert Formation

In the other deep oil test drilled in Wicomico County in 1944 (Wi-Cg 37), 6 miles east of Salisbury, Anderson (Bull. 2, p. 18) describes the Calvert section as follows:

From 640 to 1000 feet, the portion of the section from which ditch samples were collected, the beds consist of pale-gray silty clay. In the upper 60 feet dull-gray argillaceous sands were present. Fossil fragments and glauconite were noted, the glauconite being more abundant in the interval from 810 to 820 feet. From 1000 to 1140 feet the section was cored and revealed beds consisting of pale brownish-gray silty clay. Shell fragments, fish remains, Foraminifera, and diatoms were present in practically all samples.

Three wells (Wi-Cf 61, 62, and 63) were drilled to depths of about 1,000 feet in a relatively small triangle, 3 to 5 miles east-southeast of Salisbury, in search of a reservoir to store gas. These wells penetrated about 500 feet of the Calvert formation. Samples indicate that the formation is a gray silt and fine sand. The paleontology of the samples from Wi-Cf 61 and 63 is in Table 11. The log of Wi-Cf 61 shows a sand, the Nanticoke aquifer, at the top of the Calvert formation (fig. 13).

In the oil test at Berlin (Wor-Ce 12), Anderson (Bull. 2, p. 86) comments on the section from 800 to 1,230 feet below land surface:

The lithology of the samples from the Calvert formation indicates that it consists primarily of pale-gray to grayish-white silty clay with occasional streaks of fine to medium-grained sand. Traces of glauconite, lignite and shell fragments were noted.

In the deep oil test 3 miles north of Ocean City (Wor-Bh 11), the Miocene series was identified by fossils, but it was not subdivided. On the basis of the lithology of the ditch samples described by Overbeck (Bull. 2, p. 428-440), the interval from 970 to 1,650 feet is assigned to the Calvert formation. Part of this section is described by Overbeck (Bull. 2, p. 94, 95) as follows:

1160-1500 Predominantly yellowish-gray and pale-brown clay. Some fine to coarse sand and hard, calcareous beds. Shell fragments. Glauconite appears in the cuttings between 1010 and 1220 feet. Diatoms present.

1500-1650 Chiefly pale-brown clay. Foraminifera suggest that this interval corresponds to the Calvert formation of the Hammond well. Heavy diatom bed occurs at 1610-1650 feet and possibly represents the Fairhaven member.

The nearby old oil test on the Isle of Wight (Wor-Bg 10) is believed to be producing water from the Eocene series, although Clark, Mathews, and Berry (1918, p. 319) considered it possible that this water came from a basal Calvert sand.

In the old test hole drilled for water at Pocomoke City (Wor-Fb 19), the section assigned to the Calvert is 453 feet thick, extending from 609 to 1,062 feet below sea level. The section is described primarily as green clay, but one green and black sand, 40 feet thick, from 851 to 891 feet depth, is mentioned.

In Somerset County, the Calvert formation is, according to the drillers,

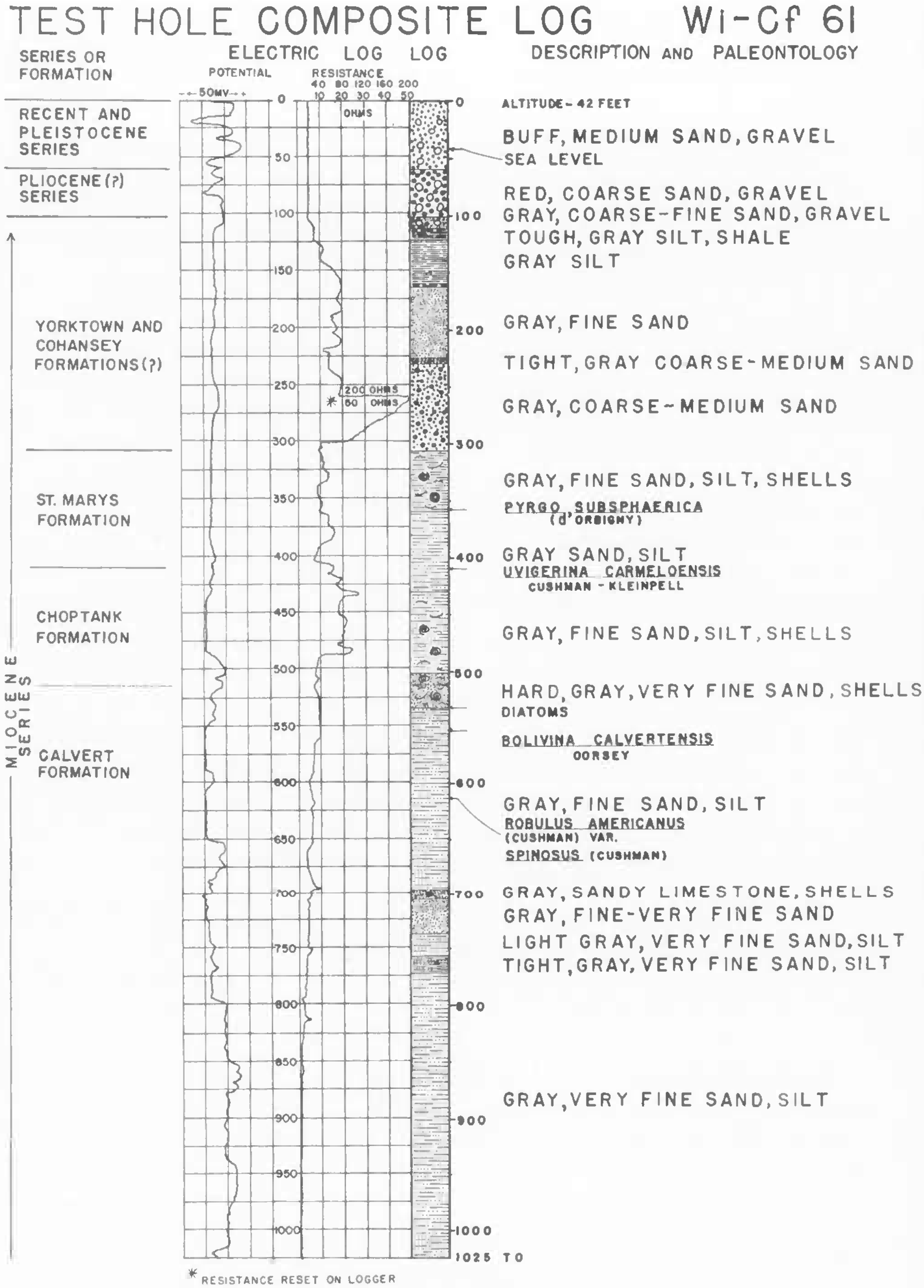

FIGURE 13. Composite Electric and Geologic logs and Paleontology of Test Hole Wi-Cf 61, near Salisbury, Wicomico County

predominantly blue, green, and brown clay. A water sand in the Calvert is mentioned in Som-Ea 1 on Smith Island, but no comment is given on yield or water quality, and the well was completed in sands of the Cretaceous system. Likewise, a 42-foot gray sand is listed in the Calvert section at Tylerton (Som-Ea 9), Smith Island, but the well was completed much deeper in Cretaceous sands. At South Marsh Island (Som-Ca 1), Deal Island (Som-Bb 1), Rumbley (Som-Cc 1), Crisfield (Som-Ec 1 to 5, 7 to 9) and Smith Island (Som-Ea 1 to 9), the Calvert formation was by-passed for deeper sands, and only in the multiple-screened city well of Crisfield (Som-Ec 4) was some water derived from it. At Princess Anne (Som-Be 50), the top of the Calvert formation is believed to have been reached at 401 feet below sea level, and 36 feet of a gray silt, clay, and sand were logged.

Since much of the Calvert formation is a silt, or very fine sand, the infiltration properties of the intake belt are probably poor. The one aquifer of the Calvert that has any appreciable extent is developed mainly in Wicomico County and is called the Nanticoke aquifer. On the basis of regional structure, this sand, if extended to sea level, would probably underlie the Pleistocene and Pliocene (?) sands and silts in northern Caroline County, northwestern Talbot County, and cross beneath Chesapeake Bay to central Calvert County.

The Nanticoke aquifer is the name herein applied to the upper sand of the Calvert formation, and to such portions of the basal part of the Choptank formation as transmit water with it, which produces water at Sharptown (Wi-Ad 1), in the vicinity of Mardela Springs (Wi-Bc 6, -Bc 27, -Bd 11), at Vienna (Dor-Dh 5, 6, 7 and 8), and extensively throughout the northeast sector of Dorchester County. The name Nanticoke has been selected because of the development of the aquifer beneath the tributary area of the Nanticoke River.

The Nanticoke aquifer is typically developed at the High School well at Mardela Springs, Wi-Bd 11, in which it is about 44 feet thick. It is 39 feet thick in the Sharptown well, Wi-Ad 1. The aquifer may be in production in well Wi-Cg 35, at the Hastings Hatchery, Parsonsburg, since this well was deepened through the Choptank formation, but no log is available on the deeper part.

The Nanticoke aquifer appears to be present in the three 1,000-foot test wells, Wi-Cf 61, 62, and 63, in the two oil tests, Wi-Bg 12 and Wi-Cg 37, and in the oil test near Ocean City, Wor-Bh 11, where it is about 110 feet thick. It appears to shale out between Fruitland and Princess Anne (Som-Be 50), and to be absent in the deep test at Pocomoke City (Wor-Fb 19). The probable extent of the aquifer is shown on the structure map of the Calvert formation (fig. 11).

The aquifer has been test drilled and test pumped at Fruitland (Wi-De 44), where it was rated with a coefficient of transmissibility of about 5,500 gallons per day per foot and a coefficient of storage of 0.00011 (Andreasen, 1953). Of five wells producing from the aquifer in Wicomico County, two (-Bc 6 and -Bc 27) use small quantities, one (-Bd 11) uses a medium quantity, and two (-Ad 1 and -Cg 35) use large quantities of water. At Vienna, Dorchester County, two wells in the Nanticoke aquifer are used for public supply and two are used for domestic purposes.

The quality of water of the Nanticoke aquifer is indicated by analyses of wells Wi-Ad 1 and Wi-Bd 11. These show a nonirony soft water, high in sodium bicarbonate.

Choptank formation. The Choptank formation is a permeable aquifer in Somerset, Wicomico, and Worcester Counties, but it yields water to only a few wells because the water is generally so high in dissolved solids that people find it suitable for only a few purposes. Six wells in Somerset County produce water from the Choptank formation, and one well is reported to have produced water from it in Wicomico County. In all, 47 wells are known to penetrate to or through the formation: 29 in Somerset County, 13 in Wicomico County, and 5 in Worcester County. Structural and thickness control is obtained from 31 of these wells; lithology is available on 30 wells; and paleontology on 10 wells.

The top of the Choptank formation slopes from a depth of about 100 feet below sea level along the Nanticoke estuary, at the northwest margin of the tri-county area, to about 800 feet below sea level beneath Assateague Island, on the southeast boundary of the area (fig. 14). The well control is not evenly distributed, so that information is actually confined to only a few areas and the contouring, therefore, looks fairly regular. A small monoclinal flattening is apparent in the vicinity of Crisfield, with a local increase in dip at Pocomoke City, but, otherwise, the average rate of dip is about 17 feet per mile.

The formation appears to thicken to the northeast at an irregular rate, from a minimum of 35 feet in a well at Crisfield to a maximum of 260 feet on Fenwick Island (fig. 15). The average thickness is estimated at 120 feet.

The formation is largely a gray coarse to fine sand with shell fragments, occasional hard beds, and lenses of gray clay. Its description in the Salisbury oil test, Wi-Cg 37, by Anderson (Bull. 2, p. 19) is:

> This formation consists of pearl-gray to white marl and medium-grained sand. Glauconite is present but is very scarce. Fragments of macro-fossils were noted in all ditch samples.

In the Ocean City oil test, Wor-Bh 11, the ditch samples from 710 to 970 feet below land surface are referred by the present writers to the Choptank formation. A summary of Overbeck's description is:

> Light olive-gray sand, little clay; sand chiefly medium and coarse-grained. Shell fragments common, forams rare. Hardshell.

Four of the six wells producing from the Choptank formation are in the Crisfield area (Som-Ec 30, 32, and 33, and -Ed 4). One well (Som-Df 2) is near

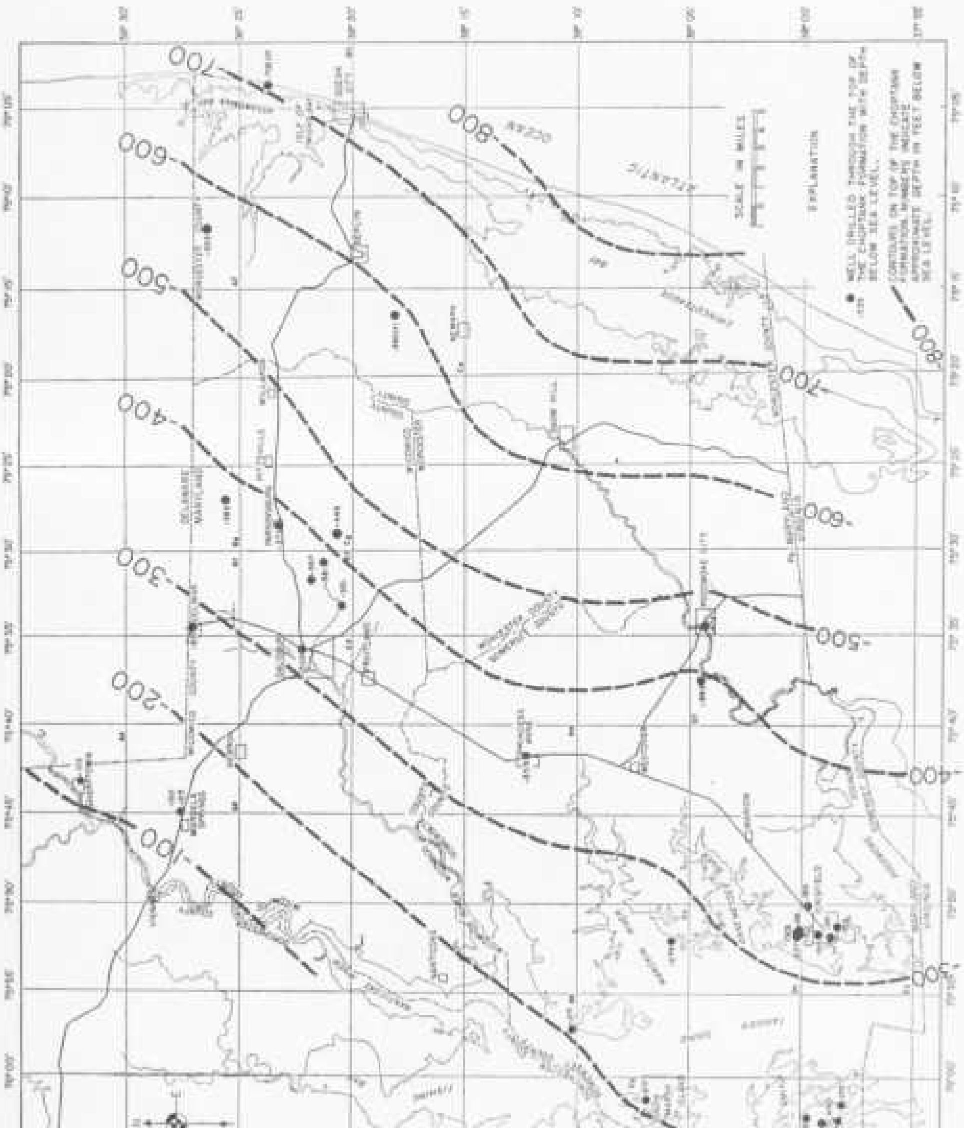

FIGURE 14. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Choptank Formation or the Base of the St. Marys Formation

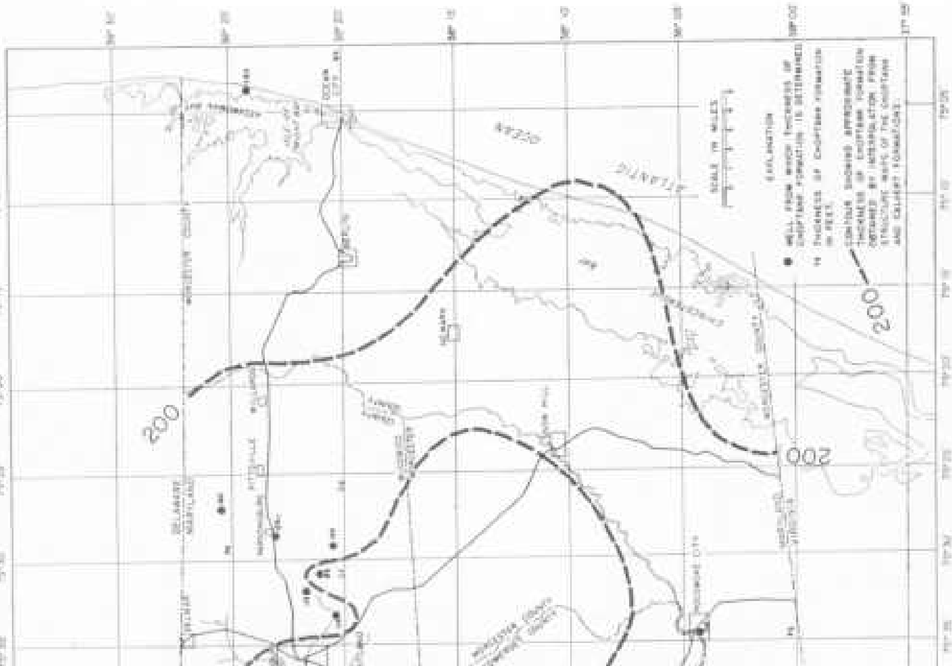

FIGURE 15. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Choptank Formation

Pocomoke City. The wells are for domestic and farm use, equipped with small reciprocating or jet electric pumps, and are rated at only small to moderate yield. The well on Deal Island, Som-Cb 16, is reported to have a large yield from the Choptank formation. A well at Hastings Hatchery, Parsonsburg, Wi-Cg 35, had a large yield from the Choptank formation before it was deepened to the Calvert formation. The quality of water from the Choptank formation there was undesirable (Table 36).

A test hole for water at Princess Anne, Som-Be 50, was drilled through 46 feet of gray sand and shells, predominantly coarse to medium grained, between depths of 373 and 419 feet, which are assigned to the Choptank formation. Although the city completed well Som-Be 51 in the higher Manokin aquifer with a 350 gpm test, the driller was of the opinion that the Choptank formation would produce more. No report on the quality of water from the Choptank formation is available from the Princess Anne test.

Specific capacities of wells in the Choptank formation are as follows: 4.6 gpm/ft. for Som-Df 2; 11.4 gpm/ft. for Som-Ec 11; 10 gpm/ft. for Som-Ec 30; and 5.1 gpm/ft. for Som-Ec 32.

Figure 38 shows that the Choptank formation has the worst water of any aquifer now in use with respect to dissolved solids (average 3,179 ppm), chloride (average 939 ppm), bicarbonate (average 1,200 ppm) and hardness (average 188 ppm), and is low only in iron (average 0.35 ppm). These averages are derived from wells Som-Cb 16, Ec 33, and Ed 4, and Wi-Cg 35. The water is frequently too bad to use. The water from the well drilled at McCready Hospital, Crisfield, Som-Ec 11, is reported too bitter to use. The well drilled for the school at Fairmount, Som-Cd 9, was plugged because it reputedly contained too much sodium bicarbonate. In well Som-Df 2, near Pocomoke City, the water is reported salty but is used. In the northern suburbs of Crisfield the quality of Som-Ec 30 is reported fair, and that of Som-Ec 32 is reported to contain sodium bicarbonate but is usable. Water from Som-Ed 4, a domestic well, east of Crisfield, had a chloride content of 939 ppm, which would limit the use of the water to special purposes.

The Choptank formation has a broad intake belt, about 14 miles wide, 20 to 30 miles northwesterly from the lower tri-county area. The quality of water probably improves toward the intake area beneath the higher lands of the Delmarva Peninsula, and better-quality water may be found in northern Wicomico and Worcester Counties than is indicated by the analyses from Somerset County on the south.

St. Marys formation. The St. Marys formation forms an aquiclude which is not known to yield water in Somerset, Wicomico, and Worcester Counties It is composed predominantly of sandy clay and silt. The top of the formation ranges in depth from 52 feet below sea level at Sharptown (Wi-Ad 1), in the northwestern corner of the tri-county area, to 502 feet below sea level in the

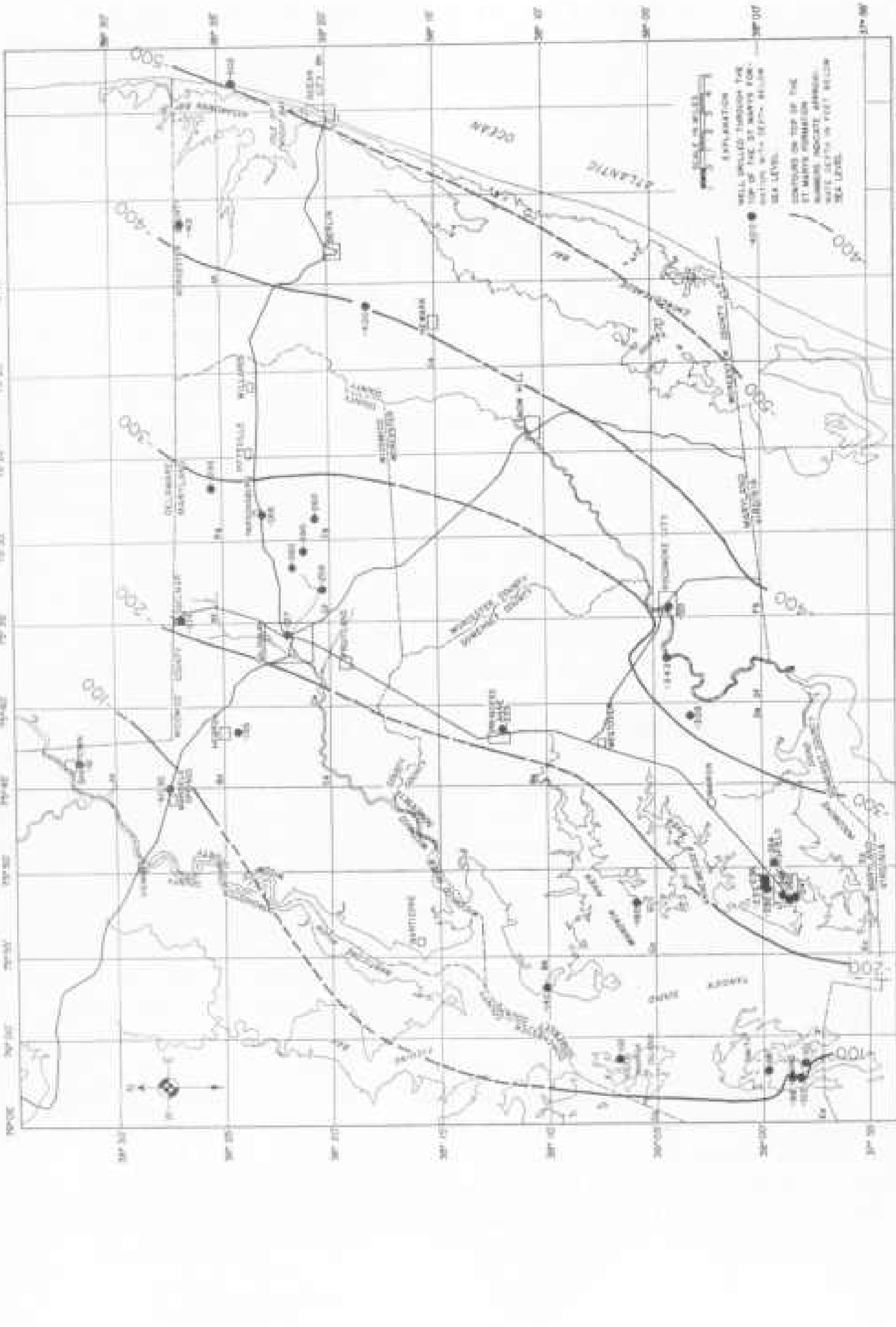

FIGURE 16. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the St. Marys Formation or the Base of the Yorktown and Cohansey Formations(?)

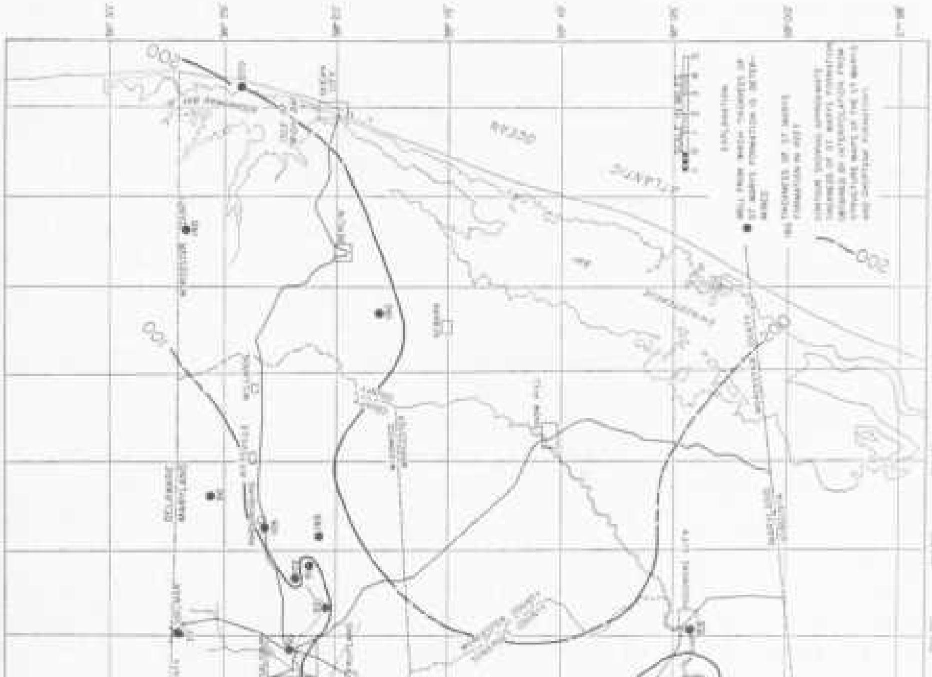

FIGURE 17. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the St. Marys Formation

Ocean City oil test (Wor-Bh 11), and somewhat deeper along the barrier islands south of Ocean City. The structure map, figure 16, indicates a southeasterly dipping homocline with a few irregularities, and an average dip of about 11 feet to the mile.

The thickness ranges from 33 feet at Mardela Springs (Wi-Bd 11), to 200 feet in the Ocean City oil test (Wor-Bh 11). The isopach map, figure 17, indicates a general thickening of the formation toward the east, with a lens-shaped thickening to more than 200 feet in the vicinity of Snow Hill. The average thickness is estimated to be 130 feet.

The control for the description of the St. Marys formation is based on 49 wells, of which 47 penetrate through the formation, and 2, Som-De 1 and Wi-Cd 33, were abandoned in it. Of these wells, 30 are in Somerset County, 14 in Wicomico County, and 5 in Worcester County. Ten were test holes and 39 are wells. For 10 wells some paleontology is available to control the stratigraphy, and 34 wells provide knowledge of the structure, thickness, and lithology.

In Somerset County the St. Marys formation, as described in the logs of 18 wells, is almost entirely a blue clay, with shell fragments. Only two wells, Som-Ce at Deal Island, and Ea 9 on Smith Island, have any appreciable gray sand recorded. An unusual description is that of Som-Df 2 near the Pocomoke River, where the formation is described as a white clay.

In Wicomico County the formation is predominantly a sandy and silty clay with shell fragments, as described in 10 wells (Wi-Ad 1, -Bd 11, -Bd 45, -Bf 8, -Bg 12, -Cd 33, -Ce 42, -Cf 61, 62 and 63), but more stringers of gray sand are logged than in the Somerset County wells. This may indicate that Wicomico County is nearer to the sedimentary source area, as well as being nearer to the wide sub-outcrop belt where the St. Marys formation lies beneath the shallow Pleistocene and Pliocene(?) mantle in Dorchester County (Clark, Shattuck, and Dall, 1904, Pl. 1).

In Worcester County, the St. Marys formation at Bishopville is a tough gray clay and rock (Wor-Af 5) and at Pocomoke City (Wor-Fb 19) it is composed of clay and boulders. In the Ocean City oil test (Wor-Bh 11) Overbeck (Bull. 2, p. 430) records 130 feet of sand, 10 feet of sandy marl, 20 feet of sand, and 40 feet of sandy clay, which the present writers have assigned to the St. Marys formation. Since these are ditch samples taken with a hydraulic rotary rig from a mudded hole, the clays and silts may have been overlooked.

Throughout most of the lower tri-county area the St. Marys formation is overlain by the Yorktown and Cohansey formations(?) of late Miocene age, but in the northwestern corner of Wicomico County, in the vicinity of Sharptown, Vienna, and Mardela Springs, it is overlain directly by a relatively thin Pleistocene and Pliocene(?) mantle.

Hydrologically the St. Marys formation functions as an aquiclude, effectively excluding the partially mineralized waters of the underlying Choptank formation from contaminating the overlying "sweet" waters of the Manokin aquifer of the Yorktown and Cohansey formations(?). In drilling through the St. Marys formation care should be taken to seal the opening between the casing and the drill hole, so that the waters of the Choptank formation do not flow upward along the outside of the casing, as the St. Marys is described in some wells as a tough clay (see Wor-Af 5) which may not everywhere be sufficiently plastic to close this opening of its own accord.

Upper Miocene series—Yorktown and Cohansey formations(?)

The upper Miocene unit in Somerset, Wicomico, and Worcester Counties consisting of the Yorktown and Cohansey formations(?) undifferentiated, contains the principal artesian aquifers which are readily accessible to drilled wells. Two prominent artesian water-bearing beds are the Manokin aquifer below and the Pocomoke aquifer above. Several locally productive sands in addition to these are also indicated. The sequence contains two relatively thick leaky aquicludes. Table 14 gives their approximate thickness, geologic character, and water-bearing properties.

The upper Miocene series conforms to the regional southeasterly dipping homocline. The top of the Miocene is an eroded surface and indicates the structure only in a general way. Figure 18, an interpretation of the eroded surface of the Miocene on which the Pliocene and Pleistocene deposits rest indicates that cuestas of low relief developed between streams which drained in a northeasterly direction. The tributaries joined a major valley in the vicinity of the Maryland-Delaware line. The northeast strike of the upper Miocene sediments, with bands of sand and silt, may have controlled the consequent drainage.

The thickness of the upper Miocene series, determined by the difference between figures 16 and 18, is shown in figure 19. The thickness ranges from zero at Sharptown to more than 400 feet under Assateague Island.

The upper Miocene series is tentatively correlated with the Yorktown formation of Virginia. This correlation does not rest upon a firm faunal relationship, but largely upon tracing the formation by means of well logs to Smith Island, South Marsh Island, and Elliott Island, from which it lies in proper stratigraphic position to have once been part of a continuous stratum with the outcrop exposures of the Yorktown formation on the peninsulas between the Potomac, Rappahannock, and York Rivers. Paleontologists have reported the upper Miocene series barren of microfossils (McLean, 1950), or have failed to differentiate it on a faunal basis (see Tables of paleontology, 10, 11, and 12).

This upper Miocene series is also tentatively correlated with the Cohansey formation of New Jersey, following Richards (1953, p. 332), who says:

TABLE 14

Aquifers of the Upper Miocene Series, Yorktown and Cohansey Formations(?), in Somerset, Wicomico and Worcester Counties

Member	Approximate Thickness (feet)	Geologic character	Water-bearing Properties
Upper aquiclude	0–100± Average 50	Gray and blue clayey silt, interstratified with layers of gray very fine to medium sand. Occasional thin shell beds.	A confining bed which yields small quantities of water from local stringer sands to 5 scheduled wells in Worcester County. Generally nonproductive.
Pocomoke aquifer	0–88 About 45 where confined	Gray medium to fine sand with occasional coarse sand, fine gravel, shells, and streaks of clay.	Yields moderate to small quantities of water to numerous wells: fairly large quantities to a few wells. Water is obtained under artesian conditions in Worcester County, at depths ranging from 60 feet below sea level at Pocomoke City to 190 feet below at Ocean City. Water-table conditions prevail where the aquifer is hydraulically connected with overlying Pleistocene and Pliocene(?) deposits across an intake belt about 4 miles wide which extends from Crisfield through Nassawango Forest and Willards.
Lower aquiclude	0–142± About 99 where confined	Gray and green clayey silt, with some rock, marl, sand, black sand and shells.	Generally nonproductive but yields some artesian water at Crisfield, and in the vicinity of Salisbury locally over a few square miles. A leaky confining bed.
Manokin aquifer	0–144 About 80 where confined	Light-gray medium to fine sand, occasionally coarse in lower section; silt and clay lentils. Shells reported in a few wells, but usually nonfossiliferous.	Yields moderate to small quantities of water to many wells in Somerset County, numerous wells in Wicomico County and a few wells in Worcester County. Yields large quantities of water to municipal wells at Princess Anne, Snow Hill, and Ocean City; the principal artesian aquifer at Snow Hill at depth of 250 feet below sea level, and the deepest producing aquifer at Ocean City at depth of 240 feet below sea level. Water-table conditions prevail in the aquifer beneath the Pleistocene and Pliocene(?) mantle over an intake belt about 8 miles wide which crosses western Wicomico County from Bivalve to Mardela and Hebron, and passes into Delaware near Delmar.

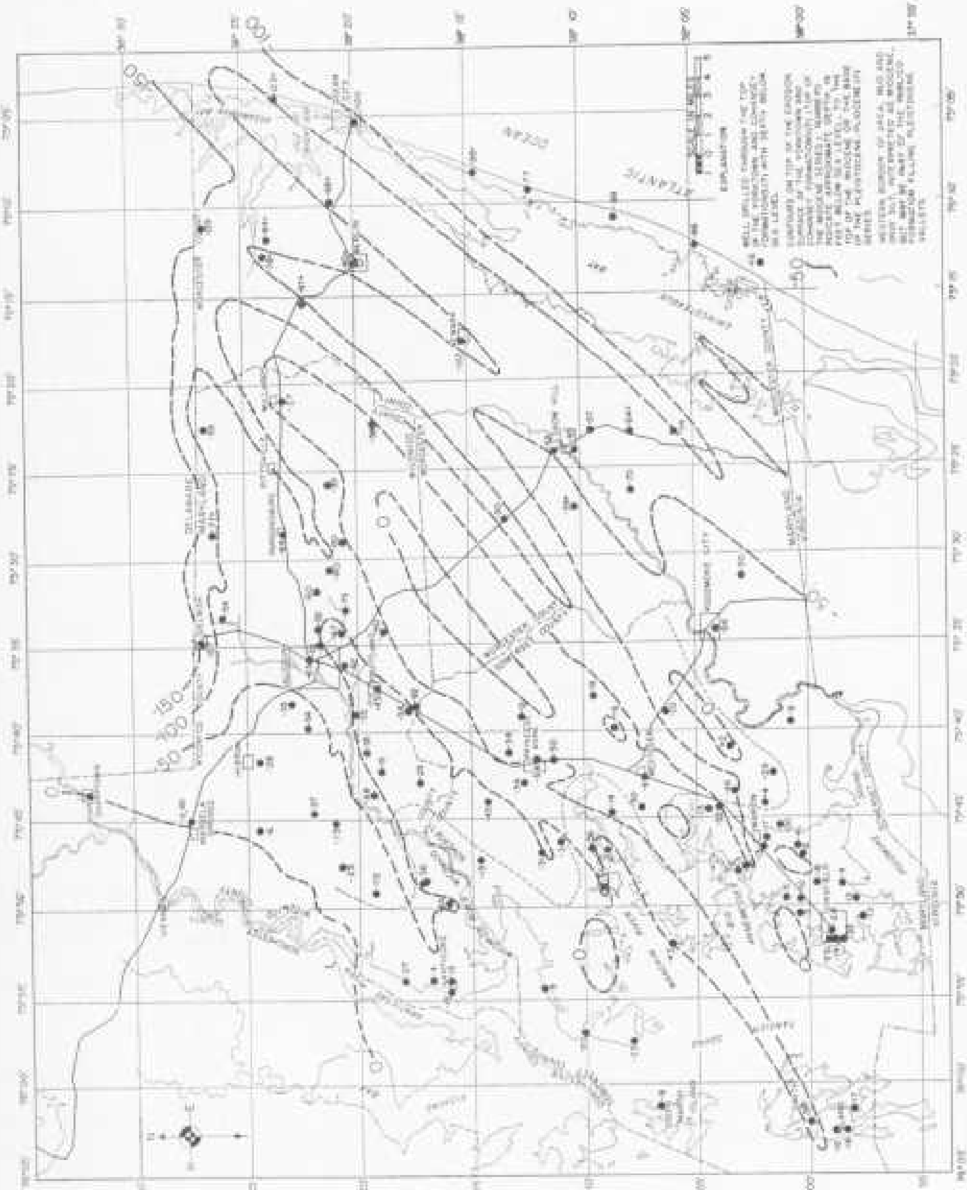

FIGURE 18. Map of Somerset, Wicomico, and Worcester Counties, showing the Erosion Surface on Top of the Yorktown and Cohansey Formations(?) on which the Pleistocene and Pliocene(?) Deposits were laid

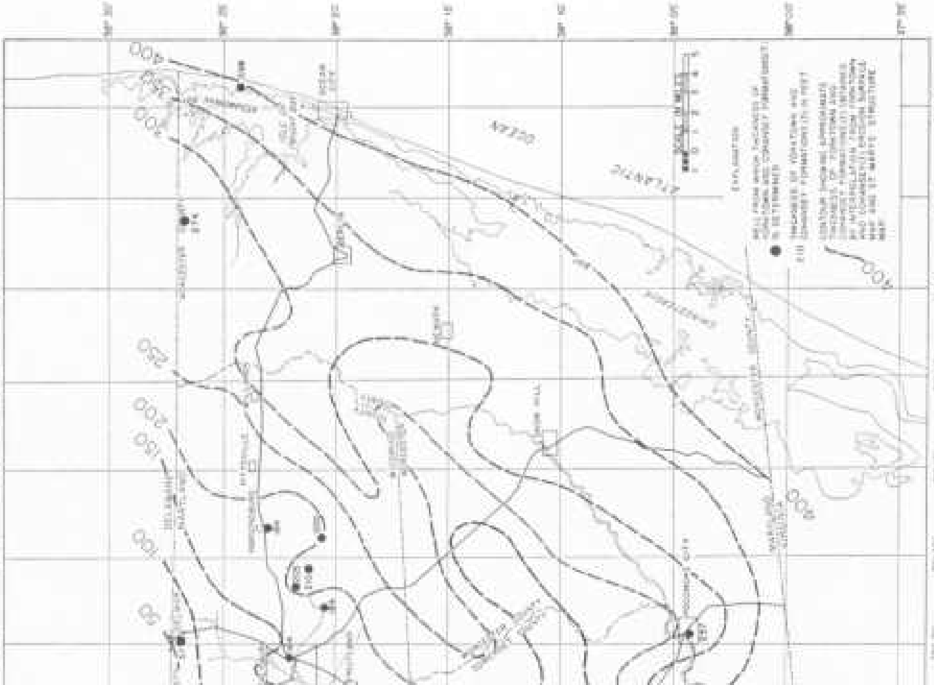

FIGURE 19. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Yorktown and Cohansey Formations(?)

Since New Jersey was probably above water during Yorktown time, no marine fossils of this age are known from the state. It is highly possible that the sands and clays of the Cohansey formation represent deltas or estuaries equivalent in age to the Yorktown farther south. The presence of some warm-climate fossil plants near Bridgeton, New Jersey, suggests a late Miocene (Yorktown ?) age for the Cohansey formation.

Manokin aquifer. The Manokin aquifer is the most important artesian bed in use in Somerset, Wicomico, and Worcester Counties. A total of 267 wells comprising 16 percent of all the wells scheduled, derive water from it. It is the principal water-bearing bed of the northern half of Somerset County, and is named for the Manokin River in that area. The aquifer is the chief source of water for the county seat, Princess Anne. It is typically developed at the town test well, Som-Be 50. In Wicomico County, the Manokin aquifer is second only to the Pleistocene and Pliocene(?) formations as a source of water. It provides a large supply to industrial wells at Fruitland, and underlies most of the county. In Worcester County, the aquifer lies at somewhat greater depths and has not yet been sought extensively, but it provides water for Snow Hill and Ocean City.

The Manokin aquifer is a gray medium- to fine-grained sand. It is coarser in the lower portion, containing some coarse sand, granules, and small lenses of fine gravel. The upper portion is fine to very fine sand, becoming silty in places. The sand appears to be almost barren of microfossils, but a few samples contain shell fragments.

The wells and structure of the Manokin aquifer are illustrated in figure 20. The top of the sand dips southeasterly at the rate of about 10 feet to the mile, from sea level in northwestern Wicomico County to more than 300 feet below sea level in southeastern Worcester County. The contour depths are only approximate. In areas where there are many drillers' logs, the top of the sand ranges 25 feet above and below the mean value. This may be due to differences in description by the well drillers, to lenticularity in the sands and overlying silts, or to small faults. It does not appear due to unconformity with the overlying aquiclude.

The Manokin aquifer has an intake belt beneath the sands and gravels of the Pleistocene and Pliocene(?) series, from which it receives recharge directly. This belt ranges from 2½ to 6 miles in width and crosses the northwestern corner of the area from Nanticoke through Hebron to Delmar.

The land surface in the Hebron-Delmar area is 40 to 60 feet above sea level. The water-table is at depths ranging from 5 to 15 feet below land surface. Therefore the average head in this portion of the intake area is about 35 feet above sea level and furnishes the hydraulic drive for the fresh-water recharge of the artesian portion of the aquifer.

The intake belt passes southwesterly beneath the Nanticoke River, Elliott Island, Fishing Bay, Bishops Head, Bloodsworth Island, and South Marsh

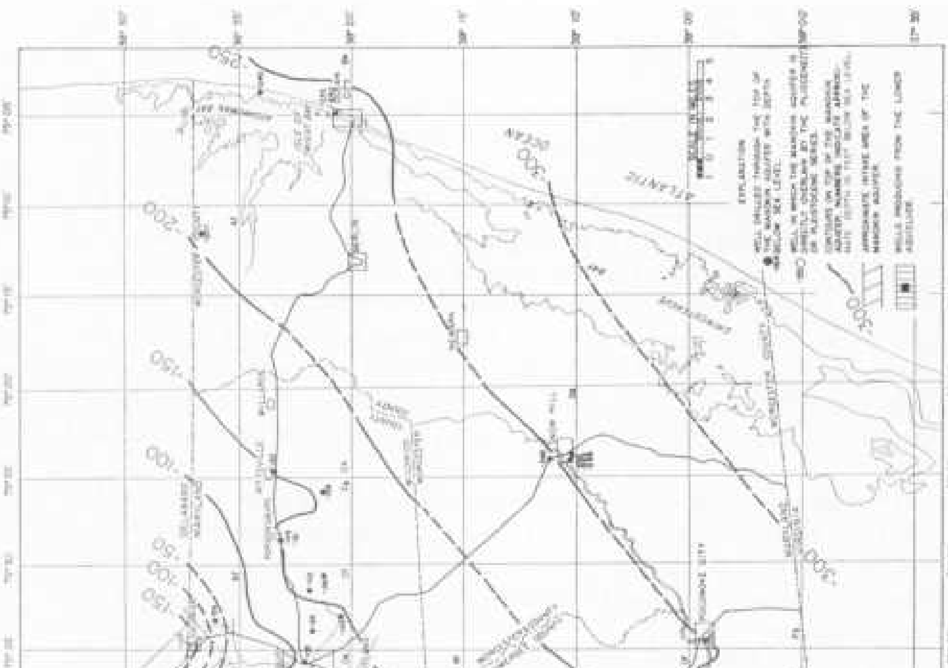

Figure 20. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Manokin Aquifer and Buried Intake Belt

Island. Here the brackish waters of the bay and marsh have access to the aquifer. A wedge of brackish water in the Manokin aquifer is shown in Plate 11 and indicated by the chemical analyses of wells Som-Bc 14, -Cb 15, -Cd 2, -Cd 39, -Ce 2, -Ce 3, -Ce 4, -Ce 5, -Ce 38, -Ce 39, -Ec 41, -Ed 40, and -Ed 41, in which the chlorides range from 133 to 792 ppm. The wedge of brackish water may be due to incomplete flushing of a former high chloride zone or perhaps the brackish water wells extend below a Ghyben-Herzberg lens in the coastal part of the outcrop area. Natural encroachment of salt water into the aquifer from higher or lower formations should be considered. Fortunately the wedge is confined to the bay shore margin and southern part of Somerset County, and most of the well waters are still suitable for many purposes.

So long as the fresh water potential from the inland area remains high and the pumping rates from the aquifer do not become excessive, the encroachment of brackish water is remote. If the pumping rate from the Manokin aquifer increases, it may be necessary to establish observation wells for periodic water sampling to determine the possibility of encroachment and to distribute the wells and adjust the rates of pumping so that the optimum yield of good water can be maintained.

The general quality of water from the Manokin aquifer is suitable for many purposes (fig. 38). The average iron content is 2 ppm and the average bicarbonate is 225 ppm, both somewhat high but both amenable to treatment. The average chloride is 173 ppm, but many of the waters in the central and northern part of the aquifer have low chlorides. The same comment applies for the average hardness (108 ppm) and the average dissolved solids (976 ppm), which are weighted by the high values in the areas of brackish water.

The water from the Manokin aquifer has the largest range in pH of any of the aquifers tested, from an acidic type at 5.3 to an alkaline type at 8.3, with a slightly alkaline average of 7.5. This range is probably due to the variety of conditions of intake, confinement, and intrusion to which the waters are subject: intake beneath fresh-water swamps and forested slopes through the Pleistocene and Pliocene(?) mantle; confinement between shell beds of the St. Marys formation and the lower aquiclude; and intrusion of brackish water from the bay.

The Manokin aquifer is absent in the Sharptown area. The thickness ranges from a featheredge at Mardela Springs to an estimated 270 feet at Ocean City. Too few wells penetrate the lower part of the aquifer to draw an isopach map. There are indications that the lower part of the Yorktown and Cohansey unit(?) is a clay in the eastern half of the tri-county area, but too few samples have been collected to confirm the lithology and too little paleontology has been done to determine whether the clay is a basal part of the Yorktown and Cohansey unit(?) or the upper part of the St. Marys formation.

In test hole Som-Be 50 the aquifer is logged as 86 feet of medium to fine sand with shell fragments, occurring between 155 and 241 feet below land surface. The aquifer is 103 feet thick in Wi-Cf 61, about 3 miles east of Salisbury (fig. 13).

The Manokin aquifer is underlain by the St. Marys formation in the northwestern half of the area, and possibly, as suggested above, has a basal clay of the Yorktown and Cohansey formations(?) in the southeastern half of the area. The St. Marys formation is a confining aquiclude which protects the Manokin aquifer from contamination by the brackish waters of the Choptank formation below.

Lower aquiclude. Between the Manokin and Pocomoke aquifers is a zone of lenticular silts and clays, with some fine sands, which yields water to wells with difficulty, or not at all, and functions principally as a confining bed. Well drillers refer to it chiefly as "blue clay" with "black sand." The zone contains some shell fragments.

The thickness of the aquiclude is 99 feet, computed from an average of 47 well logs in southern Somerset County which range from 71 feet in Som-Ed 14 to 142 feet in Som-Ec 24. The lower aquiclude is absent in northwestern Wicomico County, but is logged in 70 wells in the remainder of that county, in 139 wells in Somerset County, and 7 wells in Worcester County. The lower aquiclude probably underlies Worcester County extensively, but not enough wells penetrate to it to provide much information.

The beveled edge of the aquiclude is buried beneath a thin Pleistocene and Pliocene(?) cover in Somerset County and a thick cover in central Wicomico County. This beveled edge strikes northeasterly from Smith Island through Deal Island, Rumbley, Revels, Monie, and Victor Necks, Princess Anne, Fruitland, Salisbury, Parsonsburg, Pittsville, and Melson. Structurally, the lower aquiclude conforms to the Manokin and Pocomoke aquifers.

The lower aquiclude does contain stringer sands which yield water to some small-capacity domestic wells. A total of 69 wells, or 4 percent of the scheduled wells, are so classified.

An area in which the lower aquiclude contains sands sufficiently permeable to develop domestic wells lies northeast of Crisfield, in the vicinity of Hopewell, Ward, and Marion (Som-Dd 2, 3, 8, 10, 25, 26, 29–45). Here the drillers log blue clay and gray and black sand alternating in beds 8 to 25 feet thick. The wells may be developed in any one of several sands, which range from 120 to 170 feet below sea level. Another area is in the vicinity of Salisbury, where several wells along the banks of the Wicomico River near tide level yield small flows from a sand in the lower aquiclude (Wi-Ce 10, 14, and 76–80). The more permeable zones in the lower aquiclude may permit the passage of water by slow percolation to or from the underlying Manokin aquifer into or out of the overlying Pocomoke aquifer, or, where the Pocomoke is absent, into the Pleistocene and Pliocene(?) mantle. Accurate delineation of these zones will require careful sampling from future drill holes.

The waters derived from sands in the lower aquiclude are suitable for domestic purposes, but on the average (based on 2 to 6 analyses) they are moderately high in bicarbonate (248 ppm), slightly hard (127 ppm), and sufficiently high in chloride (105 ppm) to suggest that there has been some salt-water contamination. However, because the aquiclude is marine, the sands may never have been thoroughly flushed out. The high chloride is found in wells in Somerset County near the sub-bay outcrop. Iron is low in Somerset County (0.1 to 0.4 ppm) but high in Wicomico County (0.2 to 9.8 ppm). Dissolved solids, averaging 614 ppm, are low in Wicomico County and high in Somerset County. The pH ranges from 6.3 to 7.9, and averages 7.0 in 6 analyses.

Pocomoke aquifer. An extensive water-bearing sand underlying the central and eastern parts of the tri-county area (fig. 21) is named the Pocomoke aquifer because numerous wells in the Pocomoke drainage basin derive water from it. The aquifer is typically developed in Wor-Fb 2, an observation well of Pocomoke City from which samples were collected. In this well the aquifer has been logged as 45 feet thick, occurring from 80 to 125 feet below land surface.

Lithologically, the Pocomoke aquifer consists predominantly of gray medium- to fine-grained sand. In places it has stringers of coarse sand and small gravel and thin lenses of brown or blue clay.

The top of the Pocomoke aquifer lies about at sea level along a diagonal line from the mouth of the Big Annemessex River in Somerset County through Pittsville in Wicomico County. The top dips southeast at a rate of about 8 feet to the mile (fig. 21). It was encountered almost 200 feet below land surface in wells on Assateague Island. A Pleistocene and Pliocene(?) channel, extending to depths of 50 to 150 feet below sea level, has apparently removed the Pocomoke sand in northeastern Wicomico County except for scattered areas where it is logged in a few wells.

The intake belt of the aquifer is 1.5 to 4 miles wide and strikes northeasterly from the Crisfield area, through Marion, Westover, Nassawango forest, and Willards, to the southeastern corner of Delaware, probably passing beneath the Atlantic Ocean in the vicinity of Indian River. The intake belt is buried beneath the Pleistocene and Pliocene(?) mantle, receiving recharge from it.

The waters are confined southeasterly from the intake belt, and provide artesian water to 84 wells, or 5 percent of the wells scheduled in the tri-county area (38 wells in Somerset County, 8 wells in Wicomico County, and 38 wells in Worcester County). The Pocomoke aquifer is the principal source of water for Pocomoke City and Newark, and one of the major sources for Ocean City.

The thickness of the Pocomoke aquifer where it is confined is about 45 feet, with a range from 12 feet in Som-Dd 26 to 88 feet in Wor-Fb 11. The thickness is difficult to average areally, because many wells which penetrate to the aquifer do not go through it. In all, 147 scheduled wells provide control on the structure, and, in part, on the thickness and lithology of the Pocomoke aquifer (108 in Somerset County, 32 in Worcester County, and 7 in Wicomico County).

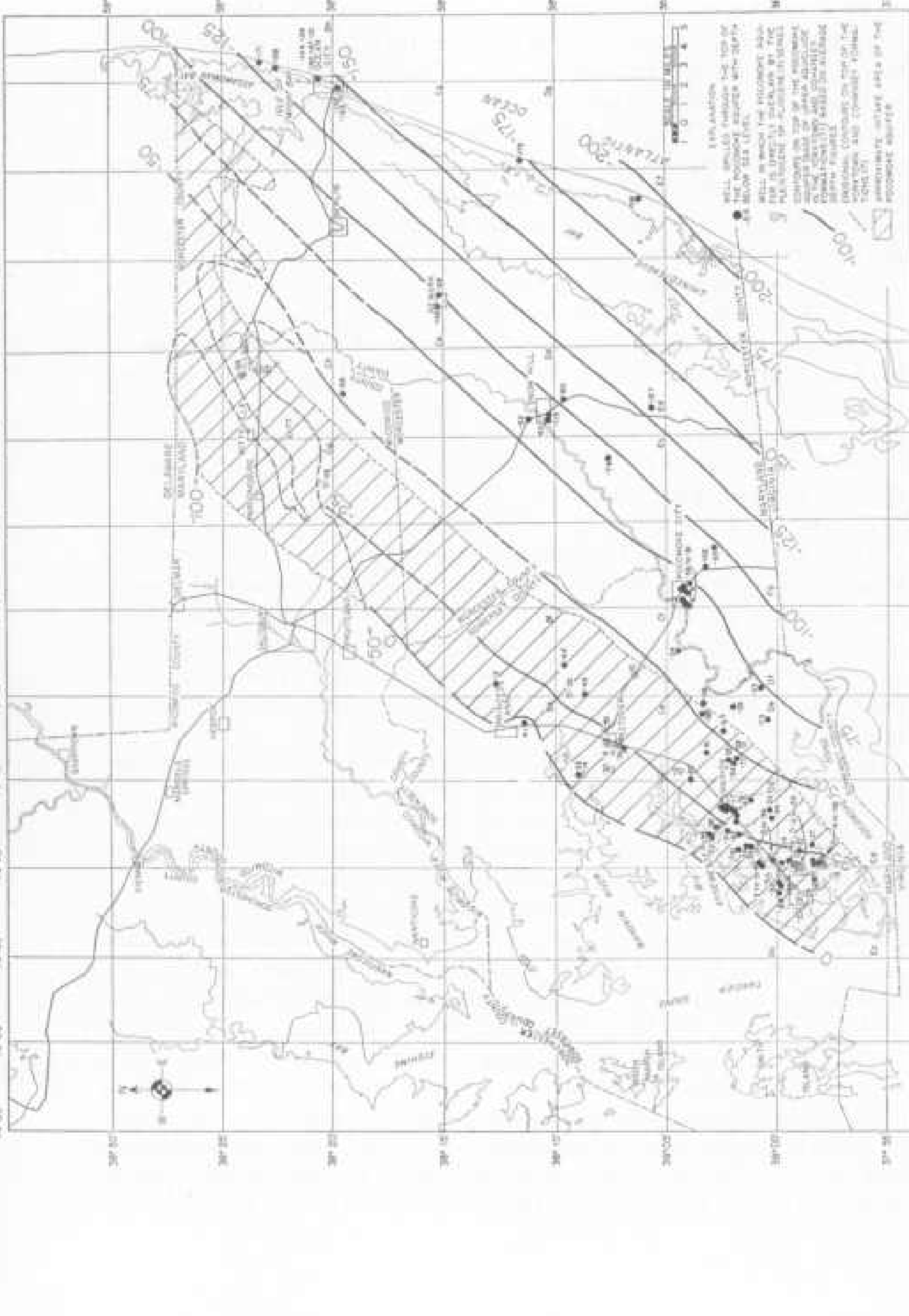

FIGURE 21. Map of Somerset, Wicomico, and Worcester Counties, showing Depth to the Top of the Pocomoke Aquifer and Buried Intake Belt

Fifteen water analyses show an average of 4.5 ppm of iron in water from the Pocomoke aquifer, making it the most "irony" aquifer in the tri-county area. The waters average low in bicarbonate (150 ppm), low in chloride (19 ppm), moderately hard (105 ppm), and relatively low in dissolved solids (187 ppm). The average pH is exactly 7.0, a neutral water. There is little or no evidence of salt-water contamination in this aquifer.

Upper aquiclude. Confining the Pocomoke aquifer in the southeastern half of the tri-county area is an overlying sheaf of lenticular silts, clays, and fine sands, designated the upper aquiclude. Drillers log most of the upper aquiclude as "blue clay," but samples indicate that it is predominantly greenish-gray silt with a few beds of medium- to fine-grained sand.

The aquiclude is overlain by the Pleistocene and Pliocene(?) buff sands and red, gravelly sands, which lie on an erosional unconformity, the surface of which is illustrated in figure 18. The upper aquiclude underlies all the area southeast of the intake belt of the Pocomoke aquifer, or almost all of Worcester County but only the southeastern corners of Somerset and Wicomico Counties.

The thickness of the upper aquiclude ranges from a foot or less along the edge of the intake belt of the Pocomoke aquifer to about 100 feet beneath Assateague Island.

Although the aquiclude is generally nonproductive, 5 wells are known to produce water from it in Worcester County. Well Wor-Ce 16 was reported to yield 15 gpm when pumped for a school at Newark, and 4 wells on Assateague Island, Wor-Dg 4 and 5, and Wor-Ef 1 and 3, were reported by the driller to yield 20 to 30 gpm. These 5 wells may draw from a single aquifer of small extent, but there is not enough control to define it.

Analyses of water from 4 of these wells are given in Table 37. They range within broad limits: iron, from 0.08 to 7.2 ppm; chloride, from 18 to 448 ppm; hardness, from 51 to 228 ppm; bicarbonate, from 290 to 440 ppm; dissolved solids, up to 491 ppm; and pH, from 6.5 to 8.1. The variation suggests that the sands may not be interconnected.

Pliocene Series

The aquifer of highest permeability, and locally, of highest transmissibility and yield, in Somerset, Wicomico, and Worcester Counties is a red gravelly sand which is correlated tentatively with the Pliocene series. This sand is found in relatively shallow wells, at the base of the tan and buff sands and silts of the Pleistocene series, and immediately above the gray sands and silts ("blue clay") of the Miocene series. The contact with the underlying Miocene is sharp, and easy to identify in well samples. The contact with the overlying Pleistocene series is unconformable, but is usually more difficult to recognize, and frequently overlooked in the driller's description. In many places it is so gradational in color and texture that the two series must be grouped together as the Pleistocene and Pliocene(?) series.

The red gravelly sand was deposited upon the eroded surface of the Miocene, probably as a fluviatile fill. Figure 18 shows the erosion surface on top of the Miocene, that is the pre-Pliocene(?) topography with, perhaps, some superimposed drainage channels of subsequent time. Figure 22, representing the topography in early Pleistocene time, indicates that the erosion surface on top of the red gravelly sand sloped to the northeast, in somewhat similar configuration to the erosion surface on the Miocene series.

The isopach map, figure 23, derived from the two erosion surface maps (figs. 18 and 22), shows that the red gravelly sand is widespread but thin in much of the area and absent in a few localities. It attains greatest thickness in north-central and eastern Wicomico County, where the maximum was recorded in samples from test hole Wi-Be 20, at Spring Hill, in which 69 feet of brown gravelly sand was logged to the bottom of the hole. The average thickness over the entire three-county area, however, probably does not exceed 10 feet. The geologic relations are shown in Plate 5.

The largest-capacity wells in the tri-county area, those of the City of Salisbury (Wi-Ce 1 to 13), are developed in the red gravelly sand. These wells, which are 43 to 65 feet deep and 12 to 24 inches in diameter, have recorded yields of 600 to 1,050 gpm. That these high yields can be sustained is partly due to recharge from the nearby park ponds, but the aquifer tests show a coefficient of transmissibility of about 100,000 gpd/ft. in the Salisbury area. Since the saturated thickness is about 60 feet, the field coefficient of permeability is about 1,600 gallons per day per square foot.

Water in the red gravelly sand occurs under water-table conditions beneath most of the area. The overlying Pleistocene sands function as a single aquifer with the red gravelly sand in yielding water to wells. Forty-four percent of the wells scheduled in Wicomico County derive water from the Pleistocene and Pliocene(?) series functioning together, and 1 percent derive water from the Pliocene(?) alone (39 percent derive water from the Pleistocene series alone and 16 percent go to formations deeper than the Pliocene). In Worcester County the record of the red gravelly sand is meager, owing to the fact that few wells are drilled to it. In this county, the overlying Pleistocene formations yield adequate quantities of water for most purposes (86 percent of the scheduled wells). The red gravelly sand was recognized in only 6 well logs (Wor-Af 5, -Bf 28, -Bh 23, 24, 25, and -Ce 16) in the northern part of the county, and in these it was found at the base of the buried valley troughs shown in figure 18. In Somerset County only 21 percent of the wells, mostly in the northeastern part of the county, derive water from the Pleistocene and Pliocene(?) series.

Beneath the Parsonsburg ridge, in central Wicomico County, and beneath Fenwick Island on the northeastern margin of Worcester County, the red gravelly sand may yield water under artesian conditions. The Parsonsburg ridge is underlain by the Walston silt of Pleistocene age which acts as a confining member for water in the Beaverdam sand, also Pleistocene in age, and

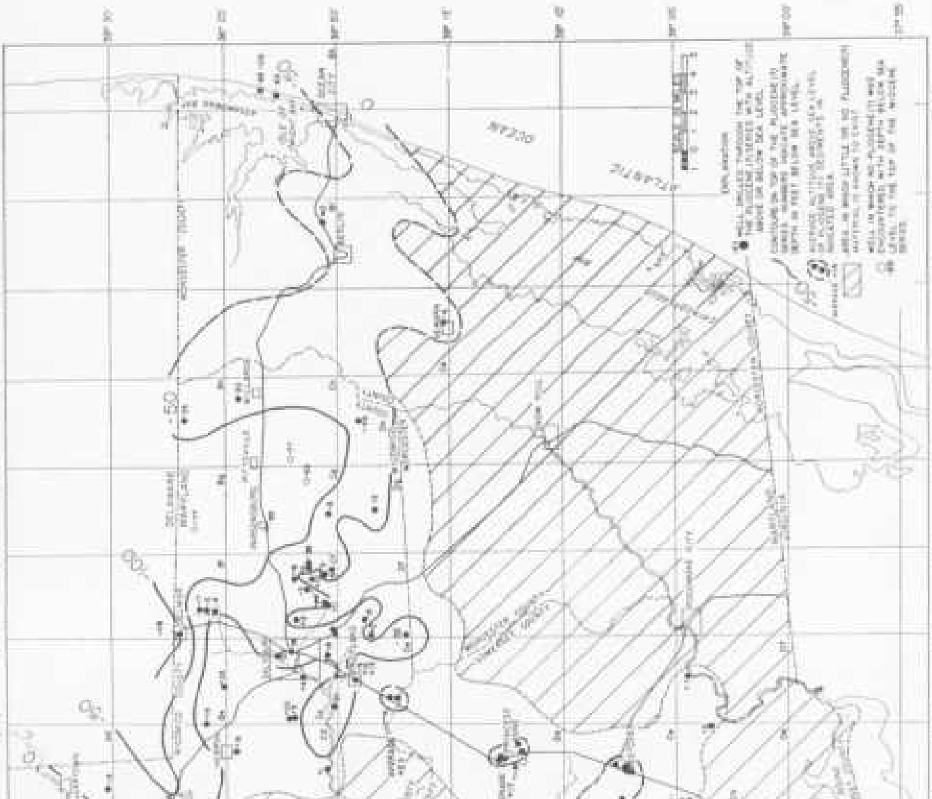

FIGURE 22. Map of Somerset, Wicomico, and Worcester Counties, showing Altitude to the Top of the Red Gravelly Sand of the Pliocene(?) Series (pre-Pleistocene Topography)

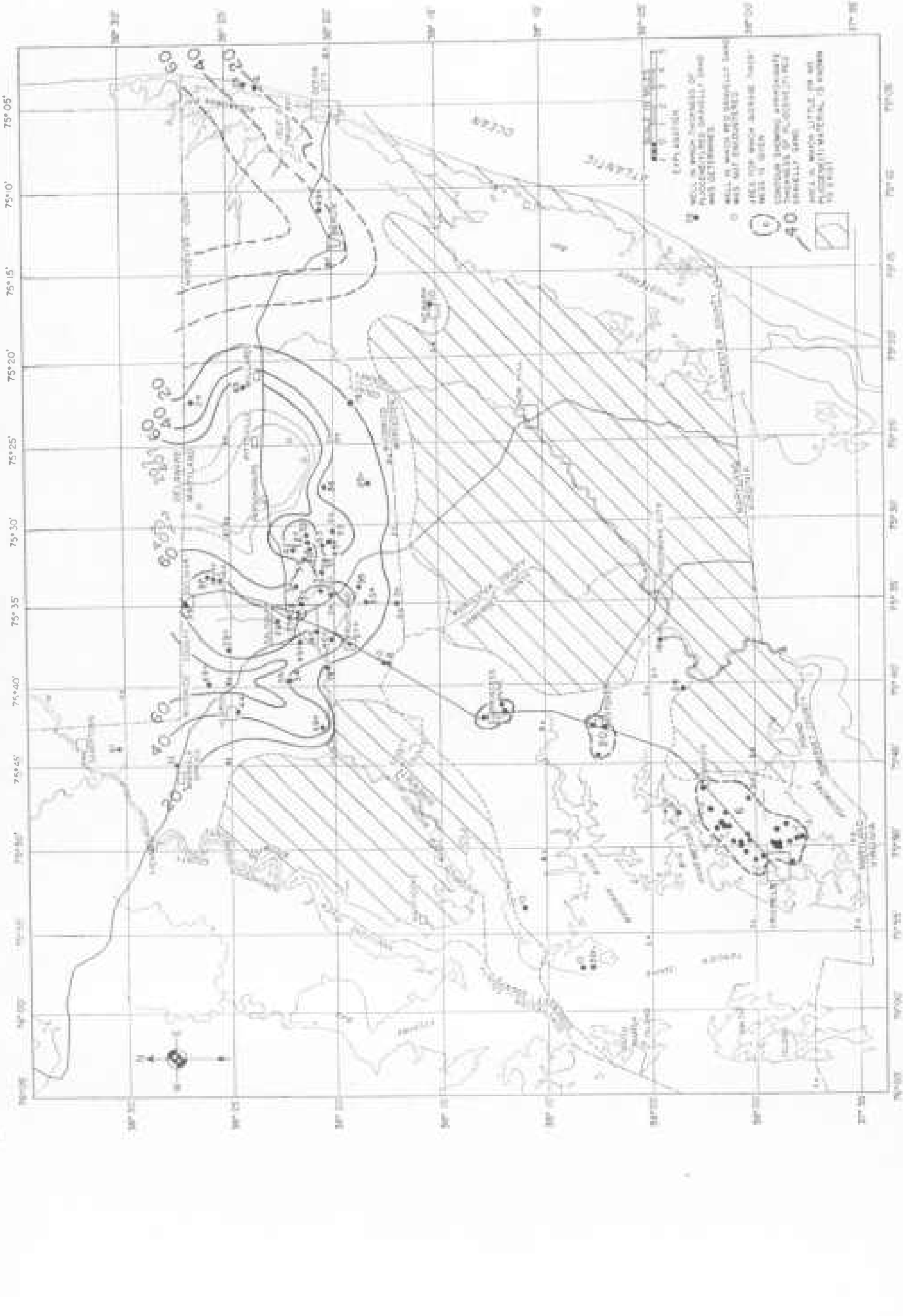

FIGURE 23. Map of Somerset, Wicomico, and Worcester Counties, showing Thickness of the Red Gravelly Sand of the Pliocene(?) Series

possibly in the underlying red gravelly sand. Over an area of about 12 square miles on this ridge, wells in the Beaverdam sand yield water under artesian pressure, although none of the wells flow. The red gravelly sand has not been definitely recognized in wells beneath this ridge, but it is probably present, at least in part, and would yield artesian water with the confined Pleistocene sand. In the Ocean City area, wells in the red gravelly sand derive water beneath confining beds of silt and blue clay under artesian pressure, and some of the wells flow at high tide.

Drillers of small-capacity wells frequently choose to set their screens in the red gravelly sand, even though it may be only 5 feet thick, because it is easier to develop a well in it than in the overlying Pleistocene deposits. This choice is probably governed by grain size: the sands of the Pleistocene series are predominantly medium- to fine-grained, whereas the red gravelly sand is medium- to coarse-grained.

The gravel of the red gravelly sand is generally small (in the pea- to walnut-size range) and disseminated. Though comprising usually less than 5 percent of the deposit, the gravel is so persistent, having been found in all the samples of the red sand, that the adjective "gravelly" is appropriate.

In color, the red gravelly sand is frequently described as brown or orange. The red coloration is due to the iron oxide, hematite, whereas the brown and orange colors are due to the hydrous iron oxide, limonite. The iron oxides seldom comprise more than 2 percent of the formation, yet their colors predominate over the colorless, drab, and white shades of the quartz pebbles and quartz sand. The iron oxides act as a loose binder or cement, holding the grains together. The red gravelly sand is best described as "slightly cemented", in contrast to the Pleistocene deposits which are unconsolidated. Well drillers report an occasional hard ledge in the formation. The sparse iron ore deposits of Wicomico and Worcester Counties may have been formed from bog iron derived from outcrops of the red gravelly sand.

Because the red gravelly sand is colored by iron oxides, it would be a natural supposition that the formation yields "irony" water. This is true only in part. Figure 38 shows that the average iron content of water from Pleistocene and Pliocene(?) aquifers is 2.5 ppm. Yet, the Salisbury city wells, which are developed in the red gravelly sand, show a range from 0.0 ppm (Wi-Ce 14) to 1.0 ppm (Wi-Ce 2) of iron. One well driller reports that he gets less "irony" water from the red gravelly sand than he does from the overlying light-colored sands.

The waters from the red gravelly sand have the lowest average pH of any formations in the area. The pH ranges from 5.6 to 7.2, and averages 6.3. These waters may be slightly corrosive. In all other major constituents—bicarbonate, chloride, hardness, and dissolved solids—the waters from the red gravelly sands average the lowest of any formation in this area (fig. 38).

A few of the well logs record a thin bed of tough clay at the top of, or within, the red gravelly sand. The samples of this material, obtained from a few wells and test holes, indicate that it is a purplish-gray silt.

QUATERNARY SYSTEM

The Quaternary system is composed almost entirely of unconsolidated deposits which form a relatively thin sedimentary mantle over most of the tri-county area.

The Pleistocene series was deposited during the epoch of widespread glaciation, but the sediments were not derived directly from the continental ice mass, which lay about 150 miles north of this area. They were outwash carried down to the sea by huge rivers of melt water and shifted by shore currents to the site of deposition. Four times the continental ice mass advanced, and four times the active front of the ice melted back. During the interglacial times the sea level rose, and terrace deposits accumulated through the work of the waves and the discharge of rivers. The Pleistocene sediments are chiefly fluviatile, estuarine, and lagoonal swamp deposits, and only in a small part marine shoreline deposits. The uppermost few feet of the detritus, particularly the gravelly sand with large boulders, is believed to have come from icebergs.

The deposits of the Recent series, which were laid down after the continental glacier withdrew from North America, are insignificant, and are frequently indistinguishable from the Pleistocene series. In this area they are confined to the soils, 1 to 3 feet thick; the accumulations of bog peat, 1 to 12 feet thick; and the coastal dunes, 5 to 25 feet thick, along the barrier islands.

Pleistocene Series

The Pleistocene series comprises the yellow, buff, and tan deposits of sand, silt, and clay below the soil zone to the top of the red gravelly sand of the Pliocene(?) series, or, where the latter is absent, to the top of the gray sand and blue clay of the Miocene series. The Pleistocene deposits are predominantly medium- to fine-grained sand, with prominent admixtures of coarse sand in some strata and silt in others, containing scattered pebbles. There are a few pits or "pockets" of sandy gravel, usually composed of small pebbles and grit, but with a few cobbles and, rarely, a few boulders. Lenses of silt are prominent in a few beds, with clay present as a minor admixture, providing sufficient binder in two localities, Salisbury and Powellville, to be used for common brick. No fossils have been positively identified with the Pleistocene deposits in Somerset, Wicomico, and Worcester Counties.

The Pleistocene deposits yield water to more wells in Somerset, Wicomico, and Worcester Counties than any other series of sands. Most of these wells are domestic dug and drive-point wells of small capacity. A total of 71.5 percent of the 1,668 wells scheduled derive water from the Pleistocene deposits alone or from the Pleistocene and Pliocene(?) deposits functioning together. These wells account for 38 percent of the total in Somerset County, 83 percent in Wicomico County, and 85 percent in Worcester County. The actual proportion may be over 95 percent, because the well canvass was directed toward obtaining only a representative sampling of the dug and driven wells, which are chiefly in Pleistocene sands, whereas an effort was made to obtain records of all the jetted and drilled wells, which are usually developed in deeper formations.

Twenty-six wells of large yield (over 5,000 gpd) have been developed in the Pleistocene formations in Worcester County, and 35 wells of large yield have been developed in the combined Pleistocene and Pliocene (?) formations in Somerset and Wicomico Counties. Cities and towns with wells of large yield in the Pleistocene and Pliocene (?) formations are Princess Anne (Som-Be 2, 49), Sharptown (Wi-Ad 2, 10, and 11), Hebron (Wi-Bd 2), Salisbury (Wi-Ce 6, 99, 100, -Cf 64, 65, 66), and Berlin (Wor-Cf 1, 2, and 3). Four irrigation wells derive large yields from these formations (Wi-Ce 25, 26, 69, and Wi-Dd 15). Three canning companies at Snow Hill (Wor-Dd 16, 17, 23), ice companies at Berlin, Ocean City and Salisbury (Wor-Cf 23, 24, 25, 26; Wor-Cg 7 and 20; Wi-Ce 29, 30, 31), poultry hatcheries, packing companies, feed and by-product companies (Wor-Af 4, -Bf 1, 2, 3, 11; Wi-Ce 32, 102, 103, -Dg 11, 12), frozen food companies (Wi-Ce 61, 68, 98, -De 3, 4) and dairies (Wi-Cf 62, 63) have large yielding wells in these formations. Three springs in Somerset County (Som-Bd 31, Ce 20, 40) yield flows of a few gallons a minute from the Pleistocene formations.

The yield of these wells is large in the sense of total pumpage, either at high rates, or at comparatively low rates for long periods. The actual reported and measured rates of pumping of wells of medium and large yield are given in Table 15 for the Pleistocene formations in Worcester County, and in Table 16 for the combined Pleistocene and Pliocene (?) formations in Somerset and Wicomico Counties. The rates range from 10 gpm to over 1,000 gpm, a variation which is dependent upon the design of the well (diameter, screen, etc.), the pumping equipment, and upon the formations themselves.

A better mode of comparing the capacities of wells is the specific capacity, or yield in gallons per minute per foot of drawdown, which is a function of the permeability of the formation and the well development. The specific capacities, also given in Table 15 and 16, show a range from 0.9 to 18.5 and average 5.8 gpm/ft. for wells in the Pleistocene formations alone, and a range from 2.5 to 20.0 and average 13.0 gpm/ft. for wells in both the Pleistocene and Pliocene (?) series.

The Pleistocene deposits yield water under water-table conditions throughout almost the entire area. Only in two areas, the Parsonsburg ridge in Wicomico County and the coastal margin near Ocean City in Worcester County, is water obtained from lower sands of the Pleistocene series beneath confining members of silt and clay.

TABLE 15

Pumping Rates and Specific Capacities of Wells in the Pleistocene Formations in Worcester County

Well	Depth (feet)	Diameter (inches)	Rate (gpm)	Specific capacity (gpm/ft)	Length of test (hrs.)
Wor-Bf 2	110	8	200	4.7	2
3	105	6	180	9.0	10
8	105	4		5.7	4
10	110	4	20	1.6	10
28	117	6	140	5.2	12
Bg 14	102	6	60	6.0	
Bh 10	98	3	30	2.5	1
14	104	3	30	2.3	2
19	80	3	40	1.9	6
20	82	3	20	0.9	8
Cf 1	101	18	500	11.6	1.2
2	105	10	700	18.9	
3	107	12	692 to 1,015	12.5 to 18.5	
21	98	6	336		
Cg 9	70	4	105	7.0	6
20	81	3	75	3.0	8
Dc 16	115	2	14	1.8	7
Dd 23	80	6	50	10	2
Ed 7	100	4	10	1.3	2
10	112	2	10	2.0	12
Average	99	6	178	5.8	6

Although the Pleistocene series forms a single continuous aquifer, the recharge and discharge of ground water occurs in separate drainage basins. The behavior of the ground-water in a typical basin, the Beaverdam Creek basin, is described in detail on pages 123 to 128. Every creek or channel which discharges into a tidal stream is the drain of a separate basin. There are thus 278 separate drainage basins in Wicomico, Somerset, and Worcester Counties bounded by the topographic divides between them. In the ground-water reservoir beneath each surface-water drainage area, there is the lateral percolation of water from high points of the water table near the divides to final discharge in the creek or marginal marsh. The ground-water divides are assumed to coincide with the topographic divides, unless well logs indicate that impermeable barriers to flow exist. Under the present regimen of ground-water infiltration, runoff, and evapotranspiration, each basin functions as a semi-independent hydrologic unit.

The average area of each of these surface and water-table basins is 4.3 square miles. Where the basins overlie permeable deposits of the Miocene, there is probably some leakage out of the basin into the Miocene artesian reservoirs,

TABLE 16

Pumping Rates and Specific Capacities of Wells in the Pleistocene and Pliocene(?) Formations in Somerset and Wicomico Counties

Well	Depth (feet)	Diameter (inches)	Rate (gpm)	Specific capacity (gpm/ft)	Length of test (hrs.)
Som-Be 2	83	6		8	
Ee 1	92	1½	18	18	1.5
Wi- Ce 28	85	6	150		
29	81	6	161		
30	82	3	90		
31	94	8	500		
61	81	8	300	7.3	
68	66	2	15		
69	80	6	90	15.0	
83	63	6	400		
92	105	1½	16		
99	52	17	420	17.5	
100	70	17	415	8.3	
103	68	8	165		
108	68	8	168		
Cf 3	109	16	519	17.3	
4	90	6	150		
64	61	17	680	20.0	
65	56	17	446	15.9	
66	70	17	810	18.8	
70	96	8	400		
Dd 15	55	6	50	12.5	2
De 7	62	4		6.9	
31	62	10	200	7.7	24
43	72	2	15	2.5	8
Dg 11	82	8	100	20.0	8
Average	76	8	241	13.0	9

which may discharge farther down dip from beneath an overlying confining bed of Miocene silt or clay.

The thickness of the Pleistocene series is shown in figure 24. The contours represent only average thickness, because the base of the Pleistocene is a dissected erosion surface with a total relief of 150 feet, and the upper surface, the present topography, is a slightly dissected plain, with a total relief of 85 feet. In small areas of close control, such as the Crisfield, Princess Anne, Pocomoke City, Snow Hill, Berlin, Ocean City, and Salisbury areas, nearby wells may show a range of 50 feet in the thickness of the Pleistocene. The greatest thickness was logged in Wi-Cg 44, in which 159 feet of Pleistocene series is indicated. The average thickness throughout the area is estimated at 50 feet.

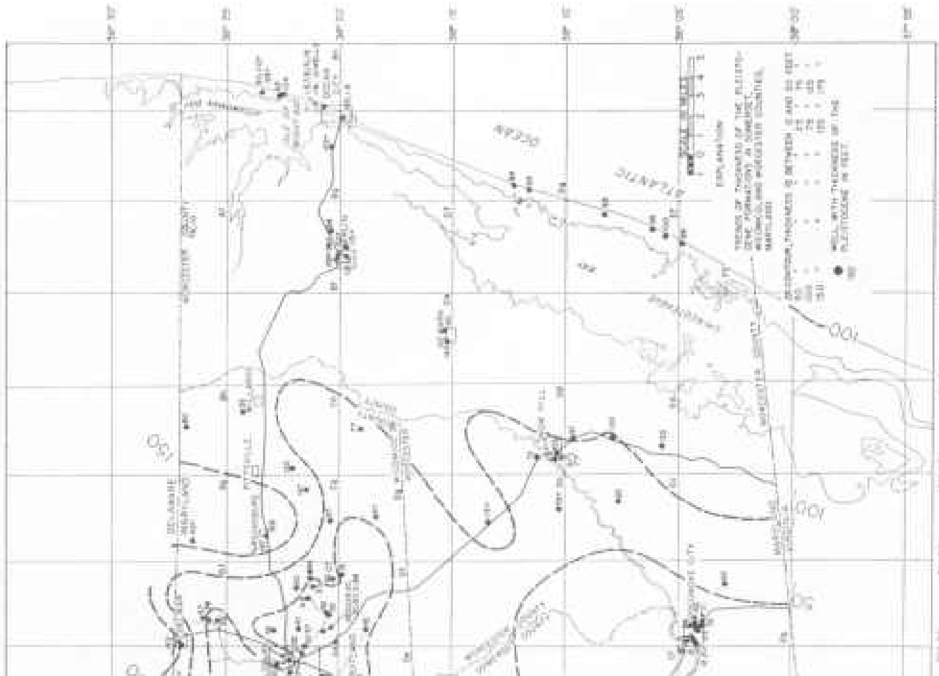

FIGURE 24. Map of Somerset, Wicomico, and Worcester Counties, showing Trends of Thickness of the Pleistocene Formations

The structure of the Pleistocene series is not definitely known because of the channel-fill type of deposition. The general slope, or dip, of the Pleistocene deposits appears to be to the northeast and east, in agreement with the rate of thickening in those directions. The underground channel-filling structure of the Pleistocene deposits may have ultimate control of the movement and discharge of ground water to wells, when pumping rates have increased to the point where natural ground-water overflow has been largely eliminated and most of the ground water is diverted to discharging wells. These Pleistocene and Pliocene(?) channel deposits are major reservoirs for both present and future shallow ground-water development.

The subdivision of the Pleistocene series is described in Table 17, and its relation to the underlying Pliocene(?) red gravelly sand is illustrated schematically in Plate 5.

Beaverdam sand. Test drilling and test augering in Somerset, Wicomico, and Worcester Counties revealed a sand sufficiently distinctive in lithology and established in stratigraphic position to be correlated from well to well. This sand is here named the *Beaverdam sand.*

The Beaverdam sand is composed of unconsolidated, white to buff, medium-grained, quartz sand, with small quantities of coarse and fine sand, pebbles and granules, and a minor admixture of white silt. It is named for Beaverdam Creek, the east branch of the Wicomico River, because of its prominent occurrence in and beneath the drainage basin of that stream.

The Beaverdam sand crops out in the banks and road cuts surrounding Schumaker Pond, but exposures are poor because the material is incoherent. Therefore, the reference locality is chosen as a test hole, Wi-Cf 63, 2 miles east of Salisbury (see log). The unit is logged from 10 feet below land surface to a depth of 82 feet, spanning a range in altitude from +28 to −44 feet, sea level datum. The Beaverdam sand has filled channels in the underlying red gravelly sand of Pliocene(?) age. It is overlain by 10 feet of the Walston silt in this well. Bore holes in the area indicate that the Walston silt lies unconformably on the Beaverdam sand, in broad filled valleys.

Samples from test holes in Wicomico County indicate that the Beaverdam sand is fairly homogeneous in composition, texture, and color. A sieve analysis of a sample from 61 to 72 feet below land surface in Wi-Cf 63, which appeared representative of the entire formation there, gave the following classification:

Granules and small pebbles	20 percent
Very coarse sand	5
Coarse sand	10
Medium sand	26
Fine sand	24
Very fine sand	7
Silt	8
	100 percent

TABLE 17

Geologic Formations of the Pleistocene Series in Somerset, Wicomico and Worcester Counties

Series	Stage*	Formation	Approximate thickness (feet)	General character	Water-bearing properties
Recent			0–25±	Peat, loam, and alluvium, with buried cypress logs. Coastal dunes.	Provides water to plants.
Pleistocene	Wisconsin glacial	Parsonsburg sand, an aquifer	0–33±	A stratified drift composed predominantly of sand; in places gravel is prominent, with a few erratic cobbles and boulders; in other places thin layers of silt and clay are interstratified with sand. The drift is formed in bar-like ridges and dunes, which are the rims, and in part the veneer floor, of "Maryland bays and basins." The top ranges in altitude from below sea level to 85 feet above sea level.	A shallow aquifer which yields small quantities of water to driven domestic wells. The high infiltration capacity permits the rapid transmission of recharge to underlying aquifers. The lowland deposits are outlets of ground-water discharge as swamps of high evapotranspiration loss.
	Sangamon interglacial	Talbot and Pamlico formations (aquiclude and aquifer).	0–80±	Terrace deposits of irregularly bedded sand, gravel, silt, and clay. Confined to a landward margin 1 to 3 miles wide along the ocean, bay, sound, and estuary shores.	Adequate supplies for domestic purposes to dug and driven wells. Water-table conditions prevail in landward portion. Artesian conditions occur beneath marsh clays on the barrier island; there the formations probably function chiefly as a confining bed to underlying Pleistocene sands.

Illinoian glacial	None	0	Beginning of present valley erosion.	
Yarmouth interglacial	Walston silt, an aquiclude, probably pre-Wicomico, Penholoway formation of Maryland and Virginia.	0–57	Lenticular beds of fine sand, silt, clay, and peat. General altitude about 40 feet above sea level. Range in altitude from 10 to 67 feet above above sea level. Presumably a remnant of a low marshy plain which extended from the western shore of Maryland to Worcester County.	Yields small quantities of water to a few domestic dug and drive point wells. Has yielded marsh gas (methane) which was used to illuminate homes in the Parsonsburg area. Acts as a confining member, creating local artesian conditions in the underlying Beaverdam sand beneath the Parsonsburg divide.
Kansan glacial	None		Scouring of the Beaverdam sand.	Unconformity permits interconnection of Pleistocene units in flow of ground water.
Aftonian interglacial	Beaverdam sand, an aquifer	0–67	Unconsolidated white to buff, medium-grained sand, with small quantities of coarse to fine sand, occasional pebbles and granules, and a lesser admixture of white silt. Altitude ranges from 48 feet below sea level to 36 feet above.	Yields moderate to large quantities of ground water to properly developed wells, frequently in conjuction with the underlying red gravelly sand. Yields small but adequate quantities of water to many driven wells. Water-table conditions prevail except beneath the thick cover of Walston silt along the Parsonsburg divide ridge.
Nebraskan glacial	None		Trenching of the red gravelly sand.	Unconformity permits intimate crossflow of ground water between Pleistocene and Pliocene(?) formations

* The age designations of the Pleistocene units included in this table are those of various authors and do not necessarily follow the usage of the U. S. Geological Survey.

The top of the Beaverdam sand ranges in altitude from 48 feet below sea level to 36 feet above. In Worcester County it appears to extend more than 100 feet below sea level. The maximum logged thickness is 72 feet, but it probably exceeds 90 feet in thickness, particularly in northeastern Worcester County.

The Beaverdam sand is an extensive aquifer, receiving and discharging water under water-table conditions in most of the area. Artesian conditions are found only in an area of a few square miles beneath the Parsonsburg ridge, where the Beaverdam sand is confined by beds of the Walston silt, and along a narrow coastal margin near Ocean City where the Beaverdam sand is confined by the Pamlico formation. Most of the large-capacity wells derive their water from the Beaverdam sand in conjunction with the underlying red gravelly sand.

Structurally, the Beaverdam sand appears to dip east at rates of 1 to 3 feet to the mile, probably along the initial sedimentary slope.

The Beaverdam sand is in some places overlain by the Walston silt, in others by the Pamlico formation, the Parsonsburg sand, or Recent deposits. It is distinguishable from the Walston silt chiefly on the basis of texture: the Beaverdam sand has very little silt or clay, and little fine sand. The fine sands of the Walston silt are also white and buff in color, but the silts and clays are buff and dark gray. Much of the Walston silt is tough, whereas the Beaverdam sand is incoherent and drills freely.

The Beaverdam sand is almost indistinguishable from the sandy phases of the Pamlico formation, but the Pamlico contains much light-gray silt, and is usually darker brown or gray in color. The Beaverdam sand in places is indistinguishable from the Parsonsburg sand, but the Parsonsburg usually has more gravel and boulders, and is brown in color. The Beaverdam sand is distinguished from the Recent material by the lack of organic matter.

Walston silt. The Walston silt, here named from Walston Branch, is a lenticular unit of sand, silty sand, sandy silt, silt, clayey silt, silty clay, and clay, with organic material, overlying unconformably the Beaverdam sand, and, underlying, unconformably, the Parsonsburg sand.

The formation crops out in the banks of Walston Branch, a tributary to Beaverdam Creek, the east branch of the Wicomico River. The exposures are poor, because the slopes are rapidly rounded by weathering, and nowhere is a complete section exposed.

The reference locality is chosen as a test hole, Wi-Cg 40, 2 miles north of Parsonsburg, from which closely spaced samples are available. In this well the Walston silt is logged as 57 feet thick, between 10 and 67 feet above sea level. It is overlain by 12 feet of the Parsonsburg sand and underlain by the Beaverdam sand. Another test hole which gives a detailed section of the sand is Wi-Cg 38 at Parsonsburg, in which 43 feet are logged. In the environs of Walston Branch, the silt ranges in thickness from 4 to 30 feet, as determined from boreholes. It occurs at a general elevation of 40 feet above sea level.

The Walston silt contains layers of dark organic clay and peat, in the area of the Parsonsburg divide. Clark, Mathews, and Berry (1918 p. 320) report that wells drilled to depths of between 30 and 40 feet (and therefore into the Walston silt) in the Parsonsburg-Pittsville area encountered marsh gas (methane) which was used to illuminate homes.

The Walston silt functions primarily as an aquiclude, although small quantities of water have been developed from domestic wells driven to sand layers in it.

Talbot and Pamlico formations. A terrace scarp, 10 to 20 feet in relief, and with a base at about 42 feet elevation, was cut by the waves of the sea along the east edge of Wicomico County (facing the present Pocomoke River valley), and in the Nassawango and Pocomoke forest area of western Worcester County. The waves of the primeval Chesapeake Bay cut a scarp in the northeastern corner of Somerset County and in central Wicomico County. This scarp represents a shoreline which is marked by other lineal features: low bars, dunes, back-bay swales, and organic soils. These terrace deposits were named the Talbot formation by Shattuck (1901, p. 73–75).

The Talbot formation is developed as a broad margin of material 7 to 14 miles wide, extending inland from the Nanticoke estuary in Wicomico County, the necks of Somerset County, and the barrier islands of Worcester County. The deposits have not been adequately differentiated from the Beaverdam sand, and it is probable that the Talbot deposits are sandy.

Eventually, the sea level receded 17 feet to a general altitude of 25 feet above the present level. The terrace formed at this level has been named the Pamlico terrace, and the associated deposits have been called the Pamlico formation (Stephenson, 1912). Breitenbach and Carter (1952) traced the 25-foot terrace in Maryland and indicated 10 sites in Worcester County where it is developed.

The broad divide in Worcester County that extends from Stockton through Berlin to Selbyville, Delaware, which was a submerged bar in the Talbot sea, probably emerged as a barrier island in the Pamlico sea. The Pocomoke valley was a back bay, comparable to Chincoteague and Sinepuxent Bays today.

The Pamlico formation is developed as a considerably narrower margin of material, 5 to 10 miles wide, extending inland from the Nanticoke estuary in Wicomico County, the necks of Somerset County, and the barrier islands of Worcester County. An effort has been made to identify the deposits of the Pamlico formation in those wells for which detailed and reliable samples are available (logs of Wi-Db 24, -Dc 19). The Pamlico formation is a gray, sandy, clayey silt, with lenses of fine to medium-grained sand and some gravel, occurring above the Beaverdam sand in several places, above the Pliocene(?) red, gravelly sand in other places, and overlying the gray sands and blue clays of the Miocene epoch in still other places. The stratigraphic relations are illustrated in Plate 5. It is probable that the silts of the Pamlico have been mistakenly assigned to the Miocene series in some areas, particularly in western Somerset County.

The Pamlico formation provides small quantities of fresh water to dug and drive-point wells where the altitude is above the salt marsh. Much of the Pamlico formation underlies salt marsh in Wicomico County along the tidal rivers and in Somerset County in the necks. Here it has been invaded by brackish waters.

Along the Atlantic shore, the Pamlico formation functions as an aquiclude, confining waters of the Beaverdam sand and the red gravelly sand. The formation there contains shells, probably reworked material, since Choptank and Calvert forms have been identified (Table 12 of paleontology, Wor-Dg 1).

Parsonsburg sand. The Parsonsburg sand is the name given here to the veneer of sand and associated deposits which compose the rims and, in places, the interior of the "Maryland basins." The formation is named for Parsonsburg, a village 6 miles east of Salisbury, on the highest divide ridge (altitude 85 feet) in Somerset, Wicomico, and Worcester Counties. The reference locality is test hole Wi-Bg 11, at Melson, at the north end of the Parsonsburg ridge. In this well, the Parsonsburg sand is 25 feet thick and overlies the Walston silt.

The Parsonsburg sand, in different places, rests unconformably on each of the earlier Pleistocene deposits. It is overlain only by soils, alluvium, and peat of the Recent series.

The Parsonsburg sand is composed predominantly of medium-grained sand, but it is poorly sorted, the materials ranging from the size of small boulders (rare), through cobbles, gravel, very coarse to very fine sand, silt, and clay. In color it is buff, tan, orange, or brown. It is distinguishable from the Walston silt by its sandy texture and from the Beaverdam sand by its darker color. It is distinguishable from the Pamlico formation by its brown shades in contrast to the gray of the Pamlico, and by its sand texture in contrast to the silt and clay of the Pamlico. It resembles the brown or orange phases of the red gravelly sand, but in general it is not as gravelly. Since the Pliocene(?) series is usually buried beneath other Pleistocene deposits the two seldom are found in contact. It is easily distinguishable from the gray sands and blue clays of the Miocene series.

The Parsonsburg sand has been logged in about 25 wells in this area, for which careful sampling has been done. The sand is believed present throughout most of the tri-county area, but it is generally not differentiable in drillers' logs. There are many fensters, or "windows," in the surface of the Parsonsburg sand, in the central area of the larger "Maryland basins," through which the older formations, or their weathered soils, may be found. The Parsonsburg sand, therefore, is logged as absent in some wells from which detailed samples are available.

The Parsonsburg sand is a veneer deposit, strewn upon the older deposits at all ranges in altitude, from below sea level to the top of the Parsonsburg divide. The maximum logged thickness is 26 feet (Wi-Cd 34), but the average in 23 wells is 12 feet. The thickest sections are on the rims of the "Maryland basins."

Recent series

The Recent series of sediments in Somerset, Wicomico, and Worcester Counties consists of thin deposits of very limited water-bearing capacity. The sediments comprise the soil, the coastal dunes, marsh muck, swamp and bog peat, alluvium, and man-made fill.

The soils have been derived from the weathering of the parent rocks, which are the Pleistocene series of sands and silts. These sands and silts are composed predominantly of quartz, one of the end products of weathering. The soils contain a small percentage of clay, which is also an end product of weathering. They have some organic matter, or humus, derived from the remains of plants. In addition the soils have gained wind-blown dust, most of which probably came from the continental interior and may consist of fragments of granite, limestone, and other rocks which decompose to provide needed mineral plant foods.

The soils of Somerset County are sandy loams, silty loams, and clay loams. The soils of Wicomico and Worcester Counties are sands and sandy loams, with less silt loam. These soils are low in lime, low in phosphate, low in potash, and may be low in nitrogen. Some of them are irony. In the coastal marsh areas the soils are brackish and gummy.

The consequence of the geological development of soil in this area is that it is relatively infertile and inclined to be waterlogged in places. The soil has, in general a high infiltration rate. When it is drained and well fertilized, it will yield good crops.

The coastal dunes are Recent deposits of the wind which face the ocean along Fenwick and Assateague Islands, in Worcester County. They attain a thickness, and height, of 25 feet, and within each is a small lens of fresh ground water above salt water which intrudes the beach sands. Shallow drive-point wells, 15 to 25 feet deep, yield fresh water for summer homes from the coastal dunes. The water is subject to pollution if the wells are too close to cesspools, septic tanks, or other waste-disposal works.

There are a few bay shore dunes in Wicomico County, in the vicinity of Nanticoke and along the tidal streams. These provide water to a few shallow wells. There are also a few bay shore dunes in Somerset County.

The Recent series contains an unusual resource in the swamp and peat bogs. They contain well-preserved whole cypress logs buried in a few feet of mud and organic litter. The "Maryland basins" in the swampy area have been "mined" for these old logs, which are a valuable wood.

Alluvium is a Recent deposit confined to the stream channels, frequently indistinguishable from the parent material. The flowing sands quickly heal gully scars, and slope wash obliterates the furrowing of fields. Destructive erosion of fields is practically unknown, since the land is flat and absorbs water rapidly.

Man-made fill is increasing in importance as a geological deposit, although in this area it is still insignificant. Huge spoil piles, ditch channels, hydraulic fills, and road grades, indicate that man is an active constructive and destructive geologic agent. Because earth-moving equipment disturbs the natural sorting and packing of water-lain and wind-blown materials, man-made fill is usually less porous and less permeable than the original undisturbed sediment.

QUANTITY OF GROUND WATER

The quantity of ground water in the sedimentary deposits of Somerset, Wicomico, and Worcester Counties is estimated at 600,000 billion gallons, based on the volume of the sedimentary prism of 265,000 billion cubic feet (surface area 44.1 billion sq. ft. x 6,000 ft. average thickness) and an estimated average porosity of 30 percent. Much of it could never be recovered because many of the formations are silts and clays with high specific retention. If the specific yield averaged 5 percent, the quantity which could be recovered would be about one-sixth of the total. To take this water from storage would require tremendous wells capable of dewatering the formations by gravity drainage down to depths of more than 8,000 feet. Even if these wells were possible, much of the water is so highly mineralized that it is suitable only for limited use such as for cooling or, if from the deeper aquifers, for heating.

Of greater importance than the quantity of water stored in the sediments is the quantity of ground-water recharge by infiltration from rainfall and from bodies of surface water. Water in storage may be large and recharge may be so high that aquifers are overflowing (rejected recharge), yet if the transmissibility is low the water may move so slowly to wells that their yields are not large.

WELL INVENTORY

The records of 1,668 wells are compiled in Tables 38, 39, and 40—456 in Somerset County, 726 in Wicomico County, and 486 in Worcester County. This is estimated to be roughly 10 percent of the total number of wells in the area. Almost all the wells of large and moderate capacity and most of the drilled and jetted wells are included in the tables. The bulk of the wells in the area for which records are not given are small capacity driven and dug wells. The location of the wells in the tables are shown on Plates 6, 7, and 8.

Table 18 lists the wells by type. The tabulation shows that jetted wells are most common in Somerset County, that in the area as a whole jetting is preferred over drilling (hydraulic or cable tool), that driven wells are more common than dug wells, and that there are few springs.

The age distribution of existing wells by type is summarized in Table 19. The table indicates increase in the proportion of jetted and drilled wells in the last 14 years. The gradual decline in the proportion of dug wells in favor of driven wells is also manifest. The low number of dug wells recorded for the early periods is probably due to the abandonment and filling of the old wells.

The average depth of wells is given in Table 20. Wells in Somerset County average about twice as deep as wells in Worcester and Wicomico Counties, and the depth of wells in Worcester County averages somewhat greater than in Wicomico County. Drilled wells are deepest; jetted wells are fairly deep; augered and driven wells are shallow, and dug wells are shallowest.

TABLE 18

Types of Wells in Somerset, Wicomico, and Worcester Counties
(for which records are given in this report)

County	Jetted	Dug	Driven	Drilled	Augered*	Spring	Unknown	Total
Somerset	279	29	125	13	3	3	4	456
Wicomico	125	40	446	67	26	1	21	726
Worcester	97	38	313	34	4	0	0	486
Total	501	107	884	114	33	4	25	1,668

* Almost all are test holes.

TABLE 19

Age Distribution of Wells by Type in Somerset, Wicomico and Worcester Counties

Period	Jetted	Dug	Driven	Drilled	Augered	Spring	Unknown	Total	Percent of known
Unknown	9	42	228	8	1	0	7	295	—
Before 1900	1	16	7	6	0	4	4	38	3
1901–1910	3	5	7	3	0	0	11	29	2
1911–1920	13	11	27	7	0	0	0	58	4
1921–1930	5	12	36	19	1	0	0	73	5
1931–1940	33	8	93	9	0	0	2	145	11
1941–1950	322	9	424	51	0	0	1	807	59
1951–1953	115	4	62	11	31	0	0	223	16
Total	501	107	884	114	33	4	25	1,668	100

The average diameter of 107 dug wells is 25.5 inches, with 24 inches most common and the range from 13 to 48 inches. Among the 884 driven wells, the $1\frac{1}{4}$- and the $1\frac{1}{2}$-inch diameter are most common and about equal in number. There are a few 1-inch, $1\frac{3}{4}$-inch and 2-inch diameter driven wells. In jetted wells, the 2-inch and $1\frac{1}{2}$-inch diameter pipes are most common. For larger capacity jetted wells, 3-, 4-, 6- and 8-inch casings are employed, and rarely, 10- and 16-inch: $1\frac{1}{4}$-, $1\frac{3}{4}$- and $3\frac{1}{2}$-inch sizes are also occasionally used. In drilled wells the 6- and 8-inch casing diameters are common and about equally popular. Very large capacity wells are 24- to 12-inch or 16- to 10-inch double-cased wells,

TABLE 20

Average Depth of Wells by Type in Somerset, Wicomico and Worcester Counties (in feet)

County	Jetted	Dug	Driven	Drilled[a]	Augered	Weighted Average
Somerset	162	20	25	760	74	131
Wicomico	102	22	30	100	36	49
Worcester	145	13	40	198	68	69
Weighted Average	144	19	33	210	43	78

[a] Deep oil tests omitted.

TABLE 21

Classification of Wells and Test Holes by Geologic Series or Formation Yielding the Water

Series or Formation	Somerset	Wicomico	Worcester	Total	Percent
Pleistocene	82	292	413	787	47
Pleistocene and Pliocene(?)	94	286	1	381	23
Pliocene(?)	0	32	0	32	2
Miocene	257	114	67	438	26
Yorktown and Cohansey formations(?)	(246)	(100)	(67)		
Upper aquiclude	0	0	(5)		
Pocomoke aquifer	(47)	(8)	(38)		
Lower aquiclude	(34)	(18)	(2)		
Manokin aquifer	(165)	(74)	(22)		
St. Marys formation	(1)	(1)	0		
Choptank formation	(8)	(4)	0		
Calvert formation (Nanticoke aquifer)	(2)	(9)	0		
Eocene	5	0	1	6	+
Piney Point formation	(5)		(1)		
Paleocene	6	0	0	6	+
Upper Cretaceous	12	0	1	13	1
Magothy formation	(11)	0	0		
Raritan formation	(1)	0	0		
Lower Cretaceous					
Patuxent formation	0	0	1	1	+
Basement	0	1	1	2	+
Duplication (well in 3 fms.)	−2			−2	
Unknown	2	1	1	4	+
	456	726	486	1,668	99+

and moderate to small capacity drilled wells are 4-inch, 3-inch, 2½-inch, 2-inch, 1½-inch, or 1¼-inches in diameter.

The wells are classified according to geologic formation in Table 21. Almost three-fourths of the wells produce from the Pleistocene and Pliocene(?) formations, and about one-fourth produce from the Miocene series. All other aquifers supply less than 2 percent of the total.

Electric pumps of the reciprocating type are most common throughout the area, although many hand pumps of the cylinder type are still in use. A few impeller pumps, either centrifugal or turbine, are used on large-capacity wells. Windmills are practically unknown, and gasoline- and steam-powered pumps are rare. Jet pumps are coming into use, mainly for domestic supplies.

GROUND-WATER RECHARGE

The ultimate "safe" yield of water from wells depends, among other things, upon the rate of recharge of water to the ground-water reservoir, which, in turn, depends upon the quantity of water available for recharge, upon the infiltration rate, and upon the rate of transmittal of water through the vadose zone to the water table. Rainfall disappears rapidly in Somerset, Wicomico, and Worcester Counties. The land surface has only slight relief, runoff is not excessive, and there are not many branching drainageways to take the water away. The flow of the streams is sustained long after rain has ceased. Trees and deep-rooted plants continue in abundant growth even during prolonged dry spells, indicating a source of available water. The soil is a sandy loam which retains some moisture even after forest litter has become dry as tinder. All these signs point to large ground-water recharge.

Beaverdam Creek Basin

To determine the rate of ground-water recharge, all measurable factors of the equation of the water cycle are measured, and the unmeasured factors are calculated statistically. Beaverdam Creek basin, above the dam at Schumaker Pond, was selected for such a study. This drainage basin (fig. 25) has an area of 19.5 square miles. It is believed to be typical of much of the tri-county area.

The instrumentation for the hydrologic study of the Beaverdam Creek basin consisted of 12 rain gages scattered throughout the basin; 25 drive observation wells within the basin and 8 just outside it; one stream-gaging station at Schumaker dam; staff gages on Schumaker pond, Parker pond, and at 4 channel points; and soil-moisture stations, each with soil-resistivity blocks buried at depths of 4, 12, and 39 inches, and soil-temperature elements at 12 inches. The elevations of wells were determined by third order leveling, and a topographic map of the area was prepared with a contour interval of 5 feet.

Observations were made weekly for 2 years, from April 1, 1950, to March 31,

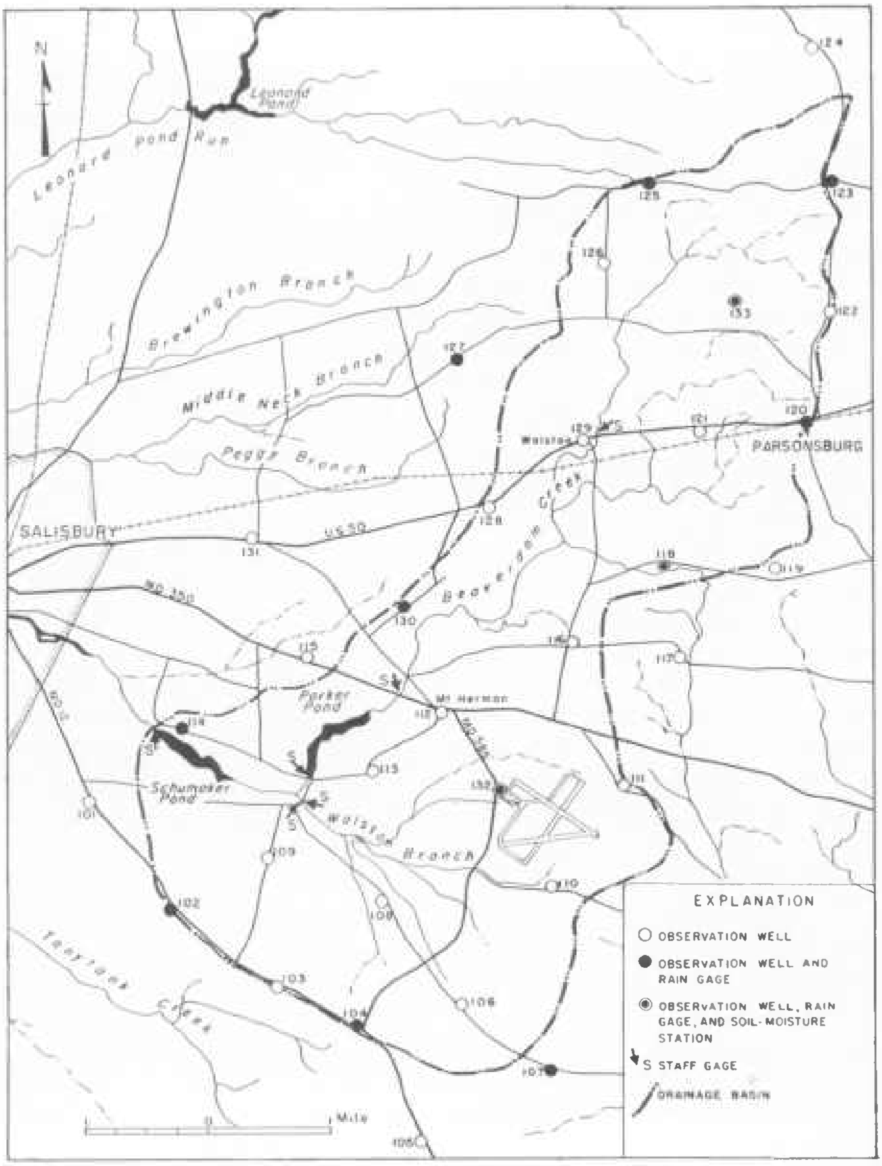

FIGURE 25. Map of Beaverdam Creek basin, Wicomico County, showing Locations of Rain Gages, Stream Staff Gages, Observation Wells and Soil Moisture Stations

1952. The hydrologic equation was written:

$$\sum_{t_1}^{t_2} P = \sum_{t_1}^{t_2} (R + ET \pm \Delta H \cdot Yg \pm \Delta SM \pm \Delta SW)$$

where t_1 = beginning time of observation

t_2 = ending time of observation

P = precipitation

R = runoff

ET = evapotranspiration

ΔH = change in mean ground-water stage

Yg = gravity yield ("field" specific yield)

ΔSM = change in soil-moisture deficiency

ΔSW = change in surface-water storage

These factors were recorded in a hydrologic budget. P, R, ΔH, ΔSM, and ΔSW were measured. ET and Yg were unknown, but by a series of convergent approximations, based on the seasonal variation known to be characteristic of evapotranspiration, Yg was determined to be 11 percent, and ET was then calculated (Table 22).

A ground-water rating curve (fig. 26) was constructed by relating the average height of the water table in wells to corresponding rates of stream discharge. A separate ground-water equation may be written as follows:

$$Gr = D \pm \Delta H \cdot Yg + ETg$$

where Gr is ground-water recharge

D is ground-water drainage (water that leaves the area by percolating through the ground across the boundaries of the area or into streams)

ΔH is change in mean ground-water stage

Yg is gravity yield

ETg is ground-water evapotranspiration

This equation was solved on the following basis. Gr (disregarding the concurrent ground-water drainage and evapotranspiration) was determined for separate short-term rises shown on the ground-water mean stage hydrograph by multiplying the total change in ground-water stage, H, by Yg. D was determined by utilizing the ground-water rating curve. ΔH was measured, Yg had been determined as 11 percent in the main budget, and the product, the change in storage, was calculated. Since all these factors were known, ETg was calculated by solving the equation. The ground-water factors are shown on a monthly budget in Table 22, which also shows the monthly precipitation and the total evapotranspiration from the main budget.

Table 22 shows that the ground-water recharge is highly variable, ranging from zero in October 1950 to 4.69 inches or 91.2 percent of the precipitation in November 1951. The percentage of the precipitation that becomes ground-water recharge is highest in the winter and lowest in the late summer and early autumn. In the 2-year period 51.5 percent of all the precipitation recharged the ground-water reservoir. This was discharged in almost equal portions by

TABLE 22

Ground-water Recharge Determined from Monthly Ground-Water Budgets

Year and Month	Precipitation P (inches)	Ground-water recharge G_r (inches)	Ground-water drainage D (inches)	Ground-water storage $H \cdot Y_g$ (inches)	Evapotranspiration		Percent of precipitation recharged $\frac{G_r}{P} \times 100$
					Ground-water ET_g (inches)	Total ET (inches)	
1950							
April	2.20	0.92	1.08	−1.19	+1.03	2.07	41.8
May	3.73	1.98	1.02	+.40	+.56	3.26	53.1
June	1.26	.26	.74	−2.38	+1.90	3.94	20.6
July	4.84	1.45	.54	−.26	+1.17	4.49	29.9
August	1.77	.26	.43	−1.58	+1.41	4.22	14.7
September	4.78	1.19	.33	+.13	+.73	3.23	24.9
October	1.27	.00	.34	−.92	+.58	1.73	.0
November	3.48	1.98	.29	+1.32	+.37	.49	56.9
December	3.34	2.84	.63	+1.85	+.36	.18	85.2
1951							
January	1.63	1.06	.68	+.26	+.12	.18	65.0
February	2.24	1.65	.75	+.99	−.09	.30	73.5
March	2.81	1.72	.92	+.33	+.47	1.03	61.3
April	2.69	.60	.89	−.86	+.57	2.07	22.3
May	3.75	2.18	.78	+.59	+.81	3.26	58.1
June	5.46	2.90	1.05	.00	+1.85	3.94	53.1
July	3.46	1.91	.82	−1.19	+2.28	4.49	55.2
August	4.29	1.06	.59	−.92	+1.39	4.22	24.7
September	3.51	.40	.44	−1.06	+1.02	3.23	11.4
October	3.00	.92	.41	+.20	+.31	1.73	30.7
November	5.14	4.69	.88	+3.23	+.58	.49	91.2
December	4.29	3.10	1.37	+1.72	+.01	.18	72.3
1952							
January	4.85	3.23	1.83	+1.19	+.21	.18	66.6
February	3.19	2.11	2.06	−.59	+.64	.30	66.1
March	5.85	4.22	2.59	+.46	+1.17	1.03	72.2
Total	82.83	42.63	21.46	+1.72	+19.45	50.24	51.5

ground-water drainage and ground-water evapotranspiration. There was a small increase in ground-water storage in the 2-year period.

A study of the variations in the percentage of recharge during the 2-year period yields interesting and significant conclusions about the ground-water hydrology of the area. During the growing season, much of the precipitation goes to satisfy the needs of plants for water and is returned to the atmosphere

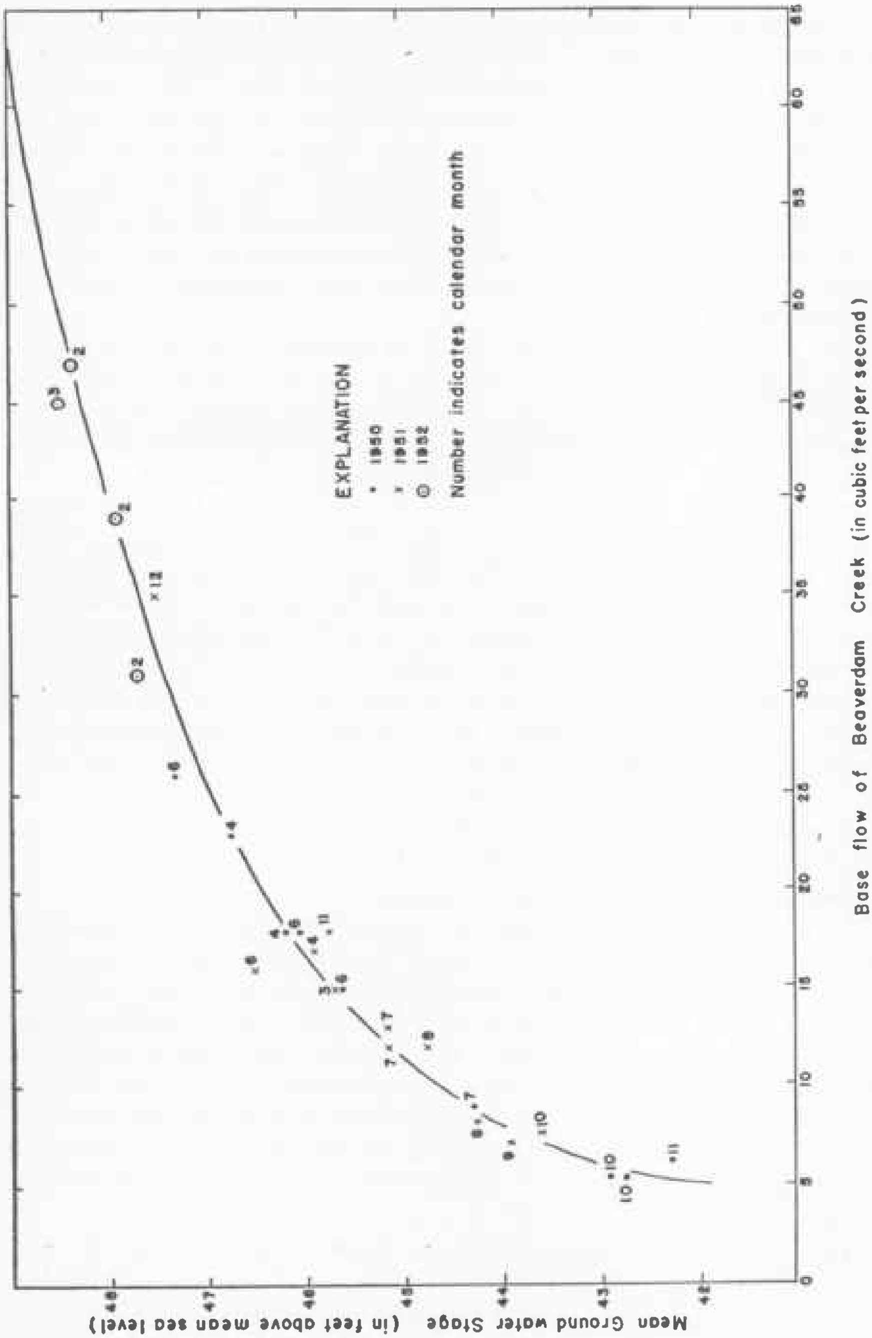

FIGURE 26. Ground-Water Rating Curve. Beaverdam Creek Basin, Wicomico County

by transpiration. Between rainstorms the plants subsist partly on water drawn up from the water table in low areas but largely on water stored in the root zone of the soil. This creates a deficiency in soil moisture (severe only in long dry periods) which is made up or partly made up by the next rain. Water moving from the land surface toward the water table must pass through the soil, so that the soil-moisture deficiency in the root zone has a first call upon the water that infiltrates into the soil. In many small storms practically all the infiltration is absorbed by the soil and little, if any, water reaches the water table. The result is that during the growing season the ground-water recharge is restricted by the demands of vegetation.

The generally high infiltration capacity of the soils in the area is indicated by the large percentages of the precipitation that become ground-water recharge during the winter season when most plants are dormant. During the five months from November to March, inclusive, of the 2-year period, the recharge ranged from 56.9 to 91.2 percent of the precipitation and averaged 71.0 percent, whereas during the growing season the range was from 0 to 58.1 and the average was 30.8. Some of the basin is covered by lakes, streams, and swamps where none of the precipitation can infiltrate because the ground is already full of water. In a large part of the basin the ground-water gradients are low and the water table is near the surface, so that the soil tends to become saturated after moderate precipitation and can then absorb no more water. The high rates of ground-water recharge which occur in the winter months in spite of these limitations suggest that the infiltration capacity of the soils of the area is probably great enough to absorb all the precipitation that reaches the land surface in any but the most intense storms. Probably almost all the precipitation that falls on unsaturated soil in the winter storms is absorbed by it but the ground-water recharge is then limited to a considerable degree by the lack of storage space between the water table and the land surface.

Approximately 40 percent of the total water returned to the atmosphere by evapotranspiration in the 2-year period was derived from ground-water sources. This is due to the large proportion of the area in which the water table is so near the surface that plant roots can draw directly from the capillary fringe above the water table. In some areas, no doubt, the capillary fringe reaches the land surface so that evaporation as well as transpiration draws water directly from the water table. If the water table in these parts of the area should be lowered, either by pumping or by drainage, the ground-water evapotranspiration would be reduced and the quantity of water available for withdrawal would be increased.

The high rate of ground-water recharge insures a high ultimate safe yield from Pleistocene and Pliocene(?) aquifers. The best methods of withdrawing water from these aquifers will depend upon the characteristics of the individual formations in the specific areas under consideration. In many places these aquifers can yield large supplies suitable for industrial or irrigation purposes.

GROUND-WATER STORAGE

Although the ground-water storage in this three-county area is vast, the additional facilities for storing the abundant precipitation are small, so that frequently the aquifers are brimfull. Even when they have a small margin of emptiness beneath higher ground in the intake area, they overflow at lower levels. The average thickness of the zone of aeration (vadose zone) is less than 4 feet, so that only a few inches of rainfall can be stored, on the average, before the zone of saturation reaches the land surface almost everywhere. Rainfalls of much lesser magnitude may saturate the soil to the surface over many square miles. In the lowland areas the zone of saturation discharges almost continually to the roots of plants and in seeps along the creek banks.

This small margin of additional ground-water storage accounts for the large water loss. Some of this loss may be captured when more storage is available. The unconfined aquifer, of the Pleistocene and Pliocene (?) series, averages 60 feet thick and has an average saturated thickness of about 56 feet. If heavy pumping is imposed upon this aquifer, dewatering of the upper part of the zone of saturation will occur around the pumped wells. The dewatered zone will provide additional storage, and permit the capture of recharge which is rejected at present.

Water-Level Fluctuations

Changes in ground-water storage are reflected as fluctuations of the level of the water table or the piezometric surface, which are most easily observed as fluctuations of water levels in wells. The water levels in wells fluctuate in response to recharge and discharge, and to changes in barometric pressure, ground temperatures, earth loading such as that caused by tides or railroad trains, and earth vibrations. Recharge is due to the infiltration of water through the soil zone down to the water table. This infiltration varies with the precipitation, and, inversely, with the surficial evapotranspiration. Discharge has two components: the ground water runoff by lateral percolation to streams and the ground-water evapotranspiration. The water-level fluctuations are modified further by the artifice of man: artificial discharge by pumping, creating cones of depression; and artificial recharge by irrigation or waste-water disposal, creating cones of elevation or water-table mounds. Fluctuations of water levels in wells due to changes in barometric pressure and vibrations are usually of minor importance when the aquifer is under water-table conditions.

Records of water levels have been collected in this area since 1947. The annual records are published in Water Supply Papers of the U. S. Geological Survey.

Figure 27 shows the fluctuation in six driven observation wells. The graphs show no evidence of declining water levels. There is a seasonal fluctuation which varies from well to well and in general ranges from 0.5 foot to 5.5 feet. This seasonal fluctuation is greatest in the divide areas where there is usually room for additional ground-water storage above the water table and least in the areas

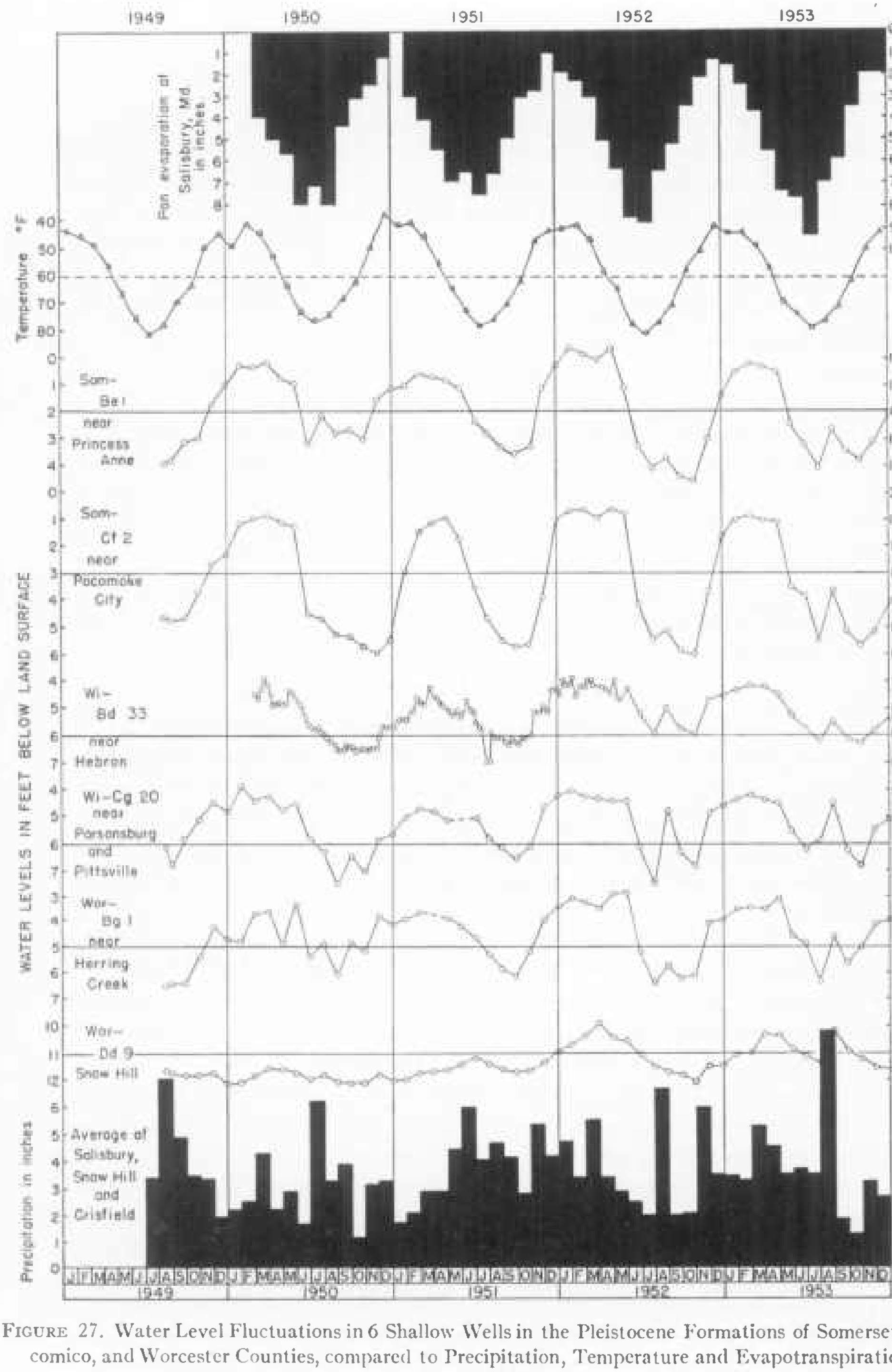

FIGURE 27. Water Level Fluctuations in 6 Shallow Wells in the Pleistocene Formations of Somerset, Wicomico, and Worcester Counties, compared to Precipitation, Temperature and Evapotranspiration, 1949 to 1953

close to streams where changes in ground-water levels are limited by the proximity of a fairly constant discharge level. Likewise the fluctuation is greater at higher altitudes above sea level. The water level is less sensitive in the records where it is deeper to water.

A simple annual cycle is repeated throughout the four years of record. As the year opens the water level is climbing to the yearly maximum, which is reached about the end of March. By the end of April there is a slight decline followed by a precipitous decline in May. The decline continues throughout June, July, and August, but at gradually lessening rate, until a yearly low is

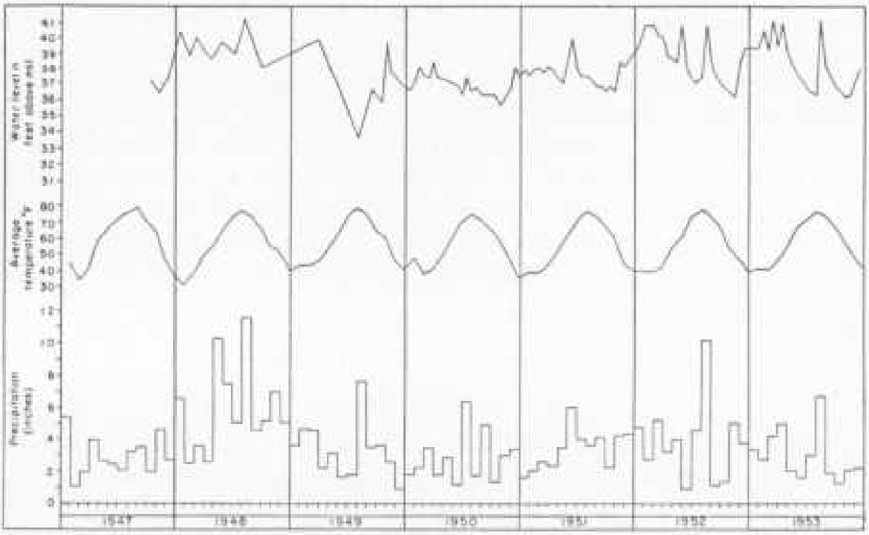

Figure 28. Water Level Fluctuations in Well Wi-Cf 3, Salisbury Airport, in response to Precipitation and Temperature, 1947–1953

reached by the end of September or October. A rapid rise occurs in November and December. This rise continues but tapers off in January and February to the end of March.

The annual cycle of water-level fluctuations follows the inverted temperature curve, because evapotranspiration (especially transpiration) is a function of temperature and is the major cause of the water-table fluctuation. The period of declining water levels corresponds closely to the growing season when the demands of plants for water prevent much of the precipitation from reaching the water table, whereas the natural discharge of water continues. The rise in the fall usually follows closely after the first killing frost. Precipitation is less of a factor because it is relatively evenly distributed throughout the year. Continued lack of moisture is reflected in sustained ground-water recession, and unusually heavy rains cause a water-level rise, even in the middle of the summer recession. Although the ground-water cycle follows the temperature curve it lags behind it by about 2.5 months. The annual temperature high is reached in July, but the ground-water low is not reached until late September or early October. This is due to the continued growth and enlargement of plants in late summer, even though the days gradually become cooler and shorter. Thus, although evaporation is on the decline, transpiration increases or continues without much abatement until September or October.

The water-level fluctuations shown in figure 27 represent the upper portion of the zone of saturation in the Pleistocene formations. In figure 28, the water level fluctuations of Wi-Cf 3, a well 108 feet deep, screened in the red gravelly sand, represent the changes in water level from the deeper portion of the zone of saturation in the Pliocene(?) sediments. This well responds sensitively to precipitation, as shown in figure 29. This well responds also to changes in barometric pressure, and to earthquakes of large magnitude.

Figure 30 shows the response of a well to pumping in the Salisbury municipal well field. Figure 31 shows the long-term correlation of the same well with pumpage and precipitation. That this well does not show a downward trend is evidence that the "safe" yield has not been exceeded in the city well field, which is developed chiefly in the red gravelly sand of the Pliocene(?) series and obtains some recharge from the Park Ponds.

GROUND-WATER DISCHARGE

Water Utilization

The people of Somerset, Wicomico, and Worcester Counties use an estimated 12.4 million gallons of ground water a day, or about 4.5 billion gallons a year. The use of surface water is negligible; however, the largest water plant in the area, the waterworks of the city of Salisbury, derives a substantial part of its ground-water recharge by infiltration from ponds on Beverdam Creek.

Table 23 summarizes the daily demand classified by ownership and by uses. In both ownership of wells and use of water, the industrial demand outweighs all others.

Table 24 summarizes the municipal pumpage in the three counties, and Table 25 records the monthly pumpage at Salisbury for the 6 years ending with 1953. The pumpage cycle at Salisbury shows a summer high and a winter low, with the July demand more than 2½ times that of February.

Discharge to Streams

The runoff that sustains the flow of streams is divided into three components: overland flow, or water which passes, via rills and rivulets, to gullies, creeks, and rivers and to the sea without entering the ground; interflow, or water which, during and for a short time after a storm, enters the soil zone and forms in it a temporary zone of saturation in which water moves laterally and emerges

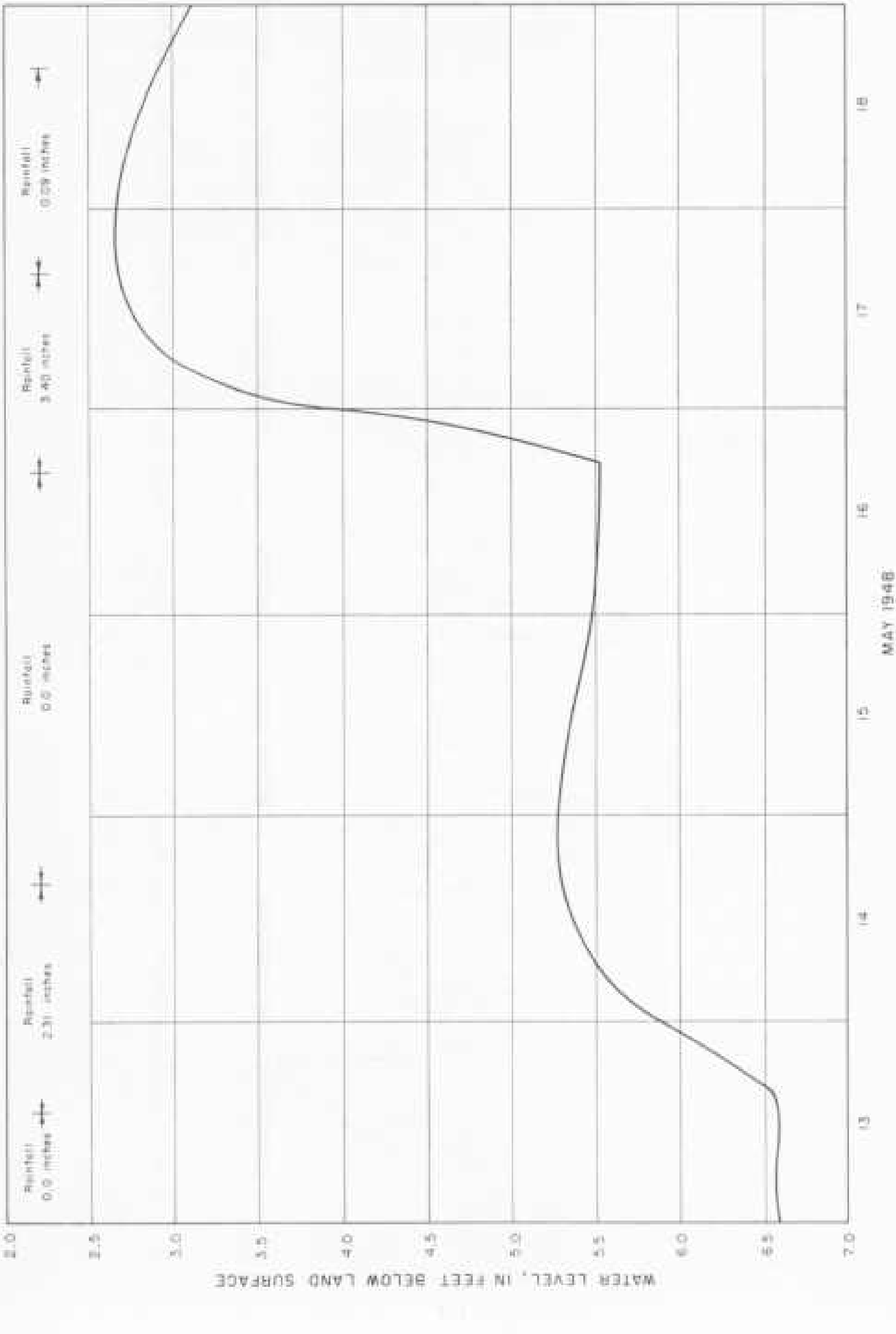

FIGURE 29. Water-level fluctuations in well Wi-Cf 3, Salisbury Airport, in response to Precipitation, May 13 to 18, 1948

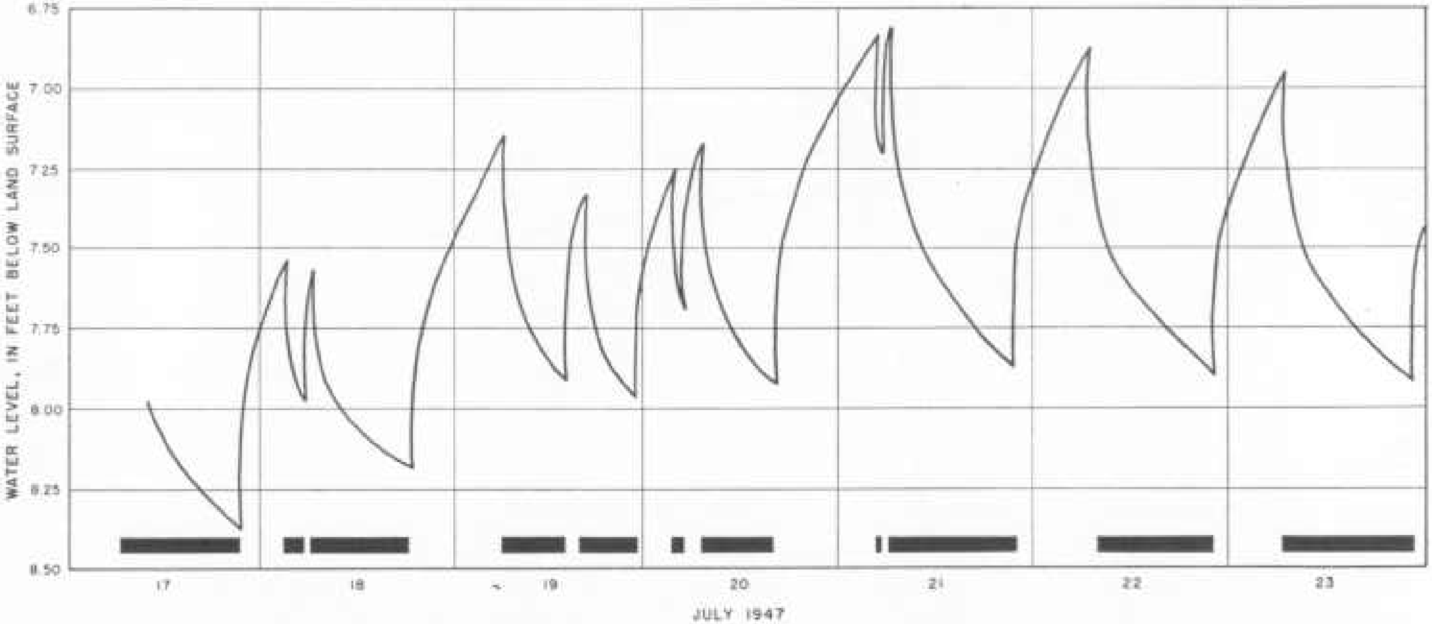

FIGURE 30. Water Level Fluctuations in Well Wi-Ce 13, showing rapid response to Pumpage of Wells Wi-Ce 1 to 5, Salisbury Municipal Field, July 17 to 23, 1947

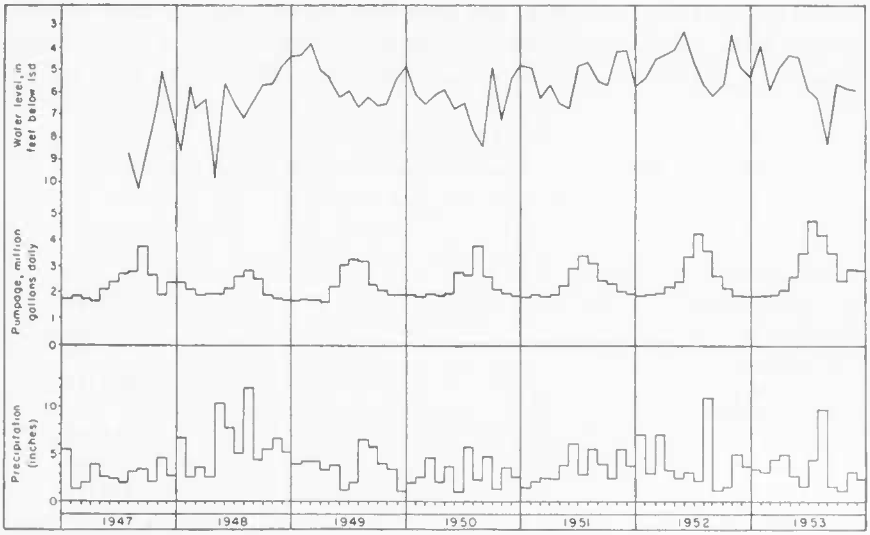

FIGURE 31. Water Level Fluctuations in Well Wi-Ce 13, Salisbury, in response to Precipitation and to Pumpage in Salisbury Municipal Well Field, 1947 to 1953

TABLE 23

Utilization of Water in Somerset, Wicomico, and Worcester Counties

(gallons per day, 1950 to 1953)

Ownership	Somerset	Wicomico	Worcester	Total
Municipal	522,000	2,656,000	1,411,000	4,589,000
Industrial	492,000	2,799,000	2,213,000	5,504,000
Rural	543,000	939,000	786,000	2,268,000
	1,557,000	6,394,000	4,410,000	12,361,000
Uses				
Domestic—Urban	193,000	677,000	826,000	1,696,000
Domestic—Farm	318,000	578,000	286,000	1,182,000
Farm—stock	225,000	361,000	500,000	1,086,000
Industrial (city wells and company wells)	641,000	4,448,000	2,698,000	7,787,000
Commercial	180,000	330,000	100,000	610,000
	1,557,000	6,394,000	4,410,000	12,361,000

as a wet-weather seep or spring; and base flow, or that water which reaches the water table, and flows laterally through the zone of saturation to discharge in a more or less permanent seepage area or spring. The stream hydrograph

TABLE 24

Municipal Pumpage in Somerset, Wicomico, and Worcester Counties

(gallons per day, 1950 to 1953)

	Pumpage
Somerset Co.	
Princes Anne	249,000
Crisfield	273,000
Wicomico Co.	
Salisbury	2,656,000
Worcester Co.	
Berlin	111,980
Snow Hill	260,000
Pocomoke City	450,000
Ocean City	589,000

TABLE 25

Monthly Pumpage at Salisbury, 1948 to 1953

(thousands of gallons)

	1948	1949	1950	1951	1952	1953
Jan.	72,656	53,376	56,470	55,556	56,802	58,628
Feb.	60,276	48,464	50,133	53,045	54,519	53,182
Mar.	58,223	54,305	55,535	55,935	59,874	60,453
Apr.	57,686	50,677	54,711	56,676	63,631	62,157
May	59,625	67,792	60,827	72,624	75,159	81,138
June	63,374	90,340	83,539	86,691	103,055	104,398
July	81,079	101,355	84,939	104,899	131,905	147,692
Aug.	88,826	99,965	116,183	96,440	108,965	130,046
Sept.	77,053	67,390	79,738	74,261	78,160	104,098
Oct.	60,054	62,734	66,536	73,245	66,656	75,443
Nov.	55,602	54,741	59,310	62,523	58,349	59,036
Dec.	54,525	56,332	59,064	61,803	59,979	60,051
Total	788,979	807,471	826,985	853,698	917,054	996,322

may be divided into (1) the flood peaks, due, in the main, to overland flow and interflow, which "flash" for a short period during and after a storm, and (2) the base-flow recession curve.

The column headed Ground-water drainage in Table 22 lists the monthly base-flow runoff (determined by inspection of the hydrograph) in inches of water over the drainage area of Beaverdam Creek above Schumaker Pond.

This base flow runoff ranges from over half the precipitation (June 1950, 59 percent; February 1952, 65 percent) to a small fraction of it (September 1950, 7 percent; November 1950, 8 percent). The 2-year average of base-flow runoff was 26 percent of the precipitation, and about 75 percent of the total runoff. Because the Beaverdam basin has a larger relief than most drainage basins in the area, the base-flow runoff would be slightly smaller in the Beaverdam basin than in the others.

Drainage of Soils

The natural drainage outlets of Somerset, Wicomico, and Worcester Counties have such a low gradient, and develop such a dense, luxuriant growth, that in the winter and spring of the year they do not carry off the excess precipitation. The soil becomes saturated, and in many areas is not cultivable until well into the growing season. Many acres have never been cultivated because of swampy conditions. These conditions are not due to local overflow of flood waters but to saturated soil, a condition which endures for several weeks. Drainage is, and will remain, a factor in land utilization in Somerset, Wicomico, and Worcester Counties.

Evapotranspiration

Evapotranspiration is the major way in which water is discharged in Somerset, Wicomico, and Worcester Counties, amounting to almost 61 percent of the precipitation in the Beaverdam basin in 1950–52 (Table 22). Because this basin is not quite as flat as the average, it probably has a slightly lower average evapotranspiration than the area as a whole. The ground-water reservoirs provided almost two-fifths of this evapotranspiration. The curves of evapotranspiration, derived from a water budget by methods of convergent approximation, are given in figure 32.

The land surface of Somerset, Wicomico, and Worcester Counties is particularly suited for the retardation of runoff and the development of optimum conditions for evapotranspiration. The hundreds of "Maryland basins" are natural catchment and detention areas for rainfall, with consequent development of lush vegetation.

Some of the evapotranspiration discharge is water used in the growth of useful plants, and so represents a "loss" only in the hydrologic sense, and is of economic benefit. However, a large part of the transpiration is due to noneconomic plant growth, and much of the evaporation occurs from marshy, swampy soil of low economic value.

AQUIFER TESTS

The rate at which water can be taken locally from a formation—that is, the number of wells and their yield and spacing—depends upon the formation characteristics: transmissibility and storage. The coefficients of transmissibility and storage can be determined in controlled aquifer tests, by pumping a well,

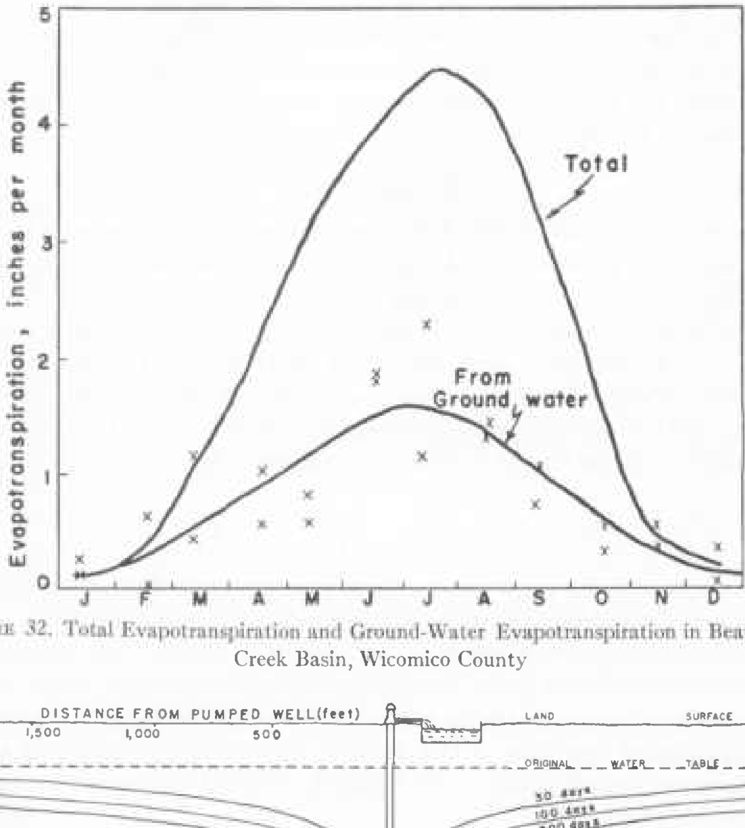

FIGURE 32. Total Evapotranspiration and Ground-Water Evapotranspiration in Beaverdam Creek Basin, Wicomico County

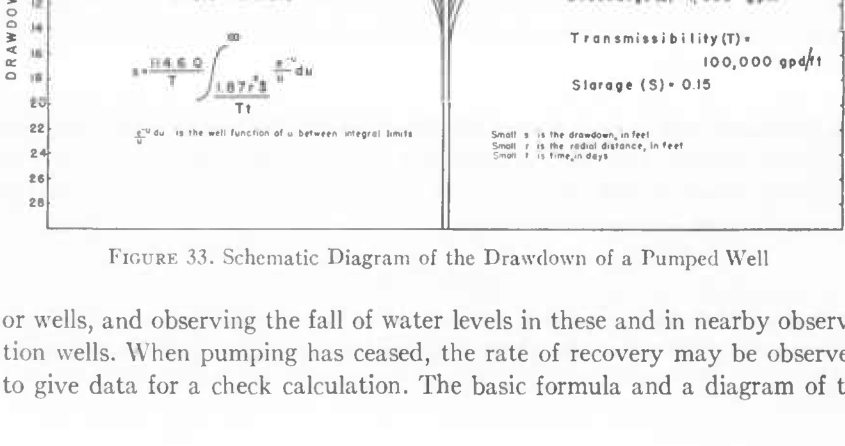

FIGURE 33. Schematic Diagram of the Drawdown of a Pumped Well

or wells, and observing the fall of water levels in these and in nearby observation wells. When pumping has ceased, the rate of recovery may be observed, to give data for a check calculation. The basic formula and a diagram of the cone of depression of a pumped well are illustrated in figure 33. Procedures for analyzing aquifer test data have been summarized bv Brown (1953).

Pleistocene and Pliocene(?) Formations

The Pleistocene and Pliocene(?) formations in most of the tri-county area yield the largest quantity of water, to the largest number of wells, and at the highest rates of yield. The ground water is, in general, unconfined, occurring under water-table conditions. The formations have relatively large storage coefficients, ranging from 1 to 20 percent, characteristic of sands which are dewatered in the process of pumping, and moderate to large coefficients of transmissibility. Specific capacities of the wells are correspondingly moderate to large (Tables 15 and 16).

Salisbury

The yield of wells at Salisbury is the largest in the tri-county area. The large city wells and nearby industrial wells are described in a separate section by Meyer and Bennett who made the well-field tests and the aquifer analyses.

The geology of the Salisbury area is illustrated in Plate 9. The Pleistocene and Pliocene(?) deposits range from 60 to 80 feet in thickness and lie on a relatively impermeable blue clay of the Miocene series. The red gravelly sand of the Pliocene(?) series composes the lower and major part of the aquifer, with 10 to 30 feet of Pleistocene buff sands at the top.

The city wells are developed in two lines along the sides of Lower and Upper Park Ponds. Three large-scale well-field tests were run: in the old well field at Lower Park Pond; along a line of test holes at Upper Park Pond, where the new city wells have since been constructed; and on a line extending south from Schumaker Pond.

The behavior of the wells during the tests is illustrated on Plate 10, and on figures 34 and 35. The aquifer coefficients are summarized in Tables 26, 27, and 28.

Although the aquifer analyses were complex and recharge boundaries were reached within a few minutes after each test was begun, causing a slackening in the rate of water-level decline and indicating that the ponds were providing a substantial part of the water by infiltration through the aquifer sands, it was concluded that the Pleistocene and Pliocene(?) aquifer has an average coefficient of transmissibility of 100,000 gpd per foot, and an average ultimate coefficient of storage of 0.15. Because of the water-table conditions, the rapid recharge, and the changes in character and permeability of the aquifer in short distances, the assumptions of the equilibrium and nonequilibrium formulas are not rigorously met. Nevertheless, the coefficients are considered to be of the right order of magnitude. They indicate a water supply favorably situated and capable of further development upstream from the present wells.

A short test was run on Wi-Ce 13, now used as an observation well. The

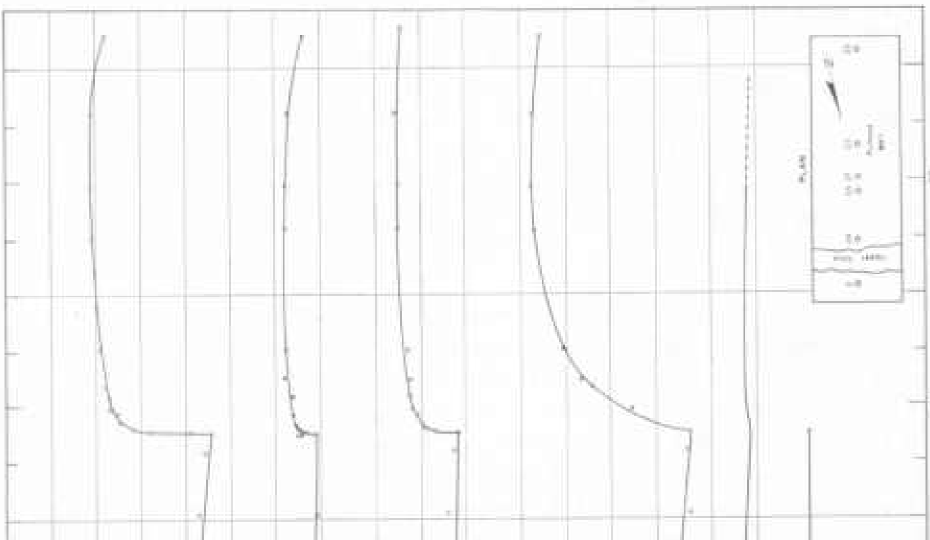

FIGURE 34. Decline and Recovery of Water Levels in an Aquifer Test at Upper Park Pond, Salisbury

well was pumped at 60 gpm for 49 minutes, and the recovery water levels were measured. The calculated coefficient of transmissibility was 132,000 gpd/ft. A similar test was made on Wi-Cf 3, an observation well at the airport. The

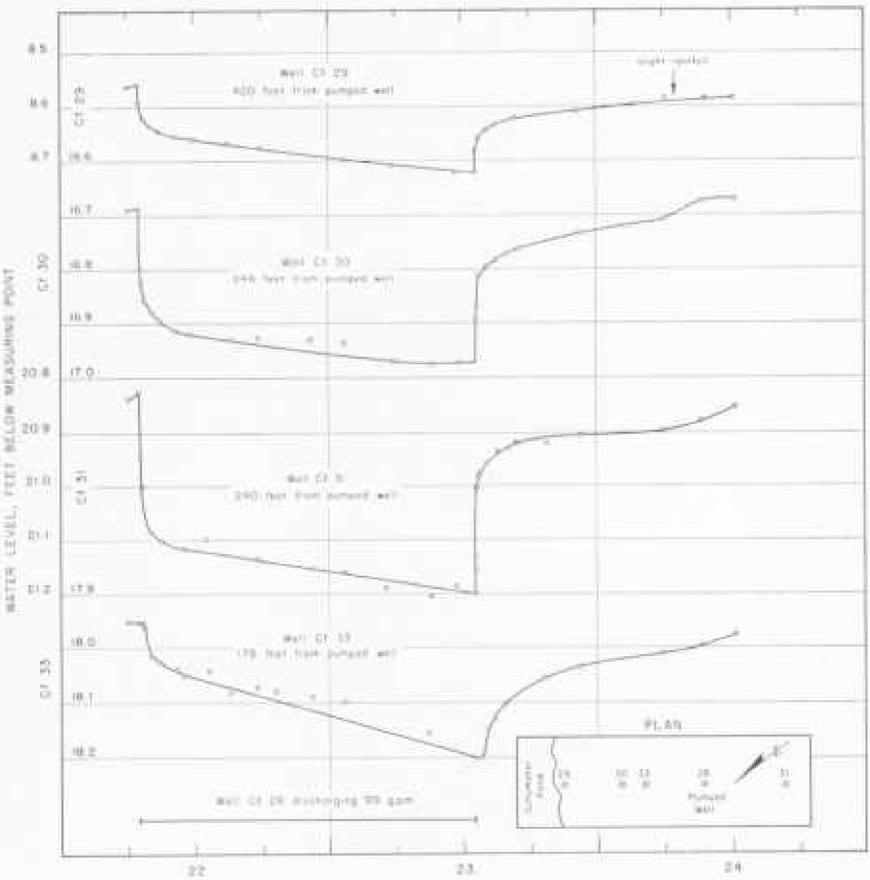

FIGURE 35. Decline and Recovery of Water Levels in an Aquifer Test at Schumaker Pond, Salisbury

well was pumped at 76 gpm for 62 minutes, at the end of which time the drawdown was 5.2 feet. From a plot of recovery levels, the coefficient of transmissibility was calculated to be about 45,500 gpd/ft.

A test was conducted also at Shoreland Freezers, Inc., on the south edge of Salisbury, in which Wi-Ce 61 was pumped at 254 gpm for 24 hours and 52 minutes. Well Wi-Ce 68, 60 feet away, behaved anomalously, drawing down 3 feet in the first 10 minutes and 0.3 foot in the next 24 hours. Drawdown water

TABLE 26

Summary of Formation Coefficients for the Aquifer Test of the Pleistocene and Pliocene(?) Series at the Old City Well Field, Lower Park Pond, Salisbury

The pumped well was Wi-Ce 8, which averaged 850 gpm.

Graphs of pumpage from Salisbury wells Ce 6, 7, and 8, and drawdown in observation wells during this test are illustrated in Plate 10.

Observation wells[1]	Formula[2]	Time interval since pump started (min.)	Rating of curve[3]	Coefficient of transmissibility (gpd/ft.)	Coefficient of storage
Ce 1 to 5, 13	Thiem, C-J	5,880	Poor	205,000	0.082
Do	do	11,640	Fair	150,000	.091
Ce 65 to 67, 16, 17, Cf 1	do	8,760	Poor	68,000	.14
Do	do	11,640	Poor	76,000	.13
Ce 5	C-J, Theis-R	7,000 to 11,000	Fair	144,000	.093
Do	Theis	4,920 to 14,000	Excellent	100,000	.13
Ce 16	do	480 to 1,740	Fair	282,000	.014
Do	do	2,820 to 18,000	Good	100,000	.035
Do	C-J, Theis-R	4,500 to 15,000	Good	104,000	.027
Ce 17	do	4,500 to 10,000	Good	106,000	.088
Do	Theis	4,400 to 14,000	Good	97,000	.12
Ce 13	do	7,800 to 11,600	Good	147,000	.15
Do	C-J, Theis-R	5,000 to 11,000	Fair	260,000	.11
Ce 65	do	500 to 1,900	Fair	118,000	.10
Do	do	1,000 to 13,000	Fair	77,000	.16
Do	Theis	2,300 to 13,000	Good	70,000	.20
Do	do	9,100 to 13,000	Good	62,000	.17
Ce 66	do	1 to 330	Very good	318,000	.17
Do	do	1,700 to 5,760	Fair	38,000	.15
Do	do	7,200 to 11,400	Fair	99,000	.087
Do	C-J, Theis-R	50 to 200	Fair	33,000	.16
Do	do	700 to 1,150	Poor	86,000	.07
Do	do	7,000 to 11,400	Good	78,000	.12
Ce 67	do	6 to 45	Good	137,000	.0054
Do	do	2,000 to 11,000	Good	78,000	.10
Do	Theis	2 to 35	Good	104,000	.0066
Do	do	2,200 to 11,000	Good	71,000	.17
Cf 1	do	0 to 6,500	Good	428,000	.11
Do	do	6,500 to 9,480	Fair	242,000	.17
Do	C-J, Theis-R	800 to 4,500	Fair	585,000	.077
Do	do	5,500 to 9,480	Good	311,000	.126

[1] See inset, Plate 7, for location of wells.

[2] The formulas may be found as follows: Thiem is an equilibrium formula published by Thiem (1906), and quoted by Wenzel (1942, p. 81). Theis is a nonequilibrium formula and type curve published by Theis (1935). Theis-R is a recovery formula on p. 522 of Theis. C-J is the Cooper and Jacob (1946) straight-line approximation derived from the Theis formula.

[3] The relative accuracy with which the plotted points fall on the type curve or form a straight line.

levels in a shallow, 23-foot, driven observation well 200 feet from the pumped well gave a coefficient of transmissibility of about 110,000 gpd/ft. and a coefficient of storage of 0.14.

The schematic diagram for a pumped well, figure 33, is drawn with the selected average figures of T and S for the Pleistocene and Pliocene(?) aquifer at Salisbury.

TABLE 27

Summary of Formation Coefficients for the Aquifer Test of the Pleistocene-Pliocene(?) Series, Upper Park Pond, Salisbury

Well Wi-Cf 22 was pumped at an average rate of 58 gpm.

Test site was on a line extending south of the upstream end of Upper Pond, opposite city well Wi-Cf 2.

Observation wells[1]	Formula[2]	Time interval since pump started (min.)	Rating of curve[3]	Coefficient of transmissibility (gpd/ft.)	Coefficient of storage	Remarks
Cf 2, 23, 24	Thiem, C-J	25	Good	99,000	0.002	Drawdown
Do	do	300	Good	73,000	.02	
Do	do	1,400	Good	60,000	.07	do
Do	do	2,600	Good	53,000	.11	do
Cf 23, 25	do	2,600	—	93,000	.03	do
Cf 23	Theis-R, C-J	1,400 to 2,600	Good	128,000	.01	do
Cf 24	do	1,400 to 2,600	Good	255,000	.01	do
Cf 25	do	300 to 2,600	Good	191,000	.005	do
Cf 22	Theis-R	1 to 280	Fair	92,000	—	Recovery
Do	do	280 to 1,000	Fair	175,000	—	do
Cf 25	Theis-R, C-J	1 to 2,000	Good	400,000	.0004	do
Cf 23	do	1 to 2,000	?	285,000	.000004	do
Do	Theis	2 to 18	Fair	183,000	.0005	Drawdown
Do	do	1 to 2,800	Fair	234,000	.0001	do
Cf 24	do	1 to 2,800	Fair	423,000	.02	do
Cf 25	do	1 to 10	Fair	336,000	.0005	
Do	do	100 to 2,800	Fair	224,000	.0002	

[1] For graphs and well locations see figure 34.
[2, 3] See table 26.

Ocean City

At Ocean City the aquifer of Pleistocene and Pliocene(?) age is confined, and the formation coefficients are small. They are representative of that aquifer only beneath the barrier islands, and are not applicable on the mainland.

Figure 36 shows the relations of the three producing aquifers in the Ocean City area. The upper aquifer, locally known as the "90-foot" aquifer, in the Pleistocene and Pliocene(?) series, is about 50 feet thick, and the top is encountered between 40 and 60 feet below sea level. It is confined above by 20 to 40 feet of gray clay correlated with the Pamlico formation.

An aquifer test was run on this aquifer by G. E. Andreasen, who states:

Well Wor-Cg 20, owned by the Whaley Ice Co., was pumped at a rate of 26.8 gpm by a small suction pump. Water-level drawdowns were observed in well Wor-Cg 7, which is 44 feet from the pumping well. Tidal influence upon the water level in the wells drilled to this aquifer was of such magnitude as to nearly obscure the drawdown due to pumping. From the

TABLE 28

Summary of Formation Coefficients for the Aquifer Test of the Pleistocene and Pliocene(?) Series, Schumaker Pond, Salisbury

Pumped well Wi-Cf 28, at 99 gpm.
Test site on a line extending south of Schumaker Pond.

Observation wells[1]	Formula[2]	Time interval since pump started (min.)	Rating of curve[3]	Coefficient of transmissibility (gpd/ft.)	Coefficient of storage	Remarks
Cf 29, 30	Thiem, C-J	25	—	109,000	0.0017	Drawdown
Do	do	300	—	93,000	.014	do
Do	do	1,000	—	92,000	.058	do
Do	do	1,800	—	99,000	.13	do
Cf 29	Theis	40 to 1,800	Poor	514,000	.0009	do
Cf 30	do	1 to 1,800	Poor	483,000	.00001	do
Cf 31	do	1 to 1,800	Fair	380,000	.0001	do
Cf 28	Theis-R	400 to 1,385	Fair	164,000	—	Recovery
Cf 29, 30	Theim	1,000	—	115,000	—	Drawdown
Cf 29, 31	do	1,000	—	150,000	—	do

[1] For graphs and well locations see figure 35.
[2, 3] See table 26.

drawdown and recovery curves, the coefficients of transmissibility and storage were roughly estimated to be 2,600 gpd/ft. and 0.0027, respectively.

The aquifer would not be adequate for municipal or other large-scale development because of the low coefficient of transmissibility. Although the coefficient of transmissibility has a large probable error, it should be of the right order of magnitude. A further limit upon the safe yield of this aquifer may be a salt-water interface which probably exists in the filled channels of Pleistocene and Pliocene(?) age beneath the ocean a few miles north of Ocean City. The pumpage demands on the aquifer are low, and the higher heads of the fresh water beneath the mainland are probably preventing salt-water encroachment. The generalized geologic cross section, Plate 5, shows conditions that would be conducive to salt-water encroachment beneath Fenwick Island should pumpage from the aquifer become large.

Pocomoke Aquifer

Pocomoke City

Two tests were run on the Pocomoke aquifer at Pocomoke City in January 1953. One was run at the 7th Street station of Pocomoke City, and the other at the Birdseye plant near the Pocomoke River.

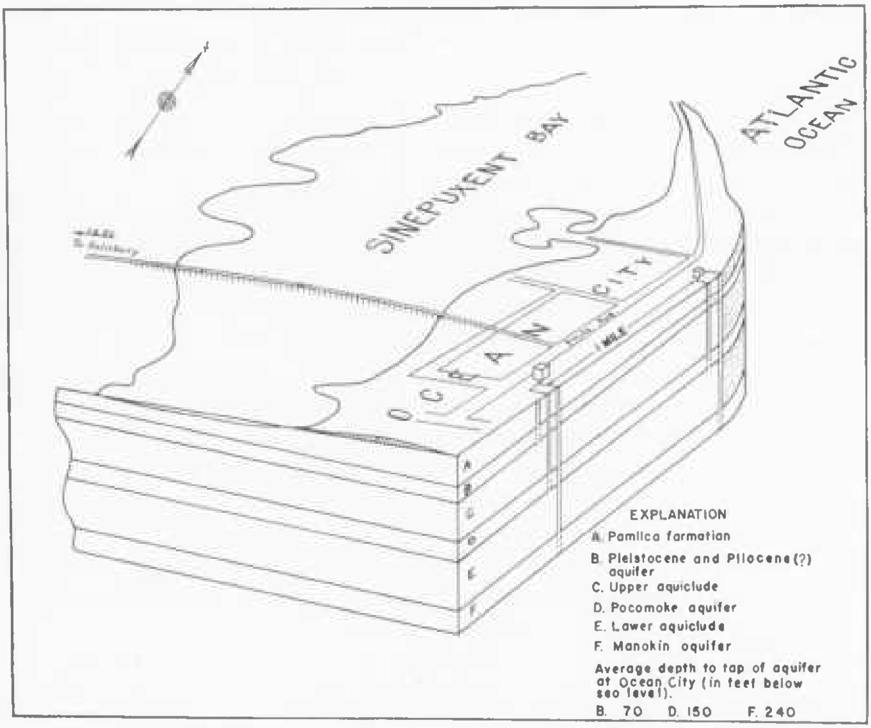

FIGURE 36. Diagram showing the Relation of Three Producing Aquifers in the Ocean City Area

Drillers' logs indicate 10 to 50 feet of sand, gravel, and clay of the Pleistocene series, underlain by 20 to 50 feet of the blue clay of the upper aquiclude of the Yorktown and Cohansey formations(?), underlain by the Pocomoke aquifer. The aquifer is about 45 feet thick and is underlain by the blue clay of the lower aquiclude.

The Pocomoke aquifer rises to the northwest, at the rate of 5 to 6 feet per mile, and directly underlies the relatively thin and permeable Pleistocene and Pliocene(?) deposits in an intake belt, the nearest edge of which is about 5 miles northwest of Pocomoke City (fig. 21). The aquifer has been logged in wells to the northeast as far as Ocean City, 32 miles away, and on the east, to lower Assateague Island, 21 miles away. Records of wells in Virginia show that the aquifer extends at least 40 miles south-southwest, to Pungoteague in lower Accomack County.

For hydrologic analysis with respect to pumpage at Pocomoke City, the aquifer may be treated as semi-infinite in extent to the southeast. A line of constant head may be approximated along the intake belt, which may be simulated by recharge wells of equal input rate as the Pocomoke City discharge 10 miles northwest of the city.

The test at the 7th Street pumping station was begun at 9:00 a.m., January 12, 1953, after a recovery of 3 days and 9 hours. Well Wor-Fb 9, at the 6th Street pumping station, 2,050 feet from the test site, also drilled to the Pocomoke aquifer, was pumped continuously in the recovery period and during the test, because it was needed to supply the city with water.

Well Wor-Fb 14 was pumped for 3 days at an average rate of 245 gpm. The pumping rate was determined by means of an orifice and piezometer tube, and discharge was to a city sewer. The discharge ranged from 261 gpm to 239 gpm. Pumping ceased at 9:00 a.m., January 15, and recovery measurements were made for 5 hours.

The principal observation well was Wor-Fb 2, located 60 feet from the pumped well, on which measurements were made with a float-type automatic water-stage recorder. Measurements were made by tape on Wor-Fb 20 and 21 at the Birdseye plant, located 4,200 and 3,900 feet, respectively, from the pumped well. These wells did not give an interpretable response because the fluctuations in them due to the pumping were obscured by fluctuations due to tides in the nearby Pocomoke River. Although a tide record was obtained, it was not possible to establish a relationship, because there were insufficient antecedent tape measurements in these wells.

The principal observation well, Wor-Fb 2, was too far from the tidal river to be appreciably affected by tides. A comparison of the pre-test recovery water levels with a barograph indicated that no barometric correction was warranted. The drawdown and recovery measurements are presented in Table 29.

The drawdown and recovery curves obtained from well Wor-Fb 2 checked closely with each other. The coefficients of transmissibility and storage as computed from the early part of the curves were about 8,000 gpd per foot and 0.003, respectively. The latter part of the curves suggests a recharge boundary about 100 to 300 feet from the observation well. The exact position or nature of this boundary could not be deduced from the data. Additional tests with several observation wells would be necessary to interpret the hydrologic conditions in the area correctly.

The test at the Birdseye plant was made on January 15 and 16, 1953. Well Wor-Fb 12 was pumped for 12 hours and 20 minutes at an average rate of 343

TABLE 29

Drawdown and Recovery of Water Levels, Aquifer Test at Pocomoke City, January 12–15, 1953

No correction needed for pre-test recovery or for barometric pressure; pumped well Wor-Fb 14, average rate 245 gpm; observation well Wor-Fb 2, 60 ft. from Wor-Fb 14.)

Time (minutes)		Water Levels (feet below measuring point)		Drawdown (feet)
Since pump on	Since pump off	Pump on	Pump off	
0			25.68	
1		25.82		0.14
2		26.02		.34
3		26.25		.57
4		26.48		.80
5		26.72		1.04
6		26.94		1.26
7		27.16		1.48
8		27.38		1.70
9		27.60		1.92
10		27.82		2.14
12		28.22		2.54
14		28.57		2.89
16		28.95		3.27
18		29.30		3.62
21		29.76		4.08
23		30.05		4.37
26		30.43		4.75
29		30.78		5.10
34		31.30		5.62
39		31.74		6.06
44		32.12		6.44
49		32.44		6.76
54		32.74		7.06
59		33.02		7.34
64		33.32		7.64
69		33.52		7.84
74		33.73		8.05
79		33.95		8.27
84		34.11		8.43
89		34.26		8.58
104		34.72		9.04
119		35.12		9.44
134		35.39		9.71
149		35.60		9.92
169		35.86		10.18
189		36.10		10.42
209		36.30		10.62
229		36.49		10.81
249		36.68		11.00

TABLE 29—*Continued*

Time (minutes)		Water Levels (feet below measuring point)		Drawdown (feet)
Since pump on	Since pump off	Pump on	Pump off	
279		37.03		11.35
309		37.33		11.65
339		37.55		11.87
369		37.74		12.06
399		37.90		12.22
449		38.13		12.45
499		38.35		12.67
549		38.54		12.86
599		38.72		13.04
704		39.00		13.32
749		39.15		13.47
824		39.30		13.62
899		39.47		13.79
974		39.63		13.95
1,124		39.90		14.22
1,274		40.15		14.47
1,424		40.36		14.68
1,574		40.57		14.89
1,724		40.72		15.04
1,900		40.79		15.11
2,084		40.97		15.29
2,224		41.15		15.47
2,384		41.32		15.64
2,547		41.47		15.79
2,620		41.51		15.83
2,763		41.63		15.95
2,940		41.78		16.10
3,120		41.90		16.22
3,300		41.95		16.27
3,480		42.02		16.34
3,660		42.14		16.46
3,833		42.22		16.54
4,028		42.31		16.63
4,187		42.36		16.68
4,320		42.44		16.76
Pumping ceased. Recovery began.				
		(Extrapolated water level)		Recovery (feet)
4,320	0	42.44	42.44	0.00
	1	42.44	42.33	.11
	2	42.44	42.10	.34
	3	42.44	41.90	.54
	4	42.44	41.62	.82

TABLE 29—*Continued*

Time (minutes)		Water Levels (feet below measuring point)		Recovery (feet)
Since pump off	Since pump off	Pump on	Pump off	
	5	42.44	41.41	1.03
	6	42.44	41.17	1.27
	7	42.44	40.97	1.47
	8	42.44	40.75	1.69
	9	42.44	40.55	1.89
	10	42.44	40.36	2.08
	12	42.44	39.93	2.51
	14	42.44	39.55	2.89
	16	42.44	39.22	3.22
	18	42.44	38.88	3.56
	21	42.44	38.40	4.04
	23	42.44	38.11	4.33
	26	42.45	37.72	4.72
	29	42.45	37.35	5.09
	34	42.45	36.80	5.64
	39	42.45	36.35	6.10
	44	42.45	35.94	6.51
	49	42.45	35.60	6.85
	54	42.45	35.30	7.15
	59	42.45	35.05	7.40
	64	42.46	34.84	7.62
	69	42.46	34.60	7.86
	74	42.46	34.44	8.02
	79	42.46	34.27	8.19
	84	42.46	34.13	8.33
	89	42.46	33.97	8.49
	104	42.47	33.62	8.85
	119	42.48	33.33	9.15
	134	42.48	33.08	9.40
	149	42.49	32.86	9.62
	169	42.49	32.62	9.87
	189	42.50	32.40	10.10
	215	42.51	32.16	10.35
	229	42.52	32.03	10.49
	240	42.52	31.96	10.56
	270	42.53	31.75	10.78
	300	42.54	31.62	10.92

Recovery measurements ceased.

gpm and water levels were observed in wells Wor-Fb 21 and Wor-Fb 20, 59 and 40 feet, respectively, from the pumped well.

The drawdown in well Wor-Fb 20 was 8.54 feet and in well Wor-Fb 21 was 6.19 feet. From the early part of the test, the coefficient of transmissibility was calculated to be about 40,000 gpd per foot and the coefficient of storage was about 0.0002. Toward the latter part of the test the data deviated from the type curve but were insufficient to permit determining the cause.

The large difference between the computed values of the coefficient of transmissibility of the aquifer at the Birdseye plant and at the city well field suggests that a relatively abrupt change in transmissibility, possibly caused by a change in lithology, occurs between the two areas.

Ocean City

Ocean City has two well fields, about 1 mile apart, designated the north and south fields (fig. 36). They derive water from the two lower of the three artesian beds, the locally-named "185-foot" and "285-foot" sands, which are, respectively, the Pocomoke aquifer and the Manokin aquifer.

The geology of the Pocomoke aquifer in the vicinity of Ocean City is somewhat irregular. At Ocean City the top of the aquifer is encountered in wells at depths of 140 to 150 feet below sea level. The top of the aquifer rises at a low gradient of 5 feet to the mile to an intake belt near Willards, Wicomico County, about 11 miles west of Ocean City (fig. 21). To the northwest the intake area is closer, only 5 miles away, where Pleistocene and Pliocene(?) valleys have channeled the upper aquiclude and opened the Pocomoke aquifer to direct recharge through the Pleistocene and Pliocene(?) fill (Pl. 5). To the southwest, presumably extending beneath the ocean, the Pocomoke aquifer is confined and protected by the upper aquiclude.

A salt-water interface with the fresh water may exist about 12 miles north of Ocean City, in the vicinity of Bethany Beach, Delaware, but insufficient geologic control is available in the southwestern corner of Delaware to substantiate this assumption. At the present rates of pumpage at Ocean City, such a salt-water zone may not constitute a danger, particularly in view of the nearer fresh-water intake belt in the headwaters of St. Martin River. However, should the pumpage from this aquifer become heavy in the Ocean City area, salt-water intrusion is a possibility.

G. E. Andreasen conducted tests on the Pocomoke aquifer at Ocean City in both the north and south well fields in the winter of 1951–52. In regard to the test in the north well field, he says:

> In the north well field a turbine pump was installed on well Wor-Bh 8, and wells -Bh 7 and -Bh 6, lying 248 feet and 888 feet from -Bh 8, respectively, were opened for water-level observation (Ocean City inset map on Pl. 8). A recording gage was installed on -Bh 7, and -Bh 6 was measured. The well field was allowed to recover several days prior to the test. During this time water-level observations were made concurrently with tidal observations so that the water levels obtained in the pumping test could be adjusted for tidal influence.
>
> During the test, the pumped well discharged at the rate of 127 gpm continuously for 19 hours. The discharge was measured by an orifice gage and pressure tube. The greatest drawdowns observed in -Bh 8, -Bh 7 and -Bh 6 were 28 feet, 8.3 feet, and 3.5 feet, respectively.

Toward the end of the test the tidal influence became relatively too great to correct, so the pumping was stopped. Recovery observations were made until the water returned to near-static level. From the drawdown and recovery curves, corrected for tidal fluctuation, the coefficient of transmissibility was computed to be 10,000 gpd/ft. and the storage coefficient was determined as 0.00012.

These three wells, Wor-Bh 6, 7, and 8 are pumped independently by separate turbine pumps, but in the aggregate they mutually interfere. Figure 37 is a schematic diagram of the interference of wells, indicating that the drawdowns

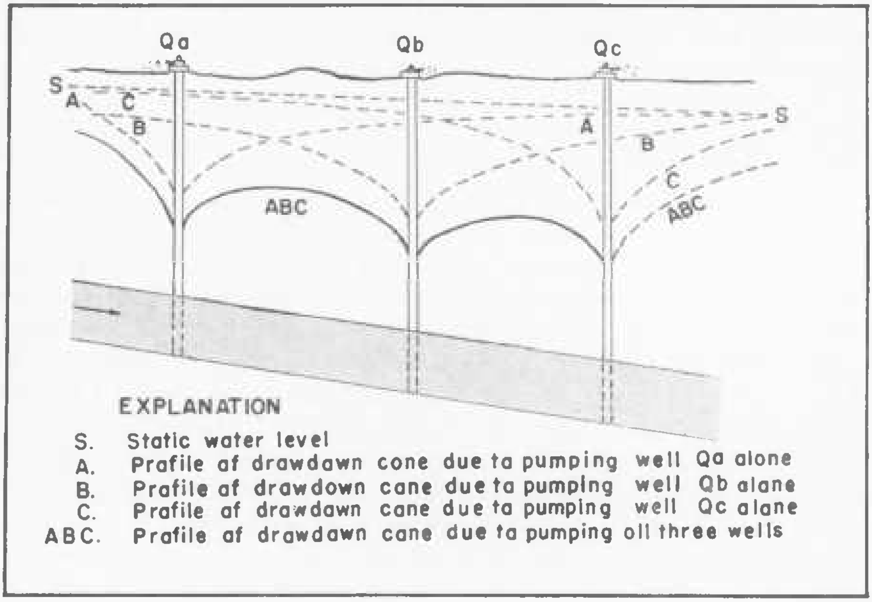

FIGURE 37. Schematic Diagram of the Interference of Wells

are additive, and the influence of the wells upon each other is dependent upon their relative distance apart and the rates and periods of pumping.

In the test in the south well field, a deep-well turbine pump was operated on city well Wor-Cg 5, for 9 hours at an average rate of 143 gpm, until tide-induced fluctuations became relatively so great that they could not be compensated. Well Wor-Cg 8 of the Whaley Ice Co., located about 225 feet from the pumped well, was used as an observation well with a recording gage. Tide and well water levels were observed for several days prior to the test to derive corrections for tide fluctuation. The drawdown in the pumped well was 15.6 feet and in the observation well 4.7 feet at the end of the test. The coefficient of transmissibility was computed to be about 14,000 gallons per day per foot and the coefficient of storage was computed to be about 0.00014. Thus the results of the two tests agree reasonably well.

Unfortunately, the aberrations on the hydrograph, due to the tides, made longer tests impracticable, and the possible effect of the intake area could not be demonstrated. These tidal fluctuations are not believed to be due to the movement of sea water into, and out of, the aquifer itself, even though there may be a subsea salt-water interface about 12 miles to the north where some daily surge occurs. Rather, they represent loading and unloading of the tidal weight upon the land, as the 1- to 6-foot rise and fall in sea level occurs at the beach, in the back-bay, and up the tidal streams. The weight of the incoming tide compresses the confining beds, and presses down upon the aquifer, causing the water levels in wells to rise. On the ebb flow, the confining beds and the aquifer expand, and the water levels in wells fall.

Manokin Aquifer

Princess Anne

The Manokin aquifer at Princess Anne is about 86 feet thick, extending from 137 feet to 223 feet below sea level. It is a gray medium to fine sand with shell fragments (log Som-Be 50). The aquifer is illustrated on the map, figure 20, and in the generalized cross section, Plate 5. The intake belt crosses western Wicomico County, the nearest edge being 7 miles northwest of Princess Anne.

An aquifer test run April 12, 1954, after a 45-hour recovery, using Som-Be 51, a new city well, as the pumped well, and Som-Be 42, located 1,300 feet south along the railway tracks, as an observation well. The test lasted only 3 hours and 20 minutes, because in that time the water level in the pumped well had fallen to 150 feet below the measuring point (12 feet above the bowls) and the well automatically shut off. Recovery water levels were measured for 1 hour. Drawdown in the observation well was 1.65 feet at the end of the test. The well discharged to the city line through a meter, and discharge was held fairly steady throughout the test at an average rate of 389 gpm.

Several values for the formation coefficients were obtained from different portions of the test curves. The test was too short to indicate boundaries.

To determine longer range values, measurements of water-level drawdown in the observation well were continued for 17 days, to April 29, and the city pumpage, although intermittent, was kept at a constant frequency (about 2 minutes on, 4 off, at 390 gpm), averaging 115 gpm. The coefficient of transmissibility was calculated as about 7,000 gpd/ft. and the coefficient of storage as about 0.0002.

These formation coefficients are small and indicate an aquifer of low permeability in this area. Because of the nearness of the intake belt, pumpage may be sustained, but large-capacity wells should be spaced far apart, preferably 2,000 feet or more. Moreover, it may be found inadvisable to put pumps in service that deliver more than 150 gpm, because of the high initial drawdowns in the pumped well. Effort should be made to develop the pumped well to reduce screen loss. The ultimate safe yield from the Manokin aquifer within the city limits of Princess Anne will not be large, and probably will not exceed 500,000 gpd.

Ocean City

The deepest water-bearing bed in use at Ocean City is the locally-named "285-foot" sand, or Manokin aquifer. The geology is summarized in figures 20 and 36 and Plate 5. The point of intake nearest Ocean City is a deep channel, cut in the Miocene surface along the Delaware line, filled with permeable deposits of the Pleistocene and Pliocene(?) series. The Manokin aquifer is probably in contact with the Pleistocene and Pliocene(?) series, receiving recharge under water-table conditions, between Whitesville and Gumboro, Delaware, about 18 miles northwest of Ocean City.

The Manokin aquifer may be regarded as infinite to the west and southwest of Ocean City, on the basis of records of wells 40 to 50 miles away in those directions. To the south, southeast, and northeast the aquifer probably extends under the ocean, protected by the confining aquicludes of the Yorktown and Cohansey formations(?). To the north, in Delaware, a few well records indicate the probable presence of the aquifer. If the intake belt continues in Delaware on the same strike as in Maryland, it would pass beneath the ocean in the vicinity of Cape Henlopen, about 32 miles north of Ocean City. Therefore, there seems to be no immediate danger of inducing direct encroachment of sea water by pumping at Ocean City, but there may be water of poor quality down the dip east of Ocean City that might migrate up dip in response to pumping.

A test of the Manokin aquifer was made by G. E. Andreasen in December, 1951. Five 6-inch wells, Wor-Bh 1, 2, 3, 4, and 5 (inset map, Pl. 8), in the north well field, on Philadelphia Avenue, between North 13th and North 15th Streets, drilled and screened in this aquifer, produced an estimated 400 gpm pumped on a common suction line. Static water level was measured at about 2 feet below land surface.

A turbine pump was installed on Wor-Bh 1. Wor-Bh 2, located 44 feet from -Bh 1, and -Bh 5, located 150 feet from -Bh 1, were opened for observation; -Bh 2 was measured with a recording gage and -Bh 5 with a tape. Water-level observations were made in the pumped well with an electric tape. The well field was allowed to recover for several days during which period concurrent measurements of the water levels in the wells and at a recording tide station were made to establish factors for a tidal correction.

Well Wor-Bh 1 was pumped at the rate of 195 gpm for 22 hours. Discharge was measured with an orifice gage and open pressure tube. Toward the end of the test the extrapolated tidal corrections became erratic, so pumping was stopped, and recovery measurements were made for a short period. The water-level drawdowns at the end of pumping, were 37 feet in Wor-Bh 1, 10 feet in -Bh 2, and 4 feet in -Bh 5.

The coefficient of transmissibility for this aquifer was computed as 26,500 gpd/ft. and the coefficient of storage as 0.00001. This coefficient of transmissibility is the highest of those obtained at Ocean City. Because there appears to be little danger of salt-water contamination to this aquifer, large-scale pumping developments can be made safely only in it, leaving the smaller capacity wells to pump from the Pleistocene and Pliocene(?) series ("90-foot" aquifer) and the medium-capacity wells to pump from the Pocomoke aquifer ("185-foot" sand) because both of these appear vulnerable to salt-water encroachment.

Snow Hill

During October 2 and 3, 1947, Rex R. Meyer ran several small well capacity and aquifer tests on wells of the city of Snow Hill, Wor-Dd 7 and -Dd 8. These wells are 290 feet deep, and are not equipped with screens. The wells are 45 feet apart.

The Manokin aquifer is tapped about 260 feet below sea level at Snow Hill. The intake area is 20 miles to the northwest (fig. 20). The aquifer may be assumed infinite in other directions.

The initial water level in Wor-Dd 7 was 4.5 feet below land surface and in Wor-Dd 8, 6.0 feet below land surface. Well Wor-Dd 7 was pumped at 122 gpm with a drawdown of 3.9 feet, for a specific capacity of 31 gpm/ft of drawdown; and at the rate of 211 gpm with a drawdown of 6.3 feet for a specific capacity of 33 gpm/ft. Well Wor-Dd 8 was pumped at the rate of 246 gpm with a drawdown of 7.7 feet, for a specific capacity of 32 gpm/ft.

Wor-Dd 8 was pumped at an estimated rate of 275 gpm (based on a drawdown of 8½ feet measured by air line, and on a specific capacity of 32 gpm/ft.) for 2 hours, and the water level in Wor-Dd 7 declined 9.6 feet. Other short-period tests were made on well Wor-Dd 7. From the drawdown and recovery water levels the coefficient of transmissibility was computed about 40,000 gpd/ft.

A coefficient of transmissibility of 40,000 gpd/ft indicates a good aquifer. However, these tests were of short duration, and longer tests may disclose unforeseen boundaries. There is little or no geological knowledge of the Manokin aquifer southeast of Snow Hill, and there may be a transition from sand to clay in that direction. An aquifer test of long duration would provide a better understanding of the potential ground-water development that could be undertaken at Snow Hill.

QUALITY OF GROUND WATER

GENERAL PRINCIPLES

As the aqueous vapor of the atmosphere condenses into water droplets, it absorbs gases. The amount of gas dissolved in rain water is a few parts per million by weight. According to Bunsen (1855) it is composed mainly of carbon dioxide (2 to 3 percent), oxygen (34 percent), and nitrogen (63 to 64 percent). Carbon dioxide acidifies the water slightly, increasing its corrosiveness and its ability to dissolve minerals in the earth. The dissolved oxygen combines with both mineral and organic matter. The nitrogen is generally inert.

As aqueous vapor condenses and falls to earth, minute quantities of other soluble gases and particles of dust in the air are collected and deposited on the surface of the earth. Ammonia, nitric acid, sulfuric acid, and chlorine are collected by rain, the amount varying according to local industrial or volcanic conditions (Clarke, 1924, p. 54). Volcanoes, fumaroles, hot springs, and marshes release gases to the air which are slightly soluble in water. Lightning fixes some of the abundant nitrogen of the air as ammonia. Chlorine, sulfur dioxide, hydrogen sulfide, oxides of nitrogen, and ammonia, in very small but, in the aggregate, probably important quantities, are thus part of the water that falls on the earth.

As water passes through the soil zone and comes in contact with humus, it absorbs substantial quantities of carbon dioxide and organic acids, so that shallow ground waters are apt to be slightly acid (pH less than 7.0). As the percolating water continues its downward travel, it dissolves some of the minerals with which it comes in contact. The mineral composition of the rocks largely determines the chemical character of water in its subsurface journey. Ground water flowing through a limestone will dissolve calcium carbonate and, if present, magnesium carbonate, and be a hard water; water in consolidated igneous or metamorphic rocks will usually be only slightly mineralized.

The variety of sedimentary sands, gravels, silts, clays, shales, and shell or marl beds in the coastal plain sediments influences the type and quality of the ground water in different aquifers and from place to place within the same aquifer. The deeper ground waters generally have more mineral matter in solution than shallow waters, because of the longer time of contact of the water with the minerals and, in some cases, perhaps, because there has not been adequate circulation of meteoric waters to remove the marine or brackish waters that once occupied the aquifers.

In order to evaluate the chemical constituents of a water as a measure of its utility and to make comparisons of different waters, chemical analyses must be made. Water analyses are generally expressed as the number of parts by weight of each constituent in each million parts by weight of water, abbreviated ppm.

The dissolved constituents in water can be divided into two groups of ions. Iron, calcium, magnesium, sodium, and potassium are the most important members of one group, the positively charged metallic ions or cations. Bicarbonate, sulfate, chloride, fluoride, and nitrate are the most common in the other group of negatively charged acidic ions or anions. The chemical analysis of a water is given in parts per million (ppm) of the listed ions. In addition to the ions listed above, other constituents are determined as needed, such as silica, which is generally regarded as being present in nonionic form. For comparisons of different waters in geochemical studies, the analytical results in parts per million may be converted to a form that shows the reaction capacity of the various ions or radicals in the water. Bennett and Meyer (1952, p. 149) point out that this method permits an early detection of salt-water contamination. Tables 35, 36, and 37 list 107 analyses, of which 55 were made by the U. S. Geological Survey; 43 by the Maryland State Department of Health; and 9 by private chemical analysts and others.

Silica

Silica, or silicon dioxide, is the most abundant constituent in the crust of the earth. It is the major constituent of sand and sandstone and occurs in many other rocks. Water dissolves silica only slightly. The average quantity of silica in ground water (Collins, Lamar, and Lohr, p. 5) is less than 30 ppm. In potable or irrigation water its presence is not important. However, silica contributes to the formation of the so-called "permanent" boiler scale in steam-generating units. This hard crust can be removed only with difficulty, being scarcely affected by acids and requiring vigorous mechanical treatment.

Cations or Basic Constituents

Iron

Iron frequently occurs in ground water in concentrations high enough to create a nuisance. Carbon dioxide in the water reacts with iron-bearing minerals to form soluble ferrous bicarbonate, which is colorless in solution. When the water comes in contact with oxygen from the air, the compound is oxidized, carbon dioxide is released, and the iron is precipitated as a red-brown flocculent hydrous ferric oxide.

The U.S. Public Health Service standards for potable and culinary water on interstate carriers allow up to 0.3 ppm of iron (or iron and manganese together). Greater quantities of iron, though not harmful to health, may cause an unpleasant taste and will produce red-brown stains on plumbing fixtures and on fabrics washed in the water. High concentrations of iron in water tend to clog the pipes in household plumbing, especially in the presence of *Crenothrix*, an otherwise harmless bacterium, that releases the iron from solution.

Manganese

Manganese, like iron, is dissolved from the minerals of the aquifer largely by the action of carbon dioxide. It is released also from solution by oxidation and is objectionable mainly because of the black stain it produces. Concentrations of manganese greater than 0.1 ppm are apt to produce stains. Objectionable quantities of manganese are rare in ground waters from the tri-county area.

Calcium and magnesium

Calcium and magnesium cause most of the hardness or soap-consuming capacity of water. These cations, together with anions in equilibrium with them, constitute 60 to 90 percent of the dissolved minerals of hard water (Collins, Lamar, and Lohr, p. 7). Calcium and magnesium are dissolved from minerals or shell beds largely by the action of carbon dioxide. They generally occur in ground water as bicarbonates or carbonates—less frequently as sulfates. Another source of calcium and magnesium in ground waters is sea water. Ground waters contaminated by the intrusion of sea water or drawn from aquifers from which the connate marine waters have not been flushed out are generally high in these constituents and, consequently, are hard.

Sodium and potassium

The effects of the sodium and potassium ions are similar; but sodium is the more important because it is more abundant. Foster (1950) noted that analyses of waters of the Atlantic and Gulf Coastal Plains showed the same carbonate and bicarbonate content at depth as was found in shallower waters. The water had changed from a predominantly calcium bicarbonate water at shallower depths to a predominantly sodium bicarbonate water at greater depths, indicating a replacement of calcium by sodium through the action of base exchange. High concentrations of sodium and potassium are found in sea water and related brines. Sodium and potassium occur in many common minerals, such as mica and feldspar, and the weathering of these minerals produces soluble compounds which are readily leached out.

Moderate quantities of sodium and potassium have no effect upon the usefulness of water for most purposes. However, large quantities induce foaming in boilers, and very large quantities render the water unsuitable for human consumption. Moderate to high percentages of sodium render water unfit for irrigation, because of its adverse effects on the soil.

Minor metals—aluminum, zinc, lithium, and copper

These metallic ions are sometimes found in ground water, but usually in very small amounts. They are trace elements, the effects of which are little understood at present. They may play a significant role in the physiology of human beings. That they play a role in the physiology of plants has been established.

Anions or Acidic Constituents

Carbonate and Bicarbonate

Carbon dioxide in ground water is present almost entirely as the bicarbonate radical (HCO_3) and as free carbon dioxide (CO_2); in places, a water may contain the carbonate radical (CO_3). Bicarbonate is the chief anion in most of the ground waters of the tri-county area except in those affected by salt-water contamination. The bicarbonate and carbonate are often reported as alkalinity which is expressed as calcium carbonate ($CaCO_3$). Because the principal hardness-forming cations, calcium and magnesium, are often in combination with carbonates and bicarbonates, the computed hardness of a water is also reported as calcium carbonate.

Sulfate

Sulfate is present in most ground water in the tri-county area in small quantities. Sulfate in hard water contributes to the formation of scale in boilers and hot-water systems. It is precipitated chiefly as calcium sulfate.

Chloride

In general, only minor amounts of chloride salts are present in ground water except in zones of salt-water contamination. If chloride is present in excess of a few hundred ppm, the water will have a salty taste.

An acceptable water for public water supply, according to the U. S. Public Health Service standards (1946), may contain up to 250 ppm of chloride. If water has large quantities of chloride, calcium, and magnesium, it may be corrosive.

Fluoride

Fluoride is present in many ground waters, but generally in small amounts. Health studies show that fluoride in amounts up to 1 ppm affects the development of children's teeth so that they will later resist decay (Dean, 1938). Continued use by growing children of water containing fluoride much in excess of 1.5 ppm, however, will cause a defect known as mottled enamel (Dean, 1936). Many cities have artificially added up to about 1 ppm of fluoride to the drinking water as an aid to development of children's teeth.

Nitrate

Small quantities of nitrate occur in most ground waters and have no significant effects upon the usefulness of the water. Oxidation of some forms of organic matter in the soil forms nitrate. The presence of nitrates in unusually large quantities (more than a few ppm) may indicate organic pollution of the ground water, especially in shallow wells. Sometimes high nitrate is due to the use of nitrate fertilizer on the fields rather than to pollution. Large concentrations of nitrate (45 ppm or more) in drinking water may be injurious to the health of infants, causing cyanosis ("blue baby") (Maxcy, 1950).

Phosphate

Very small quantities of phosphate are occasionally found in waters of the Eastern Shore. It probably has little effect upon the usefulness of the water.

Common source of phosphate is the mineral apatite. Carbonate waters take the phosphate into solution to form phosphoric acid which eventually is absorbed by living organisms and deposited as animal remains. Phosphates of iron associated with sedimentary limonite are common (Clarke, 1924, p. 523, 524). The use of phosphate fertilizers occasionally raises the phosphate content of water in shallow rural wells.

Dissolved Solids

The dissolved-solids content is the total quantity of dissolved mineral matter in a water. It is determined by evaporating a sample to dryness and weighing the residue. The U. S. Public Health Service (1946, p. 383) does not recommend waters containing more than 500 ppm of dissolved solids for public water supply; however, a dissolved-solids content up to 1,000 ppm is permitted if better water is not available.

Turbidity, or Suspended Solids

Turbidity is seldom of importance in ground-water supplies if the wells are properly developed. Unpleasant turbidity may sometimes be reduced by cleaning wells or it can be eliminated by filtration.

Hardness

The hardness of water may be defined as its soap-consuming capacity. The harder a water is, the more soap is required to make a satisfactory lather and the greater is the formation of soap curds. Hard waters form insoluble deposits (boiler scale, etc.) when heated or evaporated. Hardness in natural waters is caused primarily by the salts of calcium and magnesium. Other constituents such as iron, aluminum, strontium, barium, zinc, and free acid also cause hardness but are seldom found in natural waters in sufficient quantities to have much effect on the total hardness. Hardness is reported as the amount of calcium carbonate equivalent to all the calcium, magnesium, and other constituents that cause hardness (Collins, Lamar, and Lohr, p. 11). Calcium and magnesium equivalent to the bicarbonate in water cause carbonate hardness; other constituents, chiefly calcium and magnesium sulfate, cause noncarbonate hardness. Carbonate hardness is roughly equivalent to the term "temporary hardness," formerly used to designate that part of the hardness that could be removed by boiling because calcium bicarbonate is broken down by heat and precipitated as calcium carbonate. The portion of the hardness that could not be so improved was called "permanent hardness," which is roughly equivalent to the noncarbonate hardness. Table 30 gives the hardness scale used by the U. S. Geological Survey (Collins, Lamar, and Lohr, p. 17, 18).

pH

The acidity or alkalinity of a water is expressed by its pH value. Mathematically, the pH is the logarithm of the reciprocal of the gram ionic equivalents of hydrogen per liter of water. A neutral water has a pH value of 7.0, an acid water less than 7.0, and an alkaline water greater than 7.0. In general, the shallow ground waters are slightly acid, pH 5.5 to 6.5, due to organic acids and, especially, carbonic acid (H_2CO_3) from the soil. The waters from marl and shell beds are alkaline, pH 8 to 9.

Temperature

The water from wells up to a few tens of feet deep shows a seasonal fluctuation in temperature which decreases rapidly with depth, and its temperature averages about the same as the mean annual air temperature. The temperature

TABLE 30

Classification of Hard and Soft Waters

Hardness ranges (parts per million)	*Description of water*
0– 60	Soft water.
61–120	Moderately soft to moderately hard water.
121–180	Hard water.
over 180	Very hard water.

of water from wells at greater depths does not vary more than a degree or two. Below a depth of a few tens of feet the temperature of ground water increases at a relatively constant rate with the depth from which the water is derived. Bennett and Meyer (1952, p. 173, 174) found there is an increase of about 1°F for each 60-foot increase of depth in the Baltimore area.

The temperature of the water in well Wi-Ce 105, which is 43.9 feet deep and has an average annual water level of 28.6 feet below land surface, averaged 60°F in August, 1953, and 59°F in December, 1953. Tables 35, 36, and 37 show the recorded temperatures in wells of different depths, and Tables 38, 39, and 40 show some temperatures in the remarks column.

QUALITY OF THE WATER IN THE WATER-BEARING FORMATIONS

Figure 38 compares the average contents of iron, bicarbonate, chloride, hardness, and dissolved solids in the analyses of water samples from the aquifers in Somerset, Wicomico and Worcester Counties. Figure 39 shows the range in pH in the analyses. The locations of the wells from which the samples were obtained are shown in Plate 11. It shows that the area is not covered with an equal analytical density, nor are the aquifers, and therefore the averages are

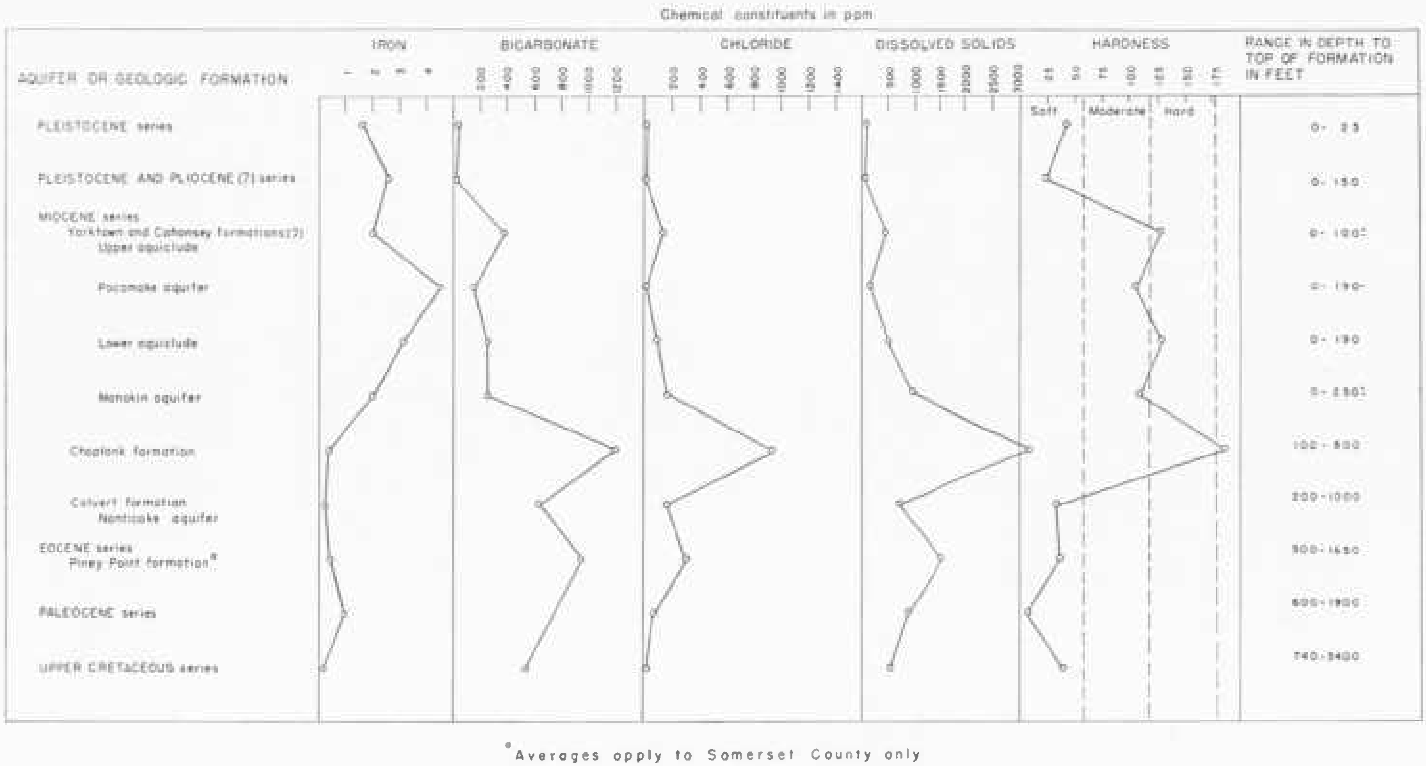

FIGURE 38. Average Parts Per Million of Iron, Bicarbonate, Chloride, Hardness and Dissolved Solids in the Aquifers of Somerset, Wicomico, and Worcester Counties

localized rather than representative. However, the data do show approximate values and comparative trends within each aquifer and from aquifer to aquifer.

PLEISTOCENE AND PLIOCENE(?) SERIES

Average values indicate that the waters of the Pleistocene and Pliocene(?) series are relatively high in iron (2.1 ppm), low in chloride (18 ppm), very low

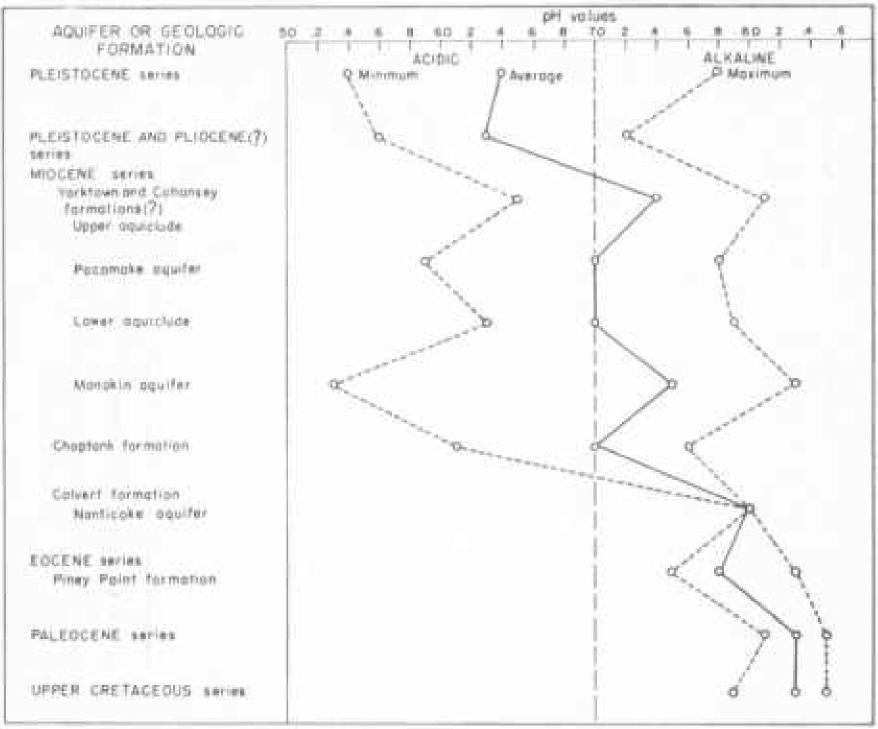

FIGURE 39. Minimum, Average, and Maximum pH Values in the Aquifers of Somerset, Wicomico, and Worcester Counties

in bicarbonate (24 ppm), and low in dissolved solids (90 ppm). They are soft and slightly acid.

MIOCENE SERIES

Yorktown and Cohansey Formations(?)

Upper aquiclude

Infrequent thin stringer sands in the upper aquiclude of the Yorktown and Cohansey formations(?) yield water with a rather high average iron content of 2.0 ppm. The average chloride content is moderately high, 143 ppm, and the dissolved solids are high with an average of 491 ppm. The waters are very hard and alkaline. The average bicarbonate content of 387 ppm is moderate for this area. Analyses of water from the upper aquiclude were made from Worcester County only.

Pocomoke aquifer

The Pocomoke aquifer, used principally in Somerset and Worcester Counties, yields waters with a high average iron content of 4.5 ppm. The average chloride content is moderate (19 ppm), the average bicarbonate content is 149 ppm, and the average dissolved solids are relatively low, 187 ppm. The waters are moderately soft to moderately hard and predominantly alkaline.

Lower aquiclude

Occasional thin stringer sands in the lower aquiclude yield water to small domestic wells. The average iron content is high, 3.1 ppm, although in some of the analyses iron is low. The average chloride content is moderately high, 105 ppm. The waters are very hard, 127 ppm. The average bicarbonate content is moderate for waters of this area, 248 ppm. The content of dissolved solids ranges from 88 to 1,080 ppm, with a high average of 614 ppm. The average pH value is 7.0, a neutral water. Analyses for the lower aquiclude include samples from Somerset and Wicomico Counties.

The quality of water in the upper and lower aquicludes is similar except for the dissolved solids. The lower aquiclude has a somewhat higher average of total dissolved solids, which is to be expected for deeper waters.

Manokin aquifer

The Manokin aquifer is the most widely used artesian aquifer in the tri-county area and is the principal aquifer in Somerset County. The average iron content for the area is high, 1.97 ppm, but in Somerset County it is only 0.44 ppm. The average chloride content is 173 ppm; but the water from two wells in the Westover area has an extremely high chloride content, perhaps due to intrusion of water from the bay. Omitting these two wells, the average chloride content is about 126 ppm. The water from Somerset County has a higher average chloride content than that from Wicomico and Worcester Counties. The bicarbonate content is moderate, 258 ppm. The average dissolved-solids content is very high, 976 ppm, which is near the tolerable limit for potable water. The water is moderately hard to hard and alkaline.

Choptank Formation

The Choptank formation is tapped in the north Crisfield area by a few wells. The water from this aquifer is perhaps the least potable taken from wells in the tri-county area. The average iron content, however, is relatively low, 0.35 ppm.

Except for the water from the Piney Point formation of Eocene age flowing from the Isle of Wight well (Wor-Bg 10) in Worcester County, the Choptank yields water with the highest average chloride content in the area, 1,940 ppm. Bicarbonate, a high content of 1,200 ppm, is reported in only one analysis. The average dissolved-solids content is 3,180 ppm. This water is the hardest ground water in the area. It is alkaline.

Calvert Formation

Nanticoke aquifer

The Nanticoke aquifer, identified only in western Wicomico County and developed to a minor degree, yields water with an average low iron content of 0.22 ppm. The average chloride content is moderately high, 162 ppm. A single analysis for dissolved solids shows 734 ppm. The water is soft and alkaline. The average bicarbonate content reported in two analyses is 637 ppm.

EOCENE SERIES

Piney Point Formation

Analyses of water from the Piney Point formation are limited to three wells, Som-Cc 1 at Rumbley and Som-Bb 1 in western Somerset County, and Wor-Bg 10 at Isle of Wight in eastern Worcester County. The results are:

	Somerset	*Worcester*
Iron	0.34	17.0
Chloride	311	2565
Hardness	35	615
Bicarbonate	948	372
Dissolved solids	1540	—

Analyses of the water from the Isle of Wight well did not include dissolved solids but they are probably very high. Water from the wells is alkaline.

Well Wor-Bg 10 has been in existence since 1914 and its water was once bottled and sold for medicinal purposes. The water was analyzed about that time and the results published by the Maryland Geological Survey in volume 10, 1918. The recent chemical analysis (Table 37) reveals that little change has taken place in the chemical composition of the water in 40 years, though many million gallons of water have flowed from the well in the intervening time.

PALEOCENE SERIES

The water from rocks of Paleocene age, pumped only at Crisfield for municipal supply, is low in iron, moderate in chloride, very soft, and alkaline, and high in dissolved solids. The highest fluoride content, 5.6 ppm, reported from the tri-county area was found in this water.

UPPER CRETACEOUS SERIES

Water from a formation of Late Cretaceous age is produced only in Somerset County. It has the lowest contents of iron and chloride of the deeper waters. It is relatively high in dissolved solids, soft, and very alkaline. The average bicarbonate content is 535 ppm. The water is rather high in fluoride, ranging from 1.4 to 3.0 ppm.

SUMMARY

Iron

The average iron content is highest in the water from the Pocomoke aquifer. That from the Manokin aquifer shows the second highest iron content except in Somerset County where the average iron content is low. The waters from the Pleistocene and Pliocene(?) aquifers are next in order of iron content. From the Choptank formation downward to the Upper Cretaceous series, the average quantity of iron in the water is low, the deepest aquifer having the lowest average iron content of all.

Chloride and Dissolved Solids

The chloride and dissolved-solids contents parallel one another in trend (fig. 38). This is because the highly mineralized ground waters of the area are connected in some way with marine conditions; however, the ratio of amounts of chloride to dissolved solids varies. The Pleistocene and the Pleistocene and Pliocene(?) aquifers in areas distant from tidal marshes have the lowest combined average chloride and dissolved-solids content of all the aquifers.

Hardness

The Pleistocene and Pliocene(?) aquifers and the aquifers below the Calvert formation yield soft waters. The waters from rocks of Miocene age are predominantly hard, probably owing to the relatively abundant shell and marl beds through which they move. The general softness of the waters of the deeper aquifers may be due to base exchange of calcium and magnesium for sodium.

pH

The trend is definitely from acid waters in the shallow aquifers to alkaline waters in the deeper aquifers (fig. 39).

SPECIAL PROBLEMS OF WATER QUALITY

SALT-WATER CONTAMINATION

The relation of fresh ground water to salt water was studied by Ghyben (1889, p. 21) and by Herzberg (1901). Their conclusions were based on the assumption of hydrostatic equilibrium between salt and fresh water, although complete equilibrium would probably be rare. Subsequently Hubbert (1940, p. 924–926) and Krul and Liefrinck (1946, p. 15–17) showed that the principles of Ghyben and Herzberg apply to moving fresh and salt water only if they are in a state of dynamic equilibrium. The Ghyben-Herzberg rule is that the distance to the fresh and salt water equilibrium zone below sea level is inversely proportional to the difference in specific gravities of the two waters. Thus, if the average specific gravity of sea water is 1.025 and that of fresh water is 1.000, the contact will be 40 times, $\frac{(1.000)}{(0.025)}$, as far below sea level as the static head of the fresh water is above sea level. To illustrate: if, in an artesian aquifer underlying a salt water body, the water table at the outcrop zone were 20 feet above sea level, the depth to the contact between fresh water and salt water would be 800 feet below sea level, if the salt water had a density of 1.025. If the salt water has a specific gravity of less than 1.025, the contact of the fresh and salt water would be deeper.

Manokin Aquifer

An isochlor map of the Manokin aquifer (Pl. 11) shows a trend of increasing chlorides from Salisbury to Crisfield. Further study is necessary to determine whether the high chlorides are residual within the formation or are due to artificially induced or natural encroachment of salty water into the aquifer from higher or lower salty aquifers. The Manokin aquifer and the Choptank formation both crop out under the saline water (about 15,000 ppm chloride) of the lower Chesapeake Bay, thus creating the possibility of salt-water contamination down dip in the aquifer. The overlying Pocomoke aquifer has been tested for chloride at only three localities, two of which are just north of Crisfield with analyses of 21 and 33 ppm. Consequently, in the Crisfield area, at least, the Pocomoke aquifer does not contribute to the high chloride content of the Manokin.

An unusual condition exists at Westover, Somerset County, where five wells within a few hundred feet of each other and apparently all drawing from the Manokin aquifer yield water with chloride contents ranging from 6 ppm to more than 790 ppm. Perhaps this situation can be linked to old wells drilled deep to the saltier aquifer in the Choptank formation and not adequately sealed, thus allowing contamination of the higher aquifer. It could be due to thin salt water tongues that have migrated inland in the Manokin aquifer, but this is considered unlikely. Another possiblity is that a part of the Pocomoke aquifer which lies near the surface at Westover may have been contaminated by salt-water intrusion from the nearby estuaries and that this contaminated water is finding its way into some of the wells through leaks in the casings.

In the Manokin aquifer the salt-water front is roughly perpendicular to the strike of the aquifer. Perhaps the great expanse of higher land to the north and northeast furnishes enough fresh-water head to the Manokin aquifer to ward off or stabilize the salt front. Periodic analyses of water should be made to determine whether or not the salt-water front is migrating inland to the north and northeast. Extreme caution should be exercised to avoid heavy concentrated pumping from the Manokin. Such pumping would create a deep wide cone of depression which might induce rapid migration of the salt water inland. Salt-water contamination of the Manokin aquifer is potentially a serious threat to future production from that aquifer. Additional geologic, hydrologic, and chemical studies are needed to determine the controlling factors so that the future use of the aquifer may be wisely planned.

METHODS OF WATER TREATMENT

Water for public water supply and industrial use should be moderately soft, low in dissolved solids, and neither strongly acid nor strongly alkaline. Public ground-water supplies are purified by various methods when necessary. The kind and amount of treatment depend on the quality of the raw water.

Municipal and Industrial Supplies

Aeration

Water is mixed with air by splashing over baffle plates, spillways, or coke beds, or by being sprayed into the air through nozzles, and collected in settling basins. Ferrous iron in the water is oxidized to the insoluble ferric form which is precipitated, odors are removed, the corrosiveness of the water, caused by carbon dioxide and other gases, is reduced, and the pH value is raised.

Sedimentation

In some instances suspended matter is removed from water by the simple gravitational process of settling in large basins. A coagulant may be added which causes the very fine suspended material to flocculate and settle out of the water.

Filtration

Solid material suspended in water can be removed by the use of filters, which are generally made of sand and gravel but sometimes of diatomite. Filtration can be slow, through large filter basins; or rapid, filtering thousands of gallons of water per day through each square foot of filter. Rapid sand filters may be of two general types, open or closed, and operated under pressure. Both types require frequent cleaning and careful attention, whereas slow sand filters may be operated for long periods without attention. A coagulant, such as aluminum sulfate, is generally used with rapid sand filters to produce flocculation and hasten the process.

Water softening

Water can be softened in a number of ways but the two principal methods are by the addition of chemicals or passage through a softening filter. The best method will depend upon the quality of the raw water and the required degree of softening. Softening chemicals frequently added to the water are lime and soda ash, which precipitate the calcium and magnesium carbonates and raise the pH value. The addition of softening agents requires careful chemical control and generally filtration after the additions have taken effect. Natural or synthetic zeolite filters absorb calcium and magnesium by base exchange and replace them with sodium. They can be restored or recharged by the addition of common salt. The zeolite filters require less expert and constant attention than the lime and soda ash treatment.

Iron removal

Cowser (1951, p. 504–505) lists seven methods for elimination or reduction of the iron content of water approved by the Illinois Department of Health. Their effectiveness varies with the type of water. The selection of a suitable method of iron removal may depend also upon what other treatment the water requires. The methods are:

1. Coke-tray aeration, retention, and filtration reduces iron below 0.2 ppm.
2. Contact filters.
    a. Gravity filtration through anthracite coal.
    b. Gravity filtration, with removal of gases from the filter by suction, reduces iron below 0.2 ppm.
3. Pressure aeration.
4. Base exchange using zeolite material.
5. Catalysis materials.
6. Lime softening, remarkably effective.
7. Sequestration, using hexametaphosphates direct to the wells, to prevent precipitation of iron in the distribution system.

Private Water Supplies

The necessity for constant expert supervision renders some of the water treatment methods used on large supplies unsuitable for small household supplies. A number of commercial iron-removal and water-softening units employing zeolites are available. They are effective on many types of water, easily adapted to domestic water-distribution systems, and are widely used. Zellar and Sorrels (1942) designed an inexpensive and simple method for iron and carbon dioxide removal using graded gravel and limestone as the filter medium in a tank ranging from 12 to 20 inches in diameter, the maximum diameter producing up to 8½ gallons a minute. The method is well adapted to domestic and farm use. The cost to build such a unit (in 1942) was estimated under $50.00.

The system must be cleaned regularly by backwashing, but it is necessary only at intervals of 6 months to a year. The limestone must be replaced as it is used up.

FLUORIDE AND FLUORIDATION

Available water analyses of the tri-county area show that fluoride is present in practically all the aquifers. The minimum, maximum and average fluoride contents of the aquifers tested are:

	Number of analyses	*Parts per million*		
		Minimum	*Maximum*	*Average*
Pleistocene series	1			0.2
Pleistocene and Pliocene(?) series	6	0.1	0.2	.15
Yorktown and Cohansey formations(?)	3	.1	.4	.23
Pocomoke aquifer	8	.1	1.2	.31
Manokin aquifer	6	.1	.5	.23
Choptank formation	1			.7
Nanticoke aquifer	1			1.0
Paleocene series	1			5.6
Upper Cretaceous series	5			2.76

The areas producing from aquifers high in fluoride are in Somerset County. Smith Island has been using water from the Upper Cretaceous since 1945, and Crisfield produces water from the Calvert and Piney Point formations, from the Paleocene series, and from the Magothy formation. One well (Som-Ec 4) at Crisfield, screened opposite the Calvert, Piney Point, and Magothy formations, tested 1.8 ppm of fluoride. A high fluoride content can be lessened by mixing with water of low fluoride content if available.

The presence of fluoride in proper quantity is effective in prevention of tooth decay. The optimum quantity appears to be about 1 ppm. Many municipalities now add fluorides to their water to bring the concentration up to 1 ppm. On the other hand, concentrations above 1.5 ppm may cause mottling of children's teeth (Dean, 1936, 1938).

WASTE DISPOSAL

Some surface water is contaminated by bacteria harmful to man, and some of this water percolates through the ground downward to the water table. Direct sources of such contamination are cesspools, septic tanks, pit privies, leaking sewers, barnyards, and garbage heaps. The U. S. Public Health Service (1950, p. 12) states that bacteria will not penetrate very far below the water table; therefore, a cased well that extends considerably below the lowest seasonal position of the water table will be less likely to be contaminated than one not so protected. It is preferable to have a layer of clay, shale, silt or even a silty or clayey sand between the contaminated water-table level and the level from which the well draws its water. When subsurface conditions necessitate it, drillers drive a tightly fitting outer casing down to the subsurface sand, thus effectively sealing off any undesirable water-table water that might filter down along the outside of the producing casing.

The U. S. Public Health Service (1950, p. 14–16) has made the following recommendations regarding location of wells with respect to sources of pollution: 50 feet from pit privies, septic tanks, sewers, and subsurface pits; 100 feet from seepage pits, subsurface sewage disposal fields, and barnyards; 150 feet from cesspools. These are minimum distances in fine-grained materials. In coarse sand and gravel or in fractured rocks, greater distances may be essential.

A well, particularly a water-table well, should be located, if possible, where the water table (and, generally, the land surface) is higher than the area of contamination. If the water-table well is pumped heavily, however, a wide and deep cone of depression may form, reversing the natural movement of water and drawing in contamination.

WELL CLEANING

Well owners on the Eastern Shore often are faced with the need of a new well because the old one has ceased to produce, primarily because of screen trouble. When possible, industries with large diameter wells have the old screen removed and a new one installed. The screen can deteriorate because of corrosive action of water, necessitating a new screen or a new well. If the screen has not become corroded but is only encrusted or plugged by mineral matter (silt, clay, or iron deposits) it is possible to renovate it by mixing buffered acid with the water in the well. The acid is allowed to stand for a time and then the mixture is surged in the well. Dry ice has been used to create high underwater pressure to force the encrustation out of the screen opening, but the degree of success of this method is not known.

The glassy phosphate sodium hexametaphosphate, also called sodium polyphosphate, is a popular and effective chemical for cleaning wells. It is easily obtained, safe to handle, and relatively inexpensive. The phosphate deflocculates small particles of clay, silt, calcium carbonate, metal oxides, and salts on the screen and in the surrounding producing area (Caplan, 1953, p. 8, 9). If, however, a screen is clogged by fine sand, chemical treatment is not applicable. The procedure for cleaning wells with this chemical is relatively simple. Commercial manufacturers of the chemical recommend how much of a charge to use in relation to size and depth of well. A general rule (Caplan, 1953, p. 11) for initial charges is 15 to 30 pounds of the chemical and 1 to 2 pounds of calcium hypochlorite for each 100 gallons of water in the well under static conditions. The chemicals are poured into the well, allowed to remain for 24 to 48 hours, and surged periodically during that period. The procedure is repeated until no further improvement results.

Ground-Water Resources of the Salisbury Area

BY

REX R. MEYER AND ROBERT R. BENNETT

NOTE

A major part of the Salisbury report by Meyer and Bennett was devoted to detailed descriptions of a series of pumping tests, principally at the well field of the Salisbury public supply. In order that all the pumping-test material might be in one place and to avoid duplicating the discussions of pumping-test theories, that part of their report is included in the section on aquifer tests.

The Salisbury report contained the usual tables of basic data such as analyses of water and well records and logs. The data from these tables have been incorporated in the similar tables in this report.

Figures 29, 30, 34 and 35 and Plates 9 and 10, and the inset (piezometric map) in Plate 7 were taken from the Salisbury report.

The sections of the Salisbury report that deal with ground-water recharge and ground-water conditions in the Salisbury area have been adapted for presentation in the following sections by Henry C. Barksdale, staff engineer.

Description of the Area

The Salisbury area, as the term is used here, comprises about 55 square miles. The city of Salisbury is in the center of the area (Pl. 7). The area is characterized by a nearly flat to gently rolling land surface that ranges in altitude from sea level to about 60 feet above sea level. Most of the area is within the Wicomico River drainage basin. The Wicomico River is affected by tides from its mouth to Salisbury where tidewater dams have been constructed on Beaverdam Creek and the Wicomico River. Several ponds have been formed in the area by dams across tributaries of the Wicomico River.

Although locally clay, or sandy clay, is present at the surface, most of the Salisbury area is underlain by a sandy permeable soil. The shallow ground water occurs under water-table conditions. The water in this aquifer originates largely from local precipitation, part of which passes through the soil zone and enters the body of ground water, after which it moves slowly toward the streams, the principal areas of discharge. The depth to the water table below the land surface is dependent, in part, on the amount, intensity, and distribution of the precipitation, the permeability of the sediments, the proximity of the areas of discharge, and the evapotranspiration from the soil and from the water table. In general, the depth to the water table is less than 25 feet below the land surface, or within the limit of lift of suction pumps.

THE SALISBURY PUBLIC WATER SUPPLY

HISTORY AND DEVELOPMENT

The public water supplies are derived from ground water. The largest public water supply in the area is that of the city of Salisbury. Prior to 1925 the water supply for the city was developed from small wells and well points which were connected in groups to suction pumps. From 1925 to 1936 the Salisbury public supply was obtained from a group of five wells in the municipal park in the southeastern part of the city (wells Wi-Ce 1 to -Ce 5) situated along the City Park Pond within 100 feet of its banks. They are all screened in the Pleistocene and Pliocene(?) red gravelly sand and range in depth from 43 to 61 feet.

Wells Wi-Ce 1 to 5 were drilled in 1925 and are spaced at intervals of about 250 to 300 feet (Pl. 7). They are constructed with 18-inch (inside diameter) concrete casings and screens, which are enveloped in an artificial gravel pack having a diameter of about 38 inches. The wells are connected to a common discharge line so that all wells may be pumped simultaneously by any one of three centrifugal suction pumps which have capacities of 1,000, 1,500, and 2,000 gpm, respectively. The combined yield of the five wells is approximately 1,800 gpm except when the water table is low during periods of low precipitation or after prolonged pumping. In the fall of 1947 when the water table in and near the well field was unusually low because of subnormal precipitation during the year, the combined yield of the five wells decreased to about 1,650 gpm.

The initial capacity of wells Wi-Ce 1 to 5 in 1925, is subject to some uncertainty. One report indicates that their individual capacities ranged from 750 to 840 gpm with a drawdown of 23 feet or less. Another report gave individual yields, presumably at maximum drawdowns, of 950 to 1,500 gpm. The total of the reported individual yields within the limit of suction in 1925 was about twice the combined yield of the wells in 1948. The writers suggested that the yield of the wells might be improved by cleaning the screens. In 1949 an attempt was made to clean the wells by surging and cleaning them out with a bailer, but it resulted in only a slight increase in yield. Later the wells were treated with sodium hexametaphosphate, and it is reported that the yields of at least some of the wells increased substantially.

Three additional wells (Wi-Ce 6 to 8) were drilled in 1936, 1937, and 1945. They are 65, 62, and 66 feet deep, respectively, and are constructed with 24-inch metal casings, 12-inch metal screens, and an artificial gravel pack about 24 inches in diameter. They are spaced 400 to 460 feet apart. Wells -Ce 6 and 7 are on the north side of City Park Pond and well -Ce 8 on the south side. Each of these wells is equipped with a deep-well turbine pump that discharges into a common 14-inch main leading to the meter and aerator. At the time of completion, these three wells were reported to yield 820, 1,200, and 1,050 gpm, respectively. When pumped separately into the main they yield approximately 600, 900, and 1,000 gpm, respectively. The total yield of the three wells when being pumped simultaneously is 2,000 to 2,300 gpm.

The combined capacity of the eight wells furnishing the public supply at the end of 1945 was about 5,000,000 gpd. The average daily consumption of water was about 2,000,000 gpd, but during the summer months when the demand was the greatest it was often necessary to pump the wells at or near their full capacity.

Five additional wells (Wi-Ce 99 and 100, and -Cf 64, 65, and 66) were constructed in 1949. They are situated along the Upper Pond east of the existing well field. Wells Wi-Ce 99, -Cf 64, and -Cf 65 are approximately 50 feet from the north bank of the pond and spaced at intervals of about 500 feet. Wells Wi-Ce 100 and -Cf 66 are on the south side of the pond opposite the other three wells and have similar spacing. These wells are constructed with 17-inch (inside diameter) concrete casing and screen (Pl. 15, fig. 2). Their depths range from 46 to 68 feet. Pumping tests, upon completion of the wells, indicate that the maximum efficient yield of Wi-Ce 99 was 450 gpm; those of Wi-Cf 64 and 65 were 650 and 400 gpm, respectively; that of Wi-Ce 100 was 750 gpm; and that of Wi-Cf 66 was 350 gpm. The combined yield of the five wells is estimated to be 1,800 gpm.

Construction of Wells

In the Salisbury area the domestic wells tapping the Yorktown and Cohansey formations (?) at depths of approximately 100 feet are usually 1½ to 2 inches in diameter and finished without a screen. The casing is set at the base of a clay, or on a thin indurated bed of sand, and an open hole is drilled into the underlying sand. With time the uncased part of the hole and part of the casing may fill with sand, and the yield of the well be reduced. This has caused the flow from wells Wi-Ce 76 and 77 to stop. The flow from well -Ce 78, situated near wells -Ce 76 and 77, resumed when it was cleaned of sand.

Most of the domestic and farm wells in the area tap the unconfined water in the Pleistocene and Pliocene(?) aquifer. These wells are usually of the driven type, 1¼ to 1½ inches in diameter, and are equipped with several feet of screen above the drive point. In general, these wells yield adequate water for domestic purposes; however, in some localities deposits of iron encrust the screens after several years and a replacement well must be driven.

The industrial and public-supply wells in the area are 4 to 24 inches in diameter and constructed with metal or concrete casings and screens. The metal-cased wells are drilled by the percussion, jet, or rotary methods, and the concrete-cased wells are mechanically dug.

Where high-yielding wells are desired it is important to construct a well so that the loss of head due to friction is at a minimum. The velocity of the water in an aquifer increases as the water approaches the well, for it must pass through an ever smaller cross-sectional area. Therefore, the maximum loss of head due to friction is at the periphery of the well. With a discharge of the same quantity of water the loss of head due to friction at the periphery of the well is less in a large-diameter well than it is in a small-diameter well. The increase in yield is not, however, directly proportional to the increase in diameter of the well. With all other factors remaining the same, and assuming that there is no turbulent

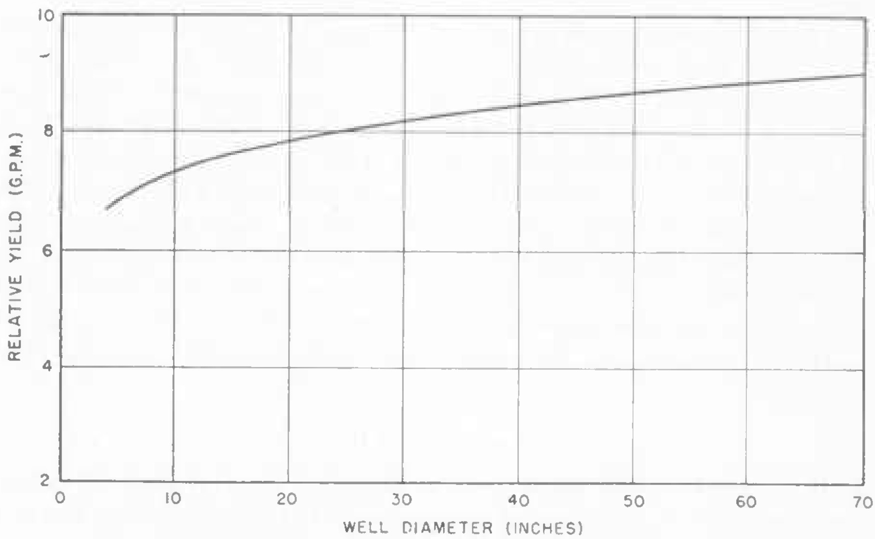

FIGURE 40. Theoretical Increase in Yield with Increase in Diameter of a Well in an Aquifer with a Coefficient of Transmissibility of 100,000 gpd/ft. and Specific Yield of 0.15, Assuming no Loss of Head through Well Screen or Casing, and that there is no Turbulent Flow.

flow, the theoretical increase in yield caused by increasing the diameter of the well from 6 to 24 inches is about 15 percent, for an aquifer having properties similar to those determined at Salisbury. Figure 40 shows the theoretical increase in yield with the increase in diameter of a well.

The greater the intake area of a screen the lower the velocity of the water entering the well. Thus, to keep the loss of head due to friction to a minimum, the screen should be constructed so that for a given aquifer it has a maximum area through which the water may enter the well. In most aquifers the size and distribution of the sand or gravel varies areally; therefore, it is seldom possible to determine the most effective size of the openings (slot size) of a screen prior to the drilling of the well. Screens are manufactured with a wide range in slot opening, and the area of intake may be as high as 50 percent of the total screen area. From a mechanical analysis of the aquifer, the size of slot opening for the screen may be selected to assure the maximum intake area and to allow a certain percentage of the fine sand to enter and be pumped out of the well. The elimination of the finer grains near the screen results in the coarse grains being in contact with the screen openings and, consequently, the intake area of the screen is at a maximum. In the construction of some wells fine gravel is added to the aquifer immediately adjacent to the well to improve the screening action and reduce friction. Such wells are said to be gravel-walled.

The removal of the fine material is commonly referred to as the development of the well. This is accomplished by pumping or surging the well to create velocities high enough to loosen the material near the well and cause the fine particles to pass through the screen. Usually, toward the end of the developing process, the well is pumped at a higher rate than is planned for the completed well, under the assumption that the future velocities will be less and the bridging of the grains at the periphery of the well that takes place during development will not be disturbed.

In March 1949 a pumping test was made by the contractor on well Wi-Cf 35 to determine its maximum efficient yield. This well is 22 inches in diameter and 61 feet deep, and is constructed with concrete casing and a concrete screen (Pl. 15, fig. 2) set from 33 feet to the base of the Pliocene(?) red gravelly sand at 61 feet. A slotted ¾-inch pipe (well P-1) was installed in the gravel pack about 1 foot from the well screen, to enable water-level measurements.

The well was pumped for 4 hours at a rate of 515 gpm, after which the rate of pumping was increased about every 60 minutes until a discharge of 750 gpm, the maximum discharge attainable with the pump, was reached. The well was pumped at this maximum rate for about 4 hours. The pumping level in the pumped well ranged from 31 feet at 530 gpm to 48 feet at 750 gpm (fig. 41). The specific capacity ranged from 20 to 18 gpm for each foot of drawdown (fig. 42), decreasing as the discharge increased. The difference in altitude of the water level in well P-1, just outside the screen in the gravel pack, from that inside well Wi-Cf 35 at different rates of pumping is shown in figure 43. These three diagrams show that the efficiency of the well is greatly reduced beyond a yield of about 700 gpm. For yields beyond this amount the quantity of water delivered becomes increasingly less for each additional foot of drawdown. The differences in altitude between the water level in well P-1 and the pumped well (fig. 43) also indicate that for this well the loss of head due to friction increases greatly between the gravel pack and inside the well at rates of discharge above 700 gpm. Turbulent flow in and around the screen probably begins at about this rate of yield, with the resulting great increase in frictional losses.

Well Wi-Cf 35 is in the Salisbury public-supply well field where the coefficients of transmissibility and storage have been determined by means of pumping tests. Using the values determined from these tests, the theoretical drawdown, in a well having an efficiency of 100 percent (no screen loss), at the end of 1 day pumping at a rate of 750 gpm would be about 11 feet. Consequently, the computed pumping level of well Wi-Cf 35 would be 18 feet. The observed pumping level at the end of ½ day was 48 feet (specific capacity about 16 gpm per foot). It seems, therefore, that the loss of head due to friction in and near the screen has materially decreased the capacity of this well. The intake area of the screen installed in this well was computed to be about 10

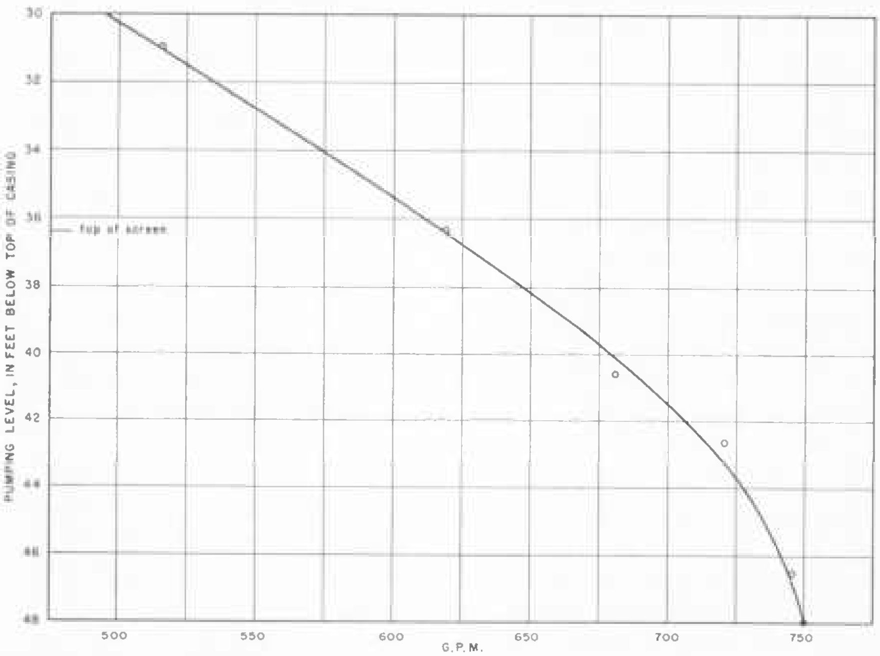

FIGURE 41. Relation of Yield of Well Wi-Cf 35 to Pumping Levels

percent of the total area of screen exposed to the formation. In contrast to this, wells Wi-Ce 7 and 8 (the nearest production wells to Wi-Cf 35) are equipped with screens exposing an area of intake of at least 40 percent. The specific capacities of these two wells were originally 37 and 34 gpm per foot of drawdown. Consequently, it appears that a large part of the loss of head due to friction in well Wi-Cf 35 is caused by the relatively small total intake area of the screen.

Tests similar to that made on well Wi-Cf 35 were made on the four other new production wells drilled for the city of Salisbury in 1949 (wells Wi-Cf 34, 36 to 38). The results on these wells were similar to that described for well Wi-Cf 35.

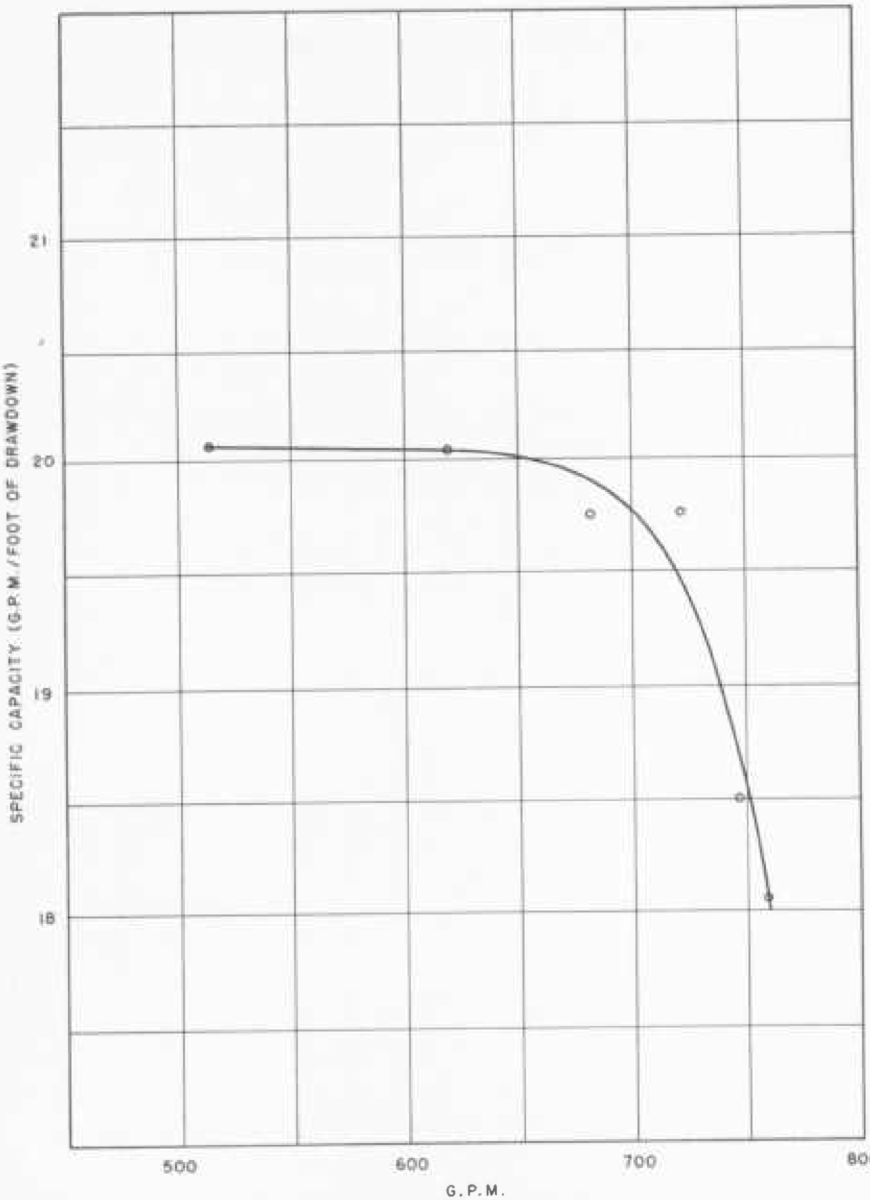

FIGURE 42. Specific-Capacity Curve of Well Wi-Cf 35

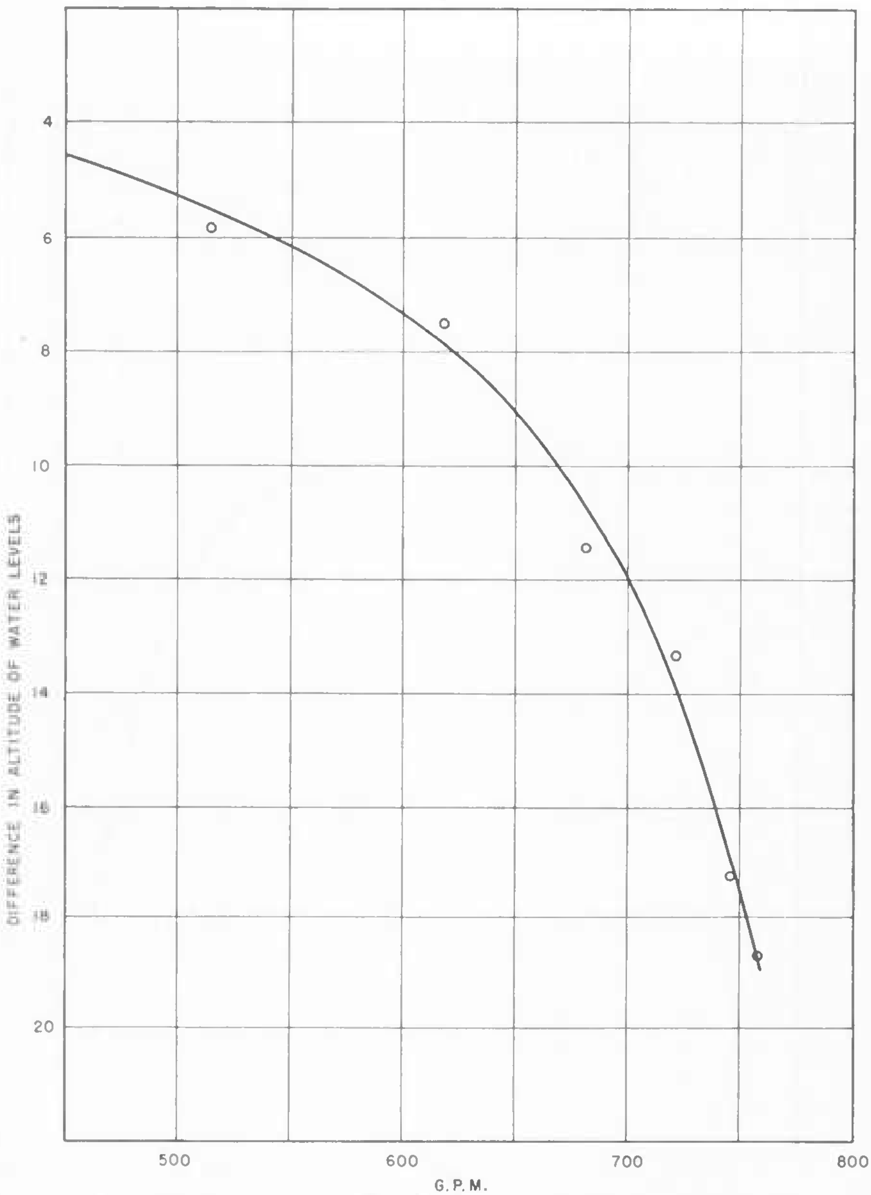

FIGURE 43. Difference in Altitude of Water Levels in Well Wi-Cf 35 and Adjacent Well P-1 in Relation to Yield

Description of the Aquifer

The samples of material taken during the drilling of wells in the Salisbury well field show that the material in the upper part of the Pleistocene and Pliocene(?) aquifer in the Salisbury well field is generally finer grained and

TABLE 31

Mechanical Analysis of Drill Cuttings from Well Wi-Cf 22

(Size in millimeters, quantity in percent)

Depth (ft.)	Granule arger than 2.362	Very coarse sand 1.168 to 2.362	Coarse sand 0.589 to 1.168	Medium sand 0.295 to 0.589	Fine sand 0.147 to 0.295	Very fine sand 0.074 to 0.147	Silt and clay
0–2	1.5	4.0	18.9	53.7	14.3	3.5	2.7
2–4	8.8	6.2	15.9	44.0	17.2	5.8	1.0
4–6	6.1	5.0	14.5	43.0	26.9	2.3	0.3
6–8	11.7	13.3	30.3	34.8	11.2	1.0	0.2
8–10	40.1	13.4	16.5	18.3	9.4	1.0	0.5
10–12	10.8	8.7	23.7	37.3	16.0	2.0	0.5
12–15	20.4	5.8	15.2	34.9	17.7	2.5	3.0
15–18	3.9	3.8	15.4	41.4	26.7	4.4	4.0
18–21	2.5	3.1	11.1	34.8	34.1	9.1	5.9
21–23	2.0	3.7	13.6	30.9	38.3	6.7	3.8
23–26	3.4	12.2	32.4	35.1	12.2	2.4	1.6
26–29	19.5	8.4	20.6	33.5	13.1	2.5	1.9
29–31	5.8	6.9	22.1	33.7	21.6	7.3	1.8
31–33	8.7	8.1	23.0	27.1	24.9	5.7	1.8
33–35	11.5	14.2	28.2	27.0	14.8	2.6	0.9
35–38	0.8	1.4	5.2	67.6	20.9	2.3	2.1
38–40	0.9	2.1	4.6	63.5	23.4	3.4	2.0
40–43	1.8	2.4	5.8	60.2	24.0	3.8	2.0
43–45	9.8	9.1	18.3	40.5	19.4	1.7	1.1
45–47	29.7	10.8	21.4	24.8	9.6	2.7	1.0
47–50	6.6	17.7	40.4	28.2	5.1	0.7	0.7
50–53	27.3	18.3	27.0	21.3	3.1	2.1	0.4
53–55	17.0	12.9	25.8	37.0	4.5	1.2	0.4

less permeable than that in the lower part. Throughout most of the well field the Pliocene(?) red gravelly sand is overlain by varying thicknesses of Pleistocene deposits which may be as thick as 25 feet in some places. The Pleistocene deposits, though generally good water-bearing materials, are not as good as the red gravelly sand.

The mechanical analyses of samples taken during the drilling of test wells Wi-Cf 22 and Wi-Cf 28 are given in Tables 31 and 32. Well -Cf 22 is one of four test wells drilled near the head of Upper Pond in the city park. Well Wi-Cf 28 is one of four drilled near Schumaker Pond, about two miles farther up Beaver-

TABLE 32

Mechanical Analysis of Drill Cuttings from Well Wi-Cf 28

(Size in millimeters, quantity in percent)

Depth (ft.)	Granule larger than 2.362	Very coarse sand 1.168 to 2.362	Coarse sand 0.589 to 1.168	Medium sand 0.295 to 0.589	Fine sand 0.147 to 0.295	Very fine sand 0.074 to 0.147	Silt and clay
0–6	0.0	0.4	5.7	40.2	38.9	7.8	6.3
6–7	0.4	2.5	5.5	23.0	28.8	18.8	20.6
7–10	5.5	3.6	5.3	19.3	41.0	17.3	7.2
10–11	4.0	9.4	7.6	12.7	28.3	18.8	18.2
11–15	0.0	1.2	2.3	14.5	47.9	25.3	8.2
15–15½	73.0	14.1	8.0	3.7	0.2	0.6	0.3
15½–17	2.4	4.5	15.5	22.5	34.6	11.1	9.0
17–22	1.6	8.2	30.1	40.5	14.3	2.7	2.3
22–25	5.7	10.8	28.6	34.9	14.5	2.4	2.1
25–30	33.6	7.4	19.4	23.8	11.4	2.8	1.1
30–33	22.6	6.0	16.5	29.2	17.9	4.2	3.3
33–35	11.2	7.6	20.4	39.2	16.2	2.4	2.3
35–38	3.9	3.2	22.5	47.0	16.4	3.6	2.8
38–41	0.7	4.4	22.5	44.2	21.3	3.5	2.8
41–43	0.6	7.6	29.8	38.7	16.8	2.8	3.3
44–47	11.5	7.0	32.9	33.8	8.1	4.1	1.6
47–49	4.5	13.3	40.7	27.9	10.3	1.8	0.9
49–50	98.4	4.2	1.2	0.1	0.1	0.0	0.0
50–52	53.2	9.4	13.7	16.1	4.5	1.6	0.4
52–55	24.3	13.5	25.9	27.3	6.3	1.1	1.2
55–57	43.1	11.0	24.0	18.0	2.0	0.9	0.4
57–59	71	8.5	10.9	8.1	0.8	0.2	0.3
59–61	14.2	24.6	30.4	24.7	3.5	1.2	1.0
61–63	31.9	14.6	18.0	27.0	6.1	1.3	0.6
63–65	58.2	2.6	10.7	21.7	5.2	1.0	0.5
65–66	89.5	1.4	3.1	4.9	0.9	0.1	0.1
66–68	3.9	5.8	24.7	46.3	13.2	4.8	1.2
68–70	4.7	4.0	20.9	44.7	20.3	3.9	1.2
70–72	9.2	5.3	21.2	39.6	20.8	2.4	1.4
72–74	15.3	5.5	18.5	38.5	18.7	1.9	1.3
74–77	0.4	0.3	0.6	3.8	72.2	19.3	3.0
77–80	5.7	9.3	18.9	16.7	36.5	10.5	1.9
80–83	28.6	16.0	21.2	13.3	14.4	4.8	0.9
83–85	32.7	26.0	20.0	8.8	8.4	3.5	0.5
85–87	10.8	14.2	35.6	27.7	8.3	2.5	0.7
87–89	20.6	17.3	31.5	21.2	3.4	4.6	0.5
89–91	12.1	15.7	26.5	16.7	19.2	8.3	1.0
91–93	8.0	7.8	5.8	17.0	17.3	8.4	7.1

dam Creek. In both wells there is a coarse layer near the bottom in the red gravelly sand. Laboratory determinations of permeability were made on samples from the eight test wells. The coefficient of transmissibility computed from these determinations is much lower than those from the pumping tests and consequently is not considered reliable. The results provide another means of comparing the sediments at different levels in the holes. Figures 44 and 45, showing the relative permeabilities at different levels in the eight test holes Wi-Cf 22–25 and 28–31, indicate a trend toward greater permeabilities near the bottom of the holes. Nevertheless, the relative difference in permeability is not great, and for most practical purposes the entire section (Pliocene(?) red gravelly sand and Pleistocene deposits) may be considered a single aquifer in the Salisbury area.

Recharge of the Aquifer

Recharge from precipitation

Many factors control the rate and amount of water that reaches the zone of saturation. Chief among these are the amount and frequency of precipitation, tillage, permeability of the soil, form of the land surface, and soil moisture. In the Salisbury area the precipitation is rather evenly distributed through the year; consequently there is usually no extended period in which the aquifer does not obtain water through recharge from precipitation. The soil in the Salisbury area is sandy and, therefore, sufficiently permeable to allow relatively large quantities of water to enter the ground. The permeability of this type of soil is not affected by tilling as much as a clayey soil; consequently, tillage in the area probably does not materially reduce recharge. Another factor favoring recharge in the area is the relatively flat land surface, which retards surface runoff and allows a maximum time for infiltration.

One of the greatest barriers to uniform seasonal recharge is the lack of moisture in the soil zone during the growing season. Water is withdrawn from the soil by plants and by evaporation and, consequently, a soil-moisture deficiency is created between periods of precipitation. During extended dry periods this deficiency increases greatly as plants continue to draw upon the available supply. Before substantial ground-water recharge can take place this moisture deficiency must be satisfied.

In areas where the water table is below the bed of a stream the ground water may be recharged from the stream. Gaging stations may be established on such influent streams, and the amount of water lost between the stations be measured. However, where the losses are small in proportion to the total streamflow, the accuracy of the measurements limits the accuracy of this direct method.

If the specific yield of the zone in which the water table fluctuates is known, the recharge may be estimated by the rise of the water table caused by water entering the zone of saturation. Even if the above requirements are determined accurately, the amount of recharge computed will be less than the total recharge, for as the water table rises the natural discharge continues, at an increased rate; consequently the rise indicates only the increase of recharge over discharge.

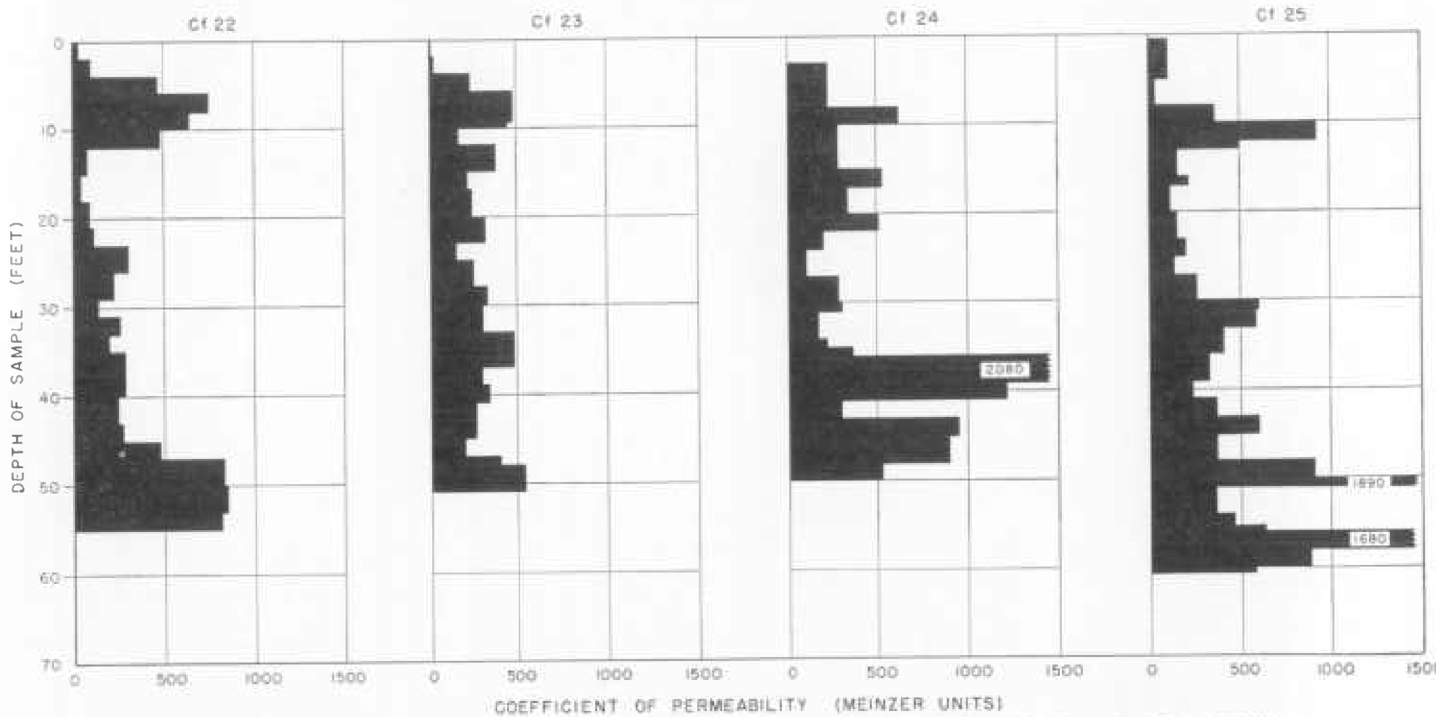

FIGURE 44. Permeabilities Determined in the Laboratory of Samples from Wells Wi-Cf 22 to 25, Upper Park Pond, Salisbury

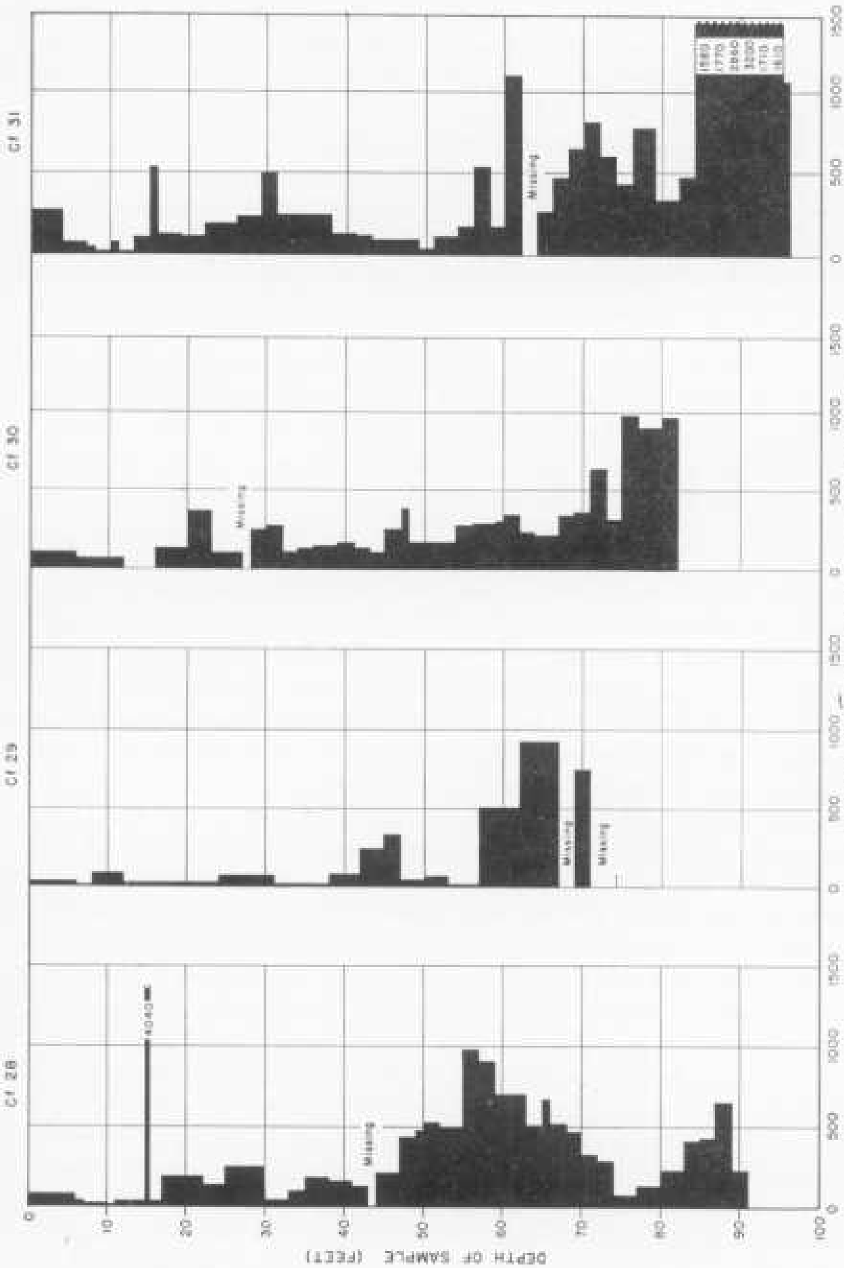

FIGURE 45. Permeabilities Determined in the Laboratory of Samples from Wells Wi-Cf 28 to 31, Schumaker Pond, near Salisbury

The indirect method of determining the amount of precipitation and losses by evaporation, transpiration, and runoff may be used to estimate recharge within a basin. The possibility of errors in determining the precipitation, evaporation and transpiration are so great that this method is generally not considered very reliable.

In areas of little or no pumping, recharge to the aquifer occurs by direct penetration of water from precipitation. Although the conditions for recharge are good, the rate of recharge may vary considerably within an area with equal amounts of precipitation. This areal nonuniformity of recharge, caused chiefly by differences in soil conditions, soil moisture, and topography, introduces errors that may be great if the measurement of recharge is restricted to local observations.

Estimates of recharge based upon fluctuations of the water table require relatively complete instrumentation and a long period of observation. This method was not used during this investigation to make quantitative determinations of recharge because of the lack of adequate time and instrumentation. Such a study made later on the Beaverdam watershed is described on pages 123 to 128.

Even though recharge cannot be determined quantitatively, it is evident from figure 29 that much of the water from precipitation reaches the water table. Figure 29 shows that a rainfall of 5.80 inches in a period of 5 days caused a rise in water level of 4.01 feet.

The most accurate and reliable estimate of recharge to the Pleistocene and Pliocene(?) aquifer in the Salisbury area was obtained from streamflow and precipitation records. The main source of error in estimates made by this method are those caused by determination of precipitation over the area and the method of separating ground-water runoff from total runoff. Streamflow records of Beaverdam Creek measured at the dam on Schumaker Pond, and precipitation records are available since 1930. It is assumed that the average precipitation recorded at the Salisbury weather station during this relatively long period is representative of the amount of water supplied to the drainage basin above the gaging station at Schumaker Pond. The method of separating ground-water runoff from the total flow of Beaverdam Creek, discussed in the section on ground-water discharge, is considered to yield a conservative estimate of the ground-water runoff. The ground-water runoff obtained from the streamflow records is equivalent to what may be called the "effective recharge" of the area or the residue of the total recharge after extraction of water by evaporation and transpiration from the water table. Based on the average monthly ground-water runoff for 158 months, from the water year ended in 1932 to that ended in 1947, the average rate of "effective recharge" was 602,000 gallons a day for each square mile of drainage area, or about 30 percent of the total precipitation.

In some areas in which there is moderate to heavy pumping the effective recharge may be increased. The lowering of the water table caused by pumping from wells may decrease the quantity of water discharged by evapotranspiration.

Recharge from streams and ponds

Recharge may be induced also by pumping that is great enough to reverse the normal hydraulic gradient toward the stream so that water enters the aquifer from the stream. This form of induced recharge is of particular importance in the determination of the "safe yield" of the Salisbury water supply. Prior to the construction of the wells, swampy conditions existed in the area of the Salisbury public-supply well field, and the water table was at or near the land surface. This swampy area has been filled in and the area has been made into a municipal park which includes, among other attractions, two small lakes or ponds, City Park Pond and Upper Pond.

The velocity of the water through the two ponds is low, so that the collection of sediment on their beds to form an impervious layer, especially on the bottom of the Upper Pond which acts as a settling basin before the water enters City Park Pond, might be expected. There was an excellent opportunity during September and October 1947 to determine if the aquifer and the ponds are hydrologically connected. An automatic water-stage recorder was in operation at well Wi-Cf 2, which is at the extreme upstream end of Upper Pond. On September 30 the gates of the tidewater dam forming City Park Pond were removed and the pond was allowed to drain. The dam forming Upper Pond was leaky and the greater difference in head between the two ponds caused by the draining of City Park Pond increased these leaks sufficiently so that the pond level of Upper Pond was lowered. The effect on the water level in well Wi-Cf 2 is shown in figure 46. Soon after the gates of the tidewater dam were removed the water level of Upper Pond started to decline and the water level in Wi-Cf 2 also was lowered. On October 3 the tidewater gates were replaced and, as the level of City Park Pond was raised, the difference in head between the two ponds was decreased until by the end of the 4th the level of Upper Pond and the water level in Wi-Cf 2 began to rise. The rise in water level and pond level continued until the 8th, at which time there was a rainfall of 1.80 inches which caused the pond level and water level in well Wi-Cf 2 to return quickly to slightly above normal. Hence, even in Upper Pond, where the possibility of siltation is the greatest, there is a definite hydrologic connection between the 50-foot aquifer and the pond. This interconnection is probably not uniform and water may enter the aquifer from the pond more rapidly in one place than in another.

When the wells in the public-supply well field are being pumped the water level is lowered around each well in the shape of an inverted cone. These indi-

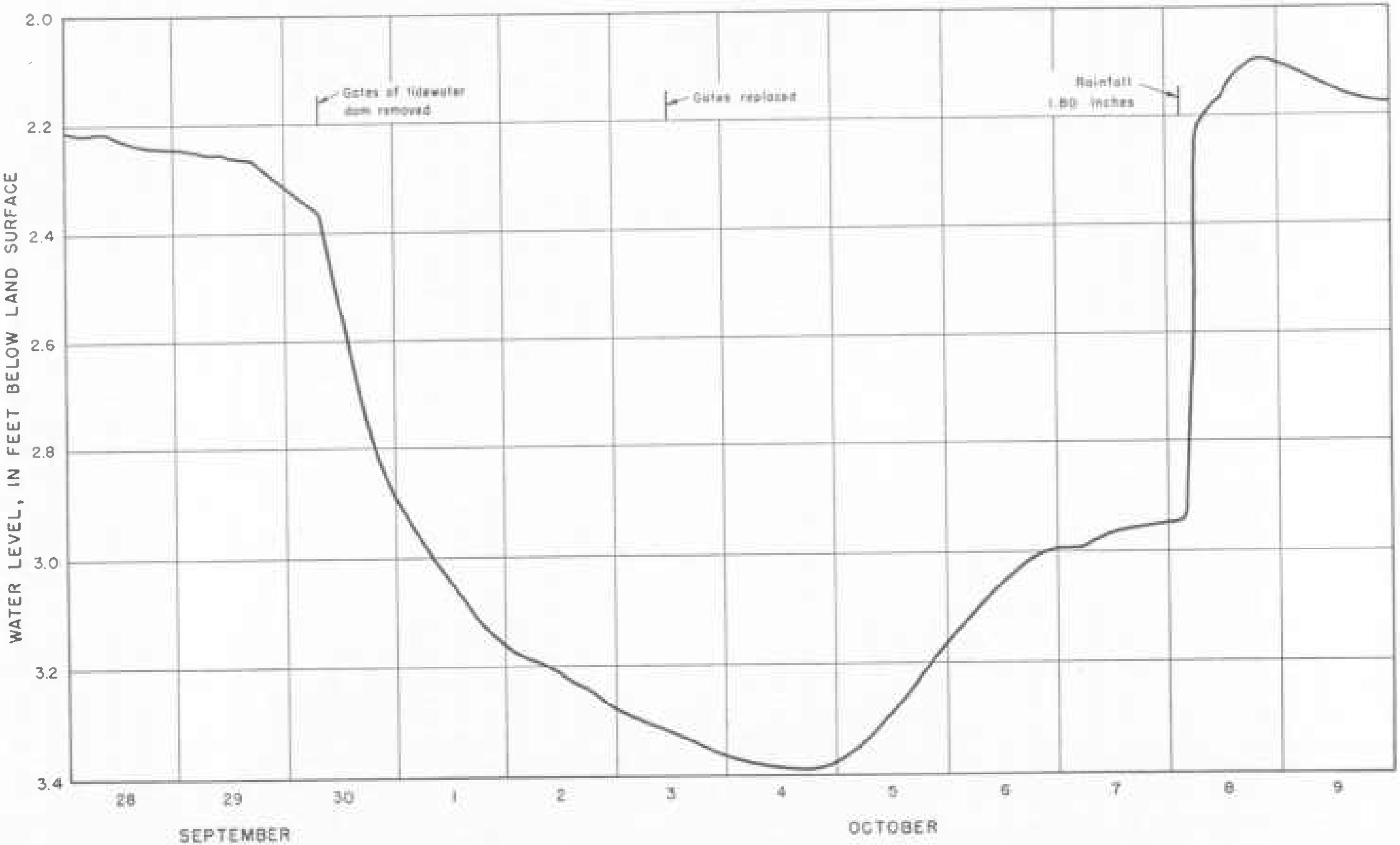

FIGURE 46. Water Level Fluctuations in Well Wi-Cf 2 caused by Changes in the Upper Pond Level and by Precipitation

vidual cones of depression merge into one larger and more complexly shaped cone of depression. As the cone of depression develops, the natural gradient from the aquifer to the pond is reversed and recharge is induced. The pumping tests show that shortly after pumping is started the water table is lowered below the bottom of the pond. Thereafter, the pore spaces in the material between the water table and the bottom of the pond are only partly filled with water. Thus the downward flow of water occurs under unsaturated conditions and the material in the uppermost part of the aquifer functions like a trickling filter. The hydrograph in figure 30 shows the fluctuation of the water level in well Wi-Ce 13 caused by pumping from wells Wi-Ce 1 to 5. Wells Wi-Ce 1 to 5 are across and about the same distance from the pond as is the observation well Wi-Ce 13. These fluctuations show that the extent of the cone of depression formed by pumping wells Wi-Ce 1 to 5, is not restricted by the pond, even though the pond acts as a source of recharge.

Well Wi-Ce 13 is 65 feet deep and, therefore, records the drop in head at the base of the aquifer caused by pumping the public-supply wells. In order to determine if the loss of head in the upper part of the aquifer is the same as that at a depth of 65 feet, a drive-point well (Wi-Ce 18) was located about 2 feet from the casing of well -Ce 13 and driven to a depth of 12.8 feet. At a depth of 12.8 feet the bottom of well -Ce 18 was 2 to 3 feet below the water table. Tape measurements were made periodically at the same time on both wells from August 1947 to January 1948 and the results showed a close agreement between the fluctuations and levels in the two wells. Although there was generally a slight difference in altitude of the two water levels, the water level in the two wells fluctuated together and the difference in altitude varied no more than 0.23 foot. Hence, it is concluded that the water level in the upper part of the aquifer is lowered by discharge from wells across the pond ending in the lower part of the aquifer, thus causing recharge to be induced from the pond.

The amount of recharge that may be induced from the ponds in the public-supply well field is determined by the condition of the bottom of the pond, by the permeability of the aquifer, by the temperature of the water, and to a certain extent by the difference in head between the aquifer and the pond. The condition of the bottom of the pond and the permeability of the aquifer may vary within relatively short distances and, hence, with a constant distribution of head the amount of recharge will vary with the permeability. The amount of recharge will also vary directly with the differences in head as long as saturated flow exists; however, when the water table is lowered below the bottom of the pond unsaturated flow exists and an additional increase in the difference in head will not increase the amount of recharge in that unit area. Owing to the reduction in viscosity, water having a high temperature will flow somewhat more rapidly through an aquifer under a given gradient than will water of low temperature.

It was not possible to measure directly the quantity of recharge induced from the pond. However, on the basis of the slope of the water table to the well field (water-table contours in inset to Pl. 7) and the coefficients of transmissibility determined from the pumping tests, estimates of the ground-water flow into the well field were made. The differences between the estimated ground-water flow into the well field and the total pumpage was assumed to be recharge from the pond. On this basis the induced recharge from the pond is believed to be at least 1 million gallons a day.

INDUSTRIAL AND IRRIGATION SUPPLIES

In the Salisbury area most of the industrial supplies are drawn from the Pliocene(?) red gravelly sand. Ice plants, refrigerating and food-processing companies, utilities, and various other types of industries draw quantities ranging from 100,000 to 1,000,000 gpd from this source. The underlying aquifers are used relatively little, because of the ample supplies that are generally available from the Pliocene(?) deposits. However, one industry in the area does draw at least a million gallons a day from the Manokin aquifer.

A few farms in the Salisbury area use ground water for irrigation. They draw their water from the Pleistocene and Pliocene(?) deposits. One or two use wells tapping the red gravelly sand, but most of them use large pits excavated below the water table as a source of supply.

NATURAL DISCHARGE OF GROUND WATER

The discharge of ground water from sediments underlying the Salisbury area is by both natural and artificial processes. Natural discharge includes the water that is evaporated from the water table or transpired by vegetation, and the water that enters the streams from the ground-water bodies and thus becomes part of the surface water. Water withdrawn from the water-bearing sediments by wells is artificial discharge.

Evapotranspiration

In the Salisbury area large amounts of water are discharged from the Pleistocene and Pliocene(?) aquifer by evaporation and transpiration. Along most of the streams are swampy areas where the water table is at or near the surface. Evaporation is greatest in these areas. Under the divides the water table is far enough below the surface so that there is little or no evaporation directly from the zone of saturation. Owing to favorable climatic conditions, and particularly to the relative abundance of water in the area, plant growth is heavy. The plants use large quantities of water from the soil zone and from the aquifer during the growing season. The quantity of water transpired is dependent on many factors, such as the type of plant, climatic and soil conditions, and the depth to the water table. Table 33 gives the transpiration ratio or pounds of water consumed for each pound of dry leaf matter. These data are condensed from a table by Lee (1949).

No direct experimental determinations were made of the amounts of evaporation or transpiration from ground water or from surface-water bodies in the Salisbury area. However, an estimate was made of the total quantity of water lost by transpiration and evaporation (from both surface- and ground-water bodies) by a study of the streamflow records of Beaverdam Creek at the gaging station at the dam forming Schumaker Pond. This drainage basin is considered typical for the area. It is mostly underlain by sandy permeable soil and includes agricultural, forest, and swampy sections. The topographic divides are

TABLE 33

Transpiration Ratios of Crops

	Pounds of water per pound of dry leaf
Corn	233 to 349
Wheat	234 to 544
Potato	281 to 575
Cabbage	518
Watermelon	577
Cantaloupe	597
Turnip	614
Cucumber	686
Bean (Soy)	715
Squash	719
Clover (Sweet)	731
Pea	235 to 747
Pumpkin	802
Alfalfa	823 to 930

20 to 40 feet higher than the channel of the stream. The stream is dendritic in pattern except where man-made structures have interrupted its course. Swampy conditions exist along its upper reaches and its tributaries.

The gaging station is equipped with an automatic water-stage recorder and a continuous record of the flow of the stream is obtained. The station was established in October 1929. The daily flow records are not complete for the years 1934 and 1936, but the records are adequate to determine the total annual runoff for 14 of the 16 years from October 1931 through September 1947. This period of record was chosen for analysis because of the adequacy of the record and because at the beginning and at the end of this period the flow of the creek was approximately the same; this makes it reasonable to assume that the ground-water storage was approximately the same at the beginning and end of the period so that no correction for change in storage is necessary. The average annual total runoff was 791,000 gpd per square mile of drainage basin. The average annual precipitation from October 1931 to September 1947 was 46.71 inches, which is equivalent to 2,240,000 gpd per square mile of drainage basin. Thus, from these records, the quantity of water returned to the atmosphere by transpiration and evaporation from all sources is 2,240,000 minus 791,000 or about 1,450,000 gpd per square mile. These figures show that the water lost through total evapotranspiration is about 65 per cent of the total water available.

Similar values are obtained from the streamflow records of the Potomac River at Point of Rocks where the drainage area is 9,651 square miles and the records extend from 1896 to 1943. The average total runoff is 636,000 gpd per square mile of drainage area. The average annual precipitation for the area and period is about 41 inches so that the total amount of water available was 1,940,000 gpd per square mile. Therefore, the total evapotranspiration is about 67 percent of the total water available. The similarity between the losses per unit area in the two basins suggests that the Beaverdam Creek flow records cover a sufficient period of time to give representative values.

Total runoff is affected in part by rainfall. During a rain the water precipitated on the area of the stream and the overland flow to the stream cause the flow of the stream to increase rapidly. After this peak discharge the flow of the stream declines at a continuously decreasing rate. The curve formed by plotting this rate of decline in flow is known as the depletion curve. Figure 47 shows the depletion curve after each rain or period of rainfall. The length and magnitude of the depletion curve is determined by the frequency and amount of precipitation and the amount of water available from ground-water storage.

Ground-Water Runoff

Ground-water runoff is the part of the total runoff derived from natural discharge from ground water. Direct surface runoff enters the stream and is discharged from the basin within a relatively short time. The ground-water runoff, however, must first enter the soil, reach the water table, and travel laterally beneath the surface. The time elapsed before it is discharged into the stream is much greater. In the Salisbury area the precipitation is great enough so that in areas of little or no pumping the water table is constantly above the level of the streams and, consequently, there is continual discharge of water from the zone of saturation into the streams. The amount of this discharge is dependent on the hydraulic gradient of the water table toward the area of discharge to the stream. The discharge to the stream is highest when the water table is highest after a period of recharge. As the water table is lowered by the discharge the ground-water runoff gradually becomes less. During periods of fair weather the ground-water runoff constitutes the total flow of the stream.

An estimate of the amount of water entering the stream from the zone of saturation in the Beaverdam Creek basin may best be made from the stream-

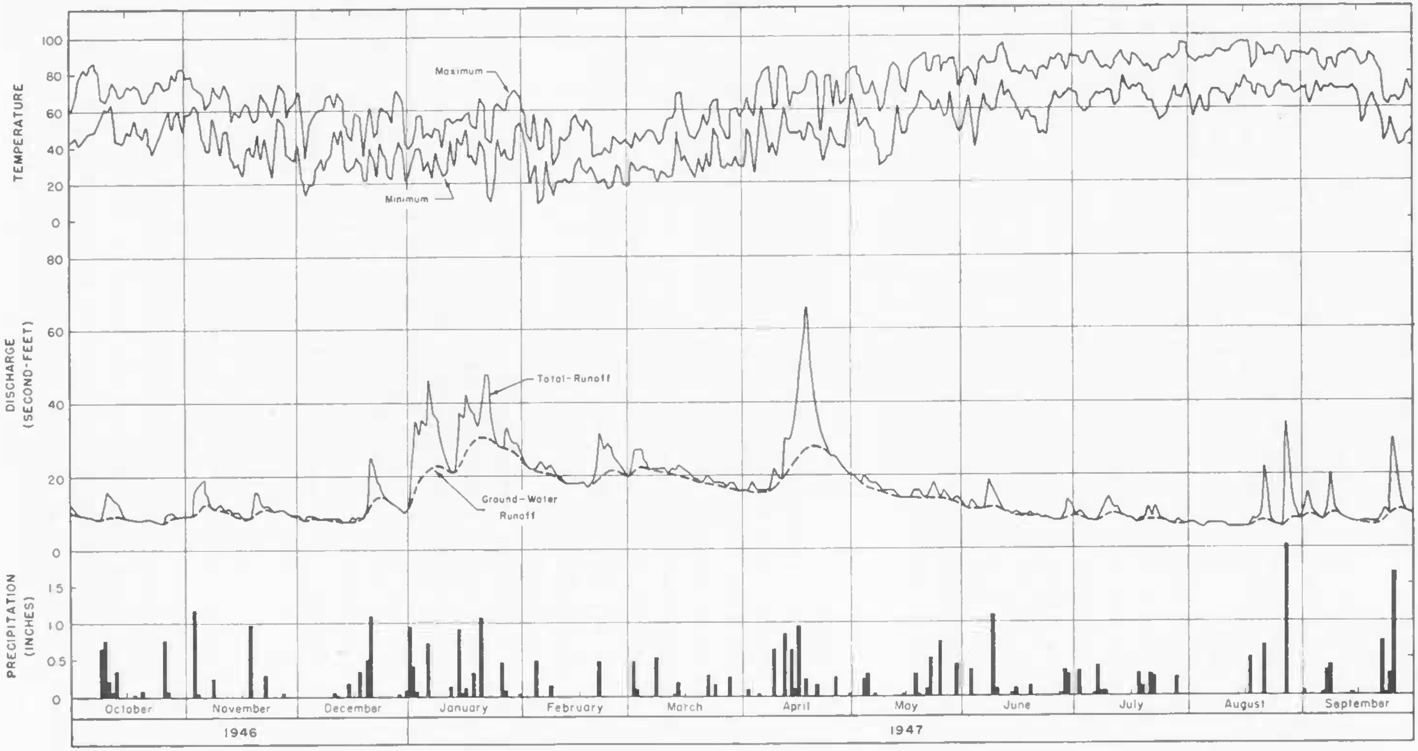

FIGURE 47. Temperature, Total Runoff, Ground-Water Runoff, and Precipitation in the Beaverdam Creek Basin, October 1946 to September 1947

flow records of the gaging station at Schumaker Pond. In the past, various methods have been used to separate the ground-water runoff from the total flow of the stream, all using the same general principle but with variations in interpretations as to the point on the depletion curve where ground-water runoff represents the total flow of the stream. Houk (1921) made the separation by drawing the line of maximum ground-water runoff through the points of medium stream flow only. Thus, he disregarded the increased discharge from the zone of saturation and soil zone shortly after a rain and the amounts determined by this method may be conservative. Meinzer and Stearns (1929) made the separation on the assumption that after a week of fair weather the storm water was all discharged and that until the next rain the runoff was essentially all ground water. Their method of separation was essentially the same as that used by Houk but included the amount of water in channel storage, and their curves separating the ground-water runoff were brought up somewhat to meet the descending curve of the total runoff. However, their determinations also are considered conservative. Horton (1933) states that the method used by Houk and by Meinzer and Stearns " . . . is incorrect and leads to underestimates of ground-water runoff, especially during wet months." He states. also, that "Ground-water flow, of course, continues during the interval of the rise (of the total flow of the stream) and follows the normal depletion-curve unless or until accretion to the water-table takes place. After accretion ends, ground-water flow in accordance with the normal depletion curve is resumed, though perhaps at a higher level." Using the methods proposed by Horton, the ground-water-runoff line on the hydrograph (fig. 47) would include still more of the total runoff during and shortly after periods of rainfall, and the estimated ground-water runoff would be greater.

In the separation of the ground-water runoff from the total runoff on the hydrographs of Beaverdam Creek consideration was given to the fact that the drainage area is permeable and that some water is held in channel storage. On one occasion it was observed that during a rainfall of more than 3 inches in 24 hours there was no visible direct surface runoff except in the immediate vicinity of the stream. Therefore, in an area such as this the occurrence of direct surface runoff is limited to a restricted area bordering the stream plus the water that falls directly on the surface-water bodies. The water that enters the soil zone near the stream may enter a temporary perched zone of saturation and move laterally to the stream before it can reach the main water table. This part of the ground-water runoff may appear on the hydrograph as water that cannot be separated from the surface runoff. However, because there appear to be no extensive perched water bodies in the basin, the water from precipitation that enters the soil at some distance from the stream is considered to be discharged either by evapotranspiration or by migration laterally to the stream. The amount of water held in channel storage in the basin is probably relatively great for a stream of this size, because much of the stream area is swampy and because there are three ponds above the gaging station. In drawing the ground-water runoff line a period of a few days, depending on the amount and frequency of the rainfall, was allowed for the water in channel storage to pass the gaging station.

Ground-water runoff was considered to be continuous during each period of precipitation. This may not be strictly accurate because during flood peaks the water in the stream may be temporarily above the level of the water table near the stream, thus causing ground-water discharge to stop. However, this probably does not occur throughout the entire stream at the same time, and it is of relatively short duration, so no estimate was made of this reduction in ground-water discharge.

Figure 47 shows the maximum and minimum temperatures, the total runoff, the estimated ground-water runoff, and the amount and distribution of precipitation during the water year 1946–47. This year was selected for illustration because of the excellence of the record and because subnormal precipitation resulted in more complete depletion curves. Although transpiration was negligible from October through December, the precipitation for the period was slightly below normal and resulted in only enough ground-water recharge to maintain the base flow of the stream. Much of the increase in ground-water storage caused by the above-normal precipitation in January was dissipated in the two following months of subnormal precipitation. The concentration of rainfall in the second week in April caused the highest total flow of the year, and ground-water storage was again increased. The below-normal precipitation from April to the end of August resulted in a continuously decreasing rate of ground-water discharge. The line separating ground-water runoff is considered to be a conservative estimate of the total amount of water derived from the zone of saturation. The line is drawn so that it coincides with the line of total stream flow during periods of little or no rainfall, and is raised to meet the descending curve during periods of rainfall. Effort was made to select the point of intersection of the two lines at the time when the water from surface runoff and channel storage was considered to have been discharged from the basin after each period of precipitation. The portion of the stream discharge shown below the dotted line on figure 47 is believed to be wholly ground-water discharge. The portion between the dotted line and the solid line represents water that entered the stream during or immediately after precipitation without passing through the ground, or at least without reaching the main water table.

The streamflow records for the water years 1932, 1933, 1935, and 1937 to 1947 were used in the analysis of the discharge from the Beaverdam Creek basin. For these 14 years, *not* a 14-year period in the usual sense, the ground-water runoff was separated from the total runoff in the manner described and as shown on figure 47. It was assumed that the amount of water discharged

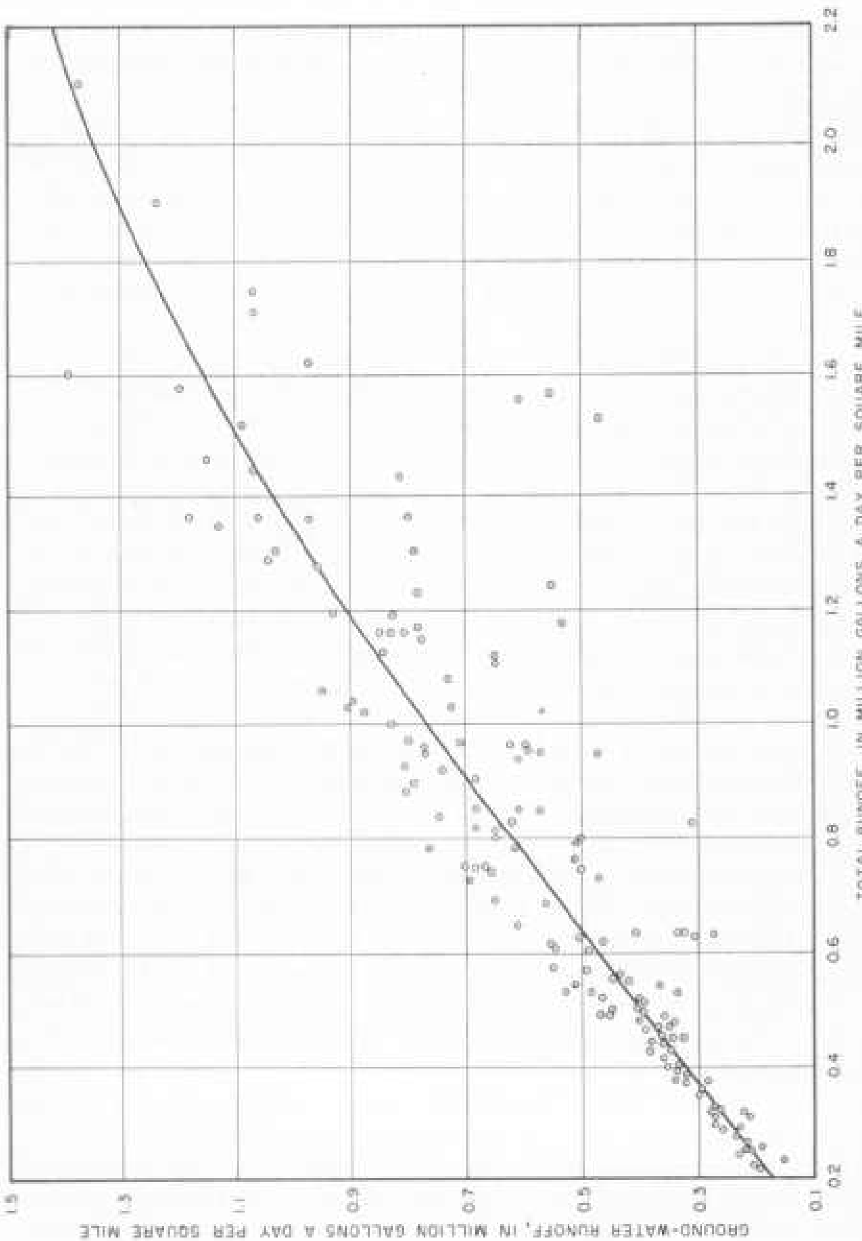

FIGURE 48. Relation of the Average Total Runoff to the Average Daily Ground Water Runoff based on 150 Monthly Determinations

by farm and domestic wells within the basin was so small in relation to the total runoff that it may be disregarded. The total runoff and ground-water runoff were computed on a monthly basis and expressed in terms of gallons a day per square mile of drainage area. The relation of the monthly total runoff to the ground-water runoff is shown in figure 48. The scattering of the points in this figure is due chiefly to variations in the amount of water in ground-water storage and by change in the time of precipitation. The points that plot far below the line are caused by rainfall at the end of the month so that only the flood stage of the depletion-curve is included in the computation. The aver-

TABLE 34

Total Runoff and Ground-Water Runoff, Beaverdam Creek Basin, 1932, 1933, 1935, 1937 to 1947

Water year ending	Total runoff (million gallons a day per square mile)	Ground-water runoff (million gallons a day per square mile)
1932	0.553	0.397
1933	.853	.629
1935	.764	.634
1937	.653	.631
1938	1.056	.621
1939	1.144	.877
1940	.855	.659
1941	.642	.478
1942	.534	.379
1943	.654	.556
1944	.832	.626
1945	.883	.668
1946	1.077	.804
1947	.570	.464
Average	.764	.602

age yearly estimates of total runoff and ground-water runoff are given in Table 34 and shown in figure 49.

The effect of differences in gage height or precipitation at the beginning or end of the yearly records generally are not as critical as for the monthly records and, consequently, only a few of the points in figure 49 fall as far from the line as in figure 48. The slope of the lines in both figures is about the same. In figure 48 the line flattens out somewhat with an increase in total runoff, indicating that the maximum ground-water runoff is being approached for this drainage area. For the entire period of record the total runoff and the ground-water runoff were 0.764 and 0.602 million gallons a day per square mile of drainage area, respectively.

The average annual precipitation from October 1931 to September 1947 was 46.71 inches or the equivalent of 2.24 million gallons a day per square mile.

Thus the total runoff, 0.764 million gallons a day per square mile, was about 34 percent of the total precipitation, and the ground-water runoff, 0.602 million gallons a day per square mile, about 27 per cent of the precipitation. The ground-water runoff constitutes nearly four-fifths of the total runoff.

Above the gaging station at Schumaker Pond the trunk and tributaries of Beaverdam Creek are approximately 10 miles in length. The average daily ground-water runoff recorded at the station is estimated to be 10.7 million

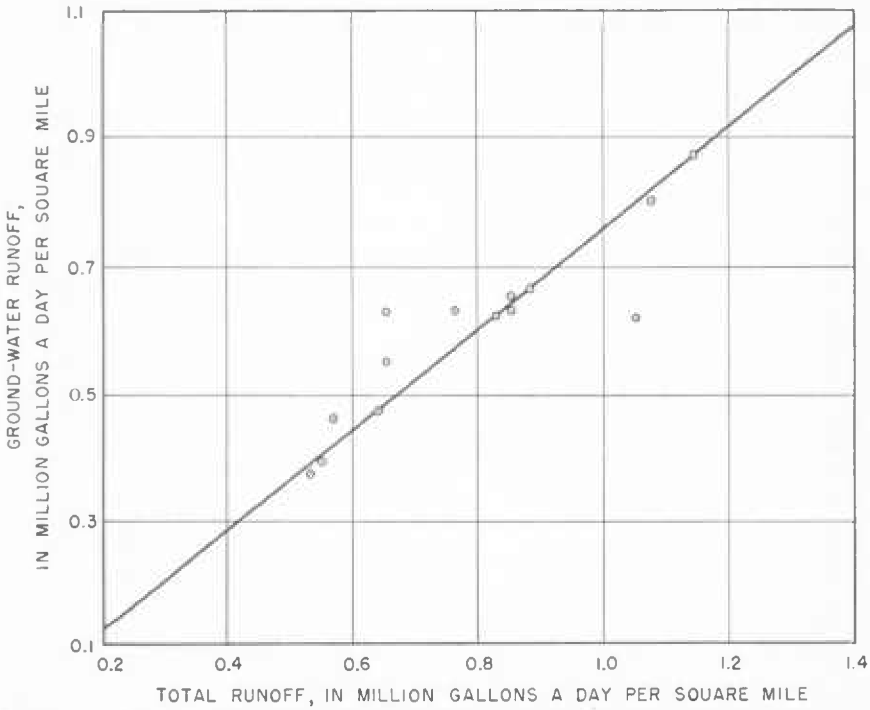

FIGURE 49. Relation of the Average Daily Total Runoff to the Average Daily Ground-Water Runoff based on 14 Yearly Determinations

gallons a day. Hence, assuming that the ground-water discharge is equal throughout the reaches of the stream, the discharge per linear mile of stream is about 1 million gallons a day.

In April 1948 the hydraulic gradient toward Schumaker Pond was determined by water-level measurements in wells Wi-Cf 28 to 31. The measured gradient of 7.6 feet a mile, with the coefficient of transmissibility of 100,000 gpd per foot determined by pumping tests on these wells indicates that about 1.5 million gallons a day was moving toward the stream from the zone of saturation for each mile of its length. The records of water-level fluctuations in other wells in the area show that during April 1948 the water table was slightly above normal, which would cause the amount of discharge determined by this method to be above the average discharge determined by the use of the streamflow records. Also, of course, some of this water was discharged by evapotranspiration before reaching the stream, so this figure is not strictly comparable to that determined from streamflow. The hydraulic gradient measured toward Schumaker Pond was within the drainage basin above the gaging station as Schumaker Pond and was unaffected by discharge from wells. A hydraulic gradient at Upper Pond was measured during the same month in wells Wi-Cf 22 to 25. These wells are within the area of influence of the public-supply well field and, therefore, the gradients are slightly affected by artificial discharge. The hydraulic gradient measured at this site was about 15 feet per mile and, with the coefficient of transmissibility determined from pumping tests on these wells, it is estimated that the ground-water discharge per linear mile of stream in this area is approximately 3 million gallons a day. However, it is to be expected that in any unit section the discharge to the stream would not necessarily be the same as the average discharge per linear mile of the entire stream.

As the geology of the Pleistocene and Pliocene(?) aquifer is similar throughout the area, it would appear reasonable to apply the values determined for the Beaverdam Creek basin to the other basins in the area.

FUTURE OF GROUND-WATER DEVELOPMENT IN SOMERSET, WICOMICO AND WORCESTER COUNTIES

An estimate based on the recharge and on maximum drawdowns of 500 feet, limited to waters suitable for most purposes, indicates that at least 360 million gallons a day is available perennially. The water utilization, in 1953, is estimated at 12.4 million gallons a day, so that the available estimated ground-water supply is many times the current use.

There is not a large supply of water of suitable quality everywhere. In an area of 1,582 square miles, many conditions of geology and topography limit the utilization of water, so that there are sections, chiefly in southwestern Somerset County, where water of good quality is hard to find, although waters of varying degrees of mineralization may be had in abundance. However, most parts of the tri-county area have at their disposal several sources of water that is of good quality, except locally for high iron content which can be readily reduced by treatment.

Plate 12 summarizes the ground-water conditions and the data used as a basis for estimation of available supplies. The largest quantities of water are found in the areas where the Pleistocene and Pliocene(?) series is thick, in channel-fill deposits. Meyer and Bennett show that the ground-water runoff averages 600,000 gpd per square mile in the Beaverdam Creek basin. This ground-water runoff was assumed to be representative. It was assumed also that half this runoff could be recovered by wells—that is, that an average of 300,000 gallons a day per square mile is available.

Approximately 490 square miles is enclosed in the area where the Pleistocene and Pliocene(?) formations are 60 feet or more thick. At 0.3 mgd per square mile this area would yield about 150 mgd to properly spaced and constructed wells. The somewhat narrower margin, about 200 square miles, where the Pleistocene and Pliocene(?) sediments are thinner, ranging from 30 to 60 ft. in thickness, if assumed to yield only 200,000 gpd per square mile, would supply an additional 40 mgd. Therefore, the Pleistocene and Pliocene(?) series would yield an estimated 190 mgd.

Similarly, if it be assumed on the basis of present storage and on the basis of future utilization of recharge, which is now rejected by the Pleistocene and Pliocene(?) formations the Pocomoke, Manokin, and Nanticoke aquifers each are capable of yielding 100,000 gpd per square mile, a total of 170 mgd may be obtained from the Miocene series, computed as follows: Pocomoke aquifer, about 508 square miles, 51 mgd; Manokin, about 900 square miles, 90 mgd; Nanticoke, about 290 square miles, 29 mgd.

The portion of the Manokin aquifer in the southern part of the area that yields water having a chloride content above 250 ppm is excluded from the estimate, because it contains a water not suitable for most purposes. Likewise, the Choptank formation, which has abundant water, has water of quality unsuitable for most purposes. The Nanticoke aquifer, below the -500 contour, has been excluded because little is known of the quality of the water in the eastern half of the area, where the aquifer lies below that depth.

It is estimated that, as of 1950–53, only 8 mgd is being taken from the Pleistocene and Pliocene(?) series, 3.7 mgd from the Miocene series, and 0.6 mgd from deeper aquifers. Very large yields are available from the pre-Miocene aquifers, in addition to the 360 mgd estimated for the Pleistocene and Pliocene(?) and Miocene series. The development of water from the deeper aquifers, of Eocene, Paleocene, and Cretaceous age, will depend upon the amount of mineralization, or temperature, that can be tolerated, as well as the cost of constructing deep wells. In all but the westernmost part of the area the water from the deeper aquifers likely will be too highly mineralized for most uses.

AGRICULTURE AND SUPPLEMENTAL IRRIGATION

The agricultural use of ground water in the period 1950 to 1953 was only about 2.3 mgd in the tri-county area. There was some interest in irrigation during this period, three localities being irrigated by the spray system. One employed a stream and two employed dug-out ponds as the source. The crops irrigated were strawberries, cucumbers, white potatoes, and sweet potatoes. The enterprises were financially successful.

Much use will probably be made of supplemental irrigation in the future. Although the area has a humid climate, with adequate to abundant total precipitation in most years, there is seldom a growing season that does not suffer one or more periods of temporary drought with 14 days or more with less than 1 inch of rain. These periods of drought occasionally bring the crops close to the wilting point. Though complete crop failures are unknown, reduced yields are not uncommon. Irrigation in a humid area is used to supply those few inches of extra moisture when they are most needed to assure copious yields. On Long Island and on the Coastal Plain of New Jersey, in areas of similar soils, topography, geology, and climate, supplemental irrigation has become a big business. If it become a big business here, it will require many million gallons a day of ground water.

To irrigate 1 square mile to a depth of 1 inch requires about 17.4 million gallons. This is equivalent to about 58 days' ground-water supply for the average square mile in the portion of the area where ground-water conditions are favorable, assuming recovery of 0.3 mgd per square mile. Farmers in such an area irrigating the entire farm with 2 inches a season would take the equivalent of less than a third of the recoverable ground-water originating on their own land. Such supplemental irrigation could be the difference between a poor yield and a good one, or between a good yield and a bounteous one. Supplemental well irrigation is feasible, so far as water supply is concerned, in more than half the land area of Somerset, Wicomico, and Worcester Counties. Plate 12 shows the areas where sufficient water of suitable quality may be found.

The sandy soils and some of the crops of the tri-county area may even tolerate some of the more saline waters. If the brackish waters of the Choptank formation are usable, they are an additional source of water in the entire area.

INDUSTRY

Industry generally requires high rates of ground-water yield (500 to 1,000 gpm per well) concentrated in relatively small areas (1 to 3 mgd in an area of perhaps only a few acres). In Somerset, Wicomico, and Worcester Counties such yields generally are available only from wells placed adjacent to surface ponds, in areas where the Pleistocene and Pliocene(?) reservoir is 60 feet or more thick. This is the situation of the Salisbury municipal water supply. There are many similar locations in the tri-county area which are at present undeveloped: the north fork of the Wicomico River from Salisbury to Delmar, with Johnsons Pond and Leonard Pond; Tonytank Pond near Fruitland; many of the tributaries of the Pocomoke River, which could be ponded, like Adkins Pond at Powellville; the Nassawango drainage basin, at Furnace;

Rewastico Pond near Quantico; Barren Pond and Mockingbird Pond near Mardela Springs; and the headwaters of Dividing Creek.

Industries that use large quantities of water have the additional problem of disposing of the effluent. If the effluent has simply been used in a cooling process, it is merely warmer, and can be returned to the ground by input wells or by spray irrigation. However, many industries produce an undesirable effluent. If these undesirable effluents are returned to the ground, they may contaminate the shallow aquifers. Disposing of them by pumping down deep wells to aquifers, such as the Patapsco or Raritan formations that already have an undesirable water, is a possibility.

MUNICIPAL SUPPLY

The availability of ground water for municipal supply is best considered with respect to the individual city supplies.

Salisbury has an adequate system of wells adjacent to City Park ponds. The system could be expanded considerably with similar wells along Schumaker Pond, and possibly along Parker Pond, on Beaverdam Creek. The total perennial yield from the aquifers of Pleistocene and Pliocene(?) age, that the Beaverdam Creek drainage basin can supply is estimated at about 10 mgd. The north fork of the Wicomico River provides similar possibilities for development, but further test drilling should precede any enterprise.

Berlin is situated on a relatively deep channel deposit of Pleistocene material, which should provide additional water for expansion of the town for many years.

Snow Hill appears to be underlain by a highly productive section of the Manokin aquifer, with considerable "available drawdown" to the top of the reservoir. Adequate facilities and a reasonable margin for expansion seem to be present.

Ocean City can develop more wells in the "285-foot" sand (Manokin aquifer), which has a moderately high transmissibility. There is no evidence of salt-water contamination in any of the three aquifers yet. Nevertheless, additional development of the "90-foot" (Pleistocene and Pliocene(?) aquifer and of the "185-foot" (Pocomoke) aquifer should proceed with caution, because of their probable proximity to salt-water tongues.

Pocomoke City appears to be provided with an ample source in the Pocomoke aquifer. The deeper Manokin aquifer may be somewhat high in chloride, but it is usable for some purposes.

Crisfield faces the continued problem of obtaining an adequate water supply from deep wells. Deeper drilling in search of water of better quality is worthy of consideration.

In the Princess Anne area additional water can be derived safely from the

Manokin aquifer, if the wells are spaced widely and the pumpage is held to moderate rates. Testing of the quality of water in the Choptank formation (see Som-Be 50) in that area would be worthwhile. The possibility of producing water from the Nanticoke aquifer should not be ruled out, for although well Som-Be 50 penetrated the upper 36 feet of the Calvert formation, that aquifer was not thoroughly tested.

TABLE 35

Chemical Analyses of Water from Wells in Somerset County

(In parts per million, except pH, specific conductance, temperature, and color)

Field Data																																
Well	Date of collection	Depth of well	Elevation of well	Aquifer, geologic formation, or age	Temperature (F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate[†] hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Color	Turbidity	Analyst
Bb 1	Dec. 8, 1952	671	5	Piney Point				0.02									948	0	131	250		0.2			64	0		2290	7.9	5		A
Bc 14	Oct. 26, 1953	132	4	Manokin				.1												133		.06		986	148		442		7.5	10	5	B
Bd 29	May 7, 1953	180	4	do				.2												48		.14		754	42		440		7.7	17	3	B
Be 14	Dec. 8, 1952	212	17	do		14	0.1	.08	0.01	0.04	0.28	13	4.7	153	10	2.4	371	0	18	62	.4	.3	0	460	52	0		784	8.2	8		A
Be 49	Dec. 8, 1952	64	18	Pleistocene and Plio-cene(?)		26		.015	2.0	.0	.01	12	5.1	24	4.2	.6	27	0	52	24	.2	.2	0	161	51	29		242	5.8	5		A
Be 51	Sep. 25, 1953	212	18	Manokin		11	1.3	.0	.0			8.0	3.3					11	4.8	46	.5	.08		406	34		286		8.1	17	20	B
Cb 15	Oct. 26, 1953	142	6	do				.6												242		.08		1240	122		524		7.5	17	5	B
Cb 16	Oct. 1, 1952	313	4	Choptank				1.0												1830		.04		2920	224		770		7.2	33	7	B
Cc 1	Jan. 15, 1951	835	2	Piney Point																562									8.1	3	3	B
	May 7, 1951	835	2	do				1.0												191		.02		1560	20		876		8.3	3	3	B
	Sep. 15, 1953	835	2	do				.0												242		.12		1530	22		943		7.7	5	3	B
Cd 2	Dec. 9, 1952	166	5	Manokin				.2												206		.06		762	84		371		7.9	15	3	B
Cd 39	Aug. 2, 1951	160	4	do				.6												311		.04		1500	150		410		7.8	3	3	B
Ce 2	Dec. 11, 1952	246	14	do				.55									480	0	103	325		.3			140	0		1930	7.6	3		A
Ce 3	Oct. 2, 1952	228	14	do				.2												792		.04		1860	268		411		7.5	7	3	B
Ce 4	Aug. 6, 1953	225	12	do				.2														.02		2420	227		405		7.3	12	5	B
Ce 5	Sep. 15, 1953	240	12	do				.1												727		.06		2390	350		447		7.5	10	5	B
Ce 10	Feb. 8, 1951	222	14	do				.2												6		.04		394	208		316		7.7	1	1	B
Ce 38	Sep. 27, 1950	226	5	do				.4												254		.04		1292	126		388		7.8	5	5	B
Ce 39	Dec. 9, 1952	231	20	do				.3												133		.06		596	57		367		8.1	17	3	B
Cf 3	Mar. 20, 1951	216	20	do				4.0												30		.08		492	45		327		8.3	5	5	B
	July 24, 1951	216	20	do				.10												38		.08		468	43		333		8.1	5	3	B

Dc 2	Oct. 2, 1952	139	4	Yorktown-Cohansey(?)[L]				.4												107		.00		686	306		359		7.3	12	3	B
Dd 16	Dec. 8, 1952	88.5	7	Pocomoke				12									271		.4	33		.2			181	0		494	7.1	3		A
Dd 29	Dec. 8, 1952	165	5	Yorktown-Cohansey(?)[L]		15	1.2	.11	.01	.03	4.1	40	39	273	26	5.0	470	0	162	278	.2	2.1	0	1080	260	0		1810	7.9	10		A
Dd 45	Oct. 15, 1952	163	6	do				.2												128		.01		604	112		334		7.7	15	3	B
Dg 1	Sep. 15, 1953	95	3	Pocomoke				2.0												15		.08		138	14		80		6.5	5	3	B
Ea 1	Apr. 26, 1948	841	2	Magothy		11		.02				2.0	.8	241			506	37	32	10	3.0	1.5		588	8				8.4			A
Ea 2	Apr. 26, 1948	840	2	do													598		14	10	1.4	1.5										A
Ea 4	Apr. 26, 1948	852	2	do													518		35	8	4.4	.2										A
Ea 5	Apr. 26, 1948	850	2	do	75	11		.02				1.8	.7	217			457	31	30	10	2.8	.1		522	7				8.5			A
Ea 7	Dec. 2, 1953	848	2	do				.0												6		.0		490	82		460		8.0	3	3	B
Ea 9	Dec. 2, 1953	915	2	Raritan				.0												5		.04		486	86		446		7.9	3	3	B
Ea 10	Nov. 17, 1953	7.2	2	Pleistocene				.08				7.0	11				24			58		3.0			59	39		355	6.5			A
Ec 1	Oct. 19, 1951	994	5	Paleocene(?)	73	13	.0	1.8	.00			1.8	.9	437	8.0		910	20	65	100	5.6	1.8		1090	8			1720	8.5	20		A
Ec 3	Oct. 19, 1951	1076	5	Magothy	79	14	.0	.12	.0			.5	1.2	294	3.0		586	12	51	70	2.2	1.3		732	6			1160	8.5	7		A
Ec 4	Oct. 19, 1951	1146	5	Calvert, Piney Point and Upper Cretaceous	81	14	.0	.10	.0			.5	.9	290	4.4		581	13	56	72	1.8	.2		730	4			1170	8.5	5		A
Ec 7	Sep. 15, 1953	1042	2	Paleocene				.0												33		.08		670	4		506		8.1	5	3	B
Ec 33	Dec. 8, 1952	362	3	Choptank		58	.0	.17	.0	.14	.54	31	31	1260	45	2.0	1200	0	62	1360	.7	.7	0	3440	205	0		5780	7.6	33		A
Ec 41	July 6, 1953	200	3	Manokin				.2												279		.16		1140	228		462		7.5	5	3	B
Ed 3	Apr. 3, 1953	70	4	Pocomoke				4.8												21		.1		490	314		258		6.7	25	110	B
Ed 4	July 24, 1951	398	5	Choptank				.10												939		.10		3910	228		1020		6.1	15	10	B
Ed 40	May 17, 1951	203	3	Manokin				.10												403		.10		1880	128		524		7.8	1	1	B
Ed 41	Dec. 9, 1952	213	6	do				.3												406		.06		1250	114		515		7.8	12	15	B

Analyst: A, U. S. Geological Survey
B, Maryland State Health Department

[1] Solids of the "B" analyses are total solids. If the turbidity is less than 10, these are approximately all dissolved solids. The "A" analyses are dissolved solids.

[L] Lower Aquiclude.

TABLE 36

Chemical Analyses of Water from Wells in Wicomico County

(In parts per million, except pH, specific conductance, temperature, and color)

Field Data																																
Well	Date of collection	Depth of well	Elevation of well	Aquifer, geologic formation, or age	Temperature (F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Solids[1]	Hardness as $CaCO_3$	Noncarbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Color	Turbidity	Carbon Dioxide (CO_2)	Analyst
Ad 1	Nov. 4, 1952	301	30	Nanticoke				0.27								830	0	115	188		1.0			18	0		1880	8.0	50			A
Ad 10	Nov. 4, 1952	86	20	Pleistocene and Plio-cene(?)				.15								7	0	4	4.5		2.4			3	0		34.3	5.9	5			A
Bd 2	Dec. 9, 1952	68	40	do				1.5								24	0	25	37		54			88	68		372	6.3	12			A
Bd 11	Nov. 4, 1952	305	25	Nanticoke		54	0.0	.16	0.00	0.02	0.0	12	4.6	245	12	444	0	24	135	1.0	1.2	0.0	734	49	0		1160	8.0	10			A
Bh 14	Aug. 15, 1950	122	40	Pocomoke		32	.1	5.0	.40	.0	.5	3.2	1.2	7.3	1.0	27	0	3	3.5	.3	.2	.0	69	13			63.8	7.1	40			A
Ce 2	Mar. 3, 1948	60	5	Pleistocene and Plio-cene(?)	61	19		1.0	.05			4.6	1.4	7.8	1.9	12	0	3.2	7.5	.1	13		70	17			83.4	5.9	0			A
Ce 10	Feb. 11, 1925	60–80	30	do				0.8											4.0				112	4					28	33		B
	Feb. 11, 1925	110–120	30	Manokin				3.6											5.5		0		2070						10	450		B
Ce 14	Jan. 14, 1925	62–70	25	Pleistocene and Plio-cene(?)				0.0											9.4		.8		48						9	8		B
Ce 21	Mar. 4, 1948	137	20	Manokin	58	23		3.6	.10			1.9	1.1	5.0	1.6	8	0	11	3.2	.1	0		52	9.2			51.3	5.3	5			A
Ce 53	1924	100	2	do				2.6											3.0		0		90	1		301			160	40		B
Ce 56–58	1924	120	5	do				8.0													0		86	12		30			15	50		B
Ce 61	Dec. 12, 1947	81	35	Pleistocene and Plio-cene(?)	60	20		.07				4.2	.9	8.2	1.6	9	0	1.0	7.1	.0	18		70	14			78.8	6.8	0			A

Cf 12	Mar. 4, 1948	—	40	Pleistocene and Pilo-cene(?)		16		.09						5.2	1.0	24	0	1.2	5.0	.1	2.4		49				61.2	6.7	0			A
Cf 22	Apr. 16, 1948	54	11	do		26		.72				2.9	2.0	6.8	1.5	16	0	6.0	4.5	.2	6.5		67	15			68.7	7.2	2			A
Cf 28	Apr. 22, 1948	92	41	do	58	26		.15				3.2	1.0	6.8	1.0	19	0	2.2	4.5	.1	4.7		64	12			61.5	6.7	2			A
Cf 64	Mar. 19, 1951	60	7	do		18		.02	.00			2.9	.5	9.7		13	0	3.5	6.8	.0	80		60	9			73.0	6.3	2	2		A
Cg 13	Nov. 4, 1952	12	80	Pleistocene				2.0								10	0	39	9.5		27			50	42		232	5.9	10			A
Cg 30	Dec. 14, 1950	12	79	do	57	9.6		.3				2.8	.7	5.9	2.8	9.2	0	1.7	12		.1		40	10			98.1	6.1				A
Cg 31	Dec. 14, 1950	12	78	do	57	11		.3				3.2	.3	3.7	1.6	6.9	0	.2	5.4		.2		32	9			51.1	6.1				A
Cg 32	Dec. 14, 1950	16	59	do	55	6.4		.2				4.1	1.0	1.6	3.3	12	0	1.3	7.6		2.2		33	14			76.6	6.3				A
Cg 35	1941	140	75	do				6.0										6	8					26				6.4			35	C
	1941	167–184	75	Yorktown-Cohansey (?)L				9.8																24.3				6.7				C
	1941	235–250	75	Manokin				5.6																29.6				6.5				C
	1941	573	75	Choptank		47.6		.12											326					93.8				7.9				C
Cg 36	Jan. 6, 1954	126	80	Yorktown-Cohansey (?)L	76			8.0											48		.06		110	42		68		6.3	45			B
Cg 44	1951	280	75	Manokin		20		6	.3									12	7					22	20			6.4			35	D
Ch 4	Nov. 5, 1952	100	38	Pocomoke				19								22	0	1.2	5.0		.5			6	0		66.7	5.9	65			A
Db 2	Nov. 4, 1952	93	5	Manokin				8.7								287	0	23	121		.4			72	0		847	7.2	30			A
De 4	Mar. 11, 1948	55	35	Pleistocene and Plio-cene(?)		20		.08				7.2	2.5	15	4.2	8	0	5.4	23	.2	29		114	28			164	5.6	5			A
De 18	Sep. 24, 1947	69	40	do				15											2.8		.14		82	12		32		6.0	7	100		B
De 30	Jan. 10, 1951	255	35	Manokin		21		8.3				23	4.7	35	4.7	171	0	1.0	9.5	.0	.3		186	77	0		302	7.2	15			A
Df 25	Sep. 15, 1950	104	40	Yorktown-Cohansey (?)L		39	.0	.19	.10	.0	.0	4.2	2.3	8.8	1.0	25	0	9.0	7.4	.1	.3	.1	88	20			903	6.3	7			A
Dh 3	Nov. 5, 1952	32	32	Pleistocene and Plio-cene(?)				1.8								20	0	6.8	17		2.1			8	0		84.3	6.5	10			A

Analyst: A, U. S. Geological Survey
B, Maryland State Health Department
C, Penniman and Browne
D, Hungerford and Terry

[1] Solids of the "B" analyses are total solids. If the turbidity is less than 10, these are approximately all dissolved solids. The "A" analyses are dissolved solids.

L Lower Aquiclude.

TABLE 37

Chemical Analyses of Water from Wells in Worcester County

(In parts per million, except pH, specific conductance, temperature, and color)

Field Data																																
Well	Date of collection	Depth of well	Elevation of well	Aquifer, or geologic formation, or age	Temperature (F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe), total	Manganese (Mn), total	Copper (Cu)	Zinc (Zn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Solids[1]	Hardness as $CaCO_3$	Non-carbonate hardness	Alkalinity as $CaCO_3$	Specific conductance in micromhos at 25°C	pH	Color	Turbidity	Carbon Dioxide (CO_2)	Analyst
Af 4	Nov. 5, 1952	110	27	Pleistocene		33	0.0	9.5	0.05	0.01	0.36	4.5	0.4	8	1.0	0.0	26	1.4	9.1	0.0	0.5	0.0	73	13	0		71	6.4	15			A
Ah 2	Aug. 31, 1953	8	8	do				.02						32			13	14	55		1.1			34	23		249	6.5				A
Ah 3	Aug. 31, 1953	72	10	do				.23						28			141	1.2	66		.9			149	33		436	7.3				A
Be 16	Nov. 4, 1952	12	30	do				1.5									6	71	31		22			52	47		332	5.4	5			A
Bg 10	Jan. 6, 1954	1706	5	Piney Point				17				100	89				606		2550		.8			615	119		8240	7.5				A
	—	1706	5	do		67.6						95	44				138		2580													G
Bh 1	Dec. 12, 1951	285	5	Manokin		24	.0	2.9	.0	.0	.0	37	16	27	12		226	2.0	30	.1	.1	.1	260	158			434	7.2	5			A
Bh 8	Dec. 17, 1951	185	5	Pocomoke		28	.0	1.3	.0	.0	.0	29	14	36	10		229	.1	20	.1	.7	.0	260	130			413	7.8	10			A
Ce 2	Aug. 31, 1953	210	38	do				2.4						31			123	1.2	12		1.2			52	0		241	6.8				A
Ce 16	Jan. 5, 1953	78	36	Yorktown-Cohansey (?)[U]		36	5.8	7.2	.13			31	.6					.2	18		.12		202	110		130		6.5	64	115		B
Cf 1	Jan. 22, 1953	101	42	Pleistocene		17	.5	.0	.0			7.2	6.8					6.1	19	.0	4.8		106	26		14		5.5	5	3		B
Cf 3	Jan. 22, 1953	107	40	do		17	.5	.2	.0			5.0	6.8					14.8	26	.0	4.0		63	12		14		5.7	5	3		B
	Nov. 4, 1952	100–120	40	do		21	.1	.09	.02	.22	.0	5.2	1.7	13	2.1	.0	15	6.4	15	.0	.2	.0	93	20	8		122	6.1	3			A
Cg 5	Jan. 4, 1952	185	5	Pocomoke		32	.0	1.3	.0	.0	.0	18	8.3	39	9.2		183	.8	16	.2	.1	.2	214	79			325	7.3	28	9	15	A
Cg 6	Jan. 11, 1952	285	5	Manokin				1.4									220	1.0	26	.2	.2			140			414	7.6				A
Cg 7	Nov. 24, 1947	90	5	Pleistocene		30		2.0	.1			20	6.0	15					13				108	76				6.8			7.0	F
Cg 8	Nov. 24, 1947	189	5	Pocomoke		24		2.2				20	8.0	52				.0	20				194	82				6.9			8.0	F
Cg 20	Jan. 4, 1952	81	5	Pleistocene		37	.0	3.0	.01	.00	.00	23	5.2	12	1.4		103	1.2	14	.2	.1	.1	154	79			214	7.5	26	18	5.2	A
Dd 10	May 27, 1952	405	20	Manokin		17	.1	.07	.02		.0	16	5.6	113	6.4	.8	303	2.5	52	.1	.6	1.1	381	63	0		612	7.9	2			A
Dd 16	Ded. 22, 1936	90	10	Pleistocene		6.3	13.76			Present		25.6	1.9						38.1				312					7.8				E

Dg 5	Sep. 10, 1953	150	8	Yorktown and Cohansey (?)[U]	60			.27						96			290	1.2	60		.2			115	0		614	7.4				A
Ed 8	Nov. 5, 1952	181	38	Pocomoke		34	.1	.09	.08	.0	.04	19	13	26	12	1.0	202	5.2	10	.0	.7	.0	220	101	0		330	7.8	10			A
Ef 1	Sep. 10, 1953	172	4	Yorktown and Cohansey (?)[U]	60			.08						368			440	34	448		1.2			228	0		2090	7.6				A
Ef 3	Sep. 10, 1953	167	4	do	60	15	.0	.36	.02	.0		12	4.7	162	8.0	1.5	430	.1	47	.4	.2	1.3	491	51	0		776	8.1	21			A
Fb 1	Sep. 25, 1953	128	20	Pocomoke				1.8											7	.2	.12		232	149		167		7.1	37	25		B
Fb 8	Sep. 22, 1953	115	20	do				4.0											19	.2	.10		238	120		115		6.8	7	33		B
Fb 9	Sep. 22, 1953	104	12	do				3.5											24	.2	.06		222	90		120		6.9	3	28		B
	Nov. 4, 1952	104	12	do		29	.0	6.0	.16	.01	.0	22	13	25	4.3	1.0	138	15	35	1.2	.7	.0	215	108	0		339	7.5	15			A
Fb 14	Sep. 22, 1953	148	20	do		32	.19	1.8	.00			74	7.4					9.7	45	.2	.04		324	142		147		7.2	40	25		B

Analyst: A, U. S. Geological Survey
B, Maryland State Health Department
E, Strasburger and Siegel
F, Infilco
G, Md. Geol. Survey, vol. 10

[1] Solids of the "B" analyses are the total solids. If the turbidity is less than 10, these are approximately all dissolved solids. The "A" analyses are dissolved solids.

[U] Upper Aquiclude.

TAB

Records of Wells in

The Manokin aquifer is basal and the Pocomoke aquifer upper Yorktown and Cohansey formations (?); aquifers de
Static water level: Measured depths are designated by "m".
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; 1c,
Type of power: E, electric; G, gasoline; H, hand; S, steam; W, windmill.
Use of water: *Type:* C, commercial; D, domestic; F, farming; I, industry; Ir, irrigation; N, not used; O, observa
Rate: S, up to 500 gpd; M, 500 to 5,000 gpd; L, over 5,000 gpd.

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ad 1	W. D. Lyons	Muir	1944	8	Jetted	40	1½
Ad 2	Thomas J. Long	—	1932	10	Dug	16	36
Ad 3	Briscoe Pinket, Jr.	White	1951	10	Jetted	106	1½
Ad 4	Floyd Bloodsworth	do	1949	8	do	53	1½
Ad 5	Mrs. Susy M. Larimer	Muir	1951	8	Driven	26	1½
Ad 6	Claud Bounds	—	1942	6	do	14	1½
Ad 7	Harold McGrath	White	1920	8	Jetted	114	2
Ad 8	R. B. Street	—	1910	6	Driven	20	1¾
Ad 9	V. Elmer Redden	White	1945	15	Jetted	130	2
Ae 1	M. K. Clark	do	1950	10	do	123	2
Ae 2	C. Gale	—	1937	7	Driven	20	1½
Ae 3	Curtis Sturgis	—	1947	20	do	30	1½
Ae 4	Robert Benepee	White	1937	3	Jetted	130	2
Ae 5	Do	do	1937	3	do	90	2
Ae 6	Alda Bell	—	1946	10	Driven	25	1½
Ae 7	H. L. Griffin	—	—	15	do	30	1¼
Ae 8	Lester Jones	White	1948	15	Jetted	147	1½
Ae 9	Mrs. Virginia Croswell	—	1877	18	Driven	25	1½
Ae 10	Mrs. Edna Daisy Muir	—	1902	18	do	35	1½
Ae 11	Mrs. Norma Smith	—	1951	20	do	50	1½
Ae 12	Walter Ingersol	—	1921	12	do	27	1½
Ae 13	Marian Barkley	—	1921	18	do	27	1½
Ae 14	Thornton Hitch	White	1952	20	Jetted	121	2
Af 1	S. Irving Taylor	Taylor	1950	30	Driven	—	1¼
Af 2	E. Christopher	Christopher	1951	40	do	34.2m	1¼
Af 3	M. White	Shockley	—	45	do	37	1¼
Af 4	L. E. Pollitt	—	1949	40	do	32	1½
Af 5	Pierce Harmon	Shockley	1943	42	do	—	1½
Af 6	Elmer Pollitt	Campbell	1941	45	do	24.0m	1½
Af 7	J. E. Willey	do	1947	35	do	32	1½
Af 8	Eddie Armstrong	—	1947	40	do	30	1½
Af 9	S. A. Mercer	—	1951	30	do	30	1½
Af 10	Herbert Willey	Murray	1952	23	do	35	1½
Af 11	A. C. Barkley	—	1920	25	do	33	1½

LE 38

Somerset County

signated Yorktown and Cohansey(?) are stringer sands not correlative with the Manokin or Pocomoke aquifers.

impeller centrifugal; T, impeller turbine; N, none; R, reciprocating.

tion; P, public supply or school; T, test hole.

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported good.
Pleistocene	—	—	R, E	D, S	Do.
Manokin	—	—	C, H	D, S	Do.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Do.
do	—	—	C, H	D, S	Water reported "irony".
Pleistocene	—	—	C, H	D, S	Water reported good.
Manokin	—	—	R, E	D,F, M	Water reported excellent.
Pleistocene	—	—	R, E	D,F, M	Water reported good.
Manokin	—	—	R, E	D,F, M	Do.
do	3	May 1950	R, E	D,F, M	See log. Water reported "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony".
do	—	—	R, E	D,F, S	Do.
Manokin	—	—	N	N	Flowing Feb. 18, 1942, 10 feet above land surface. Water reported "irony".
do	—	—	N	N	Probably flowing, covered by tides. Water reported very "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony".
do	—	—	R, E	C,D, S	Do.
Manokin	—	—	R, E	D, S	Do.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Some decline in yield during dry periods.
do	—	—	C, W	D,F, M	Water reported excellent.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	C, H	D, S	Water reported good.
do	—	—	C, H	D, S	Do.
Manokin	1	April 1952	R, E	D, S	See log. Water reported good.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported slightly "irony".
do	8.74[m]	Feb. 6, 1952	C, H	D,F, S	Do.
do	—	—	R, E	D,F, S	Water reported good.
do	2	1949	R, E	D,F, S	Do.
do	—	—	C, H	D,F, S	Water reported good. Temperature 57° F.
do	3.49[m]	Feb. 4, 1954	C, H	D,F, S	Color "irony". Temperature 56° F.
do	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	C, H	D,F, S	Water reported good.
do	—	—	R, E	C,D, M	Water reported "irony".
do	4.5	Feb. 1952	R, E	D,F, S	Water reported good. Previous well "irony", 60 feet deep.
do	—	—	C, E	D, S	Water reported slightly "irony".

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Af 12	Melvin Jones	—	1944	41	Driven	16	1½
Af 13	Oscar Jones	—	1924	43	do	32	1½
Af 14	David Pryor	—	1950	30	do	35	1¾
Af 15	Pearl Snelling	Campbell	1947	30	do	33	1½
Bb 1	Somerset Seafood Co.	Cusick	1947	6	Jetted	671	2½
Bb 2	Thomas Price	Todd	1946	5	do	144	1½
Bb 3	Harold White	White	1946	4	do	122	2
Bb 4	J. T. Beecham	Todd	1946	5	do	140	1½
Bb 5	G. M. Corbin	—	—	10	do	145	3
Bb 6	W. S. Parks	—	1942	4	Driven	10	1¼
Bb 7	Eldridge Jones	—	1942	5	do	9	1¼
Bb 8	Clarence Brown	—	1944	10	do	12	1½
Bc 1	Elmer Dashiel	White	1951	2	Jetted	131	2
Bc 2	Harry L. Bozman	do	1950	3	do	105	2
Bc 3	W. G. Stark	do	1950	3	do	105	2
Bc 4	Bain D. Webster	White	1950	3	do	135	2
Bc 5	Vaughn Wallace	Todd	1946	3	do	122	1½
Bc 6	Walter F. McDorman	White	1949	4	do	127	2
Bc 7	Henry Messick	Farlow	1947	3	do	139	2
Bc 8	Brooks Carew	Cusick	1950	4	do	147	1½
Bc 9	Mason Webster	White	1950	6	do	132	2
Bc 10	Do	do	1950	4	do	95	2
Bc 11	Ford Hopkins	do	1947	5	do	90	2
Bc 12	Harwood Wallace	do	1948	3	do	135	2
Bc 13	Monroe Jones	—	1882	6	Dug	6.5[m]	24
Bc 14	Somerset County Board of Education	White	1953	4	Jetted	132	1¼
Bd 1	Ross McIntyre	do	1946	10	do	136	2
Bd 2	Neary McIntyre	do	1946	10	do	136	2
Bd 3	Mrs. Jennie Dashiell	do	1946	10	do	139	2
Bd 4	Edna Eisnor	do	1951	5	do	107	2
Bd 5	Edgar L. Duntan	do	1951	15	do	150	2
Bd 6	John W. Horner	do	1950	5	do	101	2
Bd 7	James Parks	do	1946	4	do	94	2
Bd 8	Harry Causey	do	1948	4	do	104	2
Bd 9	Clark I. Simms	do	1946	4	do	98	2
Bd 10	Herman Dashiell	do	1950	4	do	122	2
Bd 11	R. J. Kohlheim	Cusick	1951	9	do	178	1½
Bd 12	Do	do	1950	9	do	179	1½
Bd 13	St. Peters Church Trustees	White	1947	5	do	145	2
Bd 14	Matt Melson	Farlow	1946	6	Jetted	143	2
Bd 15	J. B. Reese	White	1946	6	do	144	2

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D,F, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Do.
do	—	—	R, E	D,F, S	Water reported "irony".
do	—	—	C, E	C,D, S	Do.
Piney Point	1	Jun. 27, 1950	R, E	I, L	See log, table of paleontology, and chemical analysis. Drilled to 814 feet, plugged back. Water level 0.5 feet above land surface in 1947.
Manokin	8	Oct. 17, 1946	R, E	D, S	Water reported good.
do	4	May 15, 1946	N	N	See log. Well abandoned, driller reported salty water.
do	8	Oct. 20, 1946	R, E	D, S	Water reported trace of iron.
do	—	—	R, E	D, S	Water reported good.
Pleistocene	—	—	R, E	D, S	Water reported slightly "irony".
do	—	—	C, H	D, S	Do.
do	—	—	C, H	D, S	Water reported good.
Manokin	0.5	Aug. 1951	R, E	D, S	See log. Water reported good.
do	3	Feb. 15, 1950	C, H	D, S	Do.
do	3	Feb. 13, 1950	R, E	D, S	Do.
do	4	Feb. 20, 1950	C, H	D, S	See log. Water reported good.
do	8	Sep. 23, 1946	C, H	D, S	Water reported good.
do	0.5	Mar. 30, 1949	C, H	D, S	See log. Water reported good.
do	5.54[m]	Jan. 6, 1952	N	N	See log.
do	2	June 30, 1950	R, E	D, S	See log. Water reported good.
do	8	1950	R, E	D, S	Water reported good. Supplies 7 summer cottages.
do	1.5	Jun. 1950	R, E	D, S	See log. Water reported good.
do	—	—	R, E	D, S	Water reported good.
do	0.5	Oct. 7, 1948	C, H	D, S	Water appears slightly "irony".
Pleistocene	2.00[m]	Mar. 13, 1952	B, H	D,F, S	Do.
Manokin	1.79	Jan. 19, 1954	C, H	P, S	See log and chemical analysis.
do	2	May 11, 1946	R, E	D, S	See log. Water reported excellent.
do	4	May 10, 1946	R, E	D, S	Do.
do	3	May 7, 1946	R, E	D, S	See log of Bd 2. Water reported excellent.
do	—	—	C, H	D, S	See log. Well flowed 2 gpm from pipe 1½ feet above land surface, Jul. 1951. Water reported not good, murky brown color.
do	3	Sep. 1951	N	N	See log.
do	6	Nov. 1950	R, E	D, S	See log. Water reported good.
do	2	Sep. 21, 1946	C, H	D, S	Do.
do	3	Oct. 8, 1948	R, E	D, S	See log. Water reported slightly "irony".
do	3	Sep. 24, 1946	R, E	D, S	Do.
do	1.5	Apr. 1950	C, H	D, S	See log. Water reported good.
do	2.84[m]	Jan. 16, 1952	N	N	Do.
do	1.5	July 29, 1950	R, E	D, S	Do.
do	0.5	Nov. 22, 1947	R, E	D, S	Do.
Manokin	3	May 17, 1946	R, E	D, S	See log. Water reported good.
do	4	May 22, 1946	C, H	D, S	Do.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bd 16	James M. Farlow	White	1950	8	Jetted	136	2
Bd 17	Tom Noble	do	1952	8	do	148	2
Bd 18	Denwood Willing	—	1941	6	Driven	22	1¼
Bd 19	Leanord Sears	—	1949	9	do	51	1½
Bd 20	Oscar Maddox	—	1951	4	do	25	1½
Bd 21	Otho Tilghman	Wheatly	1942	4	Jetted	150	2
Bd 22	Wesley Bozman	—	1944	4	Driven	38	1½
Bd 23	James Bozman	Todd	1940	4	Jetted	160	1½
Bd 24	Thomas Dize	Jarrett	1944	4	do	160	1½
Bd 25	George Hall	—	1950	5	do	160	2
Bd 26	Natt Dashiel	—	1937	4	Driven	20	1¼
Bd 27	Harry Fitzgerald	—	1912	4	do	25	1½
Bd 28	Clarence E. White	Cusick	1947	5	Jetted	136	1½
Bd 29	Harry Noble	—	1944	4	do	165	2
Bd 30	Edgar Jones	—	1903	4	—	80	1½
Bd 31	Montgomery Dukes	—	—	4	Spring	2	—
Be 1	Coop. Ground-Water Program	Coop. Ground-Water Program	1949	18	Driven	22.5^{m}	1¼
Be 2	Town of Princess Anne	Shannahan Artesian Well Co.	1945	18	Jetted	83	6
Be 3	R. Reynolds	Cusick	1951	18	do	200	1½
Be 4	Roy S. Smith	White	1948	18	do	187	2
Be 5	Earl Long	do	1951	10	do	151	2
Be 6	Fred Benson	Cusick	1946	18	do	196	2
Be 7	Herman Bozman	White	1946	15	do	183	2
Be 8	David B. Kean	Cusick	1946	15	do	196	2
Be 9	Edward Pollitt	White	1952	10	do	203	2
Be 10	Harry Carter	do	1946	10	do	194	2
Be 11	Ervin E. Stroble	Cusick	1950	16	do	188	1½
Be 12	James Porter	White	1950	16	do	170	2
Be 13	Fred Gordy	Cusick	1951	18	do	208	1½
Be 14	Mrs. Vador Pusey	do	1950	17	do	212	1½
Be 15	Mrs. Ella Pusey	do	1950	14	do	198	1½

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	2	Feb. 1950	R, E	D, S	See log. Water reported "irony".
do	—	—	R, E	D, S	Water reported good.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony". Well goes dry at times.
do	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	C, H	D, S	Water reported "irony".
Manokin	—	—	C, H	D, S	Water reported good.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported slightly "irony".
Manokin	—	—	R, E	D, S	Water level reported 1940, 1 foot above land surface. Water reported good.
do	—	—	C, H	D, S	Water reported good.
do	—	—	R, E	D, S	Do.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Do.
do	—	—	R, E	D, S	Do.
Manokin	2	Sep. 18, 1947	R, E	D, S	See log.
do	—	—	R, E	D, S	See chemical analysis. Well flowing 0.5 feet above land surface Jan. 19, 1954.
Yorktown and Cohansey(?)	—	—	N	N	See Vol. 10, p. 335, Well 17, Md. Geological Survey. Well destroyed in 1951. Flow "a few inches above land surface". Flow in 1903 reported 1.5 feet above land surface.
Pleistocene(?)	—	—	N	F, S	Not flowing Feb. 1954. Water appears stagnant. Flows in wet weather.
Pleistocene	3.91 m	Aug. 16, 1949	N	O	Water level rises above land surface during wet seasons.
Pleistocene and Pliocene(?)	14	1945	T, E	P, L	See log. Specific capacity 8 gpm/ft in 1945. Pumped 20,979 gals. in Oct., Nov., Dec. 1951. Water reported "irony".
Manokin	2	Jul. 21, 1951	C, H	D, S	See log. Water reported good. Drawdown reported 7 feet after pumping 3 hours at 30 gpm.
do	4	Jul. 26, 1948	R, E	D, S	See log. Water reported good.
do	1	May 1951	R, E	D,F, S	See log. Water reported slightly "irony".
do	3	Nov. 1946	R, E	D,F, M	See log. Water reported good. Drawdown 1 foot after pumping 3 hours at 20 gpm.
do	7	Dec. 28, 1946	R, E	D,F, M	Water reported good.
do	3	Nov. 15, 1946	R, E	D, S	Drawdown 0.5 feet after 1 hour pumping 20 gpm.
do	3	Feb. 5, 1951	R, E	D,F, M	See log. Reported 146 ppm chloride; 62 ppm hardness; 340 ppm alkalinity; and pH 7.7; very much soda.
do	3	Sep. 14, 1946	R, E	D,F, M	See log. Water reported good, no soda.
do	6	Aug. 21, 1950	R, E	D, S	See log. Water reported excellent. Drawdown 2 feet after pumping 2 hours at 20 gpm.
do	4.5	May 1950	R, E	D,F, S	See log.
do	4	Oct. 24, 1951	R, E	D,F, S	See log. Water reported good. Drawdown 1 foot after pumping 3 hours at 22 gpm.
do	4	Apr. 15, 1950	R, E	D,F, S	See log and chemical analysis.
do	3	Dec. 28, 1950	C, H	D, S	See log. Water reported good. Drawdown 4 feet after pumping 2 hours at 25 gpm.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Be 16	Mrs. T. Lester Carroll	Cusick	1951	15	Jetted	188	1½
Be 17	Douglas Simpkins	White	1950	15	do	180	2
Be 18	Robert Pinto	Cusick	1951	16	do	200	1½
Be 19	Harvey Russell	White	1950	15	do	166	2
Be 20	Mrs. Black	—	1951	16	Driven	15	1½
Be 21	Alton Dryden	Muir	1947	18	do	30	1½
Be 22	C. E. Meridith	—	1941	12	do	22	1½
Be 23	M. H. Adams	White	1948	15	Jetted	210	1½
Be 24	E. W. Long	—	1912	15	Driven	20	1¼
Be 25	J. B. Miller	—	1947	12	do	20	1½
Be 26	A. E. Briddell	—	1912	12	Dug	20	36
Be 27	M. Adams	—	1951	15	Driven	20	1½
Be 28	—	—	—	18	do	20(?)	1½
Be 29	Town of Princess Anne	Cannon	1916–1918	8	Jetted	32.3 m	6–1½
Be 30	Do	do	1916–1918	18	do	26.3 m	6–1½
Be 31	Do	do	1916–1918	10	do	27.9 m	6–1½
Be 32	Do	do	1916–1918	18	do	23.5 m	6–1½
Be 33	Do	do	1916–1918	18	do	34.5 m	6–1½
Be 34	Do	do	1916–1918	18	do	33.0 m	6–1½
Be 35	Do	do	1916–1918	18	do	34.5 m	6–1½
Be 36	Do	do	1916–1918	18	do	34.9 m	6–1½
Be 37	Do	do	1916–1918	18	do	26.8 m	6–1½
Be 38	Do	do	1916–1918	18	do	25.1 m	6–1½
Be 39	Maryland State College Division of Univ. Md.	Custis	1929	9	do	196	2
Be 40	Do	do	1929	9	do	204	2
Be 41	Supplee, Wills, Jones	Pentz	1942	10	do	60	3
Be 42	E. Mace Smith	White	1929	17	do	184 m	2
Be 43	John H. Fitzgerald	Cusick	1952	18	do	203	1½
Be 44	Herman Dykes	do	1952	18	do	189	1½
Be 45	Mrs. Phillip Layfield	White	1952	17	do	213	2
Be 46	Elmer Powell	do	1952	17	do	209	2
Be 47	William Carter	do	1952	15	do	204	2
Be 48	E. Taylor	do	1952	10	do	188	2
Be 49	Town of Princess Anne	Kelly Well Co.	1928	18	Bored	64	24–18

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokiin	2	May 1, 1951	R, E	D,C, M	See log. Water reported containing soda. Drawdown 5 feet after pumping 2 hours at 25 gpm.
do	—	—	J, E	D,C, M	See log. Water reported good.
do	5	Nov. 21, 1951	R, E	D,F, M	See log. Water reported slight soda. Drawdown 2 feet after pumping 3 hours at 30 gpm.
do	4	May 1950	R, E	D,C, M	See log. Water reported good.
Pleistocene	—	—	C, H	D, S	Water reported "irony". Well cleaned by shooting down casing with pistol.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Water reported good.
do	—	—	R, E	D,F, M	Water reported good. 8 other wells on this farm.
Manokin	—	—	R, E	D, S	Water reported slightly "irony". Another well for stock.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported good.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, S	Water reported good.
do	—	—	C, H	D,F, S	Water reported slightly "irony".
do	—	—	C, H	D, S	Do.
do	13.00 [m]	Jan. 15, 1952	N	N	Old city water wells. Original depth reported 54 feet. No water level fluctuation recorded in a day. On same site as 8 wells under no. 15, p. 335, vol. 10, Md. Geol. Survey, which had a head 4 feet below land surface in 1905.
do	11.30 [m]	Jan. 15, 1952	N	N	Do.
do	11.85 [m]	Jan. 15, 1952	N	N	Do.
do	15.49 [m]	Jan. 15, 1952	N	N	Do.
do	15.44 [m]	Jan. 15, 1952	N	N	Do.
do	15.70 [m]	Jan. 15, 1952	N	N	Do.
do	15.66 [m]	Jan. 15, 1952	N	N	Do.
do	15.71 [m]	Jan. 15, 1952	N	N	Do.
do	14.40 [m]	Jan. 15, 1952	N	N	Do.
do	13.94 [m]	Jan. 15, 1952	N	N	Do.
Manokin	11	1929	N	N	Use discontinued and well covered in 1936.
do	11	1929	N	N	Do.
Pleistocene and Pliocene(?)	—	—	R, E	I, M	Pumped jointly with a well 40 feet deep. Water reported "irony".
Manokin	6.95 [m]	Aug. 5, 1952	N	O	Monthly record.
do	6	Oct. 1, 1952	R, E	D,F, S	See log.
do	5	Apr. 30, 1952	R, E	D,F,C,M	See log. Water reported good. Drawdown 6 feet after pumping 2 hours at 20 gpm.
do	6	Jun. 1952	R, E	D, S	See log.
do	2.5	May 1952	R, E	D, S	See log. Water reported containing soda.
do	6	May 1952	R, E	D, S	See log.
do	3	Nov. 1952,	R, E	D, S	See log.
Pleistocene	10	1928	T, E	P, L	See log and chemical analysis. Pumped 435 gpm. with 23 foot drawdown in 1928.

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Be 50	Town of Princess Anne	Sydnor Pump and Well Co.	1953	18	Drilled	455	6–3
Be 51	Do	do	1953	18	do	214	16–10
Be 52	Do	do	1953	18	do	77	8
Bf 1	R. B. Pusey	Cusick	1950	28	Jetted	232	2
Bf 2	Russell Powell	—	—	25	Dug	11.3 m	24
Bf 3	R. T. Doody	—	1920(?)	35	Driven	35.3 m	1¼
Bf 4	F. Long	Beauchamp	1949	40	do	10.3 m	1¼
Bf 5	S. F. Pusey	Pusey	—	38	do	10	1¼
Bf 6	R. Dykes	Dykes	1950	35	do	46	1¼
Bf 7	W. A. Waddy	Beauchamp	1951	20	do	30	1½
Bf 8	L. Warwick	do	1949	30	do	35	1¼
Bf 9	C. M. Orvis	Orvis	1942	30	do	26	1¼
Bf 10	A. Miles	Miles	1943	32	do	21.5 m	1¼
Bf 11	W. Jenkins	Jenkins	—	35	do	32.4 m	1¼
Bf 12	Margaret Cannon	—	1947	20	do	50	1½
Bg 1	G. Alder	Beauchamp	1948	30	do	14.8 m	1½
Bg 2	H. Brown	—	—	25	do	—	—
Ca 1	Berwick Development Co.	Cusick	1951	3	Jetted	871	1½–1
Cb 1	Boyd Brittingham	do	1950	5	do	157	1½
Cb 2	William C. Thomas	do	1950	6	do	142	1½
Cb 3	John W. Webster	do	1947	4	do	142	1½
Cb 4	John Bennett	Todd	1946	6	do	693	1½
Cb 5	Stanford Harrison	Cusick	1946	4	do	140	1½
Cb 6	Wilson Seafood Co.	Robbins	1915(?)	3	Drilled	500–700	4
Cb 7	Boyd Brittingham	Cusick	1950	3	Jetted	140	1½
Cb 8	Mr. Daniels	—	1942	5	Driven	23	1½
Cb 9	Stanford White	—	1945	5	do	23	1½
Cb 10	Gladys White	—	1947	5	do	23	1½
Cb 11	Robert S. Jones	—	1949	8	do	19	1¼
Cb 12	Adolphus Walters	—	—	7	do	8	1½
Cb 13	Oscar Abbott	—	1943	6	Jetted	145	1½
Cb 14	Walter Baker	—	1945	4	Driven	8	1½
Cb 15	Somerset County Board of Education	White	1953	6	Jetted	147	3-2
Cb 16	J. H. Burton & Sons	—	1933(?)	4	—	313	4
Cc 1	Dr. T. B. Whaley	White	1951	2	Jetted	840	2

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Calvert(?)	—	—	—	T	See log.
Manokin	7	Aug. 14, 1953	T, E	P, L	See log Be 50 and chemical analysis. Drawdown 133 feet after pumping 24 hours at 350 gpm.
Pleistocene	13	May 1953	T, E	P, L	See log. Water reported "irony".
Manokin	14	Apr. 12, 1950	R, E	D,F, M	See log. Water reported good.
Pleistocene	2.97 m	Feb. 6, 1952	C, H	D,F, S	Water reported good.
Pleistocene and Pliocene(?)	3.44 m	Feb. 6, 1952	C, H	D,F, S	Water reported not "irony". Temperature 52° F.
Pleistocene	1.27 m	Feb. 6, 1952	C, H	D, S	Water reported good.
do	—	—	C, H	D, S	Water reported good, little hard. A well 40 feet deep is "irony".
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Water reported "irony".
do	—	—	R, E	D, S	Water reported good.
do	—	—	R, E	D,F, S	Water reported slightly "irony".
do	—	—	C, H	D, S	Do.
do	1.18 m	Feb. 8, 1952	C, H	D, S	Do.
do	2.9 m	Feb. 8, 1952	C, H	D,F, S	Water reported "irony".
do	—	—	C, H	D, S	Do.
Pleistocene	2.59 m	Feb. 8, 1952	C, H	D, S	Water reported good.
do	—	—	R, E	D,F, M	Do.
Magothy(?)	—	—	N	C, M	See log and table of paleontology. Flow reported Oct. 15, 1951, 10 gpm.
Manokin	3	Jul. 8, 1950	R, E	D, S	See log. Water reported containing some soda and magnesium.
do	2	Jul. 26, 1950	C, H	D, S	See log. Water reported containing some soda.
do	4	Nov. 25, 1947	R, E	D, S	Water reported good.
Piney Point	8	Oct. 25, 1946	R,C, E,H	D,C, M	Water reported excellent.
Manokin	4	Dec. 5, 1946	R, E	D, S	Reported sand and gravel for 140 feet. Water reported good.
Piney Point	—	—	R, E	I, M	Water reported good.
Manokin	—	—	— E	I, M	Crabhouse.
Pleistocene	—	—	C, H	D, S	Water reported good.
do	—	—	R, E	D, S	Do.
do	—	—	R, E	D,F, S	Water reported slightly "irony".
do	—	—	R, E	D,F, S	Water reported good.
do	—	—	C, H	D, S	Do.
Manokin	—	—	R, E	D, S	Water reported flat, slight taste of soda.
Pleistocene	—	—	R, E	D, S	Water reported slightly "irony". Water below 8 feet reported marshy.
Manokin	3	Oct. 1953	R, E	P, M	See log and chemical analysis.
Choptank(?)	—	—	R, E	I, L	See chemical analysis.
Piney Point	—	—	— E	D, S	See log and chemical analysis. Water reported "soda". Depth of screen below land surface 720–740 feet. Flow reported Apr. 10, 1952, ½ gpm with head 5 feet above land surface.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cc 2	Aubrey Holland	Revel	1946	3	Dug	8	36
Cc 3	Mrs. Calvert Meredith	—	1940	3	do	8	36
Cc 4	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	2	Power Auger	95	4
Cd 1	Beauchamp Bloodsworth	White	1950	4	Jetted	151	2
Cd 2	Capt. F. B. Kauffman	do	1951	5	do	166	2
Cd 3	Koren Christensen	Farlow	1947	3	do	150	2
Cd 4	Margaret Baugher	Cusick	1951	8	do	193	1½
Cd 5	Arzie Walston	—	—	2	Driven	21	1¼
Cd 6	Evelyn Wilson	—	1940	2	Dug	8	36
Cd 7	Ethel Stevenson	—	1927	2	Driven	30	1½
Cd 8	Elmer F. Slagle	—	1947	3	do	20	1½
Cd 9	Somerset County Board of Education	Wheatley	1936	3	Jetted	350	2
Cd 10	E. P. Ross	—	1875(?)	3	Dug	25	36
Cd 11	Fairmount Parsonage	—	1900	3	do	25	36
Cd 12	Elwood Davis	Davis	1950	3	Driven	60	1½
Cd 13	Carrie Waters	Waters	1915	2	do	25	1½
Cd 14	William McLean	—	1940	7	do	18	1½
Cd 15	Do	—	1912	7	Dug	20	24
Cd 16	James Warwick	—	1890	5	Jetted	169	2
Cd 17	Edward Carpenter	—	1939	20	do	92	2
Cd 18	Do	—	—	20	Dug	15.7 m	36
Cd 19	Do	Ennis Bros.	1944	20	Jetted	196	6
Cd 20	Do	do	1941	20	do	200	4
Cd 21	M. T. Long	—	1912	8	Driven	20	1¼
Cd 22	Chas. Reichard	—	1935	15	do	15	1¾
Cd 23	Do	—	1938	15	do	15	1¾
Cd 24	Robt. Beechum	—	1912	7	do	20	1½
Cd 25	Roy Jones	—	1937	5	do	21	1¼
Cd 26	Wm. M. Grover	—	1947	21	do	15	2
Cd 27	Wm. M. Grover	—	1947	21	do	15	2
Cd 28	Do	—	1947	21	do	15	2
Cd 29	Mrs. Chas. Fontaine	Cusick	1951	8	Jetted	190	1½
Cd 30	W. W. Fontaine	Fontaine	1940	8	Driven	15	1½
Cd 31	J. P. Joynes	Joynes	1940	6	do	15	1¼
Cd 32	George R. Joynes	do	1949	5	do	19	1¼
Cd 33	Samuel Green	Green	1942	6	do	20	1½
Cd 34	Margaret Robinson	—	1943	6	do	15	1¼
Cd 35	Randolph Maddox	—	—	5	Dug	4.5 m	24

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D, S	Water reported very "irony".
do	—	—	C, H	D, S	Water reported salty, odorous in summer.
Yorktown and Cohansey(?)	—	—	N	T	See log.
Manokin	—	—	R, E	D,F, S	See log. Static water level reported 1 foot above land surface in Nov. 1950. Water reported good.
do	1.5	Sep. 1951	R, E	D,F, S	See log and chemical analysis.
do	—	—	R, E	D, S	See log. Static water level reported 1 foot above land surface Jun. 14, 1947. Water reported good.
do	0	Aug. 1, 1951	R, E	D,F, S	See log. Drawdown reported 1 foot after pumping 2 hours at 30 gpm.
Pleistocene	—	—	C, H	D, S	Water reported "irony", unfit for drinking.
do	—	—	B, H	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported "irony".
Pleistocene	—	—	R, E	D,F, M	Do.
Choptank(?)	—	—	N	N	Water reported containing too much soda. Well plugged. Reported to flow Jun. 1944.
Pleistocene and Pliocene(?)	—	—	B, H	D, S	Water reported slightly "irony" and containing soda.
do	—	—	R, E	D, S	Water reported slightly "irony".
do	—	—	R, E	D, S	Water "irony", cleared with filter.
do	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	R, E	D, S	Water reported "irony".
do	—	—	R, E	D, M	Water reported good.
Manokin	—	—	N	D, M	Well reported flowing Feb. 1952, tides affect water level. Water reported good.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, M	Water reported slightly "irony". (Cd 17, 18, 19 and 20 are connected to form a single system.)
Pleistocene	6.2 m	Feb. 6, 1952	R, E	D, S	
Manokin	18	Oct. 1944	R, E	D,F, M	See log. Water reported good.
do	—	—	R, E	D,F, M	Do.
Pleistocene	—	—	R, E	D,F, S	Water reported good.
do	—	—	R, E	D, S	Do.
do	—	—	R, E	F, S	Do.
do	—	—	R, E	D,F, S	Do.
do	.5	Feb. 16, 1952	R, E	D,F, S	Water reported slightly "irony".
do	—	—	R, E	D,F, S	Water reported good. Three wells same depth within radius of 50 feet connected.
do	—	—	R, E	D,F, S	See Cd 26.
do	—	—	R, E	D,F, S	Do.
Manokin	—	—	R, E	D, S	Water reported containing a little soda.
Pleistocene	4.5	Apr. 17, 1952	R, E	F, S	Do.
do	—	—	C, H	D, S	Water reported "irony".
do	0	1949	C, H	D, S	Do.
do	—	—	C, H	D, S	Do.
do	—	—	C, H	D, S	Do.
do	1.90 m	Apr. 17, 1952	B, H	D, S	Water reported good. Well goes dry occasionally.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cd 36	Chester P. Board	—	1877	8	Dug	7.6 m	24
Cd 37	Garland Ruark	Ruark	1950	8	Driven	90	1½
Cd 38	F. W. Maalde	Maalde	1927	3	do	23	1½
Cd 39	E. G. Hayman	Wheatley	1937	4	Jetted	160	—
Cd 40	Harold Wagner	—	—	5	—	—	—
Ce 1	C. K. Duncan	White	1946	12	Jetted	78	2
Ce 2	T. Dorsey	Cusick	1948	14	do	246	1½
Ce 3	W. W. Brosey	do	1948	14	do	228	1½
Ce 4	L. F. Catlin, Jr.	do	1951	12	do	225	1½
Ce 5	J. R. Richards	do	1950	12	do	240	1½
Ce 6	H. E. Massey	do	1946	8	do	90	2
Ce 7	N. D. Widdowson	White	1948	11	do	198	2
Ce 8	John A. Chamberlin	Cusick	1946	14	do	235	1½
Ce 9	Wm. T. James, Jr.	do	1946	14	do	238	1½
Ce 10	Donald M. Ruark	do	1949	14	do	222	1½
Ce 11	Robert H. McDorman	White	1949	12	do	192	2
Ce 12	Somers Blevins	Cusick	1947	12	do	210	1½
Ce 13	Denet Long	do	1948	14	do	237	1½
Ce 14	Long Bros.	do	1947	14	do	233	2½
Ce 15	Roy J. Ring	do	1947	10	do	190	1½
Ce 16	J. F. Joynes	White	1947	12	do	190	2
Ce 17	Phillip Richardson	—	1947	12	Driven	18	1½
Ce 18	D. J. Mulcahy	—	1951	15	do	20	1¼
Ce 19	Mrs. Wm. White	—	1950	17	do	40	1½
Ce 20	Westover Springs	—	—	5	Spring	—	—
Ce 21	Summer Labor Camp	Kohl Bros.	1934	12	Drilled	190	6

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	3.70 m	Apr. 17, 1952	R, E	D, S	Water tasted excellent.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported very "irony". Drinking water hauled from Westover Springs.
Pleistocene	—	—	J, E	D, S	Water reported "irony".
Manokin	—	—	R, E	D, S	See chemical analysis. Well was drilled deeper. Some water may come from deeper stratum.
—	—	—	H	D, S	A cistern. No wells in this area, too much salt.
Pocomoke	4	May 2, 1946	N	N	See log. Water reported very "irony". Well abandoned.
Manokin	2	Dec. 31, 1948	R, E	D, S	See log and chemical analysis.
do	3	Jun. 28, 1948	R, E	D,F, S	See log and chemical analysis. Water reported containing soda and having salty taste.
do	3 0.80 m	Oct. 31, 1951 Jan. 3, 1952	C, H	D, S	See log and chemical analysis.
do	2	May 11, 1950	R, E	D, S	See log and chemical analysis. Drawdown 2 feet after pumping 2 hours at 24 gpm, May 11, 1950.
Pocomoke	3	Nov. 20, 1946	R, E	F, S	Water reported very "irony". Jetted to 280 feet but no satisfactory water obtained below 90 feet.
Manokin	4	Dec. 21, 1948	R, E	D,F, M	See log. Water reported good.
do	4	Dec. 24, 1946	R, E	D, S	See log. Drawdown 1.5 feet after pumping 3 hours at 30 gpm, Dec. 24, 1946. Water reported containing trace of soda.
do	4	Dec. 28, 1946	R, E	D, S	See log. Drawdown 1.5 feet after pumping 3 hours at 25 gpm, Dec. 28, 1946. Water reported containing trace of soda.
do	1.5	Jul. 21, 1949	R, E	D,F, S	See log and chemical analysis.
do	1	Sep. 1949	R, E	D,F, S	See log. Water reported good.
do	1	Nov. 19, 1947	R, E	D,F, M	See log. Drawdown 3 feet after 2 hours pumping 20 gpm, Nov. 19, 1947. Water reported good.
do	4	Apr. 21, 1948	R, E	D, M	See log. Drawdown 4 feet after pumping 16 hours at 30 gpm, Apr. 21, 1948. Water reported containing soda.
do	3	Aug. 22, 1947	R, S	I, M	See log. Drawdown 3 feet after pumping 3 hours at 50 gpm, Aug. 22, 1947. Uses neutralizer for soda.
do	0.6	Sep. 27, 1947	R, E	D,F, S	See log. Drawdown 1.3 feet after pumping 2 hours at 28 gpm, Sep. 27, 1947. Water reported containing soda.
do	—	—	R, E	D,C, S	Water reported good.
Pleistocene	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	C, H	D,F, S	Water reported good.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony".
—	—	—	N	P, L	Flowing spring. Flow measured 12 gpm, Mar. 26, 1952. Water reported not "irony".
Manokin	—	—	J, E	I,D, L	Water reported containing soda. Use of well is seasonal.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ce 22	Frances Thompson	Taylor	1951	17	Driven	100	1½
Ce 23	Ella Bruin	—	1949	17	do	25	1½
Ce 24	Farm near Kings Creek	—	—	17	do	19.7 m	1½
Ce 25	Dave Collins	—	1942	15	do	18	1¼
Ce 26	Isaac White	—	1946	15	do	20	1¼
Ce 27	Joe Sigrist	—	1948	20	do	25	1¼
Ce 28	Walter Dorsey	—	1947	20	do	25	1½
Ce 29	Farm near Manokin	—	—	5	do	39.1 m	1¼
Ce 30	Col. E. L. McLendon	—	1795	5	Dug	9.4 m	24
Ce 31	William Rue	Rue	—	9	Driven	24	1¼
Ce 32	Geo. Williams	Williams	1951	11	do	30	1¼
Ce 33	William Ford	—	1942	13	do	24	1¼
Ce 34	Mrs. Charlie Poole	—	1940	14	do	41.3 m	1¼
Ce 35	Farm 2.6 miles W. of Cottage Grove	—	—	14	do	11.1 m	1¼
Ce 36	D. F. Huffman	Huffman	1946	14	do	32	1¼
Ce 37	W. W. Perry	Custis	1917	2	Jetted	190	3
Ce 38	Harry Keenan	Scott	1950	5	do	226.5	2
Ce 39	G. Barnes	Cusick	1952	20	do	282	1½
Ce 40	Kenneth Widdowson	—	—	4	Spring	1	24
Cf 1	Fulton Green	White	1947	15	Jetted	210	3-2
Cf 2	Coop. Ground-Water Program	Coop. Ground Water Program	1949	20	Driven	15 m	1¼
Cf 3	Maurice Payne	White	1951	11	Jetted	216	3-2
Cf 4	George Benson	do	1947	16	do	239	3-2
Cf 5	W. F. Pusey	—	1945	25	Driven	39	1¼
Cf 6	W. Weidema	Cusick	1947	20	Jetted	256	2½-1½
Cf 7	W. H. Long	—	1942	22	Driven	19	—
Cf 8	Maryland State Game Farm	—	1912	22	Dug	14.5 m	36
Cf 9	Mrs. Laura Cotman	—	1937	21	Driven	16	1½
Cf 10	T. B. Beauchamp	—	1852	20	do	23	1¼
Cf 11	Farm 1.2 mi. north of Costen	—	—	22	do	21.2 m	1¼
Cf 12	M. V. Taylor	—	1949	23	do	22	1¼
Cf 13	Fred Creasy	—	1940	20	do	35	1½
Cg 1	R. Beauchamp	Beauchamp	1949	20	do	24	1¼
Cg 2	Mrs. J. Pope	—	—	27	do	18-20	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pocomoke	—	—	R, E	C,D, M	Water reported good.
Pleistocene	—	—	C, H	D, S	Water tasted "irony".
do	4.09[m]	Apr. 14, 1952	C, H	D,F, S	Water reported "irony".
do	—	—	C, H	D,F, S	Do.
do	—	—	C, H	D, S	Do.
do	—	—	R, E	D, S	Water reported very "irony".
do	—	—	R, E	D,F, S	Water reported "irony" and inadequate.
Pleistocene and Pliocene(?)	2.32[m]	Apr. 18, 1952	N	N	
Pleistocene	4.91[m]	Apr. 18, 1952	R, E	D, S	Water reported good; occasionally low.
Pleistocene and Pliocene(?)	—	—	C, H	D,F, S	Water reported "irony".
do	—	—	C, H	D, S	Water reported "irony". Uses spring water from Westover, Ce 20.
do	—	—	R, E	D,F, S	Water reported "irony".
do	4.59[m]	Apr. 18, 1952	C, H	D,F, S	Do.
Pleistocene	2.11[m]	Apr. 18, 1952	C, H	N	
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony".
Manokin	—	—	R, E	D,F, M	Reported to flow 4.5 gpm, Aug. 6, 1952. Water reported good.
do	—	—	R, E	D,F, M	See chemical analysis. Static water level reported 0.5 foot above land surface in 1950.
do	6	Aug. 29, 1952	R, E	D, S	See log and chemical analysis. Drawdown 4 feet after pumping 2 hours at 25 gpm, Aug. 29, 1952. Water reported containing soda.
Pleistocene	—	—	N	F, S	Estimated flow Feb. 1954, 3 gpm. Reported 10 gpm during wet spells. Temperature 50.5°F. At foot of 8 foot bank.
Manokin	0	Oct. 31, 1947	J, E	D,F, M	See log. Water reported good.
Pleistocene	0.83[m]	Mar. 30, 1950	N	O	Monthly record.
	5.95[m]	Nov. 29, 1950			
Manokin	4	Mar. 1951	R, E	D,F, M	See log and chemical analysis.
do	4.5	Nov. 29, 1947	R, E	D,F, M	See log.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported sulfurous. Detergent filter used.
Manokin	6	Jun. 24, 1947	J, E	D,F, M	See log and table of paleontology. Water reported good, containing little soda.
Pleistocene	—	—	R, E	D, S	Water reported good.
do	3.12[m]	Mar. 27, 1952	R, E	D,F, S	Water reported "irony".
do	—	—	R,C, E,H	D,F, M	Do.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, M	Water reported slightly "irony" and containing little soda.
do	1.8[m]	Mar. 27, 1952	C, H	N	
do	—	—	C, H	D, S	Water reported "oily".
do	—	—	C, H	D, S	Water reported "irony".
Pleistocene	—	—	R, E	D,F, M	Water reported "irony".
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Water reported good.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cg 3	Somerset County Board of Education	—	1948	10	Driven	12.3 m	1¼
Cg 4	Owen Melvin	—	1948	21	do	14.5	1¼
Dc 1	Old church at Rumbley	Coop. Ground Water Program	1952	2	Power Auger	64	4
Dc 2	Noah Ward	Cusick	1952	4	Jetted	139	1½
Dd 1	A. F. Blake	White	1946	5	do	201	2
Dd 2	G. Gale	Cusick	1947	8	do	170	1½
Dd 3	O. L. Daugherty	do	1950	4	do	152	1½
Dd 4	Honiss Tull	White	1950	6	do	33	2
Dd 5	A. J. Coons	White	1951	9	do	86	2
Dd 6	Grover S. Somers	do	1951	8	do	86	2
Dd 7	F. C. Haislip	do	1951	6	do	57	2
Dd 8	Do	do	1951	6	do	100	2
Dd 9	Mrs. Phillip Ward	Cusick	1947	8	do	91	1½
Dd 10	Dr. G. Coulbourne	do	1947	8	do	116	1½
Dd 11	Marion Fire Co.	White	1949	8	do	81	2
Dd 12	H. Palmer	Cusick	1950	8	do	192	1½
Dd 13	R. Brice Wittington	White	1949	8	do	86	2
Dd 14	G. Sommers	do	1949	8	do	84.5	2
Dd 15	H. Price	do	1949	8	do	72	2
Dd 16	Roy Pusey	do	1948	7	do	88.5	2
Dd 17	E. Butler	do	1949	8	do	75	2
Dd 18	Reginald Hall	do	1948	8	do	87	2
Dd 19	H. Powell	do	1948	8	do	78	2
Dd 20	N. Wittington	do	1950	8	do	55	2
Dd 21	W. T. Chaffey	Cusick	1947	7	do	214	1½
Dd 22	Do	do	1947	7	do	220	1½
Dd 23	L. O. Powell	White	1950	5	do	86	2
Dd 24	Geo. A. Green	do	1948	8	do	95	2
Dd 25	W. Bradshaw	Cusick	1947	4	do	155	1½
Dd 26	N. R. Coulbourn	do	1947	8	do	152	1½
Dd 27	Mrs. I. E. Stevenson	do	1949	8	do	100	1½

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	0.75 m	Feb. 8, 1952	C, H	P, S	Water reported very "irony".
do	—	—	R, E	D,F, M	Water reported "irony".
Yorktown and Cohansey(?)	—	—	N	T	See log.
do	4	Jul. 30, 1952	R, E	D,F, S	See log and chemical analysis.
Manokin	8	Apr. 18, 1946	R, E	D, S	See log. Slight taste of soda.
Yorktown and Cohansey(?)	2	Nov. 6, 1947	R, E	D, S	See log. Water reported hard. Drawdown 5 feet after pumping 2 hours at 10 gpm, Nov. 6, 1947.
do	1	Jan. 6, 1950	R, E	D, S	See log. Water reported a little hard.
Pleistocene	4	Jul. 1950	J, E	F, M	See log. Water reported "irony".
Pocomoke	7	Apr. 1951	J, E	D, S	See log.
do	10	Sep. 1951	R, E	D, S	See log. Water tasted "irony".
do	2.70 m	Jan. 4, 1952	N	N	See log. Water reported very "irony".
Yorktown and Cohansey(?)	3	Jul. 1951	— E	D, S	See log.
Pocomoke	2	Oct. 1947	Ic, E	D, S	See log. Water "irony". Drawdown 1 foot after pumping 1 hour at 30 gpm, Oct. 1947.
Yorktown and Cohansey(?)	2	Oct. 25, 1947	R, E	D, S	See log. Water reported slightly "irony". 25-foot point set in blue clay 91–116 feet. Sand from 120 to 131 feet; open hole(?).
Pocomoke	2	Apr. 1949	R, E	P, M	See log. Water reported good.
Manokin	3	Aug. 12, 1950	R, E	D,F, S	See log. Drawdown 2 feet after pumping 2 hours at 28 gpm, Aug. 12, 1950.
Pocomoke	3.5	Jul. 1949	Ic, E	D, S	See log. Water tasted "irony".
do	3	Jul. 1949	R, E	C, M	See log. Water reported "irony".
do	3	Jul. 1949	J, E	D,F, M	See log. Water reported containing iron and soda.
do	5	Oct. 10, 1948	Ic, E	D, S	See log and chemical analysis.
do	2	Jul. 1949	R, E	D, S	See log. Water reported slightly "irony".
do	—	—	R, E	D, S	Water reported slightly "irony". Driller reports "sand all the way".
do	—	—	R, E	D, S	See log. Water reported slightly "irony".
do	8	Jul. 1950	C, H	I, S	See log. Water reported very "irony".
Manokin	4	Aug. 14, 1947	R, E	F, S	See log. Water reported good.
do	5	Aug. 9, 1947	R, E	D,F, S	See log. Water reported good. Drawdown 3 feet after pumping 3 hours at 25 gpm, Aug. 9, 1947.
Pocomoke	7	Jul. 1950	C, H	F, S	See log. Water reported poor.
do	6	Sep. 8, 1948	Ic, E	D,F, S	Water reported "irony". Driller reports "sand all the way".
Yorktown and Cohansey(?)	4	Jul. 23, 1947	R, E	D,F, S	See log. Water reported containing soda and hard. Iron sequestered by detergent filter. Drawdown 2 feet after pumping 2 hours at 20 gpm, Jul. 23, 1947.
do	2	Nov. 1, 1947	Ic, E	D, S	See log. Water reported a little hard, not "irony". Drawdown 5 feet after pumping 1 hour at 15 gpm, Nov. 1, 1947.
Pocomoke	3	Jun. 4, 1949	R, E	D, S	See log. Drawdown 2 feet after pumping 2 hours at 37.5 gpm, Jun. 4, 1949.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Dd 28	F. C. Haislip	Wilson	1947	2	Jetted	84	1½
Dd 29	Dr. A. Ross	Cusick	1950	5	do	165	2
Dd 30	Crisfield Airport	do	1950	4	do	163	2½
Dd 31	Crisfield Dehydrating Co.	do	1951	9	do	140	1½
Dd 32	N. R. Coulbourn	do	1946	7	do	165	3½–1½–1¼
Dd 33	Do	do	1949	7	do	147	1½
Dd 34	Do	do	1947	7	do	152	1½
Dd 35	Herman Rueben	do	1949	4	do	150	1½
Dd 36	Chas. D. Briddell, Inc.	do	1946	4	do	155	3½–1½
Dd 37	J. Frank Nelson	do	1947	5	do	166.5 m	1½
Dd 38	H. E. Sterling, Jr.	do	1946	5	do	152	3½–1½
Dd 39	J. L. Long	do	1946	4	do	160	1½
Dd 40	Ringold Sterling	do	1949	5	do	152	1½
Dd 41	W. B. Daugherty	do	1947	4	do	149	1½
Dd 42	A. L. Lawson	do	1949	4	do	150	1½
Dd 43	Benjamin F. Nelson	do	1949	4	do	149	1½
Dd 44	N. R. Coulbourn	do	1949	6	do	147	1½
Dd 45	Samuel J. Revelle	do	1952	6	do	163	1½
De 1	Carl Green	White	1952	12	do	420	3
De 2	E. Price	do	1951	8	do	81	2
De 3	N. T. Whittington	do	1951	8	do	120	2
De 4	R. L. Chamberlin	Cusick	1951	8	do	93	2
De 5	J. E. Bowland	do	1946	10	do	90	1½
De 6	Mitchell Bonneville	White	1949	9	do	116	2
De 7	J. B. Green	do	1949	8	do	118	2
De 8	Dr. G. Coulbourne	do	1950	8	do	117	2

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pocomoke	2	Dec. 5, 1947	N	N	See log. Water reported very "irony", with marshy taste. Well abandoned and covered.
Yorktown and Cohansey(?)	4	Dec. 26, 1950	N	N	See log and chemical analysis. Drawdown 6 6 feet after pumping 3 hours at 18 gpm, Dec. 26, 1950.
do	3	Jun. 16, 1950	— E	P, S	See log. Drawdown 4 feet after pumping 6 hours at 25 gpm, Jun. 16, 1950.
do	3	Apr. 24, 1951	J, E	D,I, S	See log. Water reported slightly "irony". Drawdown 3 feet after pumping 1 hour at 30 gpm, Apr. 24, 1951.
do	3.5	Sep. 6, 1946	R, E	D,F, M	See log. Drawdown 0.5 feet after pumping 3 hours at 25 gpm, Sep. 6, 1946.
do	—	—	R, E	D, S	See log. Water reported good.
do	—	—	R, E	F, S	See log.
do	3	Jun. 10, 1947	R, E	D,F, S	See log. Water tasted good. Drawdown 8 feet after pumping 3 hours, Jun. 10, 1947.
do	—	—	R, E	D,F, S	See log. Water reported good.
do	4	Jul. 22, 1947	R, E	D,F, M	See log. Water reported good. Drawdown 2 feet after pumping 2 hours at 20 gpm, Jul. 22, 1947.
do	3.5	Jun. 20, 1946	R, E	D, S	See log. Water reported good.
do	4	Sep. 26, 1946	R, E	D,F, S	See log of Ed 15. Water reported "irony". Drawdown 0.5 feet after pumping 2 hours at 15 gpm, Sep. 26, 1946.
do	2	Sep. 28, 1949	R, E	D, S	See log. Water reported good. Drawdown 14 feet after pumping 3 hours at 28 gpm, Sep. 28, 1949.
do	3.5	Sep. 1947	R, E	D,F, S	See log. Drawdown 3.5 feet after pumping 3 hours at 12 gpm, Sep. 1947.
do	3	Jun. 20, 1949	R, E	D, S	See log. Water reported good. Drawdown 2 feet after pumping 3 hours at 12 gpm, Jun. 20, 1949.
do	1	Apr. 7, 1949	R, E	D,F, S	See log. Water reported good. Drawdown 4 feet after pumping 2 hours at 18 gpm, Apr. 7, 1949.
do	0.5	Apr. 2, 1949	R, E	D, S	See log. Water reported good. Drawdown 2.5 feet after pumping 2 hours at 25 gpm, Apr. 2, 1949.
do	2	May 23, 1952	J, E	D, S	See log and chemical analysis.
St. Marys(?)	—	—	N	N	See log. Hole plugged. Did not make a well.
Pocomoke	5	Apr. 1951	R, E	D,F, S	Water reported not "irony". See log.
do	2	Oct. 1951			
	3.25 m	Jan. 4, 1952	N	N	See log.
do	4	Nov. 7, 1951	R, E	D,F, M	See log. Water reported hard, "irony". Drawdown 1 foot after pumping 2 hours at 25 gpm, Nov. 7, 1951.
do	3	Nov. 29, 1946	R, E	F, M	See log. Water reported "irony". Drawdown 0.5 feet after pumping 1 hour at 25 gpm. Nov. 29, 1946.
do	—	—	R, E	D, S	See log. Water not "irony", a little hard.
do	2	Mar. 23, 1949	R, E	D, S	See log. Water reported good.
do	3	Apr. 17, 1950	R, E	D,F, M	See log. Water reported "irony".

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft)	Diameter of Well (in.)
De 9	Roger Hall	White	1950	4	Jetted	91	2
De 10	M. W. Adams	do	1950	3	do	86	2
De 11	Edward Landon	do	1950	8	do	112	2
De 12	Carl Green, Jr.	Cusick	1947	9	do	150	1½
De 13	E. S. Williams	do	1946	3	do	108	2½–1½
De 14	B. J. Hall	do	1948	5	do	75	1½
De 15	G. Chelton	do	1946	8	do	100	2
De 16	Paul Wilkins	White	1950	8	do	87	2
De 17	H. A. Davis	Davis	1949	10	Driven	9	1¼
De 18	F. Adams	—	1942	10	do	49	1¼
De 19	Mathews Lumber and Canning Co.	Todd	1948	8	Jetted	75	2
De 20	A. T. Dashiell	Dashiell	1949	8	Driven	23	1¼
De 21	C. Miller	—	1925	13	do	13	1¼
De 22	C. Hayman	—	1932	8	do	35	1¼
De 23	J. Gerald	—	—	5	Dug	10.8 m	36
De 24	L. Taylor	Cusick	1940	3	Jetted	100	1¼
De 25	William Schumacher	Schumacher	1951	12	Driven	34	1½
De 26	Clarence E. Hartman	Cusick	1947	12	Jetted	120	1½
Df 1	George W. Bell	White	1950	7	do	82	2
Df 2	Mrs. Elizabeth Underhill	Cusick	1951	7	do	440	1½
Df 3	John Kurtz	—	1951	12	Driven	34	1¼
Df 4	L. Marriner	Marriner	—	9	do	15	1¼
Df 5	F. Cluff	—	—	8	do	27	1¼
Df 6	G. Powell	Powell	—	15	do	20	1¼
Df 7	R. L. Dryden	—	—	15	Dug	11.8 m	24
Df 8	S. T. McCready	Beauchamp	1947	18	Driven	23	1¼
Dg 1	Johnson Meat Products Co., Inc.	Scott Bros.	1942	3	Jetted	95	2
Dg 2	Do	do	1939	3	do	95	2
Ea 1	Lora C. Whitelock	Cusick	1945	2	do	841	3½–1½–1

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pocomoke	4	Apr. 24, 1950	R, E	D,F, S	See log. Water reported good.
do	2	Mar. 30, 1950	R, E	D, S	Do.
do	3.5	Apr. 3, 1950	R, E	D, S	Do.
do	5	Oct. 14, 1947	R, E	D, S	See log. Water tasted slightly "irony". Drawdown 5 feet after pumping 4 hours at 8 gpm, Oct. 14, 1947.
do	0.7	Oct. 11, 1946	R, E	D,F, S	See upper part of log Ed 15. Water reported good.
do	0	Dec. 20, 1948	R, E	D,F, S	See log. Water reported slightly "irony".
do	2	Oct. 31, 1946	R, E	D,F, S	See log. Water reported "irony".
do	4	Jul. 1950	R, E	D,F, M	See log. Water reported excellent.
Pleistocene	—	—	R, E	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Do.
Pocomoke	—	—	R, E	I, M	Water reported good. Supplies canning factory 10 weeks yearly.
Pleistocene and Pliocene(?)	3.01 m	Mar. 26, 1952	C, H	D, S	Water reported "irony".
Pleistocene	—	—	C, H	D, S	Do.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, S	Water reported slightly "irony".
Pleistocene	0.6 m	Mar. 26, 1952	B, H	D,F, S	Water reported good.
Yorktown and Cohansey(?)	—	—	R, E	D,F, M	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	R,C, E,H	D,F, M	Water reported "irony".
Pocomoke	3	Oct. 6, 1947	R, E	D,F, S	See log. Water reported "irony". Drawdown 2 feet after pumping 2 hours at 20 gpm, Oct. 6, 1947.
Pocomoke	3	Jul. 1950	R, E	D,F, M	See log. Water reported excellent.
Choptank(?)	1.5	Dec. 9, 1951	R, E	D,F, S	See log. Water reported salty. Drawdown 6.5 feet after pumping 6 hours at 30 gpm, Dec. 9, 1951.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, M	Water reported slightly "irony".
Pleistocene	—	—	R, E	D,F, M	Water reported slightly "irony". Well 8.40 feet deep nearby has water level 3.65 feet below land surface.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, S	Water "irony". Iron sequestered by detergent.
Pleistocene	1.32 m	Mar. 25, 1952	R, E	D, S	Water reported good.
Pleistocene and Pliocene(?)	—	—	R, E	F, S	Water reported "irony"; marshy and sulfurous odor.
Pocomoke	—	—	R, E	I, M	See chemical analysis.
do	—	—	R, E	I, M	Do.
Magothy(?)	—	—	N	P, L	See log, chemical analysis and table of paleontology. Water reported flowing 10 gpm at 1.3 feet above land surface on Sep. 20, 1945. Still flowing Nov. 17, 1953.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ea 2	H. Harvey Bradshaw	Cusick	1945	2	Jetted	820	3½–2½–1½
Ea 3	Willie Evans	do	1945	2	do	865	2½–1½
Ea 4	Charlton Evans	do	1946	2	do	852	2½–1½
Ea 5	Clayton Middleton	do	1946	2	do	850	2½–1½
Ea 6	Mrs. Mary W. Evans	do	1946	2	do	860	2½–1½
Ea 7	Mrs. Roland Hoffman	do	1948	2	do	848	2½–1½
Ea 8	Milton Evans	do	1948	2	do	871	2½–1½
Ea 9	Mrs. Archie Marsh	do	1948	2	do	915	2½–1½
Ea 10	Shultz Tyler	—	1915	2	Dug	7.2 m	24
Ec 1	City of Crisfield	Shannahan Artesian Well Co.	1938	5	Drilled	994	8–6
Ec 2	Do	do	1938	5	do	995	8–6
Ec 3	Do	do	1928	5	do	1076.2	10–4½
Ec 4	Do	Layne-Atlantic	1948	5	do	1146	18–6
Ec 5	Geo. A. Christy	Shannahan Artesian Well Co.	1910	2	do	1011	8–6
Ec 6	Massey Chevrolet Sales Co.	Cusick	1947	5	Jetted	81	1½
Ec 7	The Packers Ice and Cold Storage Co.	Shannahan Artesian Well Co.	1950	2	Drilled	1042	8–6
Ec 8	Do	do	1895(?)	2	do	1018	8

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Magothy(?)	—	—	N	I, M	See log, chemical analysis and table of paleontology. Flowing 12 feet above land surface Nov. 17, 1953.
do	—	—	N	P, M	See log of Ea 2. Flowing 15 feet above land surface Nov. 17, 1953.
do	—	—	N	P, L	See log. Flowing Nov. 17, 1953.
do	—	—	N	P, L	See log of Ea 4. Flowing Nov. 17, 1953. Temperature reported 75° F.
do	—	—	N	P, L	See log of Ea 4. Flowing from pipe 15 feet above land surface Nov. 17, 1953.
do	—	—	N	P, L	See log. Flowing 15 feet above land surface Nov. 17, 1953.
do	—	—	N	P, L	See table of paleontology. Flowing 15 feet above land surface Nov. 17, 1953. See log.
Raritan	—	—	N	P, L	See log. Flowing 20 feet above land surface Nov. 17, 1953.
Pleistocene	3.95 m	Nov. 17, 1953	B, H	D, S	See chemical analysis. Water tasted good.
Paleocene(?)	—	—	T, E	P, S	See chemical analysis. Standby well at standpipe. Reported flowing 2.5 feet above land surface Dec. 1937. Operating head 54 feet below land surface while pumping 100 gpm Oct. 1938. Temperature 73° F.
do	—	—	T, E	P, L	See partial log. Well reported to flow when drilled. Operating head 150 feet below land surface at close of 24 hour test pumping 300 gpm, 1938.
Magothy(?)	20	1928	T, E	P, L	See chemical analysis. Drawdown 21 feet pumping 210 gpm in 1928. Temperature 80° F.
Calvert, Piney Point and Upper Cretaceous	—	—	T, E	P, L	See log, chemical analysis, and table of paleontology. Well drilled to 1303 feet. Static water level reported 4 feet above land surface Apr. 24, 1948. Drawdown 96 feet after 48 hours pumping 300 gpm in 1948. Screened from 726 to 731, 819 to 829, and 1136 to 1146 feet below land surface. Temperature 81° F.
Paleocene(?)	—	—	T, E	I, M	See log. Reported to flow until 1949. Water level fluctuates with tides. Water used in manufacture of ice. Temperature 70° F.
Pocomoke	3	Aug. 6, 1947	R, E	C, S	See log. Drawdown 3 feet after pumping 30 min. at 20 gpm, Aug. 6, 1947.
Paleocene(?)	—	—	T, E	I, M	See log. Static water level reported 4 feet above land surface, May 12, 1950. Drawdown 56 feet after 48 hours pumping 217 gpm. Water reported containing soda, hard. Uses zeolite as softener.
do	10.37 m	Jan. 28, 1954	N	N	Static water level reported 12 feet above land surface when drilled. See Maryland Geological Survey vol. 10, 1918, table p. 335, well no. 5.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ec 9	The Packers Ice and Cold Storage Co.	—	1892	2	Drilled	1060	8
Ec 10	Bozman Motor Co.	Cusick	1946	5	Jetted	58	1½
Ec 11	Edwin M. McCready Memorial Hospital	do	1948	3	do	384	2½–1½
Ec 12	W. Hinman	White	1948	4	do	150	2
Ec 13	Stewart Emely	Cusick	1948	4	do	196	1½
Ec 14	Mrs. W. R. Byrd	do	1948	4	do	186	1½
Ec 15	M. C. Ward	do	1947	4	do	196	1½
Ec 16	O. J. Riggin	do	1950	4	do	188	1½
Ec 17	R. Laird and E. Bell	do	1947	4	do	198	1½
Ec 18	Bennett Byrd	do	1946	3	do	192	2½–1½
Ec 19	Preston Ayres	do	1946	2	do	183	3½–1½
Ec 20	N. Parks	do	1948	2	do	193	1½
Ec 21	W. H. Lowe, Jr.	do	1948	2	do	193	1½
Ec 22	J. B. Reese	do	1946	2	do	189	3½–1½
Ec 23	M. J. Thornton	do	1946	5	do	179	3½–1½
Ec 24	Edward Owens	do	1950	5	do	195	1½
Ec 25	Wm. Ryle, Jr.	do	1948	5	do	211	1½
Ec 26	W. Jones	do	1947	5	do	214	1½
Ec 27	John McIntosh	do	1947	5	do	198	1½
Ec 28	Charles T. Laird	do	1947	4	do	210	1½
Ec 29	Walter Jones	do	1949	4	do	205	1½
Ec 30	Merrill O. Boyd, Sr.	do	1948	3	do	362	1½
Ec 31	C. Hubbard Daugherty	White	1946	4	do	95.5	2

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Paleoene(?)	—	—	N	N	Well covered and abandoned. Static water level reported 12 feet above land surface in 1892. Water reported soft. See log Maryland Geological Survey vol. 10, 198, pp. 332–333, and table p. 335, well no. 4.
Pleistocene and Pliocene(?)	5	Aug. 30, 1946	R, E	C, S	Water reported very "irony". Detergent filter used.
Choptank(?)	—	—	R, E	N	See log. Static water level reported 1.5 feet above land surface May 5, 1948. Drawdown 3.5 feet after 8 hours pumping 40 gpmr Water reported containing soda, too bitte. to use.
Yorktown and Cohansey(?)	—	—	R, E	D, S	See log. Water level drops below suction lift frequently. Water reported good.
Manokin	2	May 22, 1948	R, E	D, M	See log. Water reported slightly "irony", and containing soda. Drawdown 2 feet after 1 hour pumping 25 gpm, May 1948.
do	0	May 17, 1948	C, H	D, S	Drawdown 3 feet after 1 hour pumping 30 gpm, May 1948. Water reported good.
do	1.5	Oct. 23, 1947	R, E	D, S	Drawdown 1.5 feet after 2 hours pumping 26 gpm, Oct. 23, 1947.
do	0.5 1.70 m	Dec. 30, 1950 Oct. 21, 1952	N	N	Drawdown 5.5 feet after 2 hours pumping 28 gpm, Dec. 30, 1950. Undeveloped homesite.
do	5	Jul. 7, 1947	R, E	D, M	Water reported good.
do	3	Oct. 8, 1946	R, E	D, S	Drawdown 0.5 feet after 2 hours pumping 20 gpm, Oct. 8, 1946. Water reported good.
do	1.8	Aug. 17, 1946	R, E	D, S	
do	2	May 12, 1948	R, E	D, S	Water reported containing soda.
do	1.2	Apr. 23, 1948	R, E	D, M	Do.
do	—	—	R, E	D, S	See log. Water reported containing soda.
Yorktown and Cohansey(?)	4	Aug. 28, 1946	R, E	D, S	Do.
Manokin	1.5	June 21, 1950	R, E	I, M	See log. Water reported good. Drawdown 7.5 feet after 2 hours pumping 22 gpm, Jun. 1950.
do	6	Aug. 6, 1948	R, E	D, S	See log. Drawdown 3 feet after 2 hours pumping 25 gpm, Aug. 1948.
do	4.5	Jul. 17, 1947	R, E	D, S	See log. Water reported containing soda. Drawdown 0.5 feet after 2 hours pumping 20 gpm, Jul. 1947.
do	3	Jul. 1, 1947	R, E	D, S	See log. Water reported containing soda. Drawdown 1.5 feet after 1 hour pumping 20 gpm, Jul. 1947.
do	4	Jul. 11, 1947	R, E	D, S	See log. Water reported containing soda. Drawdown 1.5 feet after 2 hours pumping 20 gpm, Jul. 1947.
do	2	Jul. 16, 1949	R, E	D, M	See log. Water reported "soda". Drawdown 6 feet after 3 hours pumping 19 gpm, Jul. 1949.
Choptank(?)	1.3	Apr. 8, 1948	J, E	D, S	See log. Water reported fair. Drawdown 3 feet after 3 hours pumping 30 gpm, Apr. 1948.
Pocomoke	3	Aug. 15, 1946	N	N	See log. Water reported "irony". Formerly used for air conditioning.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ec 32	Otis Ward	Cusick	1948	4	Jetted	360	1½
Ec 33	Leroy Ward	do	1948	3	do	362	1½
Ec 34	Wm. Morgan	do	1948	4	do	151	1½
Ec 35	Earl S. Mosher	do	1948	4	do	152	1½
Ec 36	Earl H. Dize	do	1948	4	do	152	1½
Ec 37	Alvin Stant	—	1949	5	Driven	65	1½
Ec 38	Earl Henderson	—	1927	5	Dug	4.3 m	30
Ec 39	Barney Morgan	—	1932	5	do	7.5 m	30
Ec 40	Mrs. Lena Cullen	—	1800	5	do	8.2 m	30
Ec 41	G. Bryce Revelle	Cusick	1952	3	Jetted	189	1½
Ed 1	Ralph Morris	White	1945	4	do	144	2
Ed 2	W. S. Cox	Cusick	1946	5	do	210	1½
Ed 3	C. D. Briddell, Inc.	Layne-Atlantic	1951	4	do	70	6
Ed 4	Dora McCready	Cusick	1951	5	do	398	1½
Ed 5	Clement R. Sterling	do	1951	5	do	202	1½
Ed 6	L. T. Sterling	do	1946	5	do	64	2
Ed 7	M. Sommers	do	1951	5	do	210	1½
Ed 8	S. M. Saltz	do	1951	5	do	198	1½
Ed 9	R. Bradshaw	do	1950	5	do	211	1½
Ed 10	Mrs. James Stephens	do	1950	5	do	212	1½
Ed 11	S. M. Saltz	do	1948	5	do	215	1½

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Choptank(?)	0.5	Dec. 24, 1948	R, E	D, S	See log. Water reported containing soda. Drawdown 5.5 feet after 3 hours pumping 28 gpm, Dec. 1948.
do	1.2	Aug. 14, 1948	R, E	D,F, M	See log and chemical analysis.
Yorktown and Cohansey(?)	3	May 27, 1948	R, E	D, S	See log. Water reported good. Drawdown 5 feet after 2 hours pumping 10 gpm, May 1948.
do	3	Jun. 5, 1948	R, E	D, S	See log. Water reported good. Drawdown 12 feet after 1 hour pumping 10 gpm, Jun. 1948.
do	1	May 29, 1948	R, E	D, S	See log. Water reported good. Drawdown 5 feet after 1 hour pumping 10 gpm, May 1948.
Pleistocene and Pliocene(?)	—	—	R, E	D,F, M	Water reported very "irony".
Pleistocene	1.89 m	Apr. 21, 1952	N	N	Well reported inadequate, abandoned.
do	2.55 m	Apr. 21, 1952	B, H	D, S	Water reported very "irony". Water level reported very low a few years ago.
do	2.2 m	Apr. 21, 1952	R, E	D, S	Water reported good.
Manokin	3	Sep. 16, 1952	J, E	D, S	See log and chemical analysis. Drawdown 1 foot after 2 hours pumping 30 gpm, Sep. 1952.
Yorktown and Cohansey(?)	3	Nov. 15, 1952	R, E	D,F, M	See log. Water reported good.
Manokin	4.5	Sep. 12, 1946	R, E	D,F, M	See log of Ed 15. Water reported good.
Pocomoke	3.7 4.06 m	May 28, 1951 Mar. 25, 1952	T, E	I, L	See log and chemical analysis. Drawdown 8 feet after 48 hours pumping 150 gpm, May 1951. Drilled to 230 feet, plugged back. Manokin aquifer yielded only 5 gpm.
Choptank(?)	0	Apr. 21, 1951	R, E	D,F, M	See log and chemical analysis. Field chloride test 1680 ppm.
Manokin	2	Apr. 6, 1951	R, E	D, S	See log. Water reported good. Drawdown 12 feet after 3 hours pumping 10 gpm, Apr. 1951.
Pocomoke	3.5	Sep. 18, 1946	R, E	F, M	Water reported "irony". Driller reported sand and mud all the way
Manokin	4	Jul. 14, 1951	R, E	D, S	See log. Water reported containing soda. Drawdown 5 feet after 3 hours pumping 16 gpm, Jul. 1951.
do	1.5	Apr. 11, 1951	R, E	D, S	See log. Water reported good. Drawdown 7.5 feet after 2 hours pumping 15 gpm, Apr. 1951.
do	6	Aug. 8, 1950	R, E	D, S	See log. Water reported a little hard. Drawdown 6 feet after 2 hours pumping 8 gpm, Aug. 1950.
do	2	Apr. 19, 1950	R, E	D, S	See log. Water tasted soda. Drawdown 6 feet after 2 hours pumping 25 gpm, Apr. 1950.
do	2	Dec. 6, 1948	R, E	D, S	See log. Water reported containing soda. Drawdown 3 feet after 3 hours pumping 15 gpm, Dec. 1948.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ed 12	J. Thornton	Cusick	1949	4	Jetted	198	1½
Ed 13	Sherman Dize	do	1947	4	do	200	1½
Ed 14	G. T. Cullen, Jr.	do	1947	4	do	195	1½
Ed 15	Alonzo W. Nelson	do	1946	4	do	189	1½
Ed 16	Silas Sterling	do	1951	4	do	193	1½
Ed 17	Maude Justice	do	1946	3	do	188	3½–1½
Ed 18	Jackson Sterling	do	1946	3	do	190	3½–1½
Ed 19	Willis Todd	do	1950	4	do	197.5	1½
Ed 20	Fred Tyler	do	1950	4	do	191	1½
Ed 21	N. Maddox	do	1946	5	do	194	1½
Ed 22	Alvin Blades	do	1947	4	do	204	1½
Ed 23	P. E. Maddrix	do	1948	2	do	188	1½
Ed 24	Alonzo K. Nelson	do	1951	5	do	197	t½
Ed 25	Carlton Massey	do	1947	3	do	198	1½
Ed 26	Howard Hinman	do	1946	3	do	187	3½–1½
Ed 27	Burns Sterling	do	1947	4	do	195	1½
Ed 28	A. R. Ennis	do	1949	3	do	208	1½
Ed 29	Crisfield Country Club	do	1949	3	do	200	1½
Ed 30	Wellington Tawes	do	1949	3	do	200	1½
Ed 31	Elijah S. Sterling	do	1949	4	do	210	1½
Ed 32	Howard Price	White	1948	4	do	54	2
Ed 33	V. Dize	—	—	5	Dug	6.3 m	18
Ed 34	Church at Mariners	—	1917	5	do	6.9 m	28
Ed 35	Ernest Hickman	—	—	—	—	—	—
Ed 36	Henry Bedsworth	—	1877	6	Dug	86.1 m	27

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	3	Oct. 8, 1948	R, E	D, S	See log. Water reported containing soda. Drawdown 13 feet after 3 hours pumping 25 gpm, Oct. 1948.
do	0.5	Nov. 15, 1947	R, E	D, S	See log. Water reported containing soda. Drawdown 2.5 feet after 2 hours pumping 20 gpm, Nov. 1947.
do	1.5	Oct. 9, 1947	— E	C, S	See log. Drawdown 3.5 feet after 2 hours pumping 25 gpm, Oct. 1947.
do	1.8	May 25, 1946	R, E	D, M	See log. Water reported containing soda.
do	2	Apr. 16, 1951	J, E	D, M	See log. Water reported containing soda. Drawdown 5 feet after 2 hours pumping 30 gpm, Apr. 1951.
do	1.8	Jun. 2, 1946	— E	D, S	See log of Ed. 18. Drawdown 0.33 feet after 1 hour pumping 25 gpm, Jun. 1946.
do	1.8	May 30, 1946	— E	D, S	See log. Water reported containing soda.
do	1.5	May 4, 1950	R, E	D, S	Do.
do	2	Aug. 2, 1950	R, E	D, S	See log. Water reported containing soda. Drawdown 7 feet after 3 hours pumping 20 gpm, Aug. 1950
do	2.5	Sep. 24, 1946	R, E	D, S	See log of Ed 15. Water reported good. Drawdown 0.5 feet after 1 hour pumping 20 gpm, Sep. 1946.
do	1.5	May 1, 1947	R, E	D, S	See log Water reported containing soda. Drawdown 1.5 feet after 2 hours pumping 25 gpm, May 1947.
do	0.5	Nov. 20, 1948	R, E	I, S	See log. Water reported containing soda. Drilled to 208 feet. Obtained salt water. Plugged well back. Salt water in black sand at 125 to 136 feet depth above producing zone. Drawdown 2.5 feet after 5 hours pumping 22 gpm, Nov. 1948.
do	—	—	R, E	D, S	Water reported containing soda.
do	1	Jun. 28, 1947	R, E	D, S	See log. Drawdown 1.5 feet after 2 hours pumping 22 gpm, Jun. 1947.
do	2	Aug. 1, 1946	— E	D, M	See log. Water reported good.
do	1.7	Oct. 25, 1947	R, E	C, S	See log. Water reported containing soda. Drawdown 1.3 feet after 1 hour pumping 25 gpm, Oct., 1947.
do	3	Jun. 10, 1949	R, E	D,F, S	See log. Water reported containing soda. Drawdown 4 feet after 2 hours pumping 22 gpm, Jun. 1949.
do	0	Apr. 14, 1949	— E	D, S	See log. Drawdown 4 feet after 2 hours pumping 25 gpm, Apr. 1949.
do	4	Oct. 12, 1949	R, E	F, M	See log. Water tasted soda. Drawdown 21 feet after 2 hours pumping 22 gpm, Oct. 1949.
do	2	Oct. 15, 1949	R, E	D, S	See log. Water reported containing soda. Drawdown 28 feet after 4 hours pumping 20 gpm, Oct. 1949.
Pocomoke	5	Jul. 20, 1948	C, H	N	See log. Water reported "irony".
Pleistocene	0.35 m	Mar. 25, 1952	B, H	D,F, S	Water reported hard, not "irony".
do	2.01 m	Apr. 21, 1952	B, H	D, S	Water reported good, "irony" when low.
—	—	—	B, H	D, S	A cistern, not a well. Owner has 500 gal. tank.
Pocomoke	2.60 m	Apr. 21, 1952	R, E	D, S	Water reported good, no iron.

TABLE 38

Well Number (Som-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ed 37	William Pruitt	—	1892	5	Dug	6.7m	22
Ed 38	Mrs. Iona Ward	—	—	5	do	7.7m	24
Ed 39	Mrs. Hettie Morgan	—	1922	5	do	9.4m	30
Ed 40	Kenneth Sterling	Cusick	1951	3	Jetted	203	1¼
Ed 41	Wellington Ward	do	1952	6	do	201	1½
Ee 1	John T. Handy	do	1946	5	do	92	1½
Ee 2	S. Hall	—	—	3	Dug	7.7m	18
Ef 1	H. M. Howard	White	1950	5	Jetted	73	2
Ef 2	J. E. Milbourne	—	—	3	Dug	9.5m	24
Ef 3	G. O. Morrell	—	1932	4	Jetted	95	1¼
Ef 4	S. Gray	Gray	1951	8	Driven	15	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	3.30m	Apr. 21, 1952	B, H	D, S	Water reported excellent.
do	2.40m	Apr. 21, 1952	B, H	D, S	Water tasted good, reported "irony" in summer.
do	2.80m	Apr. 21, 1952	B, H	D, S	Water tasted excellent.
Manokin	—	—	J, E	D, S	See chemical analysis.
do	5	Aug. 18, 1952	J. E	D, S	See log and chemical analysis.
Pleistocene	3	Oct. 16, 1946	R, G	F, M	See upper part of log Ed 15. Water reported "irony". Drawdown 1 foot after 1.5 hours pumping 18 gpm, Oct. 1946.
do	0.57m	Mar. 26 1952	B, H	D, S	Water reported good.
do	3	Oct. 1950	R, E	D,F, S	See log. Water reported excellent.
do	1.48m	Mar. 26, 1952	B, H	D,F, S	
Pocomoke	—	—	J, E	D,F, S	Water reported good, not "irony".
Pleistocene	—	—	R, E	D,F, S	Water reported "irony".

TAB

Records of Wells in

The Manokin aquifer is basal and the Pocomoke aquifer upper Yorktown and Cohansey formations (?); aquifers de-
Static water level: Measured depths are designated by "m".
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; Tc,
Type of power: E, electric; G, gasoline; H, hand; S, steam; W, windmill.
Use of water: *Type:* C, commercial; D, domestic; F, farming; I, industry; Ir, irrigation; N, not used; O, observa-
Rate: S, up to 500 gpd; M, 500 to 5,000 gpd; L, over 5,000 gpd.

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ac 1	J. A. Bailey	—	—	5	Driven	—	1¼
Ad 1	Village of Sharptown	Shannahan Artesian Well Co.	1936	20	Drilled	301	8
Ad 2	Do	do	—	20	do	80	6
Ad 3	Do	—	—	20	Driven	134.0 m	1½
Ad 4	Booze	—	—	30	do	90	1¼
Ad 5	Vickers Gravel Co.	—	—	15	do	15.3 m	1¼
Ad 6	Norman Brown	—	—	30	do	25.0 m	1¼
Ad 7	Naymon Brown	—	—	40	Dug	6.0 m	48
Ad 8	Lily Dew	—	—	40	Driven	31.2 m	1½
Ad 9	Coop. Ground-Water Program	White	1950	28	Jetted	48.0 m	1½
Ad 10	Village of Sharptown	Pentz	1952	20	do	86	6
Ad 11	Do	Pentz	1952	20	do	86	6
Bc 1	Herman Boog	—	—	10	Driven	—	1½
Bc 2	C. I. Bennett	—	—	25	do	—	1½
Bc 3	Do	—	—	25	Dug	9.0 m	24
Bc 4	Roy D. Lapp	—	—	10	Driven	—	1½
Bc 5	Waller & Bailey Co.	—	—	20	do	—	1½
Bc 6	Scott Bennett	Wheatley	1943	20	Drilled	268	2½
Bc 7	Fire Department of Mardela Springs	do	1947	20	do	83.9 m	3
Bc 8	G. L. Murphy	—	—	20	Bored	17.2 m	10
Bc 9	Do	—	—	20	Driven	35.0 m	1½
Bc 10	L. Donaho	—	1947	20	do	19	—
Bc 11	Do	—	—	20	do	16.8 m	1½
Bc 12	Phillip Bennett	—	1947	20	do	40.1 m	1½
Bc 13	Do	—	1947	20	do	27.6 m	1½
Bc 14	Do	—	—	20	do	27.7 m	1½
Bc 15	Margaret Truitt	—	—	20	do	54.6 m	1½
Bc 16	Do	—	—	20	do	63.3 m	1½
Bc 17	Do	—	—	20	do	36.5 m	1½
Bc 18	Milton Elliott	—	—	20	do	16.6 m	1¼
Bc 19	Lewis A. Phillips	Marvel	1940	20	do	45	1¼

LE 39

Wicomico County

signated Yorktown and Cohansey (?) are stringer sands not correlated with the Manokin or Pocomoke aquifers.

impeller centrifugal; T, impeller turbine; N, none; R, reciprocating.

tion; P, public supply or school; T, test hole.

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?)	5.57 m	Aug. 9, 1949	C, H	N	
Nanticoke	5.6	Apr. 1936	Ic, E	P, L	See log and chemical analysis. Temperature 55° F.
Pleistocene and Pliocene(?)	—	—	Ic, E	P, L	
Choptank	—	—	N	N	Small flow 4 feet above land surface observed Aug. 9, 1949.
Pleistocene and Pliocene(?)	8.15 m	Aug. 10, 1949	C, 11	D, S	Water reported "irony".
do	11.20 m	Aug. 10, 1949	C, H	N	
do	12.95 m	Aug. 10, 1949	C, H	D, S	Do.
Pleistocene	5.51 m	Aug. 12, 1949	B, H	N	
Pleistocene and Pliocene(?)	4.70 m	Aug. 12, 1949	C, H	D, S	
do	—	—	N	T	See log.
do	11	May 9, 1952	T, E	P, L	See chemical analysis.
do	9	Jul. 10, 1952	T, E	P, L	
Pleistocene	5.37 m	Aug. 10, 1949	C, H	N	
do	8.37 m	Aug. 10, 1949	C, H	N	
do	4.73 m	Aug. 10, 1949	B, H	D, S	
Pleistocene and Pliocene(?)	5.83 m	Aug. 10, 1949	C, H	F, S	
do	8.98 m	Aug. 10, 1949	C, H	N	
do					
Nanticoke	—	—	N	D, S	Measured flow 3 gpm, Aug. 10, 1949.
Pleistocene and Pliocene(?)	15.73 m	Aug. 11, 1949	Ic, G	P, S	
Pleistocene	12.39 m	Aug. 15, 1949	Ic, E	D,F, S	
Pleistocene and Pliocene(?)	13.41 m	Aug. 15, 1949	C, H	N	Water reported "irony".
Pleistocene	—	—	Ic, E	D,F, S	
do	9.39 m	Aug. 15, 1949	C,H	N	
Pleistocene and Pliocene(?)	10.85 m	Aug. 15, 1949	N	F, S	
do	9.20 m	Aug. 15, 1949	Ic, E	C, S	
do	8.76 m	Aug. 15, 1949	Ic, E	D, S	
do	3.69 m	Aug. 15, 1949	N	N	
do	8.32 m	Aug. 15, 1949	C, H	N	
do	5.60 m	Aug. 15, 1949	C, H	N, S	
Pleistocene	7.35 m	Sep. 2, 1949	C, H	N	Temperature 65° F.
Pleistocene and Pliocene(?)	—	—	C, H	D,F, S	Water reported "irony".

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bc 20	Lewis A. Phillips	—	—	20	Driven	44.3 m	1½
Bc 21	Calloway	—	—	10	do	30.5 m	1¼
Bc 22	H. C. Charnock	—	—	20	do	12.3 m	1¼
Bc 23	Ernest, Anton and Klimovics	—	—	15	do	10	1¼
Bc 24	T. J. Hochmuth	—	1944	20	do	44.0 m	1¼
Bc 25	Do	—	1947	20	do	50	2
Bc 26	Do	—	1934	20	do	45.0 m	1½
Bc 27	Elton H. Bounds	Wheatley	1941	20	Jetted	262	6–4
Bc 28	Abandoned	—	—	15	Driven	19.9 m	1¼
Bc 29	Bounds & Taylor	—	—	20	do	26.0 m	1½
Bc 30	Do	—	—	20	do	33	1¼
Bc 31	Do	—	—	20	do	5.9 m	1¼
Bc 32	Holland Majors	—	—	25	do	13.0 m	1¼
Bc 33	Bashford Eller	—	—	10	do	7.0 m	1¼
Bc 34	Leslie Bailey	—	—	20	do	32.0 m	1¼
Bc 35	Do	—	—	20	do	18.5 m	1¼
Bc 36	Carleton	—	—	20	do	37.0 m	1¼
Bc 37	Thomas Calloway	—	—	20	do	41.0 m	1¼
Bc 38	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	19.2	do	16.8 m	1
Bc 39	Mardela Springs Fire Department	Shannahan Artesian Well Co.	1948	25	Jetted	85.2 m	6–3
Bc 40	J. R. Dwyer	—	1935	25	Driven	18	2
Bc 41	Hollis Bailey	Bailey	1951	25	Dug	19.5	13
Bc 42	W. K. Ryan	Ryan	1951	25	Driven	15	1½
Bc 43	Roy Gillis	Gillis	1951	15	Dug	15	30
Bc 44	Gillis	—	—	5	Spring	—	4
Bc 45	Waller & Bailey	Short	1940	25	Driven	35	1¼
Bc 46	Mrs. H. B. Hatton	Hatton	1946	15	Dug	24	30
Bd 1	Town of Hebron	Pentz	1941	45	Jetted	68	6
Bd 2	Do	Shannahan Artesian Well Co.	1947	40	do	68	16–10
Bd 3	W. H. Phillips	White	1946	40	do	65	2
Bd 4	Wm. B. Harcum	—	—	30	Driven	33.1 m	1½
Bd 5	O. E. Bennett	—	—	40	do	25.5 m	1½
Bd 6	Mrs. Clyde Twilley	—	—	40	do	24.8 m	1½
Bd 7	Carlton Bennett	—	—	40	do	21.8 m	1½
Bd 8	Mrs. Lowell Adkins	—	—	30	do	37.4 m	1½
Bd 9	Richard Wright	—	—	20	do	52.3 m	1½
Bd 10	Do	—	—	20	do	23.4 m	1½
Bd 11	Mardela Springs High School	Shannahan Artesian Well Co.	1945	25	Jetted	305	6–4½
Bd 12	P. G. Church	—	—	25	Driven	30	1¼

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping Equipment	Use of Water	Remarks
Pleistocene and Pliocene(?)	6.20 m	Sep. 2, 1949	C, H	N	Water reported "irony". Temperature 66° F.
do	4.70 m	Sep. 2, 1949	C, H	N	Temperature 67° F.
Pleistocene	4.60 m	Sep. 12, 1949	C, H	D,F, S	Water reported "irony" and brackish. Temperature 68° F.
do	—	—	C, H	D,F, S	Water reported "irony" and brackish.
Pleistocene and Pliocene(?)	12.60 m	Sep. 12, 1949	N	N	Water reported "irony" and brackish. Temperature 64° F.
do	12	Sep. 12, 1949	Ic, E	D,F, S	Water reported very "irony".
do	11.90 m	Sep. 14, 1949	C, H	D,F, S	
Nanticoke	5	Sep. 14, 1949	Ic, E	D, S	Water reported high alkalinity.
Pleistocene	4.46 m	Sep. 22, 1949	C, H	N	Temperature 62° F.
Pleistocene and Pliocene(?)	6.64 m	Sep. 9, 1949	N	F, S	Water reported slightly "irony". Temperature 62° F.
do	—	Sep. 9, 1949	C, W	D,F, S	Water reported slightly "irony".
Pleistocene	2.53 m	Sep. 22, 1949	C, H	D,F, S	Temperature 70° F.
do	4.64 m	Sep. 30, 1949	C, H	N	Water reported slightly "irony". Temperature 65° F.
do	2.87 m	Sep. 30, 1949	C, H	F, S	Water reported slightly "irony". Temperature 62° F.
Pleistocene and Pliocene(?)	6.31 m	Oct. 3, 1949	C, H	F, S	Water reported very "irony".
Pleistocene	7.17 m	Oct. 3, 1949	C, H	D,F, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	5.36 m	Oct. 3, 1949	C, H	F, S	Water reported "irony". Temperature 65° F.
do	8.03 m	Oct. 3, 1949	N	N	Water reported very "irony". Temperature 65° F.
Pleistocene	0.78 m	Apr. 7, 1950	N	O	See log.
Pleistocene and Pliocene(?)	15.72 m	Oct. 8, 1952	N	P, S	Do.
Pleistocene	—	—	R, E	I, M	
do	10.5	Oct. 1951	R, E	D, S	
do	—	—	R, E	D, S	Water reported "irony".
do	—	—	R, E	D, S	
Pleistocene and Pliocene(?)	—	—	N	N	Water reported "irony". See Maryland Geological Survey, Vol. 10, 1918, p. 319.
do	—	—	C, H	D, S	Water reported "irony".
do	19	Oct. 13, 1952	R, E	D, S	Do.
do	—	—	Ic, E	N	Abandoned.
do	13.10 m	Sep. 5, 1947	Ic, E	P, I.	See log and chemical analysis. Yield 160 gpm.
do	15	Jun. 13, 1946	Ic, E	F, S	Yield 30 gpm.
do	6.94 m	Aug. 11, 1949	C, H	N	
do	7.30 m	Aug. 12, 1949	C, H	N	
do	9.71 m	Aug. 12, 1949	C, H	N	
do	12.31 m	Aug. 12, 1949	C, H	N	
do	7.84 m	Aug. 12, 1949	N	N	
do	12.14 m	Aug. 12, 1949	C, H	N	
do	13.50 m	Aug. 12, 1949	N	N	
Nanticoke	8	Nov. 1945	R, E	P, M	See log and chemical analysis.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported very "irony". Has hydrogen sulfide odor. Temperature 52° F.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bd 13	Mrs. Bounds	—	—	25	Driven	19	1¼
Bd 14	L. H. Waller	—	—	25	do	20	1¼
Bd 15	Paul Widdowson, Jr.	—	1949	25	do	20	1¼
Bd 16	G. W. Kenny	—	—	30	do	82	1¼
Bd 17	Do	—	—	30	do	34	1¼
Bd 18	Do	—	—	30	do	54	1¼
Bd 19	Daniel Dashiell	—	—	30	do	50.5[m]	1¼
Bd 20	Marion Wilson	—	—	30	do	39.0[m]	1¼
Bd 21	George Wright	—	—	40	do	53.0[m]	1¼
Bd 22	George Rounds	—	—	30	do	45.0[m]	1¼
Bd 23	Virgil Dykes	—	—	45	do	30.0[m]	1¼
Bd 24	John B. Taylor	—	—	40	do	42.0[m]	1¼
Bd 25	Jerdia Ellis	—	—	45	do	60	1¼
Bd 26	Do	—	—	45	do	45	1¼
Bd 27	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	43.9	do	15.4[m]	1
Bd 28	Do	do	1950	40.3	do	16.8[m]	1
Bd 29	Do	do	1950	35	do	16.4[m]	1
Bd 30	Do	do	1950	35	do	17.5[m]	1
Bd 31	Do	do	1950	30.3	do	9.5[m]	1
Bd 32	Do	do	1950	27.5	do	11.5[m]	1
Bd 33	Do	do	1950	21.6	do	11.3[m]	1
Bd 34	Do	do	1950	27.6	do	10.5[m]	1
Bd 35	Do	do	1950	29.9	do	10.8[m]	1
Bd 36	Do	do	1950	35.1	do	20.2[m]	1
Bd 37	Do	do	1950	35.1	do	11.0[m]	1
Bd 38	Do	do	1950	40.5	do	12.1[m]	1
Bd 39	Robert A. Gambrill	—	1949	20	do	20.5	1½
Bd 40	W. Hostetter	—	1941	30	do	49	1½
Bd 41	Mr. Stanton	—	1950	20	do	36	1¼
Bd 42	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	24	Power Auger	54.0[m]	3
Bd 43	Do	do	1950	44.2	Driven	15.3[m]	1
Bd 44	Do	do	1950	39.8	do	15.3[m]	1
Bd 45	Do	Baldwin	1953	25	Jetted	231.0[m]	6-4
Be 1	Archie Humphreys	Mill Bros.	1940	43	Driven	38.0[m]	1¼
Be 2	John Dykes	—	—	42	do	68.0[m]	1¼
Be 3	U. S. Department of Agriculture	—	1942	44	Drilled	61.0[m]	6
Be 4	Lowe Bros.	Lowe Bros.	1947	45	Driven	45	1¼
Be 5	Rex Gravenor	—	—	48	do	37.0[m]	1¼
Be 6	William Bradley	—	—	45	do	44.0[m]	1¼
Be 7	L. L. Cummins	—	—	50	do	71.5[m]	1¼
Be 8	Do	—	—	50	—	63	1¼
Be 9	H. Milton Hearne	—	1949	45	Driven	29.0[m]	1¼
Be 10	Walter F. Smith	—	—	45	do	40	1¼
Be 11	Franklin Holloway	—	—	45	do	43.0[m]	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	C, H	D,F, S	Water reported "irony".
do	—	—	C, H	D, S	Do.
do	—	—	Ic, E	D, S	Do.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported very "irony".
do	—	—	C, H	F, S	
do	—	—	Ic, E	F, S	
do	5.28 m	Oct. 5, 1949	C, H	D,F, S	
do	9.58 m	Oct. 11, 1949	N	N	
do	13.01 m	Oct. 11, 1949	C, H	D, S	
do	13.50 m	Oct. 13, 1949	Ic, E	D,F, S	
do	8.00 m	Oct. 13, 1949	C, H	N	
do	7.80 m	Oct. 13, 1949	C, H	F, S	Water reported slightly "irony".
do	—	—	C, H	D, S	
do	—	—	E	F, S	
Pleistocene	5.73 m	Apr. 7, 1950	N	O	See log.
do	4.68 m	Apr. 7, 1950	N	O	Do.
do	4.94 m	Apr. 7, 1950	N	O	Do.
do	5.38 m	Apr. 7, 1950	N	O	Do.
do	.82 m	Apr. 7, 1950	N	O	Do.
do	1.38 m	Apr. 7, 1950	N	O	Do.
do	4.30 m	Apr. 7, 1950	N	O	Do.
do	1.97 m	Apr. 7, 1950	N	O	Do.
do	.56 m	Apr. 7, 1950	N	O	Do.
do	.75 m	Apr. 7, 1950	N	O	Do.
do	2.21 m	Apr. 7, 1950	N	O	Do.
do	4.86 m	Apr. 7, 1950	N	O	Do.
do	6	1949	R, E	C, M	
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony".
do	—	—	R, E	C, M	Do.
do	—	—	N	T	See log.
Pleistocene	7.65 m	Jul. 7, 1950	N	O	Do.
do	6.78 m	Jul. 7, 1950	N	O	Do.
Choptank(?)	—	—	N	T	Do.
Pleistocene and Pliocene(?)	16.19 m	Aug. 27, 1947	R, E	F, S	
do	7.49 m	Oct. 9, 1947	N	N	
do	7.07 m	Oct. 9, 1947	R, E	F, S	Water reported slightly "irony".
do	—	—	C, H	D, S	
do	9.65 m	Oct. 10, 1947	C, H	N	
do	9.39 m	Oct. 17, 1949	C, H	F, S	
do	8.59 m	Oct. 18, 1949	C, H	F, S	
do	—	—	C, H	D, S	
do	8.93 m	Oct. 18, 1949	C, H	F, S	
do	—	—	R, E	D,F, S	
do	8.52 m	Oct. 18, 1949	C, H	N	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Be 12	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	44.9	Driven	22.5[m]	1
Be 13	Do	do	1950	43	do	17.0[m]	1
Be 14	Do	do	1950	48	do	15.3[m]	1
Be 15	Do	do	1950	46.7	do	17.8[m]	1
Be 16	Do	do	1950	45	do	17.3[m]	1
Be 17	Do	do	1950	41.7	do	15.3[m]	1
Be 18	Freeny Estate	—	—	45	do	21	1¼
Be 19	Do	—	—	45	do	41.8[m]	1¼
Be 20	Coop. Ground-Water Program	White	1950	65	Jetted	120.0[m]	—
Be 21	Do	Coop. Ground-Water Program	1952	45	Power Auger	49.0[m]	3
Bf 1	Edgewood Pipe & Block Co.	White	1945	47	Jetted	85	2
Bf 2	W. T. Holland	do	1945	35	do	85	2
Bf 3	Do	—	—	45	Driven	47	1¼
Bf 4	Maryland State Police Barracks	—	1938	45	—	40	2
Bf 5	R. T. White	White	1940	45	Driven	35	1¼
Bf 6	Lowe Bros.	—	—	49	do	27.0[m]	1¼
Bf 7	Do	Lowe Bros.	1947	50	do	45	1¼
Bf 8	Pennsylvania Railroad	—	1885	50	Drilled	402	—
Bf 9	Max Lucksho	—	—	45	Driven	48.7[m]	1¼
Bf 10	William Truit	Hall	—	55	do	45.6[m]	1¼
Bf 11	Paul Allshouse	Hastings	1930	51	do	39.8[m]	1¼
Bf 12	Fred Ottwell	Ottwell	1946	55	do	42.7[m]	1¼
Bf 13	Coop. Ground-Water Program	White	1950	40	Jetted	105.0[m]	—
Bf 14	Edmund Mortimer	Scott	1951	35	do	52	2
Bf 15	Clifford Brewington	do	1951	35	do	53	2
Bf 16	Guy Bergeron	—	1943	45	Driven	16.1[m]	1¼
Bg 1	Roland Beauchamp	—	—	55	Dug	13.6[m]	18
Bg 2	Charles L. White	McGee	1940	58	Driven	55	1¼
Bg 3	H. Ward	—	—	65	do	45.5[m]	1¼
Bg 4	Harry Morris	Morris	1932	65	do	56	1¼
Bg 5	V. Sciscenti	—	—	65	do	72.6[m]	1
Bg 6	Hoff	—	1939	60	do	—	1¼
Bg 7	Howard Johnson	—	—	70	do	30	1
Bg 8	Frank Holloway	Webb & Baker	1946	67	do	65.2[m]	1¼
Bg 9	Willie Shockley	Shockley	1930	70	do	16	1¼
Bg 10	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	73.4	do	10.7[m]	1

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	5.54 m	Apr. 7, 1950	N	O	See log.
do	6.47 m	Apr. 7, 1950	N	O	Do.
do	5.25 m	Apr. 7, 1950	N	O	Do.
do	4.43 m	Apr. 7, 1950	N	O	Do.
do	3.80 m	Apr. 7, 1950	N	O	Do.
do	2.26 m	Apr. 7, 1950	N	O	Do.
do	—	—	R, E	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	8.48 m	Jul. 26, 1950	C, H	F, S	Water reported "irony".
do	23.40 m	Jul. 27, 1950	N	T	See log. Temperature 62° F.
do	—	—	N	T	See log.
do	—	—	R, E	I, M	Field Analysis: Chloride, 11 p.p.m.; Iron, 0.1 p.p.m.
do	3.75 m	Aug. 27, 1947	R, E	D,F, S	
do	—	—	R, E	D, S	
do	—	—	R, E	P, S	
do	—	—	C, H	D, S	
do	9.20 m	Sep. 23, 1947	R, E	F, S	
do	—	—	C, H	D, S	
Choptank(?)	—	—	N	N	See log. Exact location unknown. See Maryland Geological Survey Vol. 10, 1918, p. 315. Well reported dry from 80 feet to the bottom.
Pleistocene and Pliocene(?)	13.35 m	Jul. 12, 1950	C, H	D, S	
do	8.97 m	Jul. 13, 1950	C, H	D, S	Water reported "irony". Temperature 62° F.
do	14.40 m	Jul. 13, 1950	N	N	Temperature 62° F.
do	12.89 m	Jul. 13, 1950	N	N	Water reported "irony". Temperature 61° F.
Yorktown and Cohansey(?)	—	—	N	T	See log.
Pleistocene and Pliocene(?)	8.5	Oct. 29, 1951	R, E	D, S	Do.
do	6.5	Nov. 5, 1951	R, E	D, S	Do.
Pleistocene	10.22 m	Jul. 12, 1950	C, H	D, S	Water reported "irony".
do	3.14 m	Nov. 21, 1949	B, H	D, S	Temperature 59° F.
Pleistocene and Pliocene(?)	15	Nov. 1949	Ic, E	F, S	
do	11.24 m	Oct. 13, 1949	C, H	D,F, S	Do.
do	2	Nov. 1949	R, E	C, S	A 20-foot well went dry in 1929. Temperature 59° F.
do	21.34 m	Dec. 21, 1949	C, H	D,F, S	Water reported "irony". Temperature 59° F
do	—	—	C, H	D,F, S	Do.
do	4	Dec. 22, 1949	R, E	F, S	
do	21.68 m	Dec. 22, 1949	C, H	N	Do.
Pleistocene	—	—	C, H	F	
do	2.75 m	Apr. 7, 1950	N	O	See log.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bg 11	Coop. Grownd-Water Program	White	1950	65	Jetted	142.0 m	—
Bg 12	F. Holloway Estate	Christie	1917	67	Drilled	1186	6
Bh 1	Richard Rayne	McGee	1947	42	Jetted	—	1¼
Bh 2	D. E. Baker	—	1905	42	Dug	9.2 m	24
Bh 3	John Calloway	—	—	50	do	7.1 m	24
Bh 4	Do	—	—	50	Driven	30	1¼
Bh 5	John W. Adkins	—	Prior 1895	42	Dug	10.3 m	24
Bh 6	Franklin Shockley	Holloway	1949	40	Redrilled	19	1¼
Bh 7	James Littleton	—	Prior 1924	38	Dug	8.3 m	25
Bh 8	Fred L. Phillips	Baker	—	40	Driven	—	1¼
Bh 9	Alire Louis	—	—	38	do	11.0	1¼
Bh 10	Frank Baker	—	—	38	do	—	1¼
Bh 11	H. C. Carey	—	1928	45	do	26.3 m	1
Bh 12	Etha Tingle	McGee	1940	50	do	30–45	1¼
Bh 13	O. W. Shockley	Shockley	1937	50	Dug	10.2 m	18
Bh 14	Coop. Ground-Water Program	White	1950	45	Jetted	122.0 m	1½
Cb 1	Geo. C. Cooper	—	1934	5	Driven	22	1¼
Cb 2	W. J. Keasey	—	1945	5	do	50	1½
Cb 3	Do	—	1937	5	do	13	1¼
Cb 4	Noah Barclay	Barclay	1937	15	do	16	1½
Cb 5	Cora Lee Wright	—	1950	18	do	16	1¼
Cb 6	Theo. Wright	Wright	1948	20	do	22	1¼
Cb 7	Veolie Moore	—	1947	20	do	18	1¼
Cb 8	Winfield Riggin	—	1944	15	do	22	1¼
Cb 9	Harry Horner	—	1927	15	do	15	1¼
Cc 1	C. B. Phillips	White	1945	20	Jetted	100	2
Cc 2	F. A. Crockett	do	1945	10	do	83	2
Cc 3	Unknown	—	—	20	Driven	17.6 m	1¼
Cc 4	Mr. Majors	—	1929	15	do	11.2 m	1¼
Cc 5	Unknown	—	—	10	do	21.5 m	1¼
Cc 6	Edward Lloyd	—	—	15	do	12	1½
Cc 7	Arthur E. Dowes	—	—	20	do	18	1¼
Cc 8	Morris Phillips	—	—	20	do	15.0 m	1¼
Cc 9	Do	—	—	20	do	12.8 m	1¼
Cc 10	Gottman	—	—	5	do	26.5 m	1¼
Cc 11	Clarence Donaho	—	—	10	do	50.5 m	1¼
Cc 12	Joseph Kenny	—	—	5	do	31.0 m	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping Equipment	Use of Water	Remarks
Pleistocene	—	—	N	T	See log.
Calvert or Chickahominy(?)	—	—	N	T	See log. Oil and gas exploratory well. See Maryland Geological Survey Vol. 10, 1918, p. 316-17. Abandoned.
Pleistocene	—	—	Ic, E	D,F, S	
do	5.32 m	Oct. 17, 1949	Ic, E	D,F, S	
do	7.06 m	Oct. 17, 1949	R, E	D,F, S	Temperature 67° F.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony". Temperature 58° F.
Pleistocene	8.19 m	Aug. 17, 1949	C, H	D, S	Temperature 68° F.
do	14	Jun. 1949	C, H	D, S	
do	7.47 m	Aug. 16, 1949	B, H	F, S	Water reported slightly "irony". Temperature 70° F.
do	—	—	Ic, E	D,F, S	Water reported "irony" and hard.
do	5.19 m	Aug. 16, 1949	C, H	F, S	Water reported "irony".
do	—	—	Ic, E	D,F, S	Water reported "irony". Temperature 70° F.
Pleistocene and Pliocene(?)	5.21 m	Nov. 21, 1949	N	N	Temperature 59° F.
do	5	1940(?)	C, H	D, S	Temperature 57° F.
Pleistocene	2.19 m	Nov. 21, 1949	N	N	Do.
Pocomoke	1.00 m	Aug. 19, 1950	N	T	See log and chemical analysis.
Pleistocene	3	Oct. 4, 1949	C, H	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	10	Oct. 12, 1949	Ic, E	D, S	Do.
Pleistocene	4	Oct. 12, 1949	Ic, E	D, S	Do.
do	—	—	C, H	D, S	
do	—	—	C, H	D, S	Water reported "irony".
do	—	—	J, E	D, S	Do.
do	—	—	R, E	D, S	
do	—	—	C, H	D, S	
do	—	—	R, E	D, S	Do.
Manokin	9	Dec. 7, 1945	C, W	D,F, S	See log.
do	7	Dec. 3, 1945	Ic, E	D,F, S	See log. Water reported "irony".
Pleistocene	4.60 m	Sep. 22, 1949	C, H	D, S	Temperature 63° F.
do	3.66 m	Sep. 22, 1949	C, H	N	Water reported slightly "irony". Temperature 67° F.
Pleistocene and Pliocene(?)	8.58 m	Sep. 22, 1949	C, H	N	
Pleistocene	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	C, H	D,F, S	Do.
do	5.46 m	Sep. 30, 1949	N	N	Water reported slightly "irony". Temperature 63° F.
do	5.77 m	Sep. 30, 1949	N	N	Water reported slightly "irony". Temperature 63° F.
Pleistocene and Pliocene(?)	4.18 m	Sep. 30, 1949	C, H	F, S	Water reported slightly "irony". Temperature 62° F.
do	6.87 m	Sep. 30, 1949	C, H	D,F, S	Water reported very "irony".
do	8.59 m	Oct. 3, 1949	C, H	D,F, S	Temperature 65° F.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cc 13	Walter Smith	—	1946	10	Driven	13	1¼
Cc 14	Do	—	1927	10	do	58	1¼
Cc 15	B. N. Michaels	—	1940	20	do	32	1¼
Cc 16	C. C. Phillips	—	—	15	do	23.6 m	1¼
Cc 17	Homer B. Owens	Owens	1910	10	do	12.4 m	1¼
Cc 18	Pilcher & Savage	—	Prior 1944	10	do	16.7 m	1¼
Cc 19	W. B. Wolford	Wolford	1950	10	do	14.0 m	1¼
Cc 20	A. F. Wilson	Harris	—	10	do	14.8 m	1¼
Cc 21	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	15	do	21.0 m	1
Cc 22	Do	do	1950	14.6	do	15.2 m	1
Cc 23	Harold Johnson	—	1947	15	do	40	1¼
Cc 24	Harold Johnson	—	—	15	do	22.6 m	1¼
Cc 25	Coop. Ground-Water Program	White	1950	15	Jetted	84.0 m	1½
Cc 26	Matthew Hull	—	1944	5	Driven	32	1¼
Cd 1	W. E. Johnson	—	—	35	do	36.7 m	1¼
Cd 2	Town of Hebron	—	—	35	do	40.2 m	1¼
Cd 3	E. DeShield	—	1937	35	do	65	1¼
Cd 4	S. J. Cole	—	—	8	do	20.0 m	1¼
Cd 5	A. Williamson	—	—	20	do	75	1¼
Cd 6	Will Jenks	—	—	10	—	—	—
Cd 7	H. Lay Phillips Co.	—	1945	13	Jetted	110	3
Cd 8	Do	—	1925	10	Driven	40.5 m	1½
Cd 9	Myron Wilson	—	—	25	do	40	1¼
Cd 10	W. T. Holland	—	—	30	do	17.0 m	1¼
Cd 11	Ernest Freeny	—	—	20	do	31	1¼
Cd 12	Jay French	—	—	20	Dug	8.6 m	24
Cd 13	Littleton Cottman	—	—	25	Driven	20	1¼
Cd 14	George W. Bounds	—	—	35	do	26.5 m	1¼
Cd 15	W. E. Brown	—	—	35	do	79	1¼
Cd 16	Vernon H. Powell	—	1930	40	do	12.3 m	1¼
Cd 17	J. French	—	—	18	do	6.1 m	1¼
Cd 18	Margaret DeShields	Halvit	1940	15	do	16.7 m	1¼
Cd 19	W. E. Messick	—	1900	40	do	54	1¼
Cd 20	V. V. Hughes	Elzey	—	40	do	39.1 m	1¼
Cd 21	Henry C. Adkins	—	—	28	do	25.1 m	1¼
Cd 22	Lena Cook	—	1935	20	Dug	7.5 m	25
Cd 23	W. J. Humphreys	—	1943	25	Driven	19.7 m	1¼

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	11	Oct. 12, 1949	N	D,F, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	12	Oct. 12, 1949	C, H	D, S	Water reported very "irony".
do	14	Oct. 12, 1949	C, H	D,F, S	Water reported "irony".
do	7.07 m	Jul. 11, 1950	C, H	D, S	Water reported "irony". Temperature 62° F.
Pleistocene	4.48 m	Jul. 11, 1950	C, H	F, S	Temperature 63° F.
do	4.83 m	Jul. 11, 1950	C, H	F, S	Water reported slightly "irony". Temperature 65° F.
do	5.73 m	Jul. 11, 1950	C, H	D, S	Temperature 64° F.
do	4.74 m	Jul. 11, 1950	C, H	D, S	Water reported "irony".
do	2.56 m	Apr. 7, 1950	N	O	See log.
do	2.56 m	Apr. 7, 1950	N	O	Do.
Pleistocene and Pliocene(?)	—	—	Ic, E	D,F, S	Well reported to flow 3 feet above land surface during wet season. Water reported very "irony".
do	7.36 m	Jul. 13, 1950	C, H	N	Water reported very "irony".
Manokin	—	—	N	T	See log. Static water level 0.50 feet above land surface Jul. 13, 1950.
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported very "irony".
do	16.61 m	Oct. 9, 1947	C, H	C, S	Water reported slightly "turbid". Temperature 59° F.
do	8.44 m	Oct. 9, 1947	C, H	P, S	
do	—	—	C, W	D,F, S	Water reported slightly "irony".
do	—	—	C, H	F, S	Static water level 0.70 feet above land surface, Jul. 13, 1948.
Manokin	—	—	R, E	D, S	
do	—	—	N	D, S	Estimated flow 0.5 gpm. Temperature 58° F.
do	1.5	Oct. 4, 1949	R, E	D, S	Water reported very "irony".
Pleistocene and Pliocene(?)	9.03 m	Oct. 4, 1949	C, H	F, S	
do	—	—	C, H	D,F, S	Water reported "irony".
Pleistocene	7.76 m	Oct. 19, 1949	C, H	D,F, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported "irony". Has hydrogen sulfide odor.
Pleistocene	7.40 m	Oct. 29, 1949	N	D,F, S	
do	—	—	C, H	D,F, S	Water reported very "irony". Has hydrogen sulfide odor.
do	9.10 m	Oct. 24, 1949	C, H	F, S	
Manokin	—	—	C, H	D,F, S	Water reported slightly "irony".
Pleistocene	5.91 m	Jun. 11, 1950	C, H	D, S	Temperature 62° F.
do	4.32 m	Jun. 11, 1950	C, H	N	Water reported "irony". Temperature 65° F.
do	2.99 m	Jun. 11, 1950	C, H	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	Ic, E	D, S	
do	12.79 m	Jul. 17, 1950	C, H	F, S	Water reported slightly "irony".
do	1.35 m	Jul. 17, 1950	C, H	F, S	Water reported "irony".
Pleistocene	3.28 m	Jul. 17, 1950	C, H	D, S	Well reported dry at times.
do	2.22 m	Jul. 17, 1950	C, H	F, S	Water reported slightly "irony".

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cd 24	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	18	Driven	15.2 m	1
Cd 25	Do	do	1950	22	do	11.5 m	1
Cd 26	Do	do	1950	28	do	11.2 m	1
Cd 27	Do	do	1950	40	do	11.5 m	1
Cd 28	Do	do	1950	38.2	do	16.1 m	1
Cd 29	Do	do	1950	34.1	do	11.5 m	1
Cd 30	Do	do	1950	29.8	do	11.5 m	1
Cd 31	Do	do	1950	25	do	12.0 m	1
Cd 32	Do	do	1950	45	do	11.7 m	1
Cd 33	Do	White	1950	45	Jetted	210.0 m	1½
Cd 34	Do	do	1950	20	do	105.0 m	1½
Cd 35	James Geddes	do	1951	20	do	68	2
Cd 36	M. W. Acworth	Todd	1943	20	do	126	2½
Cd 37	Walton Phillips	Phillips	1950	18	Driven	35	1½
Cd 38	William Dorman	Dorman	1949	15	do	18	1¼
Cd 39	Mrs. Ira A. Disharoon	—	1916	25	do	40	1½
Cd 40	Nettie Dorman	—	1948	18	do	35	1½
Cd 41	Roland Dorman	—	1948	18	do	20	1¼
Cd 42	Harry Gillis	—	1920	18	Dug	12	30
Cd 43	Camp Grounds	—	—	18	Driven	20	1¼
Cd 44	Roland J. Bailey	Bailey	1882	23	do	35	1¼
Cd 45	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	30.8	do	11.0 m	1
Ce 1	City of Salisbury	Kelly Well Co.	1925	6	Dug	58	24
Ce 2	Do	do	1925	6	do	57	24
Ce 3	Do	do	1925	6	do	43	24
Ce 4	Do	do	1925	5	do	48	24
Ce 5	Do	do	1925	6	do	61	24

—*Continued*

Aquifer, water-hearing formation, or geologic age	Static Water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	2.33 m	Apr. 7, 1950	N	O	See log.
do	1.35 m	Apr. 7, 1950	N	O	Do.
do	0.44 m	Apr. 7, 1950	N	O	Do.
do	2.50 m	Apr. 7, 1950	N	O	Do.
do	4.52 m	Apr. 7, 1950	N	O	Do.
do	3.27 m	Apr. 7, 1950	N	O	Do.
do	2.13 m	Apr. 7, 1950	N	O	Do.
do	3.48 m	Apr. 7, 1950	N	O	Do.
do	3.64 m	Apr. 7, 1950	N	O	Do.
St. Marys	2.60 m	Jul. 19, 1950	N	T	See log and table of paleontology.
Manokin	4.30 m	Jul. 12, 1950	N	T	See log.
Pleistocene and Pliocene(?)	9	Oct. 1951	Ic, E	D, S	See log. Water reported "irony".
Manokin	2.52 m	Oct. 14, 1952	Ic, E	D,F, S	Water reported "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported slightly "irony".
Pleistocene	3	1949	Ic, E	D,I, S	
Pleistocene and Pliocene(?)	—	—	Ic, E	D, S	
do	—	—	C, H	D, S	Water reported slightly "irony".
Pleistocene	—	—	Ic, E	D, S	Do.
do	—	—	Ic, E	D, S	
do	—	—	C, H	D, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	Ic, E	D	Do.
Pleistocene	5.81 m	Jun. 16, 1950	N	O	See log.
Pliocene(?)	4.83 m	Nov. 1947	Ic, E	P, L	See log. Wells Wi-Ce 1-5 pumped by common discharge line. Yield in 1947 discussed in text. Yield in 1925 reported 775 gpm with 18 feet drawdown. Depth of screen below land surface 31-57 feet. Capacity of pump 1000-2000 gpm.
do	5.15 m	Nov. 1947	Ic, E	P, L	See Wi-Ce 1. Yield in 1925 reported 840 gpm with 15 feet drawdown. Depth of screen below land surface 31-56 feet. Capacity of pump 1000-2000 gpm. See chemical analysis.
do	4.83 m	Nov. 1947	Ic, E	P, L	See Wi-Ce 1. Yield in 1925 reported 800 gpm with 23 feet drawdown. Depth of screen below land surface 22-42 feet. Capacity of pump 1000-2000 gpm.
do	4.61 m	Nov. 1947	Ic, E	P, L.	See Wi-Ce 1. Yield in 1925 reported 750 gpm with 21 feet drawdown. Depth of screen below land surface 25-47 feet. Capacity of pump 1000-2000 gpm.
do	5.08 m	Nov. 1947	Ic, E	P, L	See Wi-Ce 1. Yield in 1925 reported 750 gpm with 21 feet drawdown. Depth of screen below land surface 33-59 feet. Capacity of pump 1000-2000 gpm.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ce 6	City of Salisbury	Rulon	1936	9	Drilled	65	24–12
Ce 7	Do	do	1937	9	do	62	24–12
Ce 8	Do	do	1945	10	do	66	24–12
Ce 9	Do	—	1943	10	do	52	3
Ce 10	Do	Kelly Well Co.	1925	30	do	135	4
Ce 11	Do	do	1025	6	do	62	8–6
Ce 12	Do	do	1925	3	do	65	10–8–6
Ce 13	Do	Shannahan Artesian Well Co.	1942	7	do	55[m]	16–10
Ce 14	City of Salisbury	Kelly Well Co.	1925	25	do	146	10–8–6
Ce 15	Do	do	1925	29	do	73	10–8
Ce 16	Do	Rulon	1943	7	do	47.0[m]	4
Ce 17	Do	do	1943	8	do	63	4
Ce 18	Do	Salisbury	1947	7	Driven	13	1¼
Ce 19	Atlantic Refining Co.	do	1941	5	do	113	2
Ce 20	W. L. Vaughn	—	1941	40	do	33	1¼
Ce 21	State of Maryland Game Farm	—	1944	20	Drilled	137	2½
Ce 22	W. F. Allen Co.	Wheatley	1944	30	Driven	55–60	2½

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene (?)	—	—	T, E	P, L	See log. Yield in 1936 reported 820 gpm with 37 feet drawdown. Yield in 1947 about 600 gpm. Depth of screen below land surface 44–67 feet. Pump setting about 50 feet. Temperature 58.5° F.
Pliocene(?)	—	—	T, E	P, L	See log. Yield in 1937 reported 1200 gpm with 37 feet drawdown. Yield in 1947 about 900 gpm. Depth of screen below land surface 42–62 feet. Pump setting 45 feet, footpiece 55 feet. Capacity of pump 1000 gpm. Temperature 59° F.
do	9.47 m	Nov. 1947	T, E	P, L	See log. Yield in 1945 reported 1050 gpm with 34 feet drawdown. Yield in 1947 about 1000 gpm. Depth of screen below land surface 45–66 feet. Capacity of pump 800 gpm.
do	—	—	N	T	See log. Casing removed.
Pleistocene and Pliocene(?) and Yorktown and Cohansey(?)	24.0 7.0	1925 1925	N	T	See log and chemical analysis. Well tested between 60–80 feet and 110–120 feet. Depth of screen below land surface 60–80 feet and and 110–120 feet. Abandoned.
Pliocene(?)	2	1925	N	T	See log. Well tested 1925, 108 gpm at 61 feet and 57 gpm at 56 feet.
Pleistocene and Pliocene(?)	2	1925	N	T	See log. Yield in 1925 reported 100 gpm. Bottom of screen set at 58 feet below land surface.
Pliocene(?) and Yorktown and Cohansey(?)	8.00 m	Jul. 1947	N	O	See log. Yield in 1942 reported 200 gpm. Well equipped with water-stage recorder Jul. 1947.
Pliocene(?) and Yorktown and Cohansey(?)	—	—	N	T	See log and chemical analysis. Well tested 1925 at 70 feet, water level 15.5 feet, yield 18 gpm; at 107 feet, water level 4 feet, yield 5 gpm. Depth of screen below land surface 62–70 feet and 101–107 feet.
Pleistocene and Pliocene(?)	19	1925	N	T	See log. Depth of screen below land surface 60–70 feet. Casing removed.
Pliocene(?)	3.05 m	Jul. 1947	N	T, O	See log.
do	2.89 m	Jul. 1947	N	T, O	Do.
do	9.41 m	Aug. 1947	N	O	Do.
Manokin	—	—	N	N	Water level measured 15.5 feet above land surface, Aug. 19, 1947.
Pleistocene and Pliocene(?)	—	—	R, E	D, F, S	Field analysis: iron 0.3 p.p.m.; chloride 11 p.p.m.
Manokin	—	—	N	—	Yield in Aug. 1947 reported 9.3 gpm with 6.89 feet drawdown. Field analysis: iron over 3 p.p.m.; chloride 6 p.p.m. Water has hydrogen sulfide odor. Static water level 5.39 feet above land surface, measured Aug. 1947. Temperature 58° F. See chemical analysis.
Pleistocene and Pliocene(?)	—	—	R, E	F, S	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ce 23	W. F. Allen Co.	—	1937	30	Driven	50–55	1¼
Ce 24	Lowe Brothers	Lowe	1945	40	do	45	1½
Ce 25	Do	do	1946	40	do	50	1½
Ce 26	Do	do	1946	45	do	50	1½
Ce 27	Pocohontas Coal Co.	—	1907(?)	5	Drilled	130	2
Ce 28	Citizens Gas Co.	Pentz	1946	25	Jetted	85	6
Ce 29	Messick Ice Co.	Pentz	1944	30	Drilled	80.5 m	6
Ce 30	Do	do	1931	30	Jetted	81–83	3
Ce 31	Salisbury Ice Co.	do	1946	33	Drilled	94	8
Ce 32	Webb Packing Co.	Shannahan Artesian Well Co.	1941	33	do	90	8
Ce 33	H. Dryden	Humphreys	1945	33	Driven	55	1½
Ce 34	City of Salisbury	—	—	10	Drilled	120	—
Ce 35	Arcade Theater	—	1937	15	do	150(?)	6
Ce 36	City of Salisbury	—	—	10	do	120	—
Ce 37–40	Baltimore, Claiborne and Annapolis Railroad Co.	—	1895	25	—	70–75	1¼
Ce 41	T. H. Mitchell & Co.	—	1894	5	—	112	1¼
Ce 42	Salisbury Ice Co. (old)	—	1893	30	Drilled	424	1¼
Ce 43–52	Do	—	1906	30	—	50	2
Ce 53	Roberts Industries	—	—	2	Drilled	100	2
Ce 54	Do	—	—	5	do	100	—
Ce 55	P. D. Phillips Co.	—	1927	5	do	120	4
Ce 56–58	Tilghman Fertilizer Co.	—	—	5	do	120	—

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?)	—	—	R, E	D,C, S	
do	9.61 m	Sep. 1947	C, H	N	
do	—	—	R, E	D,Ir,L	
do	—	—	N	Ir, L	Portable pump installed for irrigation.
Manokin	—	—	N	C, M	Reported flowing Sep. 1947. Yield reported Sep. 1948 5.8 gpm. Water has hydrogen sulfide odor, reported high in iron. Temperature 59° F.
Pleistocene and Pliocene(?)	—	—	T, E	I, L	Uses approximately 140,000 gal. a day. Yield in 1947 reported 100–150 gpm. Capacity of pump 150 gpm.
do	23.55 m	Feb. 24, 1954	T, E	I, L	Uses approximately 230,000 gal. a day. Yield in 1947 reported 161 gpm. Capacity of pump 350 gpm.
do	—	—	R, E	I, L	Uses approxmiately 130,000 gal. a day. Yield in 1947 reported 90 gpm. Two wells on suction.
do	—	—	T, E	I, L	Uses approximately 600,000 gal. a day. Yield in 1947 reported 500 gpm. Capacity of pump 500 gpm. 30 other wells abandoned at plant.
do	27.5	Jul. 1941	T, E	I, L	Yield in 1941 reported 108 gpm with 6 feet drawdown. Capacity of pump 120 gpm.
do	23.87	Sep. 1947	C, W	D, S	
Manokin	—	—	N	N	Reported to flow before being covered.
do	—	—	T, E	C, M	Reported flowing 1947. Yield in 1947 reported 100 gpm. Capacity of pump 300 gpm. Reported high in iron.
do	—	—	N	N	Reported to flow before being capped.
Pleistocene and Pliocene(?)	—	—	N	N	Wells covered; exact location unknown. Water reported hard. Total yield from wells 37–40 reported 100 gpm. See Maryland Geol. Survey vol. 10, 1918, p. 322.
Manokin	—	—	N	N	Yield in 1918 reported 6 gpm. Well covered; exact location unknown. Water reported hard. Static water level reported 4 feet above land surface in 1918. See Maryland Geol. Survey vol. 10, 1918, p. 322.
Choptank	—	—	N	N	See log. Well covered; exact location unknown. See Maryland Geol. Survey vol. 10, 1918, p. 322.
Pleistocene and Pliocene(?)	—	—	N	N	Wells covered; exact location unknown. See Maryland Geol. Survey vol. 10, 1918, p. 322.
Manokin	—	—	N	I, L	Reported flowing 1947. Yield reported September 1947 1 gpm. Water has hydrogen sulfide odor, reported high in iron. See chemical analysis.
do	—	—	N	N	Well covered; exact location unknown.
do	—	—	N	N	Reported flowing 1947. Yield reported Sep. 1947 3 gpm. Reported high in iron.
do	—	—	N	N	Reported to flow. Wells covered. Reported high in iron. See chemical analysis.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ce 59	Townsend Nurseries	Pentz	1931	32	Jetted	165	6
Ce 60	Do	—	1945	32	Driven	55	2
Ce 61	Shoreland Freezers, Inc.	Pentz	1947	35	Drilled	81	8
Ce 62–63	Homestead Dairy	Humphreys	1944	40	Driven	54	2
Ce 64	Annie Ellis	—	—	30	do	35.0 m	1¼
Ce 65	City of Salisbury	Salisbury	1947	7	do	13	1¼
Ce 66	Do	do	1947	14	do	20.5 m	1¼
Ce 67	Do	do	1947	15	do	20.5 m	1¼
Ce 68	Shoreland Freezers, Inc.	Humphreys	1947	30	do	65.5 m	2
Ce 69	W. F. Allen	Pentz	1947	35	Drilled	80	6
Ce 70	C. R. Hayman	—	—	43	Driven	53	1¼
Ce 71	Pine Bluff Sanatorium	Foskey	—	12	do	28	1¼
Ce 72	Do	—	1930	16	do	44	1¼
Ce 73	J. Birdman	—	—	15	do	60	1¼
Ce 74	Herman Jenkins	Campbell	1946	25	do	26	1¼
Ce 75	Vanderbogart	White	1944	15	Drilled	60	2
Ce 76	Benedict the Florist	—	1915	4	do	85–90	4
Ce 77	Do	—	1915	4	do	85–90	6
Ce 78	Do	—	1915	4	do	85–90	4
Ce 79	Do	—	—	5	do	85–90	2
Ce 80	J. Rawson	Humphreys	1948	11	do	80	2
Ce 81	Do	do	1947	15	Driven	30	1¼
Ce 82	Ruth Hearne	do	—	25	do	80	2
Ce 83	Southern States Products Co.	Pentz	1947	20	Drilled	63	6
Ce 84	Libby Canning Co.	—	1948	25	Driven	65	2
Ce 85	Elmer Adkins	—	—	45	do	31.0 m	1¼
Ce 86	Joseph Bounds	—	1949	45	—	63	1¼
Ce 87	Corona Nurseries	—	—	45	Driven	64.2 m	2

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	—	—	Ic, E	Ir, L	Capacity of pump 90 gpm. Drilled to 300 feet; developed at 165 feet.
Pleistocene and Pliocene(?)	15	1947	R, E	D, S	Capacity of pump 10 gpm.
do	21.40	Sep. 1947	T, E	I, L	See log and chemical analysis. Pumping test data in text. Depth of screen below land surface 71–81 feet. Yield in 1947 reported 300 gpm with 41 feet drawdown. Capacity of pump 300 gpm.
do	—	—	R, E	F,D, L	Capacity of pump 50 gpm.
do	17.80 m	Oct. 1947	C, H	D, S	
do	7.20 m	Nov. 1947	N	O	Depth of screen below land surface 10–13 feet. Used for water level measurements. Casing pulled.
do	14.01 m	Nov. 1947	N	O	Depth of screen below land surface 17–20 feet. Used for water level measurements. Casing pulled.
do	12.73 m	Nov. 1947	N	O	Do.
do	23.53 m	Dec. 1947	R, E	I, L	Depth of screen below land surface 50–65 feet. Capacity of pump 15 gpm.
do	15	Oct. 1947	T, E	Ir, L	See log. Depth of screen below land surface 67–80 feet. Yield in 1947 reported 90 gpm with 6 feet drawdown. Capacity of pump 150 gpm.
do	—	—	C, H	D, S	
do	10	1938	N	N	Well covered. Reported high in iron.
do	22.63 m	Mar. 1948	N	O	Reported high in iron.
do	18	1939	R, E	D, S	Do.
do	—	—	R, E	D, S	Capacity of pump 4 gpm. Reported low in iron.
do	5	1947	R, E	D, S	Capacity of pump 6 gpm. Reported corrosive.
Yorktown and Cohansey(?)	—	—	N	N	Reported high in iron. Well plugged.
do	—	—	N	N	Yield in 1915 reported 100 gpm. Reported high in iron. Well abandoned.
do	—	—	R, E	D,I, M	Well observed to flow in 1947. Yield in 1947 reported 30 gpm. Reported high in iron. Temperature 58° F.
do	—	—	N	N	Reported to flow before being plugged.
do	—	—	N	D, S	Reported to flow July 1948. Yield in July 1948 reported 14 gpm. Temperature 58° F. Reported high in iron. Clay 75–80 feet. Could not develop well above 80 feet.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Capacity of pump 4 gpm.
do	—	—	R, E	D, S	
do	12	1947	T, E	I, L	Yield in 1947 reported 400 gpm. Capacity of pump 500 gpm.
do	—	—	R, E	I, L	Capacity of pump 30 gpm.
do	4.88 m	Oct. 19, 1949	N	N	
do	—	—	R, E	D,F, S	
do	12.95 m	Jan. 9, 1950	N	N	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ce 88	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	47	Driven	16.8 m	1
Ce 89	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	45	do	16.8 m	1
Ce 90	University of Maryland-Vegetable Research Farm	—	—	35	Do	33.0 m	1¼
Ce 91	Do	University of Maryland	1950	35	Drilled	87.3	3
Ce 92	Do	Baldwin	1950	35	do	105	1½
Ce 93	Fish Products Corp.	Shannahan Artesian Well Co.	1951	15	Jetted	60	4-2
Ce 94	Do	do	1951	15	do	60	4-2
Ce 95	Henry Sweet	White	1952	8	do	125	3-2
Ce 96	C. F. Brewington	do	1946	25	do	73.5	2
Ce 97	Wicomico County Board of Education	Shannahan Artesian Well Co.	1948	30	do	71	8
Ce 98	Shoreland Freezers	Pentz	1951	40	do	82	6
Ce 99	City of Salisbury	Kelly Well Co.	1948	7	Dug	52	17
Ce 100	Do	do	1949	7	do	70	17
Ce 101	Maryland State Teachers College	White	1950	25	Jetted	68	2½
Ce 102	Mardel Byproducts Corp.	Pentz	1951	40	do	80	6
Ce 103	C. A. Swanson & Sons	do	1951	20	do	68	8
Ce 104	University of Maryland	Shannahan Artesian Well Co.	1952	35	do	95	6
Ce 105	W. F. Messick	—	1918	40	Driven	43.9 m	1¼
Ce 106	A. J. Vanderbogart	White	1950	20	Jetted	75	4
Ce 107	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	48	Driven	17.3 m	1
Cf 1	City of Salisbury	Rulon	1943	6	Drilled	47.4 m	4
Cf 2	Do	do	1943	8	do	49.4 m	4
Cf 3	City of Salisbury Municipal Airport	do	1942	45	do	109	16
Cf 4	W. F. Allen Co.	Pentz	1945	40	Jetted	90	6
Cf 5	Delmarva Airport	—	1937	42	Driven	35	1¼
Cf 6	H. Adkins	—	—	35	do	37	1¼
Cf 7	Do	Adkins	1917	35	do	35	1¼
Cf 8	Mr. Sallylowe	—	1946	35	do	45	1¼
Cf 9	Mr. H. Ward	—	1936	45	do	35	1¼
Cf 10	Do	—	1946	45	do	70	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	5.20[m]	Apr. 7, 1950	N	O	See log.
Pleistocene	8.76[m]	Apr. 7, 1950	N	O	See log.
Pleistocene and Pliocene(?)	8.02[m]	Mar. 15, 1950	N	O	
Pliocene(?)	12.19[m]	Apr. 19, 1951	Ic, G	Ir, M	See log. Hole reached Miocene clay at 69 feet. Yield Apr. 19, 1951 reported 50 gpm.
Pleistocene and Pliocene(?)	12	Apr. 21, 1951	R, E	D, F	See log. Yield in 1950 reported 16 gpm.
Yorktown and Cohansey(?)	8	Nov. 7, 1951	C, H	D, S	See log. Water reported "irony".
do	5	Nov. 7, 1951	C, H	D, S	Do.
Manokin	—	—	N	D, S	See log. Reported flowing April 1952.
Pleistocene and Pliocene(?)	4	Nov. 9, 1946	C, H	D, S	Water reported "irony".
do	7	Nov. 8, 1948	—	P, M	See log.
do	21	Apr. 28, 1951	T, E	I, L	See log.
do	3	Nov. 1948	T, E	P, L	See log. Yield measured Mar. 1949 420 gpm with 24 feet drawdown.
do	2	Nov. 3, 1949	T, E	P, L	See log. Yield measured Dec. 1949 415 gpm with 50 feet drawdown.
Pliocene(?)	6	Jul. 1950	—	D, S	See log.
Pleistocene and Pliocene(?)	10	May 2, 1951	T, E	I, L	Do.
do	11	Oct. 10, 1951	T, E	I, L	See log. Yield Nov. 28, 1953 reported 165 gpm.
Yorktown and Cohansey(?)	14	Jan. 30, 1952	T, E	Ir, M	See log.
Pleistocene and Pliocene(?)	29.66[m]	Jan. 22, 1953	N	O	
Pliocene(?)	—	—	N	N	See log. Well abandoned and plugged.
Pleistocene	12.20[m]	May 12, 1950	N	O	See log.
Pliocene(?)	2.28[m]	Jul. 23, 1947	N	O	See log.
do	2.42[m]	Jul. 23, 1947	N	O	Do.
do	13.44[m]	Sep. 18, 1947	N	O	See log. Well equipped with water stage recorder 1947. Yield in 1942 reported 519 gpm with 30 feet drawdown. Depth of screen below land surface 90-108 feet.
do	—	—	R, E	F, M	Yield in 1947 reported 150 gpm. Capacity of pump 150 gpm.
Pleistocene and Pliocene(?)	18	Aug. 1947	R, E	D, C, S	
do	—	—	C, H	D, S	
do	16.73[m]	Sep. 18, 1947	C, H	N	
do	—	—	C, H	D, S	
do	15	Jul. 1947	C, W	D, F, S	
do	15	Jul. 1947	R, G	D, F, S	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cf 11	A. D. Bornt	—	1944	30	Driven	57	1¼
Cf 12	City of Salisbury Municipal Airport	—	—	40	—	—	2
Cf 13	T. B. Walston	—	1946	45	Driven	62	1¼
Cf 14	Mr. Lohman	—	1947	39	do	28	1¼
Cf 15	Brice Long	—	1947	43	do	28	1¼
Cf 16	WBOC-Radio Station	Humphreys	1947	30	do	60	1¼
Cf 17	Methodist Church	—	—	45	do	41	1¼
Cf 18	Willie Owens	Owens	1947	45	do	38	1¼
Cf 19	John S. Cordrey	—	1938	58	do	56	1¼
Cf 20	W. C. Luffman	—	1945	40	do	63	1¼
Cf 21	Ernest Craighton	—	1947	36	do	45	1¼
Cf 22	City of Salisbury	Schultes	1948	11	Drilled	56	6
Cf 23	Do	do	1948	7.8	do	51	2
Cf 24	Do	do	1948	8	do	50	2
Cf 25	Do	do	1948	16	do	61	2
Cf 26	Do	Coop. Ground-Water Program	1948	7	Driven	5	1¼
Cf 27	Do	do	1948	11	do	9	1¼
Cf 28	Do	Schultes	1948	41	Drilled	92	6
Cf 29	Do	do	1948	30	do	72	2
Cf 30	Do	do	1948	39	do	82	6
Cf 31	Do	do	1948	43	do	94	2
Cf 32	Do	Coop. Ground-Water Program	1948	24	Driven	5.0 m	1¼
Cf 33	Do	do	1948	40	do	23.0 m	1¼
Cf 34	Mrs. O. Dykes	—	1944	38	do	48.2 m	1¼
Cf 35	L. Malone	—	1948	38	do	40.7 m	1¼
Cf 36	E. T. Dykes	—	—	50	do	50.2 m	1¼
Cf 37	R. Whaley	—	—	55	do	55.0 m	1¼
Cf 38	D. F. Tilghman	—	—	45	do	39.0 m	1¼
Cf 39	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	37.3	do	22.6 m	1
Cf 40	Do	do	1950	41.0	do	20.5 m	1
Cf 41	Do	do	1950	45.5	do	21.5 m	1
Cf 42	Do	do	1950	42.5	do	21.0 m	1
Cf 43	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	37.0	do	21.8 m	1
Cf 44	Do	do	1950	40.8	do	16.2 m	1
Cf 45	Do	do	1950	51.6	do	18.0 m	1
Cf 46	Do	do	1950	58.3	do	22.0 m	1
Cf 47	Do	do	1950	47.5	do	13.0 m	1
Cf 48	Do	do	1950	53.1	do	16.4 m	1
Cf 49	Do	do	1950	52.6	do	15.7 m	1

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?)	17	1947	C, H	D, S	
do	—	—	R, E	C, S	Capacity of pump 10 gpm. See chemical analysis.
do	14	1946	R, E	D,F, S	Capacity of pump 5 gpm.
do	13.58[m]	Sep. 18, 1947	C, H	D, S	
do	19.18[m]	Sep. 18, 1947	C, H	D, S	
do	20	Sep. 23, 1947	R, E	P, S	
do	7.62[m]	Sep. 23, 1947	C, H	P, S	
do	—	—	R, E	D,F, S	
do	—	—	R, E	D,F, S	
do	18	1947	R, E	D, S	
do	18.16[m]	Sep. 18, 1947	C, H	C, S	
Pliocene(?)	3.50[m]	Apr. 14, 1948	N	T, O	See log and chemical analysis. Yield reported in Mar. 1948 130 gpm with 33.5 foot drawdown. Depth 55.4[m] May 14, 1953.
do	1.00[m]	Apr. 15, 1948	N	O	See log.
do	1.51[m]	Mar. 17, 1948	N	N	See log. Well used for water level measurements. Well covered.
do	7.24[m]	Mar. 25, 1948	N	N	Do.
Pleistocene	0.99[m]	Apr. 19, 1948	N	N	Well used for water level measurements. Well covered.
do	3.54[m]	Mar. 25, 1948	N	N	Do.
Pliocene(?)	17.95[m]	Apr. 21, 1948	N	T	See log and chemical analysis. Yield reported 100 gpm with 30.5 foot pumping level.
do	7.51[m]	Mar. 25, 1948	N	O	See log.
do	15.96[m]	Mar. 25, 1948	N	O	Do.
do	19.21[m]	Apr. 16, 1948	N	O	See log. Depth of screen below land surface 88–94 feet.
Pleistocene	2.12[m]	Mar. 25, 1948	N	O	
Pleistocene and Pliocene(?)	15.53[m]	Mar. 25, 1948	N	O	
do	12.10[m]	Oct. 6, 1949	C, H	D, S	Water reported slightly "irony". Temperature 62° F.
do	11.53[m]	Oct. 12, 1949	C, H	D,F, S	Temperature 62° F.
do	6.27[m]	Dec. 7, 1949	C, H	D,F, S	Water reported slightly "irony". Temperature 58° F.
do	—	—	C, H	D,F, S	
do	9.50[m]	Dec. 8, 1949	C, H	F, S	Temperature 58° F.
Pleistocene	14.33[m]	Apr. 7, 1950	N	O	See log.
do	12.68[m]	Apr. 7, 1950	N	O	Do.
do	9.20[m]	Apr. 7, 1950	N	O	Do.
do	12.56[m]	Apr. 7, 1950	N	O	Do.
Pleistocene	16.45[m]	Apr. 7, 1950	N	O	See log.
do	10.31[m]	Apr. 7, 1950	N	O	Do.
do	5.31[m]	Apr. 7, 1950	N	O	Do.
do	8.48[m]	Apr. 7, 1950	N	O	Do.
do	3.41[m]	Apr. 7, 1950	N	O	Do.
do	5.65[m]	Apr. 7, 1950	N	O	Do.
do	4.55[m]	Apr. 7, 1950	N	O	Do.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cf 50	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	45.9	Driven	16.7 m	1
Cf 51	Do	do	1950	42.2	do	21.6 m	1
Cf 52	T. Morris	—	—	50	do	21.4 m	1¼
Cf 53	City of Salisbury Municipal Airport	Humphries	1950	50	do	48	1½
Cf 54	John Smith	Cusick	1950	42	Drilled	202	1½
Cf 55	Coop. Ground-Water Program	White	1950	46	Jetted	139.0 m	1½
Cf 56	Do	Coop. Ground Water Program	1950	45.2	Driven	11.5 m	1
Cf 57	James Adkins	White	1951	35	Jetted	81	2
Cf 58	City of Salisbury Municipal Airport	Rude	1950	50.5	do	107	5
Cf 59	Mathews Hatchery	White	1946	45	do	74	2
Cf 60	John Aydelotte	Scott	1952	30	do	67	2
Cf 61	Roy Adkins	Survey Drilling Co.	1951	42	Drilled	1025	6
Cf 62	Hearn's Farm	do	1951	48	do	1024	4.75
Cf 63	Marshall S. Bornt	do	1951	38	do	1004	4.75
Cf 64	City of Salisbury	Kelly Well Co.	1949	7	Dug	61	17
Cf 65	Do	do	1949	8	do	56	17
Cf 66	Do	do	1949	10	do	70	17
Cf 67	W. Toadvine	Scott	1952	39	Jetted	64	2
Cf 68	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	39.3	Power Auger	28	3
Cf 69	Do	do	1952	39.0	do	20	3
Cf 70	Rayner Bros.	Hauser	1950	50.0	Jetted	96	8
Cg 1	Unknown	—	—	52	Driven	13.0 m	1¼
Cg 2	State of Maryland, Department of Forests & Parks	Morris	1947	55	do	68.4 m	1¼
Cg 3	C. J. Taylor Jr.	—	—	55	do	60–70	1¼
Cg 4	S. H. Truitt	—	—	55	do	15.0 m	1¼
Cg 5	P. Shockley	—	—	55	do	17.6 m	1¼
Cg 6	J. Holloway	Morris	1949	55	do	48.9 m	1¼
Cg 7	L. S. Hamblin	—	—	51	do	33.2 m	1¼
Cg 8	L. Tilghman	—	—	50	Dug	11.6 m	24
Cg 9	W. Y. Lecates	—	—	55	do	11.0 m	18
Cg 10	Do	—	—	60	do	9.0 m	19–34
Cg 11	S. Morris	—	1946	50	Driven	35.7 m	1¼
Cg 12	J. C. Davis	—	—	60	Dug	11	24

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Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	9.34 m	Apr. 7, 1950	N	O	See log.
do	12.18 m	Apr. 7, 1950	N	O	Do.
do	8.40 m	Dec. 13, 1949	C, H	D, S	Water reported slightly "irony". Temperature 59 F.
Pleistocene and Pliocene(?)	13.05 m	May 10, 1950	N	P, S	Field analysis: iron 1.2–2 p.p.m.
Manokin	12.00 m	May 4, 1950	R, E	D,F, S	See log. Field analysis: iron 5 p.p m.
Yorktown and Cohansey(?)	—	—	N	T	See log.
Pleistocene	7.50 m	Apr. 3, 1950	N	O	Do.
Pleistocene and Pliocene(?)	12	Apr. 1951	R, E	F, S	Do.
Pliocene(?)	10	Jan. 24, 1950	N	—	See log. Abandoned. Water reported very "irony".
do	15	Nov. 16, 1946	R, E	D,F, S	See log.
do	15	Jun. 9, 1952	R, E	D,F, S	See log. Water "irony". Temperature 58° F.
Calvert	—	—	N	T	See log and table of paleontology. Test hole for gas reservoir. Well is plugged.
do	—	—	N	T	See log.
do	—	—	N	T	See log and table of paleontology.
Pleistocene and Pliocene(?)	2.73 m	Mar. 1949	T, E	P, L	See log and chemical analysis. Yield in Mar. 1949 reported 680 gpm with 34 feet drawdown. Depth of screen below land surface 33–61 feet.
do	3.50 m	Jun. 1949	T, E	P, L	See log. Yield in Jun. 1949 reported 446 gpm with 28 feet drawdown. Depth of screen below land surface 26–50 feet.
do	2	Nov. 1949	T, E	P, L	See log. Yield in Nov. 1949 reported 810 gpm with 43 feet drawdown. Depth of screen below land surface 40–68 feet.
Pleistocene	14	May 29, 1952	—, E	D, S	See log.
Pleistocene and Pliocene(?)	—	—	N	T	Do.
Pleistocene	—	—	N	T	Do.
Pliocene(?)	—	—	N	T	See log. Reported yield 400 gpm. Depth of screen below land surface 76–96 feet.
Pleistocene	7.23 m	Oct. 17, 1949	C, H	N	Temperature 62° F.
Pleistocene and Pliocene(?)	12.62 m	Oct. 17, 1949	R, E	D, S	Water reported "irony". Temperature 60° F.
do	12	—	Ic, E	D,F, S	Water reported "irony".
Pleistocene	3.97 m	Dec. 6, 1949	C, H	F, S	Temperature 57° F.
do	5.80 m	Dec. 6, 1949	C, H	D,F, S	Temperature 58° F.
Pleistocene and Pliocene(?)	5.82 m	Dec. 6, 1949	C, H	D, S	Temperature 56° F.
do	3.39 m	Dec. 7, 1949	C, H	F, S	Do.
Pleistocene	2.83 m	Dec. 7, 1949	N	N	
do	2.55 m	Dec. 7, 1949	—, E	D, S	Water reported "irony".
do	1.15 m	Dec. 7, 1949	B, H	F, S	Do.
Pleistocene and Pliocene(?)	2.35 m	Dec. 7, 1949	C, H	N	Emergency well. Temperature 57° F.
Pleistocene	—	—	C, H	D,F, S	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cg 13	E. E. Hayman	—	1945	80	Driven	12.0[m]	1¼
Cg 14	Parsonsburg Manufacturing Co.	Holloway	1948	80	do	7.2[m]	1¼
Cg 15	C. Perdue	—	—	55	—	16.5[m]	1¼
Cg 16	Tri-State Sportsman Club	—	—	60	Driven	24.7[m]	1¼
Cg 17	Mrs. E. A. Riley	—	1919	30	do	14	1¼
Cg 18	Reuben Esham	Esham	1914	62	do	17.9[m]	1¼
Cg 19	German Sockliter	—	1919(?)	62	do	8.5[m]	1¼
Cg 20	Coop. Ground-Water Program	Coop. Ground-Water Program	1949	68	do	25.0[m]	1¼
Cg 21	Thomas C. Jones	Jones	1949	80	do	14.0[m]	1¼
Cg 22	Morris J. Leonard	—	1920	60	do	33.3[m]	1¼
Cg 23	Russel Wells	Wells	1947	64	Dug	10	36
Cg 24	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	49.3	Driven	17.3[m]	1
Cg 25	Do	do	1950	49.7	do	26.9[m]	1
Cg 26	Do	do	1950	50.7	do	16.8[m]	1
Cg 27	Do	do	1950	68.0	do	27.3[m]	1
Cg 28	Do	do	1950	84.1	do	17.0[m]	1
Cg 29	Do	do	1950	54.4	do	19.5[m]	1
Cg 30	Do	do	1950	78.8	do	11.5[m]	1
Cg 31	Do	do	1950	77.6	do	11.7[m]	1
Cg 32	Do	do	1950	58.6	do	15.8[m]	1
Cg 33	Do	do	1950	66.7	do	11.5[m]	1
Cg 34	Do	White	1950	49	Jetted	187.0[m]	—
Cg 35	Hastings Hatchery	Shannahan Artesian Well Co.	1941	75	Drilled(?)	685	6
Cg 36	A. P. Stephens	White	1948	80	Jetted	126	2
Cg 37	Ohio Oil Co.	—	1944	70	Drilled	5568	—
Cg 38	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	80	Power Auger	79.0[m]	3
Cg 39	State of Maryland, Department of Forests & Parks	Scott	1952	54	Jetted	256	3.2
Cg 40	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	79	Power Auger	79.0[m]	3
Cg 41	Do	do	1950	58	Driven	13.5[m]	1
Cg 42	Do	do	1950	63	do	22.0[m]	1
Cg 43	Do	do	1950	56	do	17.0[m]	1
Cg 44	Hastings Hatchery	Shannahan Artesian Well Co.	1951	75	Jetted	280	8-6
Ch 1	W. L. Layton	Layton	1909	38	Dug	7.8[m]	22
Ch 2	James E. Wilkins	Wilkins	1929	38	do	7.0[m]	24
Ch 3	V. & R. Rayne	Morriss	1948	39	Driven	35	2
Ch 4	Wicomico County Board of Education	White	1948	38	Drilled	99.5	2½
Ch 5	Davis & Truitt	McGee	1945	38	Driven	80	1½

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Aquifer, water bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	4.24 m	Dec. 8, 1949	C, H	D, S	Temperature 57° F. See chemical analysis.
do	2.36 m	Dec. 8, 1949	C, H	C, S	Temperature 58° F.
do	11.95 m	Dec. 8, 1949	C, H	D, S	Do.
do	11.92 m	Dec. 13, 1949	C, H	N	Color of water reported "milky". Temperature 60° F.
do	—	—	R, E	D,F, S	
do	2.77 m	Dec. 22, 1949	C, W	D, S	Temperature 55° F.
do	1.64 m	Dec. 22, 1949	R, E	N	Emergency well. Water reported slightly "irony". Temperature 53° F.
do	6.18 m	Aug. 16, 1949	N	O	See section on Water-level fluctuations.
do	5.72 m	Jul. 13, 1950	C, H	D, S	Temperature 68° F.
do	9.80 m	Jul. 13, 1950	N	N	Temperature 62° F.
do	6	1947	R, E	D, S	
do	2.50 m	Apr. 7, 1950	N	O	See log.
do	1.31 m	Apr. 7, 1950	N	O	Do.
do	1.56 m	Apr. 7, 1950	N	O	Do.
do	10.21 m	Apr. 7, 1 50	N	O	Do.
do	5.88 m	Apr. 7, 1950	N	O	Do.
do	4.20 m	Apr. 7, 1950	N	O	Do.
do	1.26 m	Apr. 7, 1950	N	O	See log and chemical analysis.
do	2.74 m	Apr. 7, 1950	N	O	Do.
do	6.70 m	Apr. 7, 1950	N	O	Do.
do	3.77 m	Apr. 7, 1950	N	O	See log.
Yorktown and Cohansey(?)	3.70 m	Sep. 7, 1950	N	T	See log and table of paleontology.
Calvert	—	—	T, E	I, L	See log and chemical analysis.
Yorktown and Cohansey(?)	—	—	J, E	D, S	Water reported becoming progressively "irony". See chemical analysis.
Pre-Cambrian(?) and Paleozoic(?)	—	—	—	—	Oil exploratory hole. See Maryland Dept. Geology, Mines, and Water Resources Bull. 2 for log.
Pleistocene	—	—	N	T	See log.
Manokin	16.0	May 16, 1952	J, E	D, S	Field analysis: 3 p.p.m. iron. Water reported hard. See log.
Pleistocene	—	—	N	T	See log.
do	8.00 m	Jan. 16, 1950	N	O	Do.
do	—	—	N	O	Do.
do	5.00 m	Jan. 20, 1950	N	O	Do.
Manokin	34	1951	T, E	I, L	See log and chemical analysis.
Pleistocene	7.11 m	Aug. 12, 1949	N	N	Temperature 71° F.
do	6.10 m	Aug. 12, 1949	B, H	F, S	Temperature: 71° F. Aug. 12, 1949. 64° F. Oct. 12, 1949.
do	20	1949	R, E	D,C, S	Water reported slightly "irony".
Pocomoke(?)	8	Sep. 9, 1948	—, E	P, S	See log and chemical analysis.
do	—	—	Ic, E	D,C, S	Water reported sulfurous when warm.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ch 6	Homer Rayne, Sr.	Rayne	1934	40	Driven	90	1¼
Ch 7	Do	—	1919	40	do	81.0^{m}	1¼
Ch 8	Geo. Hudson	Hudson	1940	40	do	11.8^{m}	1¼
Ch 9	Arnold Richardson	—	1919	40	Dug	9.7^{m}	26
Ch 10	Do	—	1934(?)	40	Driven	40(?)	1¼ (?)
Ch 11	P. & D. Richardson	McGee	1946	45	do	25	2
Ch 12	Do	—	—	45	do	19.1^{m}	1¼
Ch 13	Leonard Webb	Truitt	1947	40	do	26.6^{m}	1¼
Ch 14	Henry Cooper	McGee	1945	40	do	Shallow	1¼
Ch 15	Ned Jones	—	—	37	do	19.5^{m}	1¼
Ch 16	C. C. White	Farlow	1948	45	do	11.2^{m}	1¼
Ch 17	Charles Clark	Parsons	1909(?)	45	do	30	1¼
Ch 18	John Brittingham	—	1910	40	do	75	1¼
Ch 19	Do	—	1930(?)	40	Dug	7.2^{m}	18
Ch 20	Wm. Brittingham	McGee	1941	42	Driven	40.0^{m}	1¼
Ch 21	Alfred Dennis	—	1940	42	do	40	1¼
Ch 22	Ned Evans	—	—	45	do	29.0^{m}	1¼
Ch 23	Pittsville Fire Co.	—	1935	55	do	42	1¼
Ch 24	Do		1936	50	do	42	1¼
Ch 25	J. A. Hamblin	White	1944	52	Jetted	245	3
Ch 26	L. G. Tingle (Nursery)	—	—	50	Driven	21.0^{m}	1¼
Ch 27	Do	—	—	50	do	14.8^{m}	1¼
Ch 28	Do	White	1944	50	Jetted	51.1^{m}	2
Ch 29	E. Jones	Jones	1919	38	Driven	64.2^{m}	1¼
Ch 30	Grover Nicholson	Norris	1948	50	do	65.3^{m}	1¼
Ch 31	John B. Houck	—	1946	50	do	50.9^{m}	1¼
Ch 32	Mrs. H. Baker	Baker	1935	50	Dug	7.5^{m}	36
Ch 33	Coop. Ground-Water Program	White	1950	35	Jetted	131.0^{m}	1½
Ch 34	Do	do	1950	45	do	126.0^{m}	1½
Ci 1	John W. Wilkins	Wilkins	1944	42	Driven	35	1¼
Ci 2	Do	—	1919	42	do	11.8^{m}	1¼
Ci 3	R. C. Twilley	McGee	1948	42	do	15	1¼
Ci 4	E. Patey	—	—	30	do	68.1^{m}	1¼
Ci 5	C. Von Lienen	—	1942	28	do	15	1¼
Db 1	H. B. Kennerly & Son, Inc.	White	1946	5	Jetted	80	2
Db 2	Do	do	1946	5	do	93	2½
Db 3	Willing Oyster Co.	do	1947	7	do	86	1½
Db 4	H. B. Kennerly & Son. Inc.	do	1946	5	do	80	2
Db 5	W. B. Boschen	do	1946	5	do	76	2

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pocomoke(?)	—	—	Ic, E	D,F, S	Water reported slightly "irony".
do	8.05 m	Aug. 12, 1949	N	N	Temperature 71° F.
Pleistocene	8.25 m	Aug. 16, 1949	C, H	F, S	Water reported slightly "irony". Temperature 68° F.
do	7.25 m	Aug. 17, 1949	C, H	D, S	Temperature 72° F.
Pleistocene and Pliocene(?)	—	—	Ic, E	F, S	Water reported very "irony".
do	—	—	Ic, E	D,F, S	Temperature 60° F.
Pleistocene	7.53 m	Aug. 17, 1949	N	N	Temperature 65° F.
Pleistocene and Pliocene(?)	5.27 m	Aug. 17, 1949	C, H	F, S	Water reported "irony". Temperature 65° F.
Pleistocene	—	—	Ic, E	D,F, S	Temperature 63° F.
do	7.60 m	Sep. 26, 1949	C, H	N	Temperature 67° F.
do	4.97 m	Sep. 26, 1949	C, H	N	Water reported "irony". Temperature 68° F.
Pleistocene and Pliocene(?)	7	Oct. 1949	Ic, E	D,F, S	
do	—	—	Ic, E	D,F, S	
Pleistocene	3.50 m	Oct. 12, 1949	B, H	F, S	Temperature 64° F.
Pleistocene and Pliocene(?)	8.13 m	Oct. 12, 1949	R, E	F, S	Water reported "irony". Temperature 63° F.
do	—	—	R, E	F, S	Water reported "irony".
do	7.16 m	Oct. 12, 1949	C, H	D, S	Temperature 65° F.
do	—	—	Ic, G	P, S	Four wells connected by common discharge pipe. Estimated yield 21 gpm.
do	1	1937	Ic, G	P, S	Four wells connected by common discharge pipe.
Manokin	4	1947	R, E	D, S	Water reported "irony". Driller reports water 0–196 feet as irony and sulfurous.
Pleistocene	5.49 m	Dec. 15, 1949	R, E	Ir, S	Four wells connected by common discharge pipe. Temperature 54° F.
do	3.70 m	Dec. 15, 1949	R, G	Ir, S	Temperature 54° F.
Pleistocene and Pliocene(?)	4.02 m	Dec. 15, 1949	N	P, S	Temperature 55° F.
do	15.94 m	Sep. 9, 1949	C, H	F, S	Water reported "irony". Temperature 59° F.
do	7.85 m	Oct. 19, 1949	R, E	D, S	Water reported "irony". Temperature 60° F.
do	7.45 m	Jul. 13, 1950	C, H	F, S	Water reported "irony". Temperature 61° F.
Pleistocene	6.10 m	Jul. 13, 1950	C, H	D, S	Temperature 65° F.
Pocomoke	4.45 m	Aug. 17, 1950	N	T	See log.
do	5.50 m	Aug. 25, 1950	N	T	Do.
Pleistocene	—	—	Ic, E	D,F, S	Water reported "irony".
do	7.93 m	Aug. 16, 1949	C, H	D, S	Temperature 69° F.
do	—	—	Ic, E	D,F, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	14.67 m	Sep. 9, 1949	C, H	D, S	Water reported "irony". Temperature 61° F.
Pleistocene	5.27 m	Sep. 26, 1949	C, H	N	
Manokin	12	Jul. 18, 1946	T, E	I, L	See log. Yield Jul. 18, 1946 reported 40 gpm.
do	12	Jul. 19, 1946	T, E	I, L	See log and chemical analysis. Yield Jul. 19, 1946 reported 40 gpm.
do	5	Sep. 30, 1947	T, E	I, L	See log. Yield Sep. 30, 1947 reported 25 gpm.
do	1.5	Dec. 23, 1946	T, E	I, L	See log. Yield Dec. 23, 1946 reported 15 gpm.
do	5	Sep. 10, 1946	N	D, S	See log. Yield Sep. 10, 1946 reported 10 gpm.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Db 6	Harold Causey	White	1946	5	Jetted	75	2
Db 7	Girl Scouts of Wicomico County	do	1946	8	do	69	2
Db 8	Mrs. H. M. O'Day	—	1917	10	Driven	24	1¼
Db 9	A. V. Williams	—	—	5	do	18	1¼
Db 10	Roy L. Horner	—	1920	15	do	35	1¼
Db 11	Bivalve Volunteer Fire Department	—	1927	10	do	10	1¼
Db 12	L. S. Dickerson	—	1924	5	Jetted	46.0 m	2
Db 13	C. Banks	—	1938	10	Driven	18	1¼
Db 14	Wicomico County Board of Education	—	1937	10	do	11	1¼
Db 15	E. D. Cox	—	1933	6	do	42	1¼
Db 16	L. Larmore	—	1935	10	Driven	8	1¼
Db 17	Do	—	1910	10	do	8	1¼
Db 18	Do	—	1925	10	do	40	1½
Db 19	Do	—	—	10	Jetted	90	1½
Db 20	Do	—	1944	5	Driven	10	1¼
Db 21	Wicomico County Commission	—	—	5	do	17	1¼
Db 22	Jerone Elsey	—	1939	10	do	—	—
Db 23	H. H. Hambury	—	1939	10	do	28	1¼
Db 24	Coop. Ground-Water Program	White	1950	10	Jetted	84	1½
Db 25	L. H. White	do	1950	9	do	88.5	2
Db 26	Lynn Vanderpool	do	1951	8	do	82	1½
Db 27	A. Stengle Messick	Messick	1948	10	Driven	16	1¼
Db 28	Howard Hambury	Hambury	1947	15	do	20	1¼
Db 29	Ernest Larmore	—	1950	10	do	15	1¼
Db 30	Do	—	1952	15	do	7.7 m	1½
Db 31	R. H. Rosenberg	Rosenberg	1932	5	do	14	1¼
Db 32	Alexander Williams	—	1948	12	do	10	1¼
Db 33	Mrs. Jeannette Carroll	—	1946	25	do	14	1¼
Db 34	Will Davis	Davis	1932	20	do	22	1¼
Db 35	Winter Graham	—	1912	15	do	14	1¼
Db 36	Roy W. Taylor	—	1949	10	do	15	1½
Db 37	Elsie Messick	Messick	1949	12	do	14	1¼
Db 38	H. D. Larmore	White	1942	13	Jetted	72	1½
Db 39	Do	Larmore	1950	13	Driven	14	1¼
Db 40	Ralph Tingle	—	1946	20	do	12	1¼
Db 41	S. H. Bauman	Bauman	1950	5	do	8	1¼
Db 42	G. M. Stromberger	—	1885	23	do	16	1¼
Db 43	E. S. White	—	1948	5	do	9	1¼
Db 44	M. R. Henry	Henry	1940	12	do	8.5	1¼
Db 45	Alex Johnson	Johnson	1934	15	do	25	1¼
Db 46	W. A. Meigs	Meigs	1947	15	do	13	1½
Db 47	A. W. Larmar	Robinson	1922	25	Drilled	77	1½
Db 48	Do	—	1750	25	Dug	13.2 m	20

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	5	Sep. 11, 1946	N	D, S	See log.
do	4	May 28, 1947	C, H	P, S	See log. Water reported very "irony". Yield May 28, 1947 reported 30 gpm.
Pleistocene	4	1949	C, W	D, S	
do	3	—	C, H	D, S	Water reported "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported slightly "irony".
Pleistocene	3	—	Ic, E	P, S	Water reported "irony" and sulfurous.
Pleistocene and Pliocene(?)	.71[m]	Sep. 13, 1949	N	N	Water reported very "irony". Original depth reported 110 feet.
Pleistocene	4	—	C, H	D, S	Water reported very "irony".
do	3	—	C, H	P, S	Water reported slightly "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported very "irony". Observed to flow Sep. 14, 1949, 1 gpm at land surface. Flow stops with 2 foot extension.
Pleistocene	4	—	C, H	F, S	Water reported low in iron.
do	3	—	C, H	F, S	Water reported "irony" and sulfurous.
Pleistocene and Pliocene(?)	2	—	C, W	F, S	Water reported very "irony".
Manokin	2	—	C, H	D, S	Do.
Pleistocene	3	—	Ic, E	D, S	Water reported slightly "irony".
do	2	—	C, H	D, S	Do.
—	8	—	C, H	D, S	Do.
Pleistocene	11	—	C, H	D, S	Do.
Manokin	—	—	N	T	See log.
do	5	Nov. 1950	J, E	D, S	See log. Water reported "irony". Yield Nov. 1950 10 gpm.
do	4	Aug. 1951	J, E	D, S	See log. Water reported "irony". Yield Aug. 1951 7 gpm.
Pleistocene	4	Aug. 1948	C, H	D,F, S	
do	—	—	C, H	D, S	
do	—	—	C, H	D, S	
do	4.60[m]	Oct. 16, 1952	C, H	D, S	
do	—	—	R, E	D, S	Water reported slightly sulfurous.
do	—	—	R, E	D, S	
do	—	—	C, H	D,F, S	
do	—	—	C, H	D,F, S	
do	—	—	C, H	D, S	
do	—	—	R, E	D, S	Water reported "irony" and hard.
do	—	—	C, H	D, S	Water reported "irony".
Manokin	—	—	R, E	C, M	Do.
Pleistocene	—	—	R, E	D, S	Do.
do	—	—	R, E	D, S	
do	—	—	R, E	D, S	
do	—	—	R, E	D, S	
do	—	—	R, E	D, S	
do	—	—	C, H	D, S	
do	—	—	C, H	D, S	Water reported "irony".
do	—	—	R, E	D, S	Water reported "irony" and not adequate.
Manokin	2.5	1922	C, H	D, S	Water reported "irony".
Pleistocene	11.55[m]	Oct. 22, 1952	B, H	F, S	

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Db 49	Geo. H. Hubner	—	1937	20	Driven	8	1½
Db 50	Edward Wallace	—	1942	18	do	8	1¼
Db 51	Mr. M. D. Heath	—	1937	10	do	57.5	1½
Db 52	Penny White	—	1927	15	do	14	1¼
Db 53	John L. White	—	1944	15	do	14	1¼
Db 54	Harry W. Davis	—	1937	12	do	15	1¼
Dc 1	Harry Messick	White	1946	7	Jetted	83.5	2
Dc 2	James Wright	do	1946	8	do	97	2
Dc 3	Addison Wilson	do	1946	7	do	103	2
Dc 4	Miss F. Lula Dolby	do	1947	5	do	94	2
Dc 5	(Next door to Dc 3)	—	—	8	—	—	1½
Dc 6	White Haven Colored Parsonage	—	—	10	Dug	10	18
Dc 7	James A. Conway	—	1941	8	Driven	19	1¼
Dc 8	Norman Geddes	—	—	8	do	36.0 m	1¼
Dc 9	Coop. Ground-Water Program	White	1950	5	Jetted	63	1½
Dc 10	G. C. Layfield	—	1939	12	Driven	27	1¼
Dc 11	—	—	—	10	do	29	1¼
Dc 12	Alan Knowles	—	1945	13	do	34	1¼
Dc 13	Fulton Wilson	—	1942	8	do	23	1¼
Dc 14	Store at Clara	—	—	10	do	31	1¼
Dc 15	Elmer Disharoon	—	1938	5	do	30	1¼
Dc 16	Garfield Gale	—	1936	10	do	28	1¼
Dc 17	J. F. Reading	—	1930	5	do	16.0 m	1¼
Dc 18	Richard E. Valentine	White	1951	2	Jetted	111	2
Dc 19	Wicomico County Board of Education	do	1951	6	do	85	2
Dc 20	Consolidated Fisheries	—	1910	1	do	100	1½
Dc 21	Harry Messick	White	1952	6	do	85	1¼
Dc 22	Hubert L. Mezick	Mezick	1932	6	Driven	40	1¼
Dc 23	S. W. Dolby & Sons	White	1942	4	Jetted	110	1½
Dc 24	Ray Robertson	do	1922	5	do	125	1½
Dc 25	C. T. Underwood	do	1947	4	do	120	1½
Dc 26	Vance Dolby	do	1952	5	do	105	2
Dc 27	Consolidated Fisheries	—	1907	2	do	95	1¼
Dc 28	Do	—	1907	2	do	91	1¼
Dd 1	Levin Cooper	White	1947	10	do	114	2
Dd 2	Coop. Ground-Water Program	do	1950	20	do	75.0 m	1½

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D,F, S	Water reported "irony"
do	—	—	C, H	D, S	Water reported slightly "irony".
Manokin	—	—	C, H	D, S	Water reported "irony".
Pleistocene	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	C, H	D,F, S	Water reported "irony" and brackish.
do	—	—	C, H	D,F, S	Water reported "irony".
Manokin	2	Jun. 5, 1946	C, H	D, S	See log. Yield reported Jun. 5, 1946 40 gpm
do	2	Jun. 10, 1946	C, H	D, S	See log. Yield reported Jun. 10, 1946 40 gpm.
do	2	Jun. 8, 1946	C, H	D, S	See log. Yield reported Jun. 8, 1946 40 gpm
do	0	Jun. 14, 1947	N	D, S	See log. Water reported very "irony". Yield reported Jun. 14, 1947 15 gpm.
Pleistocene(?)	0.30 m	Aug. 4, 1949	C, H	N	
Pleistocene	3.95 m	Aug. 4, 1949	N	N	
do	3	—	C, H	D, S	Water reported slightly "irony".
do	6.27 m	Sep. 14, 1949	N	N	
Manokin	—	—	N	T	See log. Observed to flow June 30, 1950 1 gpm
Pleistocene	8	—	Ic, E	D, S	Water reported slightly "irony".
do	3	—	C, H	D, S	Do.
do	10	—	C, H	D, S	Do.
do	7	—	C, H	D,C, S	Do.
do	10	—	C, H	D,C, S	Do.
do	11	—	C, H	D, S	Water reported very "irony".
do	12	—	C, H	D, S	Water reported slightly "irony".
do	7.40 m	Jun. 12, 1950	C, H	D	Temperature 62° F.
Manokin	—	—	J, E	D,F, S	See log. Water reported very "irony" and sulfurous. Reported to flow Nov. 1951 2 gpm.
do	—	—	C, H	P, S	See log.
do	—	—	R, E	I, L	Water reported slightly "irony".
do	—	—	R, E	D, S	Water reported soft and not "irony".
Pleistocene and Pliocene(?)	—	—	C, H	D, S	Water reported very "irony".
Manokin	—	—	R, S	I, L	Canning factory in operation 3 months of year. One of 3 similar wells.
do	—	—	R, E	D,F, S	Water reported slightly "irony".
do	—	—	R, E	D, S	Do.
do	—	—	N	D, S	See log. Water level reported 1 ft. above land surface Sep. 1952.
do	—	—	N	N	Flowing Oct. 23, 1952. Formerly flowed 4 gpm with head 5 ft. above land surface. See Md. Geol. Survey, vol. 10, p. 322, well 29. Water reported hard and "irony".
do	—	—	N	N	Filled and abandoned. See Md. Geol. Survey, vol. 10, p. 322, well 30. Formerly flowed 2 gpm with head 5 ft. above land surface. Water reported hard and "irony".
do	8	Dec. 18, 1947	—	D, S	See log. Water reported very "irony". Yield Dec. 1947 reported 12 gpm.
do	—	—	N	T	See log. Water reported "irony". Yield Jun. 28, 1950 measured 16 gpm.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Dd 3	J. W. Chatham	—	—	15	Driven	23.9 m	1¼
Dd 4	C. J. Bryan	White	1949	10	Jetted	110	3–2
Dd 5	—	—	—	18	Driven	9.5 m	1¼
Dd 6	J. Shrivers	—	—	15	do	19.4 m	1¼
Dd 7	Angers	—	—	5	do	11.0 m	1¼
Dd 8	Mildred W. Gillis	—	—	20	do	16.5 m	1¼
Dd 9	Hurley Windsor	—	—	20	do	42.4 m	1¼
Dd 10	Herbert Elzey	Humphreys	1949	20	do	26.0 m	1¼
Dd 11	A. F. Malone	Malone	1946	25	do	27	1¼
Dd 12	Clinton Dutton	Dutton	1943	22	do	13.5 m	1¼
Dd 13	Amos Cox	Cox	1948	20	do	13.7 m	1¼
Dd 14	Clifford Fields	Humphreys	—	28	do	22.2 m	1¼
Dd 15	Fulton Allen	Pentz	1950	10	Jetted	55	6
Dd 16	Wilson Shivers	White	1952	15	do	128	2
Dd 17	Jay H. Shivers	do	1952	15	do	129	2
Dd 18	W. C. Carey	do	1952	25	do	138	2
Dd 19	Mac B. Jenkins	do	1951	25	do	146	2
De 1	John H. Dulany & Son	Sydnor Pump & Well Co.	1942	39	Drilled	210	10
De 2	Do	do	1947	39	do	231	10
De 3-4	Do	Pentz	1937	39	Jetted	55	4
De 5	Do	do	1938	39	do	55	4
De 6	Do	do	—	39	do	55	4
De 7	Do	do	1947	39	do	62	4
De 8	Do	do	1947	39	do	58	4
De 9–11	Do	do	—	39	do	55	4
De 12	V. Glasgow	—	—	38	Driven	29	1¼
De 13	George W. Bowers	White	1947	42	Jetted	126	3–2
De 14	Do	do	—	42	do	118	2
De 15	W. H. Jackson	Humphreys	1936	30	Driven	60	2
De 16	—	—	—	30	do	13.5 m	1¼
De 17	J. W. Pryor	Pryor	—	25	do	7.0 m	1¼
De 18	Temple Hill Cottages	White	1947	40	Jetted	69	2
De 19	Benjamin P. Quillin	Todd	1945	37	do	170	1½

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	2.05 m	Dec. 8, 1949	C, H	N	
Manokin	—	—	R, A	D,F, M	See log. Flow measured Sep. 28, 1949, 3 gpm. Head 2 ft. above land surface.
Pleistocene	3.4 m	Jun. 12, 1950	C, H	D,F, S	Temperature 63° F.
do	8.9 m	Jun. 12, 1950	C, H	N	Temperature 61° F.
do	6.5 m	Jun. 12, 1950	C, H	N	Temperature 62° F.
do	1.65 m	Jul. 10, 1950	C, H	N	Temperature 63° F. Water reported not "irony".
Pleistocene and Pliocene(?)	6.74 m	Jul. 10, 1950	C, H	D, S	Water reported "irony". Temperature 60° F.
do	2.77 m	Jul. 10, 1950	R, E	D, S	Water reported "irony". Temperature 65° F.
do	16	Jul. 10, 1950	C,R, E	D, S	Water reported "irony".
Pleistocene	1.65 m	Jul. 10, 1950	C, H	D, S	Water reported "irony". Temperature 65° F.
do	2.22 m	Jul. 10, 1950	C, H	F, S	Water reported not "irony". Temperature 63° F.
do	4.72 m	Jul. 10, 1950	C, H	N	Hydrogen sulfide odor. Temperature 65° F.
Pleistocene and Pliocene(?)	12	Oct. 2, 1950	Ic, E	Ir, L	See log. Water reported not "irony". Used to spray orchard. Yield reported Oct. 2, 1950 50 gpm with 4 ft. drawdown after 2 hours.
Manokin	—	—	R, E	D,F, M	See log. Water reported high in soda, "irony". Yield reported May 1952, 14 gpm.
do	2	Jun. 1952	R, E	D,F, M	See log. Water reported soft and not "irony". Yield reported Jun. 1952, 15 gpm.
do	3	Nov. 1952	R, E	D, S	See log. Water reported slightly "irony". Yield reported Nov. 1952, 10 gpm. Temperature at tank 60° F.
do	2	Dec. 1951	J, E	D,C, S	See log. Water reported very "irony". Yield reported Dec. 1951, 10 gpm. Temperature 60°F.
Manokin	—	—	T, E	I, L	Water reported 6 p.p.m. iron.
do	18	Apr. 25, 1947	T, E	I, L	See log. Water reported 6 p.p.m. iron. Yield reported Jan. 10, 1951, 250 gpm. Drawdown 99 ft. pumping 400 gpm 33 hours, 1947.
Pleistocene and Pliocene(?)	—	—	Ic, S	I, L	See chemical analysis. Yield of two wells reported Nov. 23, 1953 20 gpm.
do	—	—	N	N	In boiler room, may be measured.
do	—	—	N	N	Well partially filled.
do	12.30 m	Jul. 30, 1947	N	N	See log. Specific capacity 6.9 gpm/ft.
do	12.16 m	Jul. 30, 1947	N	N	
do	—	—	N	N	Wells pumped sand and were abandoned.
do	10.53 m	Sep. 25, 1947	C, H	N	
Yorktown and Cohansey(?)	10.50 m	Oct. 17, 1947	C, H	D,C, S	See log. Water reported very "irony".
do	—	—	R, E	D,C, M	Do.
Pleistocene and Pliocene(?)	—	—	R, E	D, S	Water reported "irony".
do	4.19 m	Jul. 13, 1948	C, H	N	
do	3.60 m	Jul. 13, 1948	C, H	N	Water reported very "irony".
do	—	—	R, E	P, M	See log and chemical analysis.
Manokin	16	1945	R, E	D,F, M	Water reported "irony". Yield estimated in 1948 15 gpm.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
De 20	Benjamin B. Quillin	Todd	1945	37	Jetted	175	1½
De 21	Do	do	1945	35	do	175	1½
De 22	Do	do	1945	35	do	190	2
De 23	W. Levin	—	1947	45	Driven	25	1¼
De 24	A. C. Ball	—	1945	45	do	38	1¼
De 25	Mrs. Hoppe	—	1949	47	do	35.8 m	1¼
De 26	A. Johnson	—	1939	45	do	27.6 m	1¼
De 27	Mary King	—	1944	35	do	33.1 m	1¼
De 28	H. Elliott	—	1945	30	do	12	1¼
De 29	Do	—	1949	30	do	45	1¼
De 30	John H. Dulany & Son	Shannahan Artesian Well Co.	1949	35	Jetted	255	10
De 31	Do	do	1949	35	do	62	10
De 32	H. A. Kambarn	Cusick	1951	35	do	219	2½–1½
De 33	Do	White	1951	35	do	69	2
De 34	Geo. W. Bowers	do	1949	40	do	72	3–2
De 35	R. Louis Nichols	Cusick	1952	30	do	211	2½
De 36	Lonnie McCall	—	1952	32	Driven	21	1½
De 37	James W. Tingle	Owens	1950	40	do	60	1¼
De 38	Smittys Esso Station	—	1947	35	do	30	1½
De 39	Mrs. Spitznagle	—	1951	43	do	30	1½
De 40	John Pryor	Pryor	1945	23	do	12	1¼
De 41	Otis Pruitt	—	1952	35	do	58	1½
De 42	Walter White	White	1925	40	do	45	1¼
De 43	Dr. W. B. Long	Scott	1953	20	Jetted	72	2
Df 1	Mr. Johnson	—	1942	45	Driven	44	1¼
Df 2	Do	—	1933	43	do	18	1¼
Df 3	Taylor Oil Co.	—	—	53	do	32.7 m	1¼
Df 4	Nassawango Church	—	1920	53	do	29.9 m	1¼
Df 5	I. W. Ware	Shockley	1946	48	do	37	1¼
Df 6	Unknown	—	—	60	do	58.2 m	1¼
Df 7	Jay Farlowe	—	1944	45	do	46	1¼
Df 8	L. Dykes	—	1943	45	do	47.5 m	1¼
Df 9	H. Ruark	Humphries	—	45	do	46.7 m	1¼
Df 10	O. Tilghman	—	1919	45	do	44.3 m	1¼
Df 11	R. Mathews	—	1927	50	do	45.8 m	2
Df 12	Unknown	—	—	45	do	39.7 m	1¼
Df 13	L. Causey	—	1937(?)	58	do	51.5 m	1¼

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	14	1945	R, E	D,F, M	Water reported "irony".
do	14	1945	R, E	D,F, M	Do.
do	11	1945	R, E	D,F, M	Do.
Pleistocene	—	—	R, E	D, S	
Pleistocene and Pliocene(?)	—	—	R, E	D, S	
do	9.60[m]	Oct. 5, 1949	N?	N?	Water reported "irony". Temperature 60° F.
Pleistocene	12.80[m]	Oct. 10, 1949	C, H	D, S	Water reported good. Temperature 62° F.
do	14.70[m]	Oct. 11, 1949	C, H	D,F, S	Water reported slightly "irony". Temperature 62° F.
do	3	—	Ic, E	F, S	
Pleistocene and Pliocene(?)	3	—	C, H	D, S	Water reported very "irony". Hydrogen sulfide odor.
Manokin	39	Aug. 20, 1949	T, E	I, L	See log and chemical analysis. Drawdown 46 feet after pumping 350 gpm 24 hours.
Pleistocene and Pliocene(?)	12	Aug. 4, 1949	T, E	I, L	See log. Yield reported 200 gpm. Drawdown 26 feet in 24 hours.
Manokin	24	Aug. 16, 1951	J, E	D, M	See log. Water reported slightly "irony". Yield reported 30 gpm for 3 hours with drawdown of 2 feet.
Pleistocene and Pliocene(?)	9	Mar. 1951	N	N	See log. Well abandoned. Reported too "irony".
do	—	—	J, E	C, M	
Manokin	16	Jul. 19, 1952	J, E	D, S	See log.
Pleistocene	4.5	Oct. 7, 1952	C, H	D, S	Water reported good.
Pleistocene and Pliocene(?)	4.5	Feb. 1950	R, E	C, M	Do.
do	—	—	R, E	C, M	Do.
do	—	—	R, E	D, S	Do.
Pleistocene	—	—	R, E	D,F, M	Water reported very "irony".
Pleistocene and Pliocene(?)	—	—	J, E	D, S	Water reported good.
do	—	—	R, E	D,F, S	Do.
do	7	Feb. 26, 1953	J, E	D, S	Water reported good. Drawdown 6 feet after pumping 15 gpm 8 hours.
Pleistocene	—	—	R, E	D,F, M	Water reported slightly "irony" and hard.
do	—	—	C, H	D, S	Water reported good.
do	7.50[m]	Sep. 25, 1947	C, H	D, S	Water reported "irony". Temperature 62° F.
	12.80[m]	Oct. 5, 1949	C, H	D, S	Do.
do	12.20[m]	Sep. 25, 1947	C, H	D, S	Water reported slightly "irony". Temperature 61° F.
	12.20[m]	Oct. 5, 1949	C, H	D, S	Do.
do	16	1947	R, E	D, S	
do	14.80[m]	Sep. 25, 1947	C, H	Ir, S	Temperature 60° F.
	14.10[m]	Oct. 5, 1949	C, H	Ir, S	Do.
do	15	1947	R, E	D,F, M	
do	11.50[m]	Oct. 6, 1949	C, H	D,F, S	Water reported good. Temperature 60° F.
do	12.70[m]	Oct. 6, 1949	C, W	D,F, S	Water reported "irony". Temperature 60° F.
do	12.80[m]	Oct. 7, 1949	C, H	F, S	Temperature 62° F.
do	10.90[m]	Oct. 7, 1949	C, H	D, S	Do.
do	12.50[m]	Oct. 10, 1949	C, H	F, S	Water reported "irony". Temperature 60° F
do	15.00[m]	Oct. 10, 1949	N	N	Do.

TABLE 39

Well Number (Wi-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Df 14	Mrs. J. Jones	—	1929	50	Driven	55.3^{m}	1¼
Df 15	C. S. Gassaway	—	—	50	do	35.8^{m}	1¼
Df 16	D. Gravenor	—	1932	48	do	51.6^{m}	1¼
Df 17	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	41.5	do	23	1
Df 18	Do	do	1950	46.1	do	28.3^{m}	1
Df 19	Do	do	1950	47.7	do	17.8^{m}	1
Df 20	Do	do	1950	55.3	do	27.3^{m}	1
Df 21	Do	do	1950	48.4	do	23.0^{m}	1
Df 22	Do	do	1950	47.7	do	17.8^{m}	1
Df 23	Do	do	1950	45.4	do	21.8^{m}	1
Df 24	Do	do	1950	46.8	do	26.3^{m}	1
Df 25	Do	White	1950	40	Jetted	104.0^{m}	1½
Df 26	Oliver Ruark	do	1951	45	do	81	2
Df 27	Maurice Holloway	do	1951	45	do	77	2
Df 28	Jay Farlow	do	1951	42	do	71.0^{m}	2
Df 29	Coop. Ground-Water Program	Coop. Ground-Water Program	1950	48	Driven	20.7^{m}	1
Df 30	Do	do	1952	44.7	Power Auger	28.5^{m}	3
Df 31	Do	do	1952	46.7	do	33.0^{m}	3
Df 32	Do	do	1952	47.7	do	30.0^{m}	3
Df 33	Do	do	1952	52.8	do	24.0^{m}	3
Df 34	Do	do	1952	56.0	do	39.0^{m}	3
Df 35	Do	do	1952	54.4	do	39.0^{m}	3
Df 36	Do	do	1952	48.8	do	29.0^{m}	3
Df 37	Do	do	1952	49.2	do	29.0^{m}	3
Df 38	Do	do	1952	44.6	do	28.5^{m}	3
Df 39	Do	do	1952	43.4	do	28.0^{m}	3
Df 40	Do	do	1952	48.2	do	29.0^{m}	3
Df 41	Do	do	1952	58.1	do	29.0^{m}	3
Df 42	Do	do	1952	52.7	do	29.0^{m}	3
Df 43	Do	do	1952	49.2	do	28.0^{m}	3
Df 44	Do	do	1952	44.9	do	29.0^{m}	3
Df 45	Do	do	1952	44.5	do	29.0^{m}	3
Df 46	Do	do	1952	44.9	do	29.0^{m}	3
Df 47	Do	do	1952	47.5	do	55.5^{m}	3
Df 48	Do	do	1952	41.4	do	28.5^{m}	3
Dg 1	C. R. Parker	Parker	1900	50	Dug	8.9^{m}	48
Dg 2	E. Wilgus	Morris	1948	48	Driven	11.4^{m}	1¼
Dg 3	Mrs. V. Lawes	—	—	42	do	32.7^{m}	1¼
Dg 4	Mrs. Davenport	—	1947	45	do	52	1½
Dg 5	State of Maryland Department of Forests & Parks	—	—	43	Dug	7.7^{m}	36
Dg 6	Homer Laws	—	1930	43	Driven	53.8^{m}	1¼
Dg 7	C. H. Pruitt	—	1944	50	do	41.1^{m}	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	14.00[m]	Oct. 11, 1949	N	F, S	Water reported good. Temperature 60° F.
do	13.10[m]	Oct. 11, 1949	N	N	Do.
do	10.00[m]	Oct. 12, 1949	C, H	D, S	Do.
do	11.05[m]	Apr. 7, 1950	N	O	See log.
do	7.90[m]	Apr. 7, 1950	N	O	See log. Yield on Apr. 17, 1950 measured 0.5 gpm.
do	3.90[m]	Apr. 7, 1950	N	O	See log. Yield on Apr. 17, 1950 measured 0.4 gpm.
do	7.80[m]	Apr. 7, 1950	N	O	See log.
do	1.00[m]	Apr. 7, 1950	N	O	Do.
do	.50[m]	Apr. 7, 1950	N	O	Do.
do	9.70[m]	Apr. 7, 1950	N	O	Do.
do	3.50[m]	Apr. 7, 1950	N	O	Do.
Yorktown and Cohansey(?)	6.19[m]	Sep. 15, 1950	N	T	See log and chemical analysis. Yield on Sep. 15, 1950 measured 10 gpm.
do	7	Oct. 1951	C, H	D, S	See log. Water reported good.
Pleistocene and Pliocene(?)	7	Nov. 1951	R, E	D, S	Do.
do	13.00[m]	Jun. 20, 1953	R, E	D,F, M	See log. Water reported "irony". Taste bad. Temperature 57° F.
Pleistocene	5.72[m]	Jan. 13, 1950	N	O	See log.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	—	—	N	T	Do.
do	6.8[m]	May 12, 1952	N	T	Do.
do	—	—	N	T	Do.
do	5.6[m]	Sep. 8, 1949	Ic, E	D, S	Water reported good. Temperature 67° F
do	6.8[m]	Sep. 8, 1949	C, H	D,F, S	Water reported good. Temperature 65° F.
do	6.1[m]	Sep. 8, 1949	C, H	D,F, S	Temperature 65° F.
Pleistocene and Pliocene(?)	13	—	R, E	D, S	
Pleistocene	3.14[m]	Sep. 9, 1949	N	P, S	Used for fire fighting. Temperature 65° F.
Pleistocene and Pliocene(?)	23.8[m]	Sep. 9, 1949	C, H	D,F, S	Water reported "irony".
do	7.6[m]	Oct. 11, 1949	C, H	D,F, S	Water reported good. Temperature 61° F.

TABLE 39

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Dg 8	State of Maryland Department of Forests and Parks	—	1946	50	Driven	48.1 m	1¼
Dg 9	N. Jones	—	—	45	do	56.1 m	1¼
Dg 10	R. Hales	—	1944	45	do	60.8 m	1¼
Dg 11	Armour-Ches-Peake	Shannahan Artesian Well Co.	1950	45	Jetted	82	12–8
Dg 12	Do	do	1950	45	do	82	12–8
Dh 1	R. Vinal	Morris	1948	50	Driven	30	1¼
Dh 2	L. Timmons	McGee-Morris	1943	60	do	68.0 m	1¼
Dh 3	Williams	Morris	1946	32	do	32.02 m	1¼
Dh 4	Charles Coulbourne	Baker	1940	30	do	59.3 m	1¼
Dh 5	C. S. Purdue	—	1850	30	Dug	11.9 m	24
Dh 6	M. W. Owens	Owens	1949	30	Driven	11.8 m	1¼
Dh 7	John Powell	Morris	1947	42	do	50.7 m	1¼
Dh 8	P. Wilkins	do	1945	40	do	56.8 m	1¼
Dh 9	F. Kelly	Holloway	1948	38	do	24.2 m	1¼
Dh 10	J. E. Rayne	—	1849	25	Dug	9.0 m	18–24
Dh 11	C. Timmons	—	1937	38	Driven	48.2 m	1¼
Dh 12	Coop. Ground-Water Program	White	1950	38	Jetted	104	1½
Dh 13	O. B. Holland	Scott	1951	35	do	168	3–2
Eb 1	W. P. Young	—	—	10	Driven	110	1¼
Eb 2	Mr. Shockley	—	1937	10	do	18	1¼
Eb 3	Eldridge Dunn	Dunn	1951	10	do	14	1¼

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?)	10.9 m	Oct. 12, 1949	C, H	F, S	Water reported "milky".
do	6.70 m	Oct. 11, 1949	C, H	N	Temperature 61° F.
do	5.90 m	Oct. 12, 1949	C, H	D, S	Water reported good. Temperature 61° F.
do	11	Dec. 9, 1950	T, E	I, L	See log. Yield reported Dec. 9, 1950, 100 gpm for 8 hours with 5 feet drawdown. Temperature 57° F.
do	12.5	Dec. 9, 1950	T, E	I, L	See log. Pumping level reported 40 feet, Jun. 19, 1953. Water reported "irony".
Pleistocene	4.5	Aug. 29, 1949	Ic, E	D, S	Yield reported Aug. 29, 1949, 9 gpm. Water reported good.
Pleistocene and Pliocene(?)	27.70 m	Aug. 29, 1949	C, H	F, S	Water reported "irony". Temperature 57° F.
do	9.30 m	Aug. 30, 1949	C, H	N	See chemical analysis. Temperature 63° F.
do	11.47 m	Aug. 30, 1949	C, H	D, S	Water "irony". Temperature 65° F.
Pleistocene	10.60 m	Aug. 30, 1949	B, H	D, S	Temperature 65° F.
do	5.75 m	Aug. 30, 1949	N	D, S	Water reported "irony". Temperature 66° F
Pleistocene and Pliocene(?)	13.30 m	Aug. 30, 1949	C, H	D, S	Water reported good. Temperature 59° F.
do	13.70 m	Sep. 8, 1949	R, G	D,F, M	Water reported good. Temperature 62° F.
Pleistocene	6.3 m	Sep. 9, 1949	C, H	D, S	Water reported good.
do	7.8 m	Sep. 9, 1949	B, H	D, S	Unfit for drinking. Temperature 64° F.
Pleistocene and Pliocene(?)	10.6 m	Sep. 9, 1949	C, H	D, S	Water reported good. Temperature 58° F.
Yorktown and Cohansey(?)	11.02 m	Sep. 12, 1950	N	T	See log.
Pocomoke	8	Oct 24, 1951	R, E	D, S	See log. Drawdown 6 ft. after pumping 4 hours at 13 gpm. Oct. 24, 1951. Water became "irony" in 2 weeks.
Manokin	2	—	C, W	D,C, S	Water reported very "irony".
Pleistocene	3	Sep. 12, 1949	C, H	D, S	Do.
do	—	—	C, H	D, S	Water reported not "irony".

TAB

Records of Wells in

The Manokin aquifer is basal and the Pocomoke aquifer upper Yorktown and Cohansey formations (?); aquifers de
Static water level: Measured depths are designated by "m".
Pumping equipment: *Method of lift:* A, air lift; B, bucket; C, cylinder-lift (includes pitcher pumps); J, jet; Ic,
Type of power: E, electric; G, gasoline; H, hand; S, steam; W, windmill.
Use of water: *Type:* C, commercial; D, domestic; F, farming; I, industry; Ir, irrigation; N not used; O, observa
Rate: S, up to 500 gpd; M, 500 to 5,000 gpd; L, over 5,000 gpd.

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ae 1	Mitchell Murray	Baker	1940	40	Driven	28	1¼
Ae 2	H. W. Carey	Daisey	1950	42	do	58	1¼
Ae 3	Reese Bratten	Baker	1930(?)	36	do	65	1¼
Ae 4	Do	—	—	36	Dug	11.5^{m}	30
Ae 5	Roddie Tull	Magee	1946	36	Driven	15	1¼
Ae 6	Horace Littleton	Baker	1951	40	do	14	1¼
Ae 7	E. Jones	Tull	—	40	do	17	1¼
Ae 8	Do	—	—	40	do	40	1¼
Ae 9	Harry Carey	Magee	1944	45	do	63	1¼
Ae 10	Do	do	1951	45	do	20	1½
Ae 11	Ronald Hudson	—	—	40	do	10.5^{m}	1½
Ae 12	Leon Gray	Baker	1952	40	do	16	1½
Ae 13	Do	do	1952	40	do	15.0^{m}	1½
Ae 14	Clarence Smith	—	—	40	do	19.2^{m}	1¼
Ae 15	L. J. Mahoney	—	—	42	do	17.1^{m}	1¼
Af 1	Daniel R. Hudson	Baker	1931	44	do	22	1¼
Af 2	V. M. Long	—	1940(?)	44	Jetted	95	3
Af 3	Richard Baks	—	1947	24	Driven	12	1¼
Af 4	Morris Hatchery	Pentz	1949	27	Jetted	110	6
Af 5	Do	Shannahan Artesian Well Co.	1943	27	do	379	8–3
Af 6	Do	Pentz	1945	27	do	105	6
Af 7	R. Beechum	Magee	1947	25	Driven	12	1¼
Af 8	do	do	—	30	do	22	1¼
Af 9	John Sturgent	—	—	46	Dug	12.0^{m}	30
Af 10	E. L. Selby	Magee	1936	12	Driven	85	1¼
Af 11	Norman L. Hall	—	—	38	Dug	11.7^{m}	20
Af 12	Orlando Hall	Baker	1948	30	Driven	22	1¼
Af 13	Raymond Hall	—	—	38	do	16.4^{m}	1¼
Af 14	Handy Latchum	—	—	14	Dug	10.7^{m}	18
Af 15	Chas. Niblett	Magee	1937	22	Driven	10.9^{m}	1¼
Af 16	Do	do	1940	22	do	11	1¼
Af 17	W. M. Showell	Showell	1949	20	do	12.5^{m}	1½
Af 18	Katie Rickards	Selby	1951	20	Dug	10.1^{m}	24
Ag 1	Harry Hemphill	Hammond	1950	10	Driven	75	1¼

LE 40

Worcester County

signated Yorktown and Cohansey (?) are stringer sands not correlated with the Manokin or Pocomoke aquifers.

impeller centrifugal; T, impeller turbine; N, none; R, reciprocating.

tion; P, public supply or school; T, test hole.

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported "irony" and hard. Tastes poor.
do	—	—	C, H	D, S	Water reported hard.
do	1.50 m	Jan. 21, 1952	B, H	F, S	Water reported soft.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	D, S	Do.
do	—	—	R, E	F, M	Water reported hard.
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, G	F, M	Do.
do	1.13 m	Apr. 22, 1952	C, H	F, S	
do	—	—	C, H	D, S	Water reported at 14 feet, tasted and smelled like rotten eggs. Drove 2 feet deeper through soft material—good water.
do	2.80 m	Apr. 22, 1952	C, H	F, S	
do	4.02 m	Apr. 22, 1952	C, H	D,F, S	Water reported slightly "irony".
do	4.93 m	Apr. 22, 1952	C, H	D,F, S	Do.
do	—	—	R, E	D,F, M	Water reported "irony". Abandoned well driven to 65 feet. No water below 30 feet.
do	28	1940	R, E	D,F, M	Water reported "irony".
do	—	—	R, E	D,F, M	Water reported "irony" and hard.
do	—	—	T, E	I, L	See log and chemical analysis.
Manokin(?)	15.09 m	Nov. 4, 1952	N	N	See log. More iron than 110-ft. well. Pumped salt water from 641 foot depth. Reported specific capacity 4 gpm per foot of draw-down.
Pleistocene	—	—	N	N	Water reported "irony".
do	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	R, E	F, M	Do.
do	2.40 m	Dec. 4, 1951	B, H	D, S	
do	4	1949	R, E	D,F, M	Water reported "irony".
do	4.30 m	Apr. 22, 1952	R, E	D,F, M	
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	3.53 m	Apr. 22, 1952	C, H	D, S	Do.
do	4.44 m	Apr. 23, 1952	B, H	D, S	Water reported soft.
do	2.58 m	Apr. 22, 1952	C, H	N	
do	—	—	R, E	D,F, M	
do	3.03 m	Apr. 22, 1952	C, H	D,F, M	Water reported soft.
do	5.12 m	Apr. 23, 1952	R, E	D, S	Had 3 wells driven (20, 40 and 50 ft). Abandoned because water had marshy odor, bad taste and was very "irony".
do	—	—	R, E	D, S	Water reported "irony". No water from 14 to 75 feet.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ag 2	Elbert Esham	Magee	1944	22	Driven	96	1¼
Ag 3	Do	do	1944	22	do	85	1¼
Ag 4	Herman Hudson	Hudson	1943	19	do	30.1[m]	1¼
Ag 5	Frank J. Wells	Baker	1945	10	do	15.0[m]	1¼
Ag 6	Do	Steele	1930	10	do	11–12	1¼
Ag 7	Lena Bunting	Bunting	1907	15	Dug	9.4[m]	18
Ag 8	Virginia Clogg	Godfrey	1917	20	do	11.5[m]	22
Ah 1	Donald Scott	—	1949	10	Driven	20	1¼
Ah 2	John Taylor	Taylor	—	8	do	7.9[m]	1¼
Ah 3	Ed Hastings	Hammond Bros.	1950	10	do	72	1½
Ah 4	Wm. M. Johnson	Magee	1952	11	do	35	1¼
Be 1	C. D. Nock	—	—	39	Dug	16.5[m]	26
Be 2	Do	Magee	1946	39	Driven	97	1¼
Be 3	A. H. Williams	do	1945	45	do	15	1¼
Be 4	Do	do	1941	45	do	40	1¼
Be 5	John H. Lewis	—	1850	40	Dug	14.7[m]	30
Be 6	Do	—	1938	40	do	13.9[m]	26
Be 7	Emily Lloyd Watts	Baker	1940	29	Driven	35	1½
Be 8	Do	Hammond Bros.	1949	29	do	35	2
Be 9	Clinton Hudson	Magee	1949	39	do	19–20	1½
Be 10	Harry B. Davis	do	1949	36	do	35–40	1¼
Be 11	Ben Jackson	Jackson	1949	36	do	18–20	1¼
Be 12	Edward Baker	Baker	1951	36	do	22	1¼
Be 13	Crawford Howland	do	1949	39	do	10	1¼
Be 14	Do	do	1949	39	do	10	1¼
Be 15	Maude Whaley	—	—	35	Dug	9.8[m]	24
Be 16	Beulah Lewis	—	1951	30	Driven	11.9[m]	1½
Be 17	Roddie Tull	—	—	35	Dug	9.2[m]	24
Be 18	Collins Elliott	Baker	1952	36	Driven	21.9[m]	1½
Be 19	Vaughn Richardson	—	—	27	do	28.3[m]	1½
Be 20	Harold Holloway	Hammond	1951	30	do	85	1½
Be 21	Do	—	—	30	do	13.4[m]	1¼
Be 22	Coop. Ground Water Program	Baldwin	1953	39	Jetted	126	4
Bf 1	Acme Poultry Co.	Pentz	1945	30	Jetted	98	6
Bf 2	Do	do	1950	30	do	110	8
Bf 3	Do	do	1951	35	do	105	8–6
Bf 4	E. Tingle	Magee	1948	16	Driven	28	1¼
Bf 5	Magee Tydol Gas	do	1950	20	do	85	1¼
Bf 6	George Mitchell	do	1950	20	do	60	1½
Bf 7	R. Beechem	do	1950	16	do	61	1¼
Bf 8	C. D. Gumm	Paul White	1951	21	do	105	4
Bf 9	Do	Magee	1920	21	do	50	1½

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D, S	Water reported slightly "irony".
do	—	—	R, E	F, M	Do.
do	4.00 m	Apr. 23, 1952	C, H	F, M	Good water. Has electric pump to well driven just outside house to same depth, reported to yield water "ironier and harder".
do	3.49 m	Apr. 23, 1952	C, H	N	Used for emergency.
do	—	—	R, E	D,F, M	Water reported soft.
do	4.33 m	Apr. 23, 1952	B, H	D,F, S	Do.
do	6.17 m	Apr. 23, 1952	B, H	D,F, S	Do.
do	—	—	R, E	D, S	Good water at 15 feet, but inadequate. Has marshy odor after 2 months use.
do	5.22 m	May 24, 1952	C, H	D, S	See chemical analysis.
do	—	—	R, E	P,S, M	See chemical analysis. Salty water from 6 to 28 feet.
do	—	—	R, E	D,F, M	Water reported soft.
do	6.55 m	Dec, 6, 1951	R, E	D, S	Water reported slightly "irony".
do	11.76 m	Dec. 6, 1951	N	N	Water reported very "irony", well abandoned.
do	—	—	C, H	D, S	Water reported slightly "irony".
do	12	—	R, E	F, M	Water reported very "irony".
do	3.94 m	Jan. 3, 1951	B, H	D, S	Water reported unfit for drinking and hard.
do	4.50 m	Jan. 3, 1951	R, E	D, S	Well reported to be dry at times.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	F, M	Water reported "irony" and hard.
do	—	—	R, E	D,F, M	
do	—	—	R, E	D,F, M	Water reported odorous, "irony" and hard.
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	F, M	Do.
do	2.06 m	May 5, 1952	B, H	D, S	Water reported hard.
do	0.65 m	May 5, 1952	C, H	D, S	See chemical analysis.
do	4.37 m	May 5, 1952	R, E	D,F, M	Water reported hard.
do	3.74 m	May 5, 1952	C, H	D, S	Water reported poor quality, very "irony".
do	3.13 m	May 5, 1952	C, H	F, S	Water reported soft.
do	—	—	J, E	D,F, M	Water reported slightly "irony".
do	3.78 m	May 5, 1952	C, H	N	Water reported "irony" and hard.
do	—	—	N	T	See log.
do	13.6	Sep. 1945	T, E	I, L	See log. Water reported slightly "irony".
do	12	Jun. 20, 1950	T, E	I, L	See log. Yield reported Aug. 12, 1950, 200 gpm for 2 hours with 43 feet drawdown.
do	10	Oct. 1951	T, E	I, L	See log. Yield reported Oct. 15, 1951, 180 gpm for 10 hours with 20 feet drawdown.
do	—	—	R, E	D,F, M	
do	—	—	Ic, E	C, L	
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	8.96 m	Dec. 3, 1951	R, E	D,F, M	Do.
do	10	Feb. 1951	R, G	D,F, M	See log. Yield reported Feb. 24, 1951, 85 gpm for 4 hours with 15 feet drawdown.
do	12	Dec. 3, 1951	R, E	D,F, M	Water reported slightly "irony".

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bf 10	Showell Mfg. Co.	Paul White	1950	24	Jetted	100	4
Bf 11	Showell Poultry, Inc.	Pentz	1947	24	do	110	6
Bf 12	Frank Widic	Magee	1942	36	Driven	100	1¼
Bf 13	Q. Bowen	do	—	35	do	50	1½
Bf 14	J. Worth	—	—	37	do	—	1¼
Bf 15	E. Williams	Magee	—	25	do	35	1¼
Bf 16	John Bishop	—	—	20	Dug	14.1[m]	20
Bf 17	Do	Baker	1939	20	Driven	75	1¼
Bf 18	Catherine Holland	—	—	30	Dug	15.7[m]	22
Bf 19	Roland W. Beacham	Magee	1950	20	Driven	53[m]	1¼
Bf 20	B. Hanley	do	—	35	do	15–20	1
Bf 21	Irving Lynch	—	—	28	do	34.3[m]	1¼
Bf 22	May Purdue	—	—	25	do	23.9[m]	1¼
Bf 23	Forester Showell	—	—	20	do	28.5[m]	1¼
Bf 24	Anna Burbage	—	—	25	do	58.0[m]	1¼
Bf 25	C. J. Casper	—	1880	15	Dug	14.2[m]	18
Bf 26	Clarence Smith	Magee	—	25	Driven	22.3[m]	1¼
Bf 27	Jacob Adkins	do	1951	33	do	40	1¼
Bf 28	Worcester County, Board of Education	Artesian Well Drilling Co.	1952	35	Jetted	117	6
Bg 1	Coop. Ground-Water Program	Coop. Ground-Water Program	1949	10	Driven	14	1¼
Bg 2	Henry Burbage	—	1950	6	do	19	1¼
Bg 3	Cropper Chicken Farm	—	—	5	do	19.2[m]	1¼
Bg 4	Winchester Farms	Magee	—	12	do	70	1½
Bg 5	Do	do	1900	12	do	70	1½
Bg 6	Ocean Downs	Pentz	1949	12	Jetted	80	4
Bg 7	Do	do	1951	12	do	80	3
Bg 8	R. Beechem	Magee	1940	18	Driven	14	1
Bg 9	W. Bunting	do	1945	5	do	20	1¼
Bg 10	Shore Lumber Co.	Shannahan Artesian Well Co.	1914	5	Drilled	1706	16-12-10-8-4
Bg 11	Esso Gas Station	Baker	1946	10	Driven	20	1¼
Bg 12	Irving Lynch	Lynch	1937	10	do	35	1¼
Bg 13	Do	—	1932	10	do	24.8[m]	1¼
Bg 14	Francis Scott Key Motel	Pentz	1953	10	Jetted	102	6
Bh 1	Ocean City	Shannahan Artesian Well Co.	1939	5	do	272	8–6
Bh 2	Do	do	1939	5	do	267	8–6
Bh 3	Do	do	1939	5	do	267	8–6
Bh 4	Do	do	1939	5	do	266	8–6

—*Continued*

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	14	Aug. 12, 1950	R, E	I, L	See log. Yield reported Aug. 12, 1950, 20 gpm for 10 hours with 13 feet drawdown.
do	14	1947	T, E	I, L	Reported yield 100 gpm 8 hours daily 5 days a week.
do	—	—	R, E	D,F, M	Water reported slightly "irony" with marshy taste.
do	—	—	R, E	D,F, M	Water reported "irony".
do	—	—	R, E	D,F, M	
do	—	—	J, E	D, S	Do.
do	10.20 m	Apr. 23, 1952	B, H	D, S	Water reported soft.
do	—	—	J, E	F, M	Water reported very "irony" and hard.
do	5.46	Apr. 23, 1952	B, H	D, S	Water reported soft.
do	11.79 m	Apr. 23, 1952	C, H	D, S	Do.
do	—	—	C, H	D, S	
do	2.14 m	Apr. 30, 1952	C, H	F, N	
do	4.76 m	Apr. 30, 1952	C, H	D, S	Water reported soft.
do	2.20 m	Apr. 30, 1952	C, H	D, S	Do.
do	1.21 m	Apr. 30, 1952	C, H	D, N	Water reported extremely "irony", bad tasting, with a heavy odor.
do	7.56 m	Apr. 30, 1952	B, H	D, S	Water reported soft.
do	5.01 m	Apr. 30, 1952	C, H	D, S	Water reported slightly "irony".
do	—	—	J, E	D, S	Do.
Pliocene(?)	18	Jan. 31, 1953	T, E	P, L	See log. Yield reported Jan. 31, 1953, 140 gpm for 12 hours with 27 feet drawdown.
Pleistocene	3.25 m	Feb. 29, 1952	N	O	
do	4	June 1950	R, E	D, S	
do	2.47 m	Nov. 28, 1951	C, H	D,F, S	Water reported "irony".
do	1.55 m	Nov. 28, 1951	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Do.
do	3	Nov. 28, 1951	T, E	D,F, L	See log. Water reported moderately "irony".
do	—	—	T, E	F, L	See log. Water reported moderately "irony". Seasonal use 75,000 gal. a day for 25 days.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported "irony".
Piney Point	—	—	N	N	See log and chemical analysis. Temperature 70° F., flowing. Drilled as petroleum exploration well. See Md. Geol. Survey, vol 10, p. 327.
Pleistocene	5	Nov. 8, 1951	R, E	C, S	Water reported very "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	1.77 m	Apr. 30, 1952	C, H	F, N	
do	4	Mar. 31, 1953	T, E	C, M	See log. Water reported slightly "irony". Yield reported Mar. 31, 1953, 60 gpm with 10 ft. drawdown.
Manokin	2	1946	Ic, E	P, L	See log and chemical analysis. Pumping test data in text. Combined yield of Bh 1-5 is 400 gpm.
do	2	1946	Ic E	P, L	See log Bh 1. Pumping test data in text.
do	2	1946	Ic, E	P, L	See log Bh 1.
do	2	1946	Ic, E	P, L	Do.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Bh 5	Ocean City	Shannahan Artesian Well Co.	1939	5	Jetted	266	8–6
Bh 6	Do	do	1947	5	do	192.2	10–6
Bh 7	Do	do	1947	5	do	174.7	10–5
Bh 8	Do	do	1947	5	do	176	10–5
Bh 9	G. L. Esham	Magee	1940	5	Drilled	88.7 m	2
Bh 10	Stewart Jones	Pentz	1951	14	Jetted	98	3
Bh 11	Standard Oil Co. of N. J.	Noble Drilling Co.	1946	8	Drilled	7710	24–10¾
Bh 12	Ray Jarvis	Childson	1946	20	Driven	92	1½
Bh 13	Ocean City	Shannahan Artesian Well Co.	1947	5	Jetted	320	10–6
Bh 14	W. L. Holland	Pentz	1951	13	do	104	3
Bh 15	Bill Bunting	—	1952	5	Driven	5.0 m	1¼
Bh 16	James E. Warren	Baker	1944	4	Jetted	127	2
Bh 17	Talbot Burbage	White	1946	4	do	93	2
Bh 18	Ollie F. Hudson	do	1946	5	do	95	2
Bh 19	Henry P. Burns	Paul White	1952	5	do	80	3
Bh 20	Waldo Spelta	Paul White	1952	2	do	82	3
Bh 21	Earl Gray	Pentz	1953	7	do	94	3
Bh 22	H. B. Roberts	White	1953	5	do	128	3–2
Bh 23	J. E. Jacobs	Farlow	1953	4	do	191	3–2
Bh 24	J. Warren	White	1953	2	do	180	3–2
Bh 25	K. Brown	Scott	1952	5	do	126	—
Ca 1	Edward Webb	—	—	45	Driven	30	1¼
Ca 2	J. R. McGrath	Malone	1927	40	do	23	1¼
Cb 1	John M. Shockley	Shockley	1949	40	do	18	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	2	1946	Ic, E	P, L	See log Bh 1. Pumping test data in text.
Pocomoke	0	Mar. 23, 1947	Ic, E	P, L	See log. Yield reported Mar. 23, 1947, 140 gpm for 6 hours with 29 feet drawdown. Combined yield of Bh 6, 7, 8, 600 gpm. Pumping test data in text. Screen 160.5–192 feet.
do	4	May 23, 1947	Ic, E	P, L	See log. Yield reported May 23, 1947, 120 gpm with 14 feet drawdown. Pumping test data in text. Screen 150.7–174.7 feet.
do	7	Jun. 28, 1947	Ic, E	P, L	See log and chemical analyses. Yield reported June 28, 1947, 100 gpm with 10 feet drawdown. Pumping test data in text. Screen 151–176 feet.
Pleistocene	4.17 m	Oct. 15, 1950	N	N	See log. Observation well Oct. 15, 1950 to May 29, 1953.
do	7	Feb. 21, 1951	R, E	D, S	See log. Yield reported Feb. 21, 1951, 30 gpm for 1 hour with 12 feet drawdown.
Patuxent	—	—	N	N	Oil exploratory hole. See Dept. Geology Mines and Water Resources Bull. 2 for log.
Pleistocene	12	1946	R, E	C, M	Water reported "irony" with swampy taste.
Manokin	—	—	N	N	See log. Static water level reported 1947, 2 feet above land surface. Yield reported Apr. 23, 1947, 25 gpm for 6 hours with 52 feet drawdown. Well not developed. 126 feet of casing left in hole.
Pleistocene	7	Sep. 28, 1951	R, E	D, S	See log. Yield reported Sep. 28, 1951, 30 gpm for 2 hours with 13 feet drawdown.
do	2.36 m	May 24, 1952	C, H	D, S	Water reported poor, marshy odor and brownish.
do	—	—	Ic, E	C, L	Water reported "irony" and hard. Serves 26 cottages through summer.
do	—	—	J, E	D, M	See log. Water reported "irony". Serves 9 apartments.
do	2	Jun. 21, 1946	—, E	D, S	See log.
do	3	Mar. 21, 1952	Ic, E	D, S	See log. Water reported "irony" and acid. Yield reported Mar. 3, 1952, 40 gpm for 6 hours with 21 feet drawdown.
do	2	Mar. 14, 1952	Ic, E	C, M	See log. Yield reported Mar. 14, 1952, 20 gpm for 8 hours with 22 feet drawdown. Water reported "irony", acid and marshy odor.
do	7	Jun. 11, 1953	—, E	D, S	See log. Yield reported June 11, 1953, 50 gpm for 2 hours with 15 feet drawdown.
do	3	Jun. 1953	—	D, S	See log.
Pocomoke	5	Aug. 1953	—, E	D, S	Do.
do	4	Jul. 1953	Ic, E	D, S	See log. Water tastes "irony".
Pleistocene and Pliocene(?)	—	—	N	N	See log. Water reported "irony" and salty. Well casing pulled.
Pleistocene	—	—	R, E	D, F, M	Water reported soft.
do	—	—	R, E	D, F, M	Do.
do	—	—	C, H	D, S	4 driven wells on farm. Water from two 40-foot wells reported "irony". Good water reported from 12-foot and 18-foot wells.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cb 2	W. K. Wilson	Wilson	1949	40	Driven	45	1¼
Cb 3	Darmond Nuse	Nuse	1950	40	do	54	1½
Cb 4	Wayne Stephens	Stephens	1946	47	do	90	1½
Cb 5	Michael DeStefano	Wilson	—	47	do	15–18	1¼
Cb 6	Mrs. Chas. Clarkson	—	—	50	do	32	1½
Cb 7	Arch Patterson	Patterson	1949	57	do	59	1¼
Cb 8	Albert Hales	—	—	57	do	65	1¼
Cb 9	St. Lukes Church	—	—	46	do	35.0 m	1¼
Cc 1	Mrs. Everett Mills	Smullen	1950	40	do	16–18	1¼
Cd 1	W. T. Burbage	Davis	1950	20	Drilled	231	3½–1½
Cd 2	Do	Magee	1944	20	Jetted	128	1¼
Cd 3	Marvin Tyndall	do	1949	29	Driven	29–33	1½
Cd 4	Rodney Bounds	Baker	1949	20	do	45	1¼
Cd 5	William Laws	Magee	1948	25	do	50	1½
Cd 6	Ralph Shockley	Nelson	1946	40	do	35	1¼
Cd 7	John Taylor	Taylor	1948	35	do	40–50	1¼
Cd 8	J. W. Shockley and Son	Magee	1951	30	do	15	1½
Cd 9	W. Elton Jones	—	1935	25	do	30–40	1¼
Ce 1	Russell Timmons	Timmons	1946	30	Dug	27	36
Ce 2	Ralph L. Mason	Shannahan Artesian Well Co.	1951	38	Jetted	210	8–6
Ce 3	Sidney Collins	Brittingham	1945	38	Driven	28	1¼
Ce 4	Beacham and Trader	Magee	1951	20	do	25	1¼
Ce 5	Rillie P. Dennis	Crapper	1917	30	do	90	1½
Ce 5	Do	—	—	30	do	12	1½
Ce 7	Horace Townsend	Magee	1948	30	do	22	1½
Ce 8	Do	do	1941	30	do	24	1½
Ce 9	Harrison Bros.	do	1935	38	do	30	1½
Ce 10	Selby Purnell	Baker	1945	32	do	20	1¼
Ce 11	Joseph Downs	Magee	1945	36	do	26	1¼
Ce 12	Socony Vacuum Oil Co.	Big Chief Drilling Co.	1945	30	Drilled	7178	4
Ce 13	Fred Dalton	—	—	30	Driven	21.3 m	1¼
Ce 14	Williams A.M.E. Church	—	—	25	do	11.5 m	1¼
Ce 15	Bruce Spence	—	—	30	do	22.4 m	1¼
Ce 16	Worcester County, Board of Education	Scott	1952	36	Jetted	78	2
Cf 1	City of Berlin	Kelly Well Co.	1930	42	Drilled	101	18
Cf 2	Do	Ennis	1937	42	do	105	10
Cf 3	Do	Rulon	1947	40	do	115	24–12

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	C, H	D, S	Water reported soft.
do	—	—	J, E	D,F, S	Do.
do	—	—	J, E	D,F, M	Do.
do	—	—	C, H	D, S	Water reported slightly "irony" and hard.
do	—	—	C, H	D,F, M	Water reported slightly "irony".
do	—	—	J, E	D,F, M	Water reported hard.
do	—	—	C, H	N	
do	6.33 m	Sep. 25, 1947	C, H	D, S	Water reported "irony". Temperature 59° F.
do	—	—	C, H	D,F, S	
Manokin	8	1950	R, E	D, M	
Pleistocene	—	—	R, E	F, M	Water reported "irony" and hard.
do	—	—	J, E	D,F, M	
do	—	—	J, E	D,F, S	Water reported soft.
do	—	—	R, E	D, S	
do	—	—	C, H	D,F, S	Do.
do	—	—	C, H	D,F, S	Do.
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D, S	
do	—	—	J, E	D, S	Water from 60 to 70-foot well reported very "irony".
Pocomoke	21	Jul. 6, 1951	Ic, E	I, L	See log and chemical analysis. Yield reported July 6, 1951, 75 gpm for 8 hours with 9 feet drawdown.
Pleistocene	—	—	R, E	D,F, M	Water reported very "irony".
do	—	—	R, E	D,F, M	Water reported to taste bad, cloudy.
do	9.40 m	Jan. 9, 1952	W	F, S	Water reported "irony".
do	—	—	C, H	D, S	Water reported "irony" and hard.
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Do.
do	—	—	J, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Water reported soft, good at 14 feet.
Paleozoic(?) and Pre-Cambrian(?)	—	—	N	T	Oil exploratory hole. See Dept. Geology, Mines and Water Resources, Bull. 2 for log.
Pleistocene	5.35 m	May 16, 1952	C, H	D, S	Water reported soft.
do	2.80 m	May 16, 1952	C, H	P, S	
do	3.92 m	May 22, 1952	C, H	D, S	Water reported slightly "irony" and soft.
Pocomoke	11	Aug. 19, 1952	J, E	P, M	See log and chemical analysis. Yield reported Aug. 19, 1952, 15 gpm for 10 hours with 3 feet drawdown.
Pleistocene	16.55 m	Nov. 5, 1951	T, E	P, L	See log and chemical analysis. Yield reported 1947, 500 gpm for 1 hour and 10 minutes with 43 feet drawdown.
do	8	Apr. 1937	T, E	P, L	See log. Yield reported April 1937, 700 gpm with 37 feet drawdown, screen 40 feet.
do	8	Jan. 6, 1948	T, E	P, L	See log and chemical analysis. Yield reported Jan. 6, 7, 1948, 692 to 1015 gpm with 55 feet drawdown, screen 91–107 feet.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cf 4	H. Thompson	Thompson	1950	18	Driven	14	1
Cf 5	Ernest E. Burbage, Jr.	—	1938	5	do	28	1¼
Cf 6	Charles Holloway	Magee	1949	18	Driven	50–60	1¼
Cf 7	Roland Beacham	Baker	—	25	do	150	1
Cf 8	Berlin Milling Co.	do	1941	20	do	60	1¼
Cf 9	J. W. Shockley	Magee	1951	30	Jetted	72	2
Cf 10	Do	do	1951	20	do	—	1½
Cf 11	Ralph Mason	do	1950	10	Driven	20	1½
Cf 12	Do	do	1951	12	do	28	1½
Cf 13	Clive J. Bassett	do	1944	15	do	17	1¼
Cf 14	Zed Holston	do	1950	36	do	21	1¼
Cf 15	Clay Evans	Baker	1945	32	do	37	1¼
Cf 16	John Dowdy	Dowdy	1951	15	do	16.5[m]	1¼
Cf 17	Charlie Bounds	—	—	20	do	62.5[m]	1¼
Cf 18	Henry H. Heine	—	—	20	do	13.5[m]	1¼
Cf 19	Emma K. Robins Gray	—	—	20	do	42.7[m]	1¼
Cf 20	Archie Bishop	Baker	1951	38	do	15.9[m]	1¼
Cf 21	Hastings	Pentz	1938	38	Jetted	98	6
Cf 22	Eastern Highways Const. Corp.	Eastern Highways Const. Corp.	1951	20	Driven	16.6[m]	1¼
Cf 23	Davis Ice & Coal Co.	Pentz	1941	42	Jetted	110	6
Cf 24	Do	do	1945	42	do	110	6
Cf 25–26	Do	do	1941	42	do	110	3
Cf 27–28	Do	do	1945	42	do	110	3
Cg 1	Ocean City	Shannahan Artesian Well Co.	1900(?)	5	Drilled	285	4
Cg 2	Do	Pentz	1925	5	do	285	6
Cg 3	Do	do	1925	5	do	285	6
Cg 4	Do	do	1925	5	do	285	6
Cg 5	Do	Shannahan Artesian Well Co.	1947	5	Jetted	183	10–8–5
Cg 6	J. P. Whaley and E. W. Scott	Magee	1920	5	Drilled	285	6
Cg 7	Do	Shannahan Artesian Well Co.	1947	5	Jetted	90	6
Cg 8	Do	do	1947	5	do	189	10–6
Cg 9	Davis and Lynch Fish Co.	Paul White	1951	7	do	76	4
Cg 10	Do	Magee	1935	7	Drilled	70	4
Cg 11	John Charrier	—	1951	14	Driven	33	2
Cg 12	Do	—	1951	14	do	15	1¼
Cg 13	B & Hatchery	Baker	1948	11	do	18	1¼
Cg 14	G. S. Patton	White	1946	9	Jetted	94	2
Cg 15	Do	Baker	1951	11	Driven	14.5	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D,F, M	Water reported slightly "irony".
do	3	Jan. 4, 1952	R, E	D,F, M	Water reported soft.
do	—	—	R, E	D,F, M	Water reported "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	F, M	Do.
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	D,F, M	Do.
do	2.85 m	Ma 7, 1952	C, H	D, S	Do.
do	14.92 m	May 7, 1952	C, H	D, S	Do.
do	3.00 m	May 8, 1952	C, H	D, N	
do	13.61 m	May 16, 1952	C, H	D, S	Water reported slightly "irony".
do	6.07 m	May 16, 1952	C, H	D, S	Water reported soft.
do	—	—	T, E	I, N	Yield reported 1938, 336 gpm. Cannery and chicken processing plant, not used.
do	9.30 m	May 16, 1952	C, H	D, S	Water reported soft.
do	—	—	Ic, E	I, L	Impellers set at 55 feet, 20-foot screen.
do	—	—	Ic, E	I, L	Do.
do	—	—	R, E	I, L	20-foot screen. Same pump for both wells.
do	—	—	R, E	I, L	Do.
Manokin	—	—	Ic, E	P, L	Static water level reported 5 feet above land surface in 1925. Water reported "irony".
do	—	—	Ic, E	P, L	Do.
do	—	—	Ic, E	P, L	Do.
do	—	—	Ic, E	P, L	Do.
Pocomoke	8	Jul. 19, 1947	Ic, E	P, L	See log and chemical analysis. Pumping test data in text. Yield reported July 19, 1947, 120 gpm for 6 hours with 8 feet drawdown. Screen 160.5–180.5 feet.
Manokin	—	—	Ic, E	I, L	See chemical analysis. Water flows intermittently.
Pleistocene	0	Mar. 1947	Ic, E	I, L	See chemical analysis. Temperature 55° F. Pumping test data in text.
Pocomoke	0	Mar. 1, 1947	Ic, E	I, L	See log and chemical analysis. Pumping test data in text. Yield reported Mar. 1, 1947, 175 gpm for 4 hours with 17 feet drawdown. Temperature Cg 6 and 8, 61° F.
Pleistocene	5	Sep. 20, 1951	N	N	See log. Yield reported Sept. 20, 1951, 105 gpm for 6 hours with 15 feet drawdown.
do	—	—	R, E	I, L	
do	12	Nov. 1951	R, E	D, S	Water reported very "irony".
do	12	Nov. 15, 1951	C, H	D, —	Water reported "irony".
do	3	1948	R, E	I, M	Do.
do	3	Jun. 1946	Ic, E	D, S	See log. Water reported slightly "irony".
do	6	Dec. 11, 1951	R, E	D, S	Water reported slightly "irony".

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Cg 16	Edward L. Carey	—	1946	10	Driven	18	1¼
Cg 17	Do	—	1946	10	do	—	2
Cg 18	F. P. Gray	Magee	1949	10	do	28	1¼
Cg 19	I. L. Massey	Massey	1945	8	do	14	1¼
Cg 20	J. P. Whaley and E. W. Scott	Paul White	1951	5	Jetted	81	3
Cg 21	—	Pentz	—	11	do	100	—
Cg 22	Edgar Fooks	Fooks	1942	20	Driven	24.4 m	1¼
Cg 23	Margaret Derickson	Derickson	1951	12	do	10.8 m	1¼
Cg 24	Clara Henry	—	—	11	do	16.3 m	1¼
Cg 25	Mary A. Smith	—	—	12	do	13.4 m	1¼
Cg 26	Vincent Holloway	Baker	1949	11	do	12–14	1¼
Cg 27	Do	do	1949	11	do	12.1 m	1¼
Cg 28	Harry Jarvis	—	—	9	do	11.3 m	1¼
Cg 29	Do	—	—	9	do	—	1¼
Cg 30	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	2	Power Auger	98	3
Cg 31	McCabe	—	1937	8	Jetted	550(?)	—
Dc 1	Paul W. Shockley	Smullen	1945	30	Driven	40	1½
Dc 2	Gorman Perdue	do	—	47	do	65	1½
Dc 3	E. S. Carmean	Carmean	—	26	do	16	1¼
Dc 4	Frank West	Magee	1927	29	do	45	1½
Dc 5	Fred Mariner	Smullen	1949	32	do	75–80	1½
Dc 6	F. M. Butler	do	—	21	do	34	1¼
Dc 7	E. D. Pennewell	Pennewell	1927	20	do	25	2
Dc 8	G. W. Pusey	Smullen	—	22	do	38	1¼
Dc 9	Do	do	—	22	do	38	1¼
Dc 10	Do	do	—	22	do	38	1¼
Dc 11	Do	do	—	22	do	38	1¼
Dc 22	Do	—	—	22	do	35–40	1¼
Dc 13	V. A. Blades	Blades	1940(?)	20	do	21	1¼
Dc 14	Ed. J. Cubler	Ennis	1948	20	Jetted	59	6–4
Dc 15	Do	Smullen	—	20	Driven	35	1¼
Dc 16	State of Maryland Department of Forests and Parks	Scott	1951	25	Jetted	115	3–2
Dd 1	Carl Dryden	Magee	1928	20	Driven	30–35	1¼
Dd 2	Leroy Cherrix	Smullen	1945	20	do	32	1¼
Dd 3	Bailey Disharoon	do	1947	23	do	30–40	1¼
Dd 4	Roger P. Carmean	do	1944	23	do	38–40	1½
Dd 5	Herman Parsons	do	1951	33	do	94	1½
Dd 6	Do	do	1942	33	do	80	1½
Dd 7	City of Snow Hill	Shannahan Artesian Well Co.	1896	13	Drilled	290	6

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level: Feet below land surface	Static water level: Date of measurement	Pumping Equipment	Use of Water	Remarks
Pleistocene	—	—	R, E	D S,	
do	—	—	R, E	F, M	Water reported "irony".
do	4	Dec. 11, 1951	J, E	D,F, M	Water reported slightly "irony".
do	2	Dec. 11, 1951	Ic, E	D,F, M	
do	4	Aug. 11, 1951	Ic, E	I, L	See log and chemical analysis. Pumping test data in text. Yield reported Aug. 11, 1951, 75 gpm for 8 hours with 25 feet drawdown. Screen 70-80 feet.
do	—	—	R, N	N	See log.
do	4.00 m	May 7, 1952	C, H	D, S	Water reported slightly "irony" and soft.
do	1.59 m	May 7, 1952	C, H	D, S	Water reported soft.
do	2.17 m	May 7, 1952	C, H	D, S	Do.
do	2.08 m	May 7, 1952	C, H	D, S	Do.
do	—	—	C, H	D, S	Do.
do	3.22 m	May 7, 1952	Ic, G	F, S	Do.
do	2.65 m	May 7, 1952	C, H	D, S	Do.
do	—	—	R, E	D, S	Water reported very "irony".
do	—	—	N	T, —	See log.
—	—	—	— E	D, S	
do	—	—	C, H	D,F, M	Water reported soft.
do	—	—	C, H	D,F, M	Water reported having slight sulfurous odor and "irony"; 30-foot well slightly less "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	W	D,F, M	Do.
do	—	—	W	D,F, M	Do.
do	—	—	C, H	D,F, M	Do.
do	—	—	W	D,F, M	Do.
do	—	—	J, E	D, M	Do.
do	—	—	R, E	F, M	
do	—	—	R, E	F, M	
do	—	—	R, E	F, M	Do.
do	—	—	C, H	F, S	
do	—	—	R, E	D,F, M	Do.
do	—	—	Ic, G	F, M	See log. Irrigation supply.
do	—	—	R, E	D, M	Water reported soft.
do	12	Aug. 11, 1951	J, E	D, S	See log. Yield reported Aug. 11, 1951, 14 gpm for 7 hours with 8 feet drawdown.
do	—	—	W	D,F, M	Water reported soft.
do	—	—	R, E	D,F, M	Do.
do	—	—	J, E	D,F, M	
do	—	—	W	D,F, M	Do.
do	—	—	J, E	D, M	Owner reported driller stopped on white sand and limonite. Water was good, now, bad tasting, with "irony" odor and color medium hardness.
do	—	—	W	F, M	Water tastes bad. Sulfurous odor. Extremely "irony".
Manokin	—	—	N	N	Pumping test data in text. Well not used. Casing too small for turbine pump.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Dd 8	City of Snow Hill	Shannahan Artesian Well Co.	1925	13	Drilled	290	8
Dd 9	Coop. Ground-Water Program	Coop. Ground-Water Program	1949	25	Driven	20.5 m	1¼
Dd 10	City of Snow Hill	Shannahan Artesian Well Co.	1948	20	Drilled	405	10
Dd 11	Charles M. Hudson	Smullen	1939	20	Driven	15–20	1½
Dd 12	Do	do	1948	20	do	30–35	1½
Dd 13	Wrights Filling Station	Wright	1930	25	do	46	1½
Dd 14	George Wright	do	1949	25	do	60	1½
Dd 15	W. T. Onley Canning Co.	Pentz	1936	10	Jetted	285	6
Dd 16	Do	do	1938	10	do	90(?)	4
Dd 17	Wesley Canning Co.	do	1947	25	do	100	4
Dd 18	Eben Truitt	Smullen	1951	36	Driven	25	1¼
Dd 19	Otho Taylor	Taylor	1920	20	do	22	1¼
Dd 20	Samuel E. Riley	—	—	—	do	—	1¼
Dd 21	Frank West	Smullen	1945	24	do	45	1½
Dd 22	Pase Shockley	do	1947	39	do	58	1¼
Dd 23	Brown Canning Co.	Pentz	1950	17	Jetted	80	8–6
Dd 24	Worcester Fertilizer Co.	do	1935	10	do	285	6
Dd 25	Dryden Hatchery	Ennis	1945	20	do	330	6
Dd 26	Snow Hill Poultry Co., Inc.	do	1945	5	do	336	6
Dd 27	Do	Pentz	1947	5	do	286	6
Dd 28	Phila. Dairy Prod.	Wilson	1930–32	17	do	40–65	6
Dd 29	Graham Carmean	Smullen	1947	40	Driven	65	1¼
Dd 30	Snow Hill Canning Co.	do	1951	10	do	30	2
Dd 31	Nock Snow Hill Hatcheries	Pentz	1938	20	Jetted	325	3
Dd 32	Edward Shockley	Smullen	1951	33	Driven	28	1¼
Dd 33	Do	—	1916	33	do	24.6 m	1¼
Dd 34	Albert Dickerson	Smullen	—	30	do	28.2 m	1¼
Dd 35	Do	Magee	1944	30	do	25	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Manokin	—	—	T, E	P, L	Pumping test data in text. Yield reported October 1947, 250-300 gpm.
Pleistocene	10.34 m	Feb. 29, 1952	N	O	
Manokin	17	Jun. 8, 1948	T, E	P, L	See log and chemical analysis. Yield reported June 8, 1948, 500 gpm for 24 hours with 85 feet drawdown. Depth of screen below land surface 305.5-365.5 feet.
Pleistocene	—	—	J, E	D,F, M	
do	—	—	C, H	F, S	
do	—	—	C, H	C, S	Water reported slightly "irony".
do	—	—	C, H	D, S	Water reported soft.
Manokin	—	—	T, E	I, L	Flows continuously. Well is pumped consistently 16 hours daily during 4-month canning season.
Pleistocene	—	—	Ic, E	I, L	Flows continuously. Well used only when heavy demand is placed on 285 foot well. See chemical analysis.
do	—	—	T, E	I, L	Pumped consistently 11.5 hours daily for 5-week season.
do	—	—	R, E	F, M	Water reported bad tasting (seepage) and "irony".
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	J, E	D,F, S	
do	—	—	R, E	D,F, M	Do.
do	—	—	R, E	D,F, M	Water reported soft.
do	6	Jun. 6, 1950	C, E	I, L	See log. Yield reported June 6, 1950, 50 gpm for 2 hours with 5 feet drawdown. Water reported slightly "irony".
Manokin	—	—	N	N	Reported to flow in 1935, 150 gpm 3 feet above land surface when city wells not pumping.
do	9.64 m	Aug. 7, 1947	T, E	I, L	See log. Yield reported Aug. 18, 1945, 200 gpm for 24 hours with 25 feet drawdown. Static water level reported 5 feet below land surface in 1945.
do	—	—	T, E	I, L	See log and table of paleontology. Reported to flow, Sep. 15, 1945, 180 gpm 20-foot screen.
do	5.39 m	Aug. 7, 1947	T, E	I, L	See log. Yield reported July 1947, 100 gpm for 8 hours with 30 feet drawdown. Static water level 0 feet, 10-foot screen.
Pleistocene	10(?)	1947	R, E	I, M	
do	—	—	R, E	D,F, M	Water reported hard and "irony". Drove a well 18 feet (good water). Went dry 1947. Drove again to 49 feet, but water was unfit to use.
do	—	—	R, E	I, M	
Manokin	—	—	R, E	I, L	Water reported to flow in 1938, soft.
Pleistocene	—	—	R, E	D,F, M	Water reported soft.
do	9.47 m	Jun. 3, 1952	C, H	N	
do	5.39 m	Jun. 3, 1952	W	N	
do	—	—	J, E	D,F, M	

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Dd 36	Worcester County Board of Education	Kielkopf	1952	30	Jetted	162	6
De 1	Preston Disharoon	Magee	1945	16	Driven	15	1¼
De 2	Reginald Taylor	Tull	1900	20	Dug	13.4 m	32
De 3	Raymond Bowen	Dennis	1951	20	Driven	52	1¼
De 4	James Titus	—	1929	13	do	30	1¼
De 5	Ida Holston	Smullen	1951	25	do	48	1¼
De 6	Do	do	1951	25	do	75	1¼
De 7	Rodney Bounds	Magee	1939	10	do	35–40	1½
De 8	Sara K. Nock	Nock	1926	15	Dug	27.8 m	24
De 9	George Jackson	Hearn	1950	15	Driven	25	1¼
De 10	George Dryden	Magee	1949	10	do	28	1¼
De 11	F. H. and W. A. Langmaid	do	1949	15	do	22.5	1½
De 12	Lloyd McCabe	do	1950	20	do	54	1¼
De 13	Do	McCabe	1951	20	do	20	1¼
De 14	Wood Containers Corp.	Smullen	1951	31	do	55	1¼
De 15	George Dryden	Magee	1950	35	do	42	1½
De 16	Will Dennis	Dennis	1949	8	do	20.8 m	1¼
De 17	Sidney Cropper	Magee	1949	35	do	40.0 m	1¼
De 18	Walt Dennis	Dennis	1945	39	do	15.0 m	1¼
De 19	Otho Johnson	Johnson	1949	35	do	11.6 m	1¼
De 20	Harvey Trader	Trader	1930	25	Dug	19.0 m	20
De 21	Do	Baker	1937	25	Driven	85	1¼
De 22	Rolus Dennis	—	—	23	do	55.4 m	1¼
Df 1	Preston Disharoon	Magee	1950	15	do	74	1½
Df 2	Raymond Bounds	Bounds	1936	10	do	14.4 m	1¼
Dg 1	Coop. Ground-Water Program	Coop. Ground-Water Program	1952	3	Power Auger	79	3
Dg 2	Do	do	1952	3	do	89	3
Dg 3	U. S. Coast Guard Station	—	—	4	Driven	15(?)	—
Dg 4	Leon Ackerman	Scott	1953	8	Jetted	151	2
Dg 5	R. C. Walker	do	1953	8	do	150	2
Eb 1	Elizabeth Moore	—	1950	6	Driven	23	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene and Pliocene(?) and Pocomoke	22	Dec. 1952		P, M	
Pleistocene	–	–	R, E	F, M	Water reported soft and slightly "irony".
do	5.55 m	Jan. 15, 1952	S, H	D,F, M	Water reported soft. Well went nearly dry 1939–40.
do	2.65 m	Jan. 15, 1952	R, E	D,F, M	Water reported soft and slightly "irony". Well 35 feet, was irony, drove deeper.
do	–	–	R, E	D,F, L	Water reported soft. Turkey farm. 2 wells same depth, uses 6,000+ gal. a day.
do	–	–	J, E	D,F, M	Water reported soft.
do	–	–	C, H	D, S	Do.
do	–	–	R, E	D,F, M	Water reported soft. 1951 dry spell affected quantity and quality.
do	21.40 m	Jan. 15, 1952	C, H	D,F, M	Well was originally 25.6 feet (gravel). Went partially dry, dug 2 feet deeper to sand. Water reported soft.
do	–	–	J, E	D,F, M	Water reported slightly "irony".
do	–	–	R, E	D,F, M	Water reported soft.
do	–	–	J, E	D,F, M	Drove 40+ feet and got no water; pulled back to 22.5 feet. Water reported soft.
do	–	–	R, E	D,F, M	Water reported slightly "irony". Pumps from 2 wells same depth tied together.
do	–	–	R, E	F, M	More and better water than De 12.
do	–	–	R, S	I, L	Wells were 20–25 feet for 3 years. Water had bad odor and taste. Went dry 1951 (driller reported to have hit hard strata at 30 feet).
do	–	–	R, E	D,F, M	
do	3.05 m	May 22, 1952	C, H	D, S	Water reported soft.
do	12.57 m	May 22, 1952	N	N	
do	6.40 m	May 22, 1952	C, H	D, S	Water reported soft.
do	5.00 m	May 22, 1952	C, H	D, S	Do.
do	13.55 m	May 22, 1952	B, H	D, S	Do.
do	–	–	C, H	N	Do.
do	11.07 m	May 22, 1952	C, H	D, S	
do	–	–	R, E	D,F, M	Water reported slightly "irony".
do	3.59 m	May 7, 1952	C, H	D, S	Water reported soft.
do	–	–	N	T	See log and table of paleontology.
do	–	–	N	T	See log.
do	–	–	–	N	Collected rain water for use.
Yorktown and Cohansey(?)	3	Apr. 24, 1953	N	N	See log. Yield reported Apr. 4, 1953, 30 gpm for 8 hours with 5 feet drawdown.
do	1.43 m	Sep. 10, 1953	N	N	See log and chemical analysis. Yield reported May 12, 1953, 25 gpm for 8 hours with 5 feet drawdown. Temperature 60° F. Depth of screen below land surface 140–150 feet.
Pleistocene	–	–	C, H	D, S	Water reported milky and "irony".

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Eb 2	Ralph Devaux	—	1942	6	Driven	14.0 m	1¼
Eb 3	Elton Costen	Costen	1940	6	do	18	1¼
Eb 4	State of Maryland Dept. Forests and Parks	—	1951	37	do	100	1½
Eb 5	Ed Corbin	Corbin	1949	31	do	12.6 m	1¼
Eb 6	Adial Pusey	Pusey	1942	29	do	18	1¼
Eb 7	C. H. Corbin	Beauchamp	1944	27	do	58	1¼
Eb 8	J. F. Finney	Finney	1945	28	do	30	1¼
Eb 9	Do	do	1937	28	do	21.6 m	1½
Eb 10	Willie Ames	—	—	25	Dug	8.6 m	24
Eb 11	Roger Butler	Butler	1940	33	Driven	40	1¼
Eb 12	Emory Townsend	Townsend	1949	30	do	68	1¼
Eb 13	—	—	—	25	do	40.9 m	1¼
Eb 14	Brice Pusey	Pusey	1950	30	do	23	1¼
Eb 15	Harvey T. Pusey	Beauchamp	1950	15	do	16	1½
Eb 16	W. C. Carmean	Carmean	1947	10	do	22	1¼
Ec 1	Raymond Massey	—	—	20	do	30	1¼
Ec 2	Mrs. Cecil Redden	Beauchamp	1947	28	do	20	1¼
Ec 3	Mrs. A. F. Pilchard	—	1940	28	do	25	1¼
Ec 4	I. M. Pilchard	Pilchard	1942	25	do	33	1¼
Ec 5	Paul Tyre	—	1912	14	Dug	14	20
Ec 6	Geo. Collic	—	1932	4	Driven	19	1¼
Ec 7	Shiloh Church	—	1907	5	do	12.5 m	1½
Ec 8	William Ward	Ward	1927	10	do	24	1¼
Ec 9	Vernon C. Johnson	Johnson	1943	18	do	33	1¼
Ec 10	Arthur Payne	—	1892	16	Dug	12.3 m	22
Ec 11	Samuel Burbage	Beauchamp	1946	35	Driven	44.5	1¼
Ec 12	James Redden	Redden	1951	40	do	24	1¼
Ec 13	Arthur Robinson	Robinson	1950	33	do	30	1¼
Ec 14	Milton Pruitt	Pruitt	1942	18	do	19	1¼
Ec 15	Wilson Payne	—	—	21	do	39.6 m	1¼
Ec 16	Harold Nock	Smullen	1950	14	do	17	1¼
Ec 17	Chas. Dryden	—	1947	20	do	33.7 m	1¼
Ec 18	Mervin Breads	—	1947	12	do	14	1¼
Ec 19	Holland Stanford	Stanford	1941	18	do	28	1¼
Ec 20	Marion Disharoon	Smullen	—	12	do	—	—
Ec 21	John J. Adkins	—	1942	14	do	32.8 m	1¼
Ec 22	Dr. A. J. Boyer	Smullen	1942	15	do	50	1¼
Ec 23	J. T. Strickland	—	—	12	do	12.1 m	1¼
Ec 24	Sylvester Scott	—	1950	25	do	40	1¼
Ec 25	George Bishop	Beauchamp	1947	25	do	16.6 m	1¼
Ec 26	State of Maryland Dept. Forests and Parks	Scott	1953	10	Jetted	117	3–2
Ed 1	Luther J. Lawson	Smullen	1939	20	Driven	69	1½
Ed 2	Do	do	1950	40	do	22–24	1½

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	5.24 m	May 6, 1952	C, H	D, S	
do	–	–	C, H	D, S	
Pocomoke(?)	–	–	R, E	D, S	
Pleistocene	4.23 m	May 8, 1952	C, H	D,F, S	Water reported slightly "irony".
do	–	–	R, E	D, S	Do.
do	–	–	R, E	D,F, M	Do.
do	–	–	C, H	D, M	Water reported "irony".
do	3.87 m	May 9, 1952	C, H	D,F, M	
do	2.68 m	May 9, 1952	B, H	D, S	
do	–	–	C, H	D, M	
do	–	–	C, H	D,F, M	Water reported slightly "irony".
do	10.92 m	May 9, 1952	C, H	N	Water reported "irony".
do	–	–	C, H	D,F, S	
do	–	–	C, H	D,F, M	
do	–	–	C, H	D, S	Water reported slightly "irony".
do	–	–	R, E	D, M	Water reported "irony".
do	–	–	R, E	D,F, M	Water reported hard.
do	–	–	R, E	D,F, M	Water reported "irony" and sulfurous.
do	–	–	R, E	D,F, M	Water reported "irony".
do	–	–	C, H	D, S	Water reported soft.
do	–	–	C, H	D, S	
do	1.75 m	May 5, 1952	C, H	P, S	Water reported "irony".
do	–	–	C, H	D,F, M	Do. –
do	–	–	C, H	D, S	Water reported slightly "irony".
do	5.56 m	May 5, 1952	B, H	D,F, M	Water reported "irony".
do	–	–	R, E	D,F, M	Do.
do	–	–	C, H	D,F, M	Water reported "irony". Uses water from 15-foot well for washing.
do	–	–	R, E	D,F, S	Water reported very "irony". Uses water from a dug well for washing.
do	–	–	C, H	D, S	
do	7.20 m	May 7, 1952	C, H	F, M	Water tasted ,,irony".
do	–	–	R, E	F, M	Water reported slightly "irony".
do	2.97 m	May 7, 1952	C, H	D, S	Do.
do	–	–	C, H	D, S	
do	–	–	R, E	D,F, M	
do	–	–	C, H	D,F, M	
do	10.17 m	May 8, 1952	C, H	F, M	
do	–	–	R, E	D,F, M	Water reported slightly "irony".
do	8.83 m	May 8, 1952	C, H	F, S	Do.
do	–	–	R, E	D, M	Water reported very "irony".
do	2.60 m	May 8, 1952	C, H	F, M	Water reported slightly "irony".
Pocomoke(?)	3	Feb. 11, 1953	– E	D, S	See log.
Pleistocene	–	–	R, E	D,F, M	Owner reported water at 20 feet, insufficient quantity; water at 46 feet, tasted fair but had offensive marshy odor; water at 69 feet "irony".
do	–	–	R, E	D, S	Owner reported driving well to 105 feet, no water; redrove present well 100 feet N.W.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ed 3	Harvey Redden	Smullen	1951	40	Driven	59	1¼
Ed 4	Cherrix Bros.	do	1936	40	do	60	1½
Ed 5	W. T. Onley	Magee	1947	40	do	101	1½
Ed 6	Henry Cherrix	Smullen	1949	34	do	90–93	1½
Ed 7	J. Goldhaber	Pentz	1950	36	Jetted	100	4
Ed 8	M. P. Selby	Ennis	1945	38	do	181	4–1½
Ed 9	Elmer Pilchard	Kellam	1951	34	Drilled	198	2
Ed 10	Clayt Scarborough	Scott	1952	35	Jetted	112	3–2
Ed 11	Theo. Houck	Kellam	1951	38	Drilled	179.5	4–2¼
Ed 12	Ira Webb	do	1951	40	do	147	2
Ed 13	A. E. Hancock	Smullen	1940	36	Driven	21	1¼
Ed 14	Do	Hancock	1917	36	Dug	13.2 m	20
Ed 15	Melvin Gaskill	John Scott	1950	37	Jetted	197	2
Ed 16	B. Clay Chapman	Scott	1952	40	do	151	3
Ed 17	Robert McKittrick	—	—	38	Dug	14.1 m	20
Ed 18	G. E. Bratten	—	—	40	do	7.5 m	20
Ed 19	Mrs. Howard Rogers	—	—	—	Driven	10.0 m	1¼
Ed 20	Lawrence Godfrey	Smullen	1949	25	do	33.5 m	1¼
Ed 21	Mose Hudson	—	1951	—	do	60	1¼
Ee 1	Norman Tarr	Smullen	1948	20	do	22	1¼
Ee 2	Thomas A. Moore	do	1946	24	do	45	1½
Ee 3	Do	Moore	—	24	Dug	10.8 m	24
Ee 4	Paul Jones, Jr.	Pentz	1945	20	Jetted	70	3
Ee 5	Thomas I. Conner	Conner	1911	40	Dug	12.9 m	24
Ee 6	Do	Smullen	1945	40	Driven	103	2
Ee 7	O. T. Aydelotte	do	1945	9	do	15	1¼
Ee 8	Do	do	1929	40	do	15–16	1¼
Ee 9	Paul Jones and Son	Pentz	1945	13	Jetted	70	3
Ee 10	Roy B. Stagg	Smullen	1947	10	Driven	33	1¼
Ee 11	Wm. Phillips	—	—	40	do	10.7 m	1¼
Ee 12	Olin Pusey	Pusey	1947	13	do	17	1¼
Ee 13	O. T. Aydelotte	Smullen	1949	12	do	47.3 m	1¼
Ee 14	Elmer Smullen	do	1949	20	do	74	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	–	–	R, E	D,F, M	Water reported soft, at 40 feet "irony".
do	–	–	C, H	N	Water reported soft.
do	–	–	R, E	D,F, M	Water reported "irony" and hard.
do	–	–	C, H	D,F, M	Do.
do	–	–	J, E	D,F, M	See log. Yield reported Nov. 9, 1949, 10 gpm for 2 hours with 8 feet drawdown. Depth of screen below land surface 90–100 feet.
Pocomoke	27.5	Oct. 2, 1945	J, E	D,F, M	See log and chemical analysis. Yield reported Oct. 2, 1945, 40 gpm for 16 hours with 13.5 feet drawdown. 10-foot screen.
do	–	–	J, E	D, S	Owner reported had well to 60 feet. Water was "irony" and hard.
Pleistocene	–	–	J, E	D, S	See log. Owner reported had well 65 feet. Fair taste but "irony". Seemed to be going dry. Drove another 20–25 feet. Bad taste. Did not use. Yield reported Jan. 4, 1952, 10 gpm for 12 hours with 5 feet drawdown. No screen.
Pocomoke	–	–	J, E	D,F, M	Water reported hard.
Pocomoke(?)	–	–	J, E	D,F, M	Water reported soft. Shells found at 90 feet.
Pleistocene	–	–	R, E	F, M	Owner reported drove an earlier well 50 feet. Found water (insufficient). Drove to 90 feet. Water "irony", hard, fair taste.
do	4.65 m	Jan. 18, 1952	R, E	D, S	Water reported soft.
Pocomoke	–	–	J, E	D, S	
do	28	Mar. 2, 1952	J, E	D, S	See log. Yield reported Mar. 3, 1952, 10 gpm for ½ hour with 7 feet drawdown. No screen.
Pleistocene	6.81 m	Jun. 3, 1952	R, E	D, M	Water reported slightly "irony" and soft.
do	3.00 m	Jun. 3, 1952	B, H	D,F, M	Water reported soft.
do	6.04 m	Jun. 3, 1952	C, H	N	
do	6.84 m	Jun. 4, 1952	C, H	D,F, S	Water reported "irony" and hard.
do	–	–	C, H	D, S	Water reported slightly "irony".
do	–	–	C, H	D,F, M	Water reported soft.
do	–	–	R, E	D,F, M	
do	5.40 m	Jan. 16, 1952	N	N	
do	–	–	R, E	D,F, M	Water reported soft.
do	5.70 m	Jan. 16, 1952	C, H	D,F, M	Do.
do	–	–	W	N	Water reported hard.
do	–	–	C, H	D,F, M	Water reported soft.
do	–	–	R, E	D,F, M	
do	–	–	J, E	D,F, M	Owner reported well was drilled 200+ feet No water. Pulled back to 70 feet, water soft.
do	–	–	R, E	D,F, S	Water reported "irony" and hard.
do	2.56 m	Jun. 4, 1952	C, H	D, S	Do.
do	–	–	R, E	D, M	Water reported soft.
do	2.56 m	Jun. 4, 1952	C, H	D, S	
do	–	–	R, E	D, S	Water reported soft. Owner reported nearby 30-foot well was very "irony".

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Ef 1	Leon Ackerman	Scott	1953	4	Jetted	171.8 m	2
Ef 2	Peter Van Roon	do	1953	4	do	228	2
Ef 3	R. E. McConville	do	1953	4	do	167.0 m	2
Fa 1	Upshur Merrill	Merrill	1940	20	Driven	22	1¼
Fa 2	Do	—	—	20	Dug	9.7 m	24
Fa 3	Edgar Benson	—	1947	12	Driven	15	1½
Fa 4	Kermit McKay	Beechup	1948	15	do	25–28	1½
Fa 5	India Merrill	Merrill	1944	10	do	20	1¼
Fa 6	L. Culden	—	—	12	do	21.1 m	1½
Fa 7	Ed. Stevenson	Outten	1945	20	do	20.5 m	1½
Fa 8	E. P. Matthews	—	1953	15	do	18	1¼
Fa 9	C. Hargis Merrill	Beechup	1948	15	do	32	1¼
Fa 10	Willis C. Hall	do	1942	5	do	14	1¼
Fb 1	City of Pocomoke	Pentz	1946	20	Jetted	128	8
Fb 2	Do	Rulon	1947	20	Drilled	130	16–10
Fb 3	Do	Kelly Well Co.	1928	20	do	29.6 m	24
Fb 4	Do	do	1928	20	do	30.5 m	24
Fb 5	Do	do	1928	20	do	33.8 m	24
Fb 6	Do	do	1928	20	do	37.8 m	24
Fb 7	Do	do	1928	20	do	41	24
Fb 8	Do	Layne-Atlantic	1948	20	do	115	8
Fb 9	Do	do	1948	12	do	104	8
Fb 10	Mason Canning Co.	Shannahan Artesian Well Co.	1948	5	Jetted	124	16–10
Fb 11	Birdseye Div., General Foods Corp.	Layne-Atlantic	1950	3	Drilled	130	8
Fb 12	Do	Shannahan Artesian Well Co.	1950	4	Jetted	128	16–10

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Yorktown and Cohansey(?)	1.22 m	Sep. 10, 1953	–	–	See log and chemical analysis. Temperature 60° F. Yield May 5, 1953, 20 gpm for 8 hours with 5 feet drawdown. Depth of screen below land surface 166–176 feet.
Pocomoke	12	Jun. 12, 1953	–	–	See log. Yield reported June 6, 1953, 12 gpm for 7 hours with 8 feet drawdown. Depth of screen below land surface 218–228 feet.
Yorktown and Cohansey(?)	.01 m	Jun. 24, 1953	C, H	D, S	See log and chemical analysis. Temperature 60° F. Yield reported June 24, 1953, 20 gpm for 4 hours with 14 feet drawdown. 10-foot screen.
Pleistocene	–	–	R, E	D, M	Water reported "irony".
do	7.40 m	Oct. 8, 1952	N	N	
do	–	–	C, H	D, S	Water reported soft.
do	–	–	J, E	D, M	
do	–	–	R, E	D, M	Water reported "irony".
do	5.73 m	Oct. 8, 1952	R, E	D, S	Do.
do	9.17 m	Oct. 13, 1952	C, H	D, S	Water reported "irony" and soft.
do	–	–	R, E	D, S	
do	–	–	Ic, E	D, S	Water reported "irony", hard. Owner reported salt water at 11 feet, water at 20 feet, poor flow.
do	–	–	R, E	D, M	Water reported soft.
Pocomoke	18	1946	T, E	P, L	See log and chemical analysis.
do	30	Oct. 3, 1947	N	O, –	See log. Monthly record. Yield reported Oct. 3, 1947, 154 gpm for 24 hours witb 60 feet drawdown. Depth of screen below land surface 100–130 feet. Well abandoned. Pumping test data in text.
Pleistocene	10.00 m	May 15, 1950	N	N	See log. Well abandoned.
do	7.14 m	May 15, 1950	N	N	Do.
do	5.94 m	May 15, 1950	N	N	Do.
do	7.69 m	May 15, 1950	N	N	Do.
do	5.50 m	May 15, 1950	N	N	Do.
Pocomoke	21	Apr. 7, 1948	T, E	P, L	See log and chemical analysis. Yield reported Apr. 7, 1948, 328 gpm for 24 hours with 16 feet drawdown. Depth of screen below land surface 95–115 feet.
do	15.5	Aug. 21, 1948	T, E	P, L	See log and chemical analysis. Yield reported Aug. 21, 1948, 302 gpm for 24 hours with 53 feet drawdown. Depth of screen below land surface 84–104 feet.
do	13 m	May 15, 1950	T, E	I, L	See log. Yield reported July 7, 1948, 250 gpm for 24 hours with 77.5 feet drawdown. Depth of screen below land surface 106–124 feet.
do	13	May 22, 1950	T, E	I, L	See log. Yield reported May 22, 1950, 325 gpm for 24 hours with 8 feet drawdown. Depth of screen below land surface, 110–130 feet.
do	17	Aug. 21, 1950	T, E	I, L	See log. Yield reported Aug. 21, 1950, 658 gpm for 10 hours with 29 feet drawdown. Depth of screen below land surface 108–128 feet. Pumping test data in text.

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Fb 13	Mason Canning Co.	Shannahan Artesian Well Co.	1942	6	Jetted	100	16–10
Fb 14	City of Pocomoke	Layne-Atlantic	1952	20	Drilled	140	8
Fb 15	Mason Canning Co.	Artesian Well Drilling Co.	1937–1938	7	Jetted	122.6 m	8
Fb 16	Do	do	1938	6	do	200.5 m	8
Fb 17	City of Pocomoke	Layne-Atlantic	1948	26	Drilled	150	8
Fb 18	Duncan Bros.	Scott	1952	28	Jetted	170	3–2
Fb 19	City of Pocomoke	Shannahan Artesian Well Co	1906–1907	—1	Drilled	1540	6
Fb 20	Birdseye Div., General Foods Corp.	Layne-Atlantic	1950	3	do	130	2
Fb 21	Do	Shannahan Artesian Well Co.	1950	4	Jetted	141	2
Fb 22	Walter Watson	—	—	15	Driven	14	1½
Fb 23	Do	Watson	1944	15	do	10.0 m	1½
Fb 24	J. Milton Howard	Howard	1944	14	do	22	1¼
Fb 25	W. E. Sparrow	Sparrow	1934	20	do	36–42	1½
Fb 26	W. T. Bunting	Bunting	1952	25	do	28	1½
Fb 27	Do	do	—	25	do	20.7 m	1½
Fb 28	P. T. Barnes	Barnes	—	26	do	49.6 m	1¼
Fb 29	William Townsend	Beauchamp	1952	29	do	15	1¼
Fb 30	Lloyd Townsend	do	1950	23	do	32	1½
Fb 31	Do	Townsend	1918	23	do	36.7 m	1¼
Fb 32	Morris Boston	Porter	1952	30	Jetted	135	1½
Fb 33	R. I. Lednum & Co.	—	1949	6	do	130	2
Fb 34	Do	—	1937	6	do	80–90	2
Fb 35	Pocomoke Provision Co.	Lewis	1937	8	do	108–110	2
Fb 36	Archie Ward	Ward	1952	6	Driven	12	1¼
Fb 37	J. S. McAllister	Porter	1945	33	Jetted	59	2
Fb 38	Do	Pilchard	—	33	Dug	8.8 m	26
Fb 39	Do	Stevens	1943	33	Driven	30	1¼
Fb 40	Louis Beauchamp	—	—	32	Dug	9.0 m	24
Fb 41	W. H. Taylor	Melvin	1920	20	Driven	23	1½
Fb 42	Do	Taylor	1925	20	do	20.0 m	1
Fb 43	City of Pocomoke	Kelly Well Co.	1928	20	Drilled	134	
Fc 1	Arthur Jones	Jones	1927	25	Driven	18	1¼
Fc 2	M. E. Baylis	Baylis	1948	25	do	26	1¼
Fc 3	Wm. T. Brown	Smullen	1950	35	do	68	1¼
Fc 4	C. M. Brown	—	—	31	Dug	47.5 m	25
Fc 5	Elda B. Shockley	—	1942	32	Driven	86	1¼

—Continued

Aquifer, water-bearing formation, or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pocomoke	—	—	T, E	I, L	See log. Yield reported Aug. 12, 1950, 450 gpm.
do	29	Feb. 2, 1952	T, E	P, L	See log and chemical analysis. Yield reported Feb. 2, 1952, 319 gpm for 10 hours with 42 feet drawdown. Depth of screen below land surface, 100-120 and 135-140 feet. Pumping test data in text.
do	17.71 m	Aug. 12, 1952	N	N	
Yorktown and Cohansey(?)	3.34 m	Aug. 15, 1952	N	N	Water reported to be salty.
Pocomoke	22.5	May 6, 1948	N	N	See log. Well casing pulled and hole plugged.
do	9	May 21, 1952	R, E	I, L	See log. Water reported to have marshy odor. Not used for drinking.
Upper Cretaceous	—	—	N	N	See log. See Md. Geol. Survey, vol. 10, p. 326. Well flowing Aug. 13, 1952, at edge of Pocomoke River under water.
Pocomoke	.07 m	Jan. 12, 1953	N	O	Monthly record. Pumping test data in text. Water level Jan. 1, 1953, 2.57 feet above sea level.
do	1.05 m	Jan. 6, 1953	N	O	Pumping test data in text. Water level Jan. 6, 1953, 3.55 feet above sea level.
Pleistocene	—	—	C, H	D, S	Water reported "irony".
do	5.77 m	Oct. 13, 1952	N	N	Do.
do	—	—	Ic, E	D,F, M	Water reported very "irony".
do	—	—	R, E	D, M	Water reported slightly "irony".
do	—	—	C, H	D, S	Water reported very "irony".
do	14.46 m	Oct. 14, 1952	C, H	F, S	
do	9.46 m	Oct. 14, 1952	C, H	D, S	Water reported "irony".
do	—	—	R, E	D, M	Water reported very "irony".
do	—	—	R. E	D,F, M	Water reported slightly "irony".
do	12.30 m	Oct. 14, 1952	C, H	F, S	
Pocomoke	18	Sep. 8, 1952	N	N	See log.
do	—	—	C, E	I, L	
do	—	—	R, E	I, L	Water reported to flow 1937. Stopped flowing 1939.
do	—	—	R, E	I, L	
Pleistocene	—	—	C, H	D,F, S	Owner reported earlier well to 32 feet, 25 feet from present well. Water very odorous.
do	—	—	R, E	D,F, M	Water reported very "irony".
do	4.84 m	Dec. 19, 1952	B, H	F, S	Reported falling water level during drought August 1952. Water soft.
do	—	—	C, H	D, S	Water reported "irony", originally at 18 feet, gave good water but poor flow.
do	2.91 m	Dec. 19, 1952	R, E	D,F, S	Water reported soft.
do	—	—	C, H	D, S	Water reported "irony".
do	5.38 m	Oct. 13, 1952	C, H	N	
Pocomoke	—	—	N	T	See log.
Pleistocene	—	—	R, E	D,F, M	
do	—	—	R, E	D,F, M	
do	—	—	— E	D, S	Water reported very "irony", soft.
do	6.10 m	Apr. 22, 1952	— E	D,F, M	
do	—	—	R, E	D,F, M	Water reported slightly "irony".

TABLE 40

Well Number (Wor-)	Owner or Name	Driller	Date	Altitude (ft.)	Type of Well	Depth of Well (ft.)	Diameter of Well (in.)
Fc 6	Alvin Sturgis	Sturgis	1946	34	Driven	16	1½
Fc 7	—	—	—	30	do	11.1 m	1¼
Fc 8	J. Ralph Boston	Boston	1924	36	do	26	1¼
Fc 9	St. Pauls Church	—	—	35	do	20.0 m	1¼
Fc 10	Dr. Crichard	—	1948	35	do	40	1¼
Fc 11	Lem Holland	—	1902	30	Dug	11.8 m	20
Fc 12	A. J. Payne	Payne	1947	35	Driven	32	1½
Fc 13	Marion Jones	Jones	1950	35	do	13	1¼
Fc 14	Raymond Lambertson	Lambertson	1952	31	do	20	1¼
Fc 15	—	—	—	10	Dug	8.2 m	24
Fc 16	W. A. Redden	Beauchamp	1950	25	Driven	32	1¼
Fc 17	Frank P. Holland	Holland	1951	33	do	19	1¼
Fc 18	M. H. Redden	Redden	1932	33	do	19	1¼
Fc 19	—	—	—	33	Dug	8.1 m	22
Fc 20	J. E. Stevens	Porter	1944	33	Driven	80	1¼
Fc 21	Chas. Culp	Culp	1952	35	do	19	1¼
Fc 22	Milton Payne	Beauchamp	1942	30	do	20	1¼
Fc 23	Bessie Gooty	—	1877	35	Dug	11.0 m	20
Fc 24	Chester Outten	Outten	1942	30	Driven	19	1¼
Fc 25	Thomas Outten	do	1902	30	Dug	8.8 m	20
Fc 26	Francis Ward	Ward	1942	35	Driven	45	1½
Fc 27	Leroy Emt	—	—	35	Dug	10.9 m	20
Fc 28	Elsie Douglass	Douglass	1930	33	Driven	14	1¼
Fc 29	Earl Ward	Ward	1942	23	do	28	1¼
Fd 1	Frank Trinka	Smullen	1950	20	do	35	1½
Fd 2	Charlie C. Ward	do	1940	20	do	39	1¼
Fd 3	Stockton Ice Co.	Pentz	1940	20	Jetted	212	8–6
Fd 4	Do	do	1937	20	do	60	3
Fd 5	R. Quincy Blevins	—	1946	30	Driven	35	1¼
Fd 6	Do	—	1942	30	do	27	1¼
Fd 7	Raymond Pilchard	Smullen	1949	30	do	55–60	1¼
Fd 8	C. J. Scarborough	Pentz	—	10	Jetted	56	3–2
Fd 9	Alice L. Sharpley	Hancock	—	19	Dug	17.5 m	26
Fd 10	A. D. Linton	—	—	6	Driven	34	1½
Fd 11	Edwin Hancock	Hancock	1942	10	do	15	1¼
Fd 12	Fred Hickman	Smullen	1952	20	do	57	1¼
Ff 1	Coop. Ground-Water Program	Coop. Ground-Water Prngram	1952	3	Power Auger	104	3

—*Continued*

Aquifer, water-bearing formation or geologic age	Static water level		Pumping Equipment	Use of Water	Remarks
	Feet below land surface	Date of measurement			
Pleistocene	—	—	R, E	D,F, M	Water reported very "irony".
do	2.22 m	Apr. 30, 1952	N	N	
do	—	—	R, E	D,F, M	
do	9.49 m	Apr. 30, 1952	C, H	P, S	
do	—	—	C, H	D, S	
do	1.94 m	Apr. 30, 1952	B, H	D, S	
do	—	—	R, E	D,F, M	
do	5	1950	R, E	D,F, S	
do	—	—	C, H	F, S	
do	1.90 m	Apr. 30, 1952	B, H	F, S	
do	—	—	R, E	D,F, M	Water reported "irony".
do	—	—	R, E	D,F, M	
do	—	—	R, E	D,F, M	Do.
do	1.84 m	May 1, 1952	B, H	N	Water reported odorous.
do	—	—	R, E	D,F, M	
do	—	—	C, H	D, S	Water reported slightly "irony".
do	—	—	R, E	D,F, M	Water reported "irony".
do	3.41 m	May 1, 1952	B, H	D, S	
do	—	—	R, E	D,F, M	
do	2.52 m	May 1, 1952	R, E	D,F, M	Reported well never goes dry.
do	—	—	R, E	D,F, M	Water reported "irony".
do	4.12 m	May 1, 1952	R, E	D,F, M	Water reported slightly "irony".
do	—	—	C, H	D, S	
do	—	—	C, H	D,F, S	Water reported "irony".
do	—	—	Ic, E	D, S	Water reported "irony".
do	—	—	R, E	D,F, M	Water reported soft.
Pocomoke	—	—	T, E	I, L	Water reported hard. Leaves white flakes in ice.
Pleistocene	—	—	R, E	I, —	Water reported to have bad odor, very "irony". Used only in emergency.
do	—	—	R, E	D,F, M	Water reported soft.
do	—	—	R, E	F, M	Water reported bad taste, bad odor, "irony".
do	—	—	C, H	D, S	Water reported "irony" and soft.
do	—	—	J, E	I, L	Water reported "irony". Salt water struck at 100 feet.
do	12.80 m	Dec. 10, 1952	C, H	D, S	Water reported soft.
do	—	—	C, H	D, S	Do.
do	—	—	R, E	D,F, S	Water reported soft.
do	—	—	R, E	D,F, M	Water reported soft. Water obtained at 27 feet "irony".
Yorktown and Cohansey(?)	—	—	N	T	See log.

TABLE 41

Logs of Wells in Somerset County

	Thickness (feet)	Depth (feet)
Well Som-Ae 1 (Altitude: 10 feet)		
Pleistocene series:		
Surface soils and sand	25	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt and clay; mud; some gravel	71	96
Manokin aquifer:		
Sand	27	123
Well Som-Ae 14 (Altitude: 20 feet)		
Pleistocene and Pliocene (?) series:		
Surface soils; clay, red	21	21
Sand and gravel; water	7	28
Clay	12	40
Gravel	2	42
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	68	110
Manokin aquifer:		
Sand, gray	11	121
Well Som-Bb 1 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	5	5
Marsh mud	3	8
Sand, white	7	15
Sand, red	10	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, gray	16	41
Clay, blue	43	84
Manokin aquifer:		
Sand, white	30	114
Sand, fine, gray	33	147
St. Marys (?) formation:		
Clay, blue	73	220
Choptank (?) formation:		
Sand, fine, black	40	260
Rock layer, hard	—	—
Sand, gray, black	55	315
Calvert (?) formation:		
Clay, blue	105	420
Sand, fine, gray	21	441
Clay, blue	97	538
Sand, coarse, gray	22	560
Clay, brown	28	588

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Eocene series:		
Piney Point formation:		
Sand, coarse, gray black	83	671
Paleocene series:		
Clay, light	20	691
Sand, black	39	730
Clay, brown	84.5	814.5
Well Som-Bb 3 (Altitude: 4 feet)		
Pleistocene series:		
Mud, black	10	10
Sand, light	30	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay (mud), blue	65	105
Manokin aquifer:		
Sand, gray	17	122
Well Som-Bc 1 (Altitude: 2 feet)		
Pleistocene and Pliocene (?) series:		
Sand; silt; clay (marsh mud)	6	6
Sand; water	3	9
Silt; clay (marsh mud)	12	21
Sand; gravel and mud	4	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	17	42
Clay; gravel	3	45
Silt; clay (mud)	75	120
Manokin aquifer;		
Sand, gray; water	13	131
Well Som-Bc 2 (Altitude: 3 feet)		
Pleistocene series:		
Surface soils	8	8
Sand; water	4	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud) and sand	78	90
Manokin aquifer:		
Sand	15	105
Well Som-Bc 3 (Altitude: 3 feet)		
Pleistocene series:		
Surface soils	8	8
Sand; water	4	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	78	90
Manokin aquifer:		
Sand	15	105

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Bc 4 (Altitude: 3 feet)		
Pleistocene series:		
Surface soils	5	5
Sand; water	5	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	30	40
Clay	50	90
Manokin aquifer:		
Sand, fine	15	105
Sand, mud balls	15	120
Sand	15	135
Well Som-Bc 6 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils; water	22	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	83	105
Manokin aquifer:		
Sand; water	22	127
Well Som-Bc 7 (Altitude: 3 feet)		
Pleistocene series:		
Surface sand; mud	25	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue, and mud	85	110
Manokin aquifer:		
Sand; water	29	139
Well Som-Bc 8 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	10	20
Clay, blue	20	40
Sand, brown	18	58
Clay, blue	57	115
Manokin aquifer:		
Sand, gray	32	147
Well Som-Bc 10 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils	8	8
Sand; water	4	12

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	28	40
Sand; water	2	42
Clay, blue	38	80
Manokin aquifer:		
Sand; water	15	95
Well Som-Bc 14 (Altitude: 4 feet)		
Recent and Pleistocene series:		
Marsh mud	6	6
Sand; silt and clay	7	13
Sand; some water	2	15
Clay	25	40
Clay and gravel	10	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue, sticky	65	115
Manokin aquifer:		
Sand, gray, and water	17	132
Well Som-Bd 1 (Altitude: 10 feet)		
Pleistocene series:		
Surface soils	23	23
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	17	40
Sand; water	5	45
Silt; clay (mud)	50	95
Manokin aquifer:		
Sand; water	41	136
Well Som-Bd 2 (Altitude: 10 feet)		
Pleistocene and Pliocene (?) series:		
Clay, blue	5	5
Sand and gravel, light	45	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	45	95
Manokin aquifer:		
Sand, gray	41	136
Well Som-Bd 4 (Altitude: 5 feet)		
Pleistocene series:		
Surface soils	10	10
Sand; water	3	13

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	82	95
Manokin aquifer:		
Sand; fine mud balls; water	12	107
Well Som-Bd 5 (Altitude: 15 feet)		
Recent series:		
Surface soils	19	19
Pleistocene series:		
Sand; water	21	40
Sand and gravel	8	48
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Clay	82	130
Manokin aquifer:		
Sand; water	20	150
Well Som-Bd 6 (Altitude: 5 feet)		
Pleistocene series:		
Surface soils	22	22
Sand; water	3	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	62	87
Manokin aquifer:		
Sand; water	14	101
Well Som-Bd 7 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils	17	17
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	23	40
Sand	5	45
Clay; mud	33	78
Manokin aquifer:		
Sand	16	94
Well Som-Bd 8 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils	18	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	22	40
Sand, light	10	50
Silt; clay (mud)	37	87

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, gray	17	104
Well Som-Bd 9 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils	22	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	56	78
Manokin aquifer:		
Sand	20	98
Well Som-Bd 10 (Altitude: 4 feet)		
Pleistocene series:		
Surface soils	13	13
Sand; water	9	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	63	85
Manokin aquifer:		
Sand, quick	10	95
Sand, fine; water	27	122
Well Som-Bd 11 (Altitude: 9 feet)		
Pleistocene and Pliocene (?) series:		
Clay, brown	7	7
Sand, brown	13	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	10	30
Sand, gray	30	60
Clay, blue	88	148
Manokin aquifer:		
Sand, gray, and shells	30	178
Well Som-Bd 12 (Altitude: 9 feet)		
Pleistocene and Pliocene (?) series:		
Clay, gray	6	6
Sand, red	6	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	14	26
Clay, blue	114	140
Manokin aquifer:		
Sand, shells, hard	39	179

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Bd 13 (Altitude: 5 feet)		
Pleistocene series:		
Surface soils	12	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud)	112	124
Manokin aquifer:		
Sand:	21	145
Well Som-Bd 14 (Altitude: 6 feet)		
Pleistocene series:		
Clay, black	5	5
Sand, light	53	58
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	72	130
Manokin aquifer:		
Sand, gray	13	143
Well Som-Bd 15 (Altitude: 6 feet)		
Pleistocene series:		
Surface soils	6	6
Sand and gravel, light	51	57
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay (mud), black	63	120
Manokin aquifer:		
Sand, gray	23.8	143.8
Well-Som-Bd 16 (Altitude: 8 feet)		
Pleistocene series:		
Surface soils	26	26
Sand; water	24	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue; some gravel at 65 feet	65	115
Manokin aquifer:		
Sand, gray; water	21	136
Well Som-Be 2 (Altitude: 18 feet)		
Pleistocene series:		
Sand and gravel	14	14
Sand, light, and gravel	4	18
Clay	7	25
Sand and gravel, pea size	22	47
Sand and gravel	11	58
Sand and gravel, small, with clay streaks	18	76

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	27	103
Well Som-Be 3 (Altitude: 18 feet)		
Pleistocene series:		
Sand, white	6	6
Sand, gray	6	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	5	17
Pocomoke aquifer:		
Sand, gray, and shell	44	61
Lower aquiclude:		
Clay, blue	11	72
Sand, gray	27	99
Clay, blue	18	117
Sand, black	10	127
Clay	51	178
Manokin aquifer:		
Sand, gray, and shells	22	200
Well Som-Be 4 (Altitude: 18 feet)		
Pleistocene series:		
Missing	10	10
Beaverdam sand:		
Sand, medium, buff	30	40
Missing	5	45
Sand, medium, light gray, some granules and pebbles, 1 inch	10	55
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, coarse to very coarse, gray	10	65
Silt and clay (mud)	82	147
Manokin aquifer:		
Sand, medium to fine, gray	23	170
Missing	17	187
Well Som-Be 5 (Altitude: 10 feet)		
Pleistocene and Pliocene (?) series:		
Top soil; sand and clay	19	19
Sand; water, bad odor	5	24
Silt and clay (mud)	21	45
Sand; water, irony	10	55
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	75	130

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, gray; water	21	151
Well Som-Be 6 (Altitude: 18 feet)		
Pleistocene series:		
Clay, dark	6	6
Sand, coarse, white	66	72
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	80	152
Manokin aquifer:		
Sand, very fine	44	196
Well Som-Be 9 (Altitude: 10 feet)		
Pleistocene series:		
Top soil; sand and clay	10	10
Sand; water	2	12
Silt and clay (mud)	23	35
Sand; water	25	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	120	180
Manokin aquifer:		
Sand; water	23	203
Well Som-Be 10 (Altitude: 10 feet)		
Pleistocene and Pliocene (?) series:		
Top soil and sand; water	25	25
Silt and clay (mud)	25	50
Sand; water, irony	25	75
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	85	160
Manokin aquifer:		
Sand; water	34	194
Well Som-Be 11 (Altitude: 16 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	10	10
Sand and gravel	4	14
Sand, white	8	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	8	30
Sand, gray	5	35
Clay, blue	37	72
Sand, dark	28	100
Clay, blue	60	160

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, gray, and shells	28	188
Well Som-Be 12 (Altitude: 16 feet)		
Pleistocene and Pliocene (?) series:		
Top soil; sand and clay	12	12
Clay, sandy	24	36
Sand; water, irony	24	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	95	155
Manokin aquifer:		
Sand, gray; water	15	170
Well Som-Be 13 (Altitude: 18 feet)		
Pleistocene and Pliocene (?) series:		
Clay, white	3	3
Sand, white	19	22
Clay, blue	6	28
Sand and gravel	22	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	10	60
Sand, gray	22	82
Clay, red	83	165
Manokin aquifer:		
Sand, gray, and shells	43	208
Well Som-Be 14 (Altitude: 17 feet)		
Pleistocene and Pliocene (?) series:		
Sand, black	2	2
Sand, red	16	18
Sand, gray	37	55
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	6	61
Sand, gray	14	75
Clay, blue	97	172
Manokin aquifer:		
Sand, gray	40	212
Well Som-Be 15 (Altitude: 14 feet)		
Pleistocene and Pliocene (?) series:		
Top soil and sand, black	4	4
Sand, red	14	18
Sand and gravel	2	20
Sand, gray	20	40
Sand and gravel	4	44
Sand, gray	15	59
Gravel and sand	2	61

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	61	122
Sand, black	10	132
Clay, blue	23	155
Manokin aquifer:		
Sand, gray, and shells	43	198
Well Som-Be 16 (Altitude: 15 feet)		
Pleistocene and Pliocene (?) series:		
Top soil, dark	2	2
Sand, red	6	8
Sand, white	30	38
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	22	60
Sand, gray	12	72
Clay	54	126
Sand, black	6	132
Clay, blue	26	158
Manokin aquifer:		
Sand, gray	30	188
Well Som-Be 17 (Altitude: 17 feet)		
Pleistocene series:		
Sand; silt and clay	27	27
Sand; water	8	35
Silt and clay (mud)	10	45
Sand; water	40	85
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	15	100
Sand	2	102
Clay; fine sand and silt	55	157
Manokin aquifer:		
Sand	23	180
Well Som-Be 18 (Altitude: 16 feet)		
Pleistocene series:		
Clay, yellow	6	6
Sand and gravel	8	14
Sand, gray	32	46
Sand and gravel	4	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	28	78
Clay, blue	90	168
Manokin aquifer:		
Sand, gray	32	200

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Be 19 (Altitude: 15 feet)		
Pleistocene series:		
Sand; silt and clay	15	15
Clay, sandy	20	35
Sand; water	21	56
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	92	148
Manokin aquifer:		
Sand; water	18	166
Well Som-Be 43 (Altitude: 18 feet)		
Pleistocene series:		
Sand, white	10	10
Gravel	2	12
Sand, white	6	18
Gravel	2	20
Sand, white	20	40
Miocene series:		
Lower aquiclude:		
Clay, blue	10	50
Sand, brown	18	68
Clay, blue	32	100
Sand, gray	20	120
Clay, blue	30	150
Manokin aquifer:		
Sand, brown	12	162
Sand, gray	41	203
Well Som-Be 44 (Altitude: 18 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	7	7
Sand, white	10	17
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	23	40
Gravel	3	43
Sand, gray	29	72
Clay, blue	68	140
Manokin aquifer:		
Sand, gray, and shells	49	189
Well Som-Be 45 (Altitude: 17 feet)		
Recent and Pleistocene series:		
Surface soils	10	10
Sand; water	4	14
Silt; sand; clay and mud	9	23
Sand; water	7	30
Silt; sand; clay and mud	10	40
Sand; water and gravel	44	84

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	106	190
Manokin aquifer:		
Sand, brown	3	193
Sand, very fine; water	20	213
Well Som-Be 46 (Altitude: 17 feet)		
Recent, Pleistocene and Pliocene (?) series:		
Surface soils (mostly clay)	21	21
Sand; water (with odor)	5	26
Clay	19	45
Sand; much water, very irony	39	84
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	101	185
Manokin aquifer:		
Sand, dark brown, and water, very brown	5	190
Sand, fine, very hard, and water	19	209
Well Som-Be 47 (Altitude: 15 feet)		
Pleistocene series:		
Surface clays	13	13
Sand; water	3	16
Silt; sand; clay and mud	19	35
Sand; water	45	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; sand; clay and mud	105	185
Manokin aquifer:		
Sand; water	19	204
Well Som-Be 48 (Altitude: 10 feet)		
Pleistocene series:		
Sand, silty, medium, fine, red, brown	5	5
Silt and sand, medium, fine, buff	10	15
Sand, coarse, medium, some granules, buff	10	25
Sand, medium, gray, some granules	5	30
Sand, very coarse to medium, some granules, buff; water	40	70
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, coarse, gray, with clay stringers	5	75
Silt and clay, gray, tough	15	90
Silt and sand, granule to coarse, brown	10	100
Silt and sand, coarse to fine, gray	50	150
Silt and sand, medium to fine, gray; shell fragments	5	155

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, fine, brownish gray	5	160
Sand, medium to very fine, gray; shell fragments	20	180
Sand, gray; water	8	188
Well Som-Be 49 (Altitude: 18 feet)		
Pleistocene series:		
Pamlico formation:		
Clay	10	10
Sand and clay	7	17
Clay, blue	4	21
Beaverdam sand:		
Sand, coarse	14	35
Sand with clay balls	10	45
Sand, coarse	5	50
Sand and gravel	14	64
Test Hole Som-Be 50 (Altitude: 18 feet)		
Recent series:		
Top soil and fill	2	2
Pleistocene series:		
Parsonsburg sand:		
Sand, yellow	10	12
Sand and gravel, white	11	23
Pamlico formation:		
Clay, dark	2	25
Sand, coarse, tan, some gravel granules, and silt	15	40
Beaverdam sand:		
Sand, medium, and pea gravel, gray	12	52
Sand, very coarse to medium, gray, some pea gravel and granules	25	77
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand and clay, dark	5	82
Clay, dark	13	95
Sand	6	101
Clay, dark	17	118
Clay, sandy, dark	10	128
Silt and clay, gray	27	155
Manokin aquifer:		
Sand, medium to fine, gray; shell fragments	86	241
St. Marys (?) formation:		
Clay and silt, sandy, gray	49	290
Sand, coarse to medium, gray (hard drilling)	1	291
Clay and silt, sandy, gray	82	373

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Choptank (?) formation:		
Sand, coarse to fine, gray; shell fragments (hard drilling)	11	384
Sand, medium, gray	30	414
Sand, medium, gray; shell fragments (hard drilling)	5	419
Calvert (?) formation:		
Clay	2	421
Rock, shell	4	425
Silt; clay, and sand, coarse to medium, gray (driller reported mostly clay for the section)	30	455
Well Som-Be 52 (Altitude: 18 feet)		
Recent series:		
Topsoil	2	2
Pleistocene series:		
Parsonsburg sand:		
Sand, yellow	10	12
Sand, white, and gravel	11	23
Pamlico formation:		
Clay, dark	2	25
Sand and gravel	15	40
Sand, blue, and gravel; streaks of clay, dark	12	52
Beaverdam sand:		
Sand and gravel	25	77
Well Som-Bf 1 (Altitude: 28 feet)		
Pleistocene and Pliocene (?) series:		
Clay, red	10	10
Sand, red	8	18
Clay, blue	2	20
Sand, white	20	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	1	41
Pocomoke aquifer:		
Sand, gray, and shells	74	115
Lower aquiclude:		
Clay, blue	47	162
Manokin aquifer:		
Sand, brown	12	174
Sand, gray, and shells	58	232
Well Som-Ca 1 (Altitude: 3 feet)		
Pleistocene and Pliocene (?) series:		
Marsh soil	1.5	1.5
Clay, yellow	2.5	4
Sand, brown	8	12

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, gray	34	46
Clay, blue	4	50
Manokin aquifer:		
Sand and gravel, black	12	62
Clay, blue	48	110
St. Marys (?) formation:		
Clay, blue	110	220
Choptank (?) formation:		
Sand, gray, hard; shells	80	300
Calvert formation:		
Clay, blue	202	502
Sand, soft; rock	2	504
Eocene series:		
Piney Point (?) formation:		
Sand, dark gray	26	530
Clay, brown	16	546
Sand, gray, hard	54	600
Clay, blue	10	610
Paleocene series:		
Sand, black	50	660
Clay, blue	115	775
Sand, hard	10	785
Clay, blue	45	830
Upper Cretaceous series:		
Magothy formation:		
Sand, gray, soft	41	871
Well Som-Cb 1 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	20	20
Sand, gray	7	27
Gravel and sand	1	28
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	9	37
Clay, blue	84	121
Manokin aquifer:		
Sand, gray, and shells	36	157
Well Som-Cb 2 (Altitude: 6 feet)		
Pleistocene and Pliocene (?) series:		
Sand, white	11	11
Sand, red	10	21
Sand, gray	11	32
Gravel and sand	2	34

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	76	110
Manokin aquifer:		
Sand, gray	32	142
Well Som-Cb 15 (Altitude: 6 feet)		
Recent and Pleistocene series:		
Surface soils	14	14
Sand; water	2	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, variegated	44	60
Silt; clay; sand; shell and mud	4	64
Clay, blue, sticky	64	128
Manokin aquifer:		
Sand, fine, gray, and water	19	147
Wel Som-Cc 1 (Altitude: 2 feet)		
(Composite of two logs from different drillers who worked on this hole)		
Recent series:		
Soil, top, and subsoil, clay	5	5
Pleistocene series:		
Sand and gravel; salt water	40	45
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, very fine	15	60
Sand, fine, gray, and silt with gumbo clay and shells	102	162
Rock (8 inches)		162
St. Marys (?) formation: (split based on Ec 4)		
Sand, fine, gray, and silt	76	238
Gumbo clay and shells	40	278
Choptank (?) formation: (see Ec 4)		
Sand, very fine, hard	39	317
Sand, very fine, compact and hard, with rock	14	331
Sand, hard; salt water	9	340
Sand, fine, hard, and rock	15	355
Sand and mud	40	395
Sand; salty water	15	410
Calvert (?) formation:		
Sand, silty, fine, cementlike, hard, gray	160	570
Shells, yellow	15	585
Shale, greenish brown	51	636
Silt and sand, fine to coarse, black, alternately hard and soft	90	726

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Eocene (?) series:		
Piney Point formation:		
Sand, fine, medium, coarse, gray, with small shell fragments; water	6	732
Sand, green; water	3	735
Sand, silty, fine	105	840
Test Hole Som-Cc 4 (Altitude: 2 feet)		
Pliocene (?) series:		
Sand; silt and clay, medium, dark brown	1.5	1.5
Silt, clayey, sandy, medium, fine, brown to tan	1	2.5
Silt, clayey, sandy, medium, fine, red, brown	1.5	4
Silt; clay and sand, medium, fine, brown, gray, some granules.	1	5
Sand, silty, coarse, medium, brown	5.5	10.5
Sand, silty, coarse, red, brown	2	12.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, silty, medium, gray, buff	1.5	14
Sand and silt, medium to very fine, tan	13	27
Silt, sandy, fine, very fine, tan	11.5	38.5
Sand and silt, fine, very fine, gray, tan	5	43.5
Sand, silty, medium, fine, tan, buff	15	58.5
Silt, clayey, sandy, very fine, gray	36.5	95
Well Som-Cd 1 (Altitude: 4 feet)		
Pleistocene series:		
Sand; silt and clay	8	8
Sand (salt water)	4	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay and mud	124	136
Manokin aquifer:		
Sand	15	151
Well Som-Cd 2 (Altitude: 5 feet)		
Pleistocene series:		
Sand; silt and clay	12	12
Sand; water	4	16
Silt and clay (mud)	32	48
Sand	9	57
Gravel and sand	4	61
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt and clay (mud)	89	150
Manokin aquifer:		
Sand	16	166

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Cd 3 (Altitude: 2 feet)		
Pleistocene series:		
Missing	15	15
Sand, medium, tan	15	30
Sand, granule to medium, silty, tan, some pea-size gravel	10	40
Sand, granule to medium, gray, some pea-size and larger gravel	10	50
Sand, medium, buff	10	60
Sand, granule to medium, gray to buff, some pea-size and larger gravel	3	63
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand, fine to very fine, brown-gray	70	133
Manokin aquifer:		
Sand, medium, gray; shell fragments	14	147
Well Som-Cd 4 (Altitude: 8 feet)		
Pleistocene series:		
Sand, white	23	23
Clay, blue	37	60
Gravel and sand	2	62
Clay, blue	4	66
Sand, gray	25	91
Gravel and sand	2	93
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	72	165
Manokin aquifer:		
Sand, gray	28	193
Well Som-Cd 19 (Altitude: 20 feet)		
Pleistocene series:		
Sand	22	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, gray	33	55
Sand	17	72
Clay, black	95	167
Manokin aquifer:		
Sand, gray, and shells	29	196
Well Som-Cd 20 (Altitude: 20 feet)		
Pleistocene series:		
Sand	30	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Silt; clay and sand (mud, blue)	25	55
Sand, coarse, white	15	70
Silt; clay and sand (mud, blue)	95	165

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, fine, white, and water	35	200
Well Som-Ce 1 (Altitude: 12 feet)		
Pleistocene series:		
Clay, blue (?)	5	5
Clay and sand, light	60	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	13	78
Well Som-Ce 2 (Altitude: 14 feet)		
Recent series:		
Soil	1	1
Pleistocene series:		
Sand, white	41	42
Gravel and sand	6	48
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, white	36	84
Lower aquiclude:		
Clay, blue	11	95
Clay, yellow	5	100
Sand, gray, and shells	15	115
Clay, blue	95	210
Manokin aquifer:		
Sand, gray, and shells	36	246
Well Som-Ce 3 (Altitude: 14 feet)		
Recent series:		
Missing	1	1
Soils, dark earth	2	3
Pleistocene and Pliocene (?) series:		
Clay, blue	5	8
Sand, red	10	18
Sand, gray	10	28
Gravel and sand	2	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	30	60
Sand, white	20	80
Lower aquiclude:		
Clay, blue	15	95
Sand, black, and shells	15	110
Clay, blue	88	198
Manokin aquifer:		
Sand, gray, and shells	30	228

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ce 4 (Altitude: 12 feet)		
Pleistocene and Pliocene (?) series:		
Sand, white	6	6
Sand, red	5	11
Sand, gray	22	33
Gravel and sand	2	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	45	80
Lower aquiclude:		
Clay, blue	100	180
Manokin aquifer:		
Sand, gray, and shells	45	225
Well Som-Ce 5 (Altitude: 12 feet)		
Recent (?) series:		
Missing	6	6
Pleistocene and Pliocene (?) series:		
Sand, red	4	10
Gravel	2	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, brown	28	40
Pocomoke aquifer:		
Sand, gray	38	78
Lower aquiclude:		
Clay, blue	34	112
Sand, black	8	120
Clay, blue	60	180
Manokin aquifer:		
Sand, gray	55	235
Well Som-Ce 7 (Altitude: 11 feet)		
Recent and Pleistocene series:		
Surface soils and water	18	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Silt; sand; clay and mud	22	40
Sand; water, irony	40	80
Lower aquiclude:		
Silt; sand; clay and mud	90	170
Manokin aquifer:		
Sand; water	28.5	198.5

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ce 8 (Altitude: 14 feet)		
Pleistocene and Pliocene (?) series:		
Clay	6	6
Sand, red	14	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, light gray, some gravel	20	40
Sand, dark gray, and gravel; much water, irony	40	80
Lower aquiclude:		
Clay, blue	110	190
Manokin aquifer:		
Sand; water	45	235
Well Som-Ce 9 (Altitude: 14 feet)		
Pleistocene and Pliocene (?) series:		
Clay, blue	8	8
Sand, red	12	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, light gray	20	40
Sand, dark gray; much water, irony	40	80
Lower aquiclude:		
Clay, blue	110	190
Manokin aquifer:		
Sand; water	48	238
Well Som-Ce 10 (Altitude: 14 feet)		
Recent series:		
Surface soils, black	2	2
Pliocene (?) series:		
Sand, red	10	12
Gravel	2	14
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	6	20
Gravel	2	22
Sand, coarse, gray	22	44
Sand, coarse, white	36	80
Gravel	2	82
Lower aquiclude:		
Clay, blue	8	90
Sand, black, and shells	20	110
Clay, blue	79	189
Manokin aquifer:		
Sand, gray, and shells	33	222

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ce 11 (Altitude: 12 feet)		
Recent and Pleistocene series:		
Surface soils; water	16	16
Silt; sand; clay and mud	10	26
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand; water	14	40
Lower aquiclude:		
Silt; sand; clay and mud	45	85
Sand; water	17	102
Clay, blue	68	170
Manokin aquifer:		
Sand; water	22	192
Well Som-Ce 12 (Altitude: 12 feet)		
Recent (?) series:		
Missing	5	5
Pleistocene and Pliocene (?) series:		
Clay, brown	3	8
Sand, red	5	13
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, brown	27	40
Pocomoke aquifer:		
Sand, coarse, gray, and gravel	20	60
Sand, black, and shells	7	67
Lower aquiclude:		
Clay, blue	101	168
Manokin aquifer:		
Sand, coarse, gray	42	210
Well Som-Ce 13 (Altitude: 14 feet)		
Pleistocene series:		
Clay, dark brown	8	8
Sand, coarse, white, and gravel (division based on Ce 8)	22	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, coarse, white, and gravel	48	78
Lower aquiclude:		
Clay, blue	17	95
Sand, fine	15	110
Clay, blue	85	195
Manokin aquifer:		
Sand, coarse, gray, and shells, very fine	42	237

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ce 14 (Altitude: 14 feet)		
Pliocene (?) series		
Sand, red	8	8
Sand, white, and gravel (division based on Ce 8)	22	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, white, and gravel	52	82
Lower aquiclude:		
Clay, blue	13	95
Sand, black and gray	10	105
Shells, very hard	5	110
Clay, blue	68	178
Manokin aquifer:		
Sand and gravel, hard	15	193
Sand, gray, and shells	40	233
Well Som-Ce 15 (Altitude: 10 feet)		
Pliocene (?) series:		
Clay, red	4	4
Sand, red	5	9
Clay, white	3	12
Sand, red, and gravel	28	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, white	29	69
Lower aquiclude:		
Clay, blue	21	90
Sand, black	20	110
Clay, blue	50	160
Manokin aquifer:		
Sand, coarse, gray, and shells	30	190
Well Som-Ce 39 (Altitude: 20 feet)		
Pliocene (?) series:		
Sand, red	16	16
Gravel	5	21
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	7	28
Pocomoke aquifer:		
Sand, gray	45	73
Gravel	2	75
Clay, blue	5	80
Sand, gray	15	95

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Lower aquiclude:		
Clay, blue	100	195
Manokin aquifer:		
Sand, gray, hard	20	215
Sand, gray	67	282
Well Som-Cf 1 (Altitude: 15 feet)		
Pleistocene series:		
Sand, medium to fine, light buff	40	40
Gravel, pea-size, some ½-inch, white and gray	8	48
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, medium, light buff	57	105
Lower aquiclude:		
Clay, blue	5	110
Silt, light coffee-brown; some medium to coarse sand with granules	15	125
Silt, light gray; some fine sand with granules and pea-size gravel	70	195
Manokin aquifer:		
Sand, medium, light gray, some shell fragments	15	210
Well Som-Cf 3 (Altitude: 11 feet)		
Recent and Pleistocene series:		
Surface soils	8	8
Sand; water	3	11
Clay; silt; sand and mud	14	25
Sand; water, irony	5	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay; silt; sand and mud	25	55
Pocomoke aquifer:		
Sand and gravel; water, irony	30	85
Lower aquiclude:		
Silt; sand; clay, blue, and mud	100	185
Manokin aquifer:		
Sand, gray; water	31	216
Well Som-Cf 4 (Altitude: 16 feet)		
Pleistocene series:		
Sand; water	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; sand; clay and mud	55	65
Pocomoke aquifer:		
Sand; water	29	94
Lower aquiclude:		
Clay, blue, very hard	126	220

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand; water	23	243
Rock		243
Well Som-Cf 6 (Altitude: 20 feet)		
Pleistocene series:		
Sand, medium, light buff	30	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, very coarse to fine, gray, and gravel	30	60
Sand, medium to fine, brown and gray	20	80
Sand, very coarse to medium, some granules and pea-size gravel	10	90
Sand, coarse to medium, with silt, some granules and pea-size gravel	30	120
Lower aquiclude:		
Silt, blue (wet), gray-brown (dry); some sand, fine	10	130
Sand, silty, medium, light brown, iron-stained, with shell fragments	10	140
Silt, blue (wet), light olive-brown (dry), with shell fragments and fine sand	80	220
Manokin aquifer:		
Sand, fine, gray (wet), light grayish-brown (dry), and shells	36	256
Test Hole Som-Dc 1 (Altitude: 2 feet)		
Pleistocene series:		
Parsonsburg sand:		
Silt, sandy, clayey, fine, dark brown to buff, tough	2	2
Sand and silt, medium, fine, buff to tan, tough	1.5	3.5
Sand and silt, medium, tan	3	6.5
Sand, silty, medium, brown to dark brown	3	9.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Silt, sandy, fine to very fine, gray	2	11.5
Silt, sandy, fine to very fine, gray, some pyrite	1	12.5
Sand, silty, fine to very fine, gray	1	13.5
Silt, sandy, clayey, fine to very fine, tan	1.5	15
Silt, sandy, clayey, fine to very fine, tan, some gravel	3.5	18.5
Silt, clayey, gray, tan, tough	13	31.5
Silt, clayey, sandy, fine to very fine, gray, iron-red	2.5	34
Sand, silty, medium, gray, some gravel	29	63
Silt, sandy, medium to fine, gray, some gravel	1	64
Well Som-Dc 2 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	7	7

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer (?):		
Sand, gray	12	19
Clay, blue	9	28
Sand, gray	24	52
Lower aquiclude:		
Clay, blue	6	58
Sand, gray	22	80
Clay, blue	35	115
Sand, gray	24	139
Well Som-Dd 1 (Altitude: 5 feet)		
Pleistocene series:		
Sand, light	35	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, light yellow	40	75
Sand and shells; some clay balls	90	165
Clay, blue	17	182
Manokin aquifer:		
Sand, green; water	19	201
Well Som-Dd 2 (Altitude: 8 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	8	8
Clay, brown	6	14
Gravel	3	17
Sand, brown	13	30
Sand, coarse, and gravel	6	36
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	22	58
Pocomoke aquifer:		
Sand, gray	24	82
Lower aquiclude:		
Clay, blue	23	105
Sand, black, and shells	16	121
Clay, blue	23	144
Sand, gray, and clay	26	170
Well Som-Dd 3 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	14	14

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	14	28
Clay, blue	12	40
Sand, gray	20	60
Lower aquiclude:		
Clay, blue	10	70
Sand, gray	10	80
Clay, blue	15	95
Sand, black	25	120
Clay, blue	8	128
Sand, gray	24	152
Well Som-Dd 4 (Altitude: 6 feet)		
Recent and Pleistocene series:		
Surface soils	20	20
Sand; water	13	33
Well Som-Dd 5 (Altitude: 9 feet)		
Recent and Pleistocene series:		
Surface soils	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Silt; clay; sand and mud	45	65
Pocomoke aquifer:		
Sand; water	21	86
Well Som-Dd 6 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	16	16
Sand	2	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Silt; sand; clay and mud	53	71
Pocomoke aquifer:		
Sand; water	15	86
Well Som-Dd 7 (Altitude: 6 feet)		
Recent series:		
Sand; silt and clay	8	8
Pleistocene series:		
Sand; water	1	9
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay; sand and silt (mud)	33	42

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand; water	15	57
Well Som-Dd 8 (Altitude: 6 feet)		
Recent series:		
Sand; silt and clay	10	10
Pleistocene series:		
Sand; water, salty	2	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay; silt and sand (mud)	23	35
Pocomoke aquifer:		
Sand	15	50
Lower aquiclude:		
Clay; silt and sand (mud)	35	85
Sand, green; water	15	100
Well Som-Dd 9 (Altitude: 8 feet)		
Pleistocene series:		
Clay, white	5	5
Sand, dark	5	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, gray	8	18
Clay, brown	7	25
Pocomoke aquifer:		
Sand, coarse, gray	7	32
Clay, blue	4	36
Sand, coarse, gray	9	45
Gravel, heavy	10	55
Clay, blue	5	60
Sand, coarse, gray	31	91
Well Som-Dd 10 (Altitude: 8 feet)		
Recent series:		
Clay, dark	4	4
Pleistocene series:		
Sand, fine, gray	6	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	15	25
Pocomoke aquifer:		
Sand, light gray	6	31
Clay, brown	4	35
Sand, coarse, gray	55	90
Lower aquiclude:		
Clay, blue	30	120
Sand, black	11	131

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Dd 11 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils; water	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	38	58
Pocomoke aquifer:		
Sand; water	23	81
Well Som-Dd 12 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Sand, white	8	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	22	30
Pocomoke aquifer:		
Sand, gray	30	60
Gravel	4	64
Sand, gray	16	80
Clay, blue	5	85
Sand, gray	8	93
Lower aquiclude:		
Manokin aquifer (at depth ?)		
Not reported	99	192
Well Som-Dd 13 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils; water	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	48	68
Pocomoke aquifer:		
Sand; water	16	84
Well Som-Dd 14 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils; water	18	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	47	65
Pocomoke aquifer:		
Sand; water	19.5	84.5
Well Som-Dd 15 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Silt; clay; sand and gravel; water	25	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	35	60

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand; water	12	72
Well Som-Dd 16 (Altitude: 7 feet)		
Recent and Pleistocene series:		
Sand; silt and clay	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	50	70
Pocomoke aquifer:		
Sand; water	18.5	88.5
Well Som-Dd 17 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils; water	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	37	57
Pocomoke aquifer:		
Sand; water	18	75
Well Som-Dd 19 (Altitude: 8 feet)		
Recent series:		
Clay; silt and sand (mud)	22	22
Pleistocene series:		
Sand	8	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; clay and sand (mud)	30	60
Pocomoke aquifer:		
Sand; water	18	78
Well Som-Dd 20 (Altitude: 8 feet)		
Recent series:		
Surface soils	10	10
Pleistocene series:		
Sand, clayey, some water	6	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay; silt and sand (mud)	30	46
Pocomoke aquifer:		
Sand; water, very irony	9	55
Well Som-Dd 21 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	11	11

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	5	16
Sand, gray	2	18
Clay, blue	7	25
Silt; clay and sand (pieces of wood)	2	27
Clay, brown	5	32
Pocomoke aquifer:		
Sand, coarse, gray	7	39
Sand, brown	21	60
Sand, coarse, gray	31	91
Lower aquiclude:		
Clay, brown	7	98
Sand, gray, and shells	5	103
Clay, brown	7	110
Sand, green	7	117
Clay, brown	3	120
Sand, black, and shells	16	136
Clay, blue	44	180
Manokin aquifer:		
Sand, coarse, and shells	34	214
Well Som-Dd 22 (Altitude: 7 feet)		
Pliocene (?) series:		
Sand, red	12	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	29	41
Pocomoke aquifer:		
Sand, coarse, gray, and gravel	17	58
Sand, coarse, gray	27	85
Lower aquiclude:		
Clay, brown	12	97
Sand, gray, and shells	13	110
Sand, brown	20	130
Sand, gray	17	147
Clay, blue	43	190
Manokin aquifer:		
Sand, coarse, gray, and shells	30	220
Well Som-Dd 23 (Altitude: 5 feet)		
Recent series:		
Surface soils	8	8
Pleistocene series:		
Sand	4	12

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; sand and clay (mud)	18	30
Clay and gravel	3	33
Clay	37	70
Pocomoke aquifer:		
Sand; water	16	86
Well Som-Dd 25 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	8	8
Sand, gray	8	16
Gravel, coarse	2	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	17	35
Pocomoke aquifer:		
Sand, coarse, gray	18	53
Clay, blue	7	60
Sand, gray	15	75
Lower aquiclude:		
Clay, blue, and shells	18	93
Sand, black, and shells	5	98
Clay, brown	7	105
Clay, blue	21	126
Sand, gray, and shells	29	155
Well Som-Dd 26 (Altitude: 8 feet)		
Pleistocene and Pliocene (?) series:		
Missing	1	1
Clay	3	4
Sand, red	5	9
Clay, brown	14	23
Gravel	2	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	45	70
Pocomoke aquifer:		
Sand, coarse, gray	12	82
Lower aquiclude:		
Clay, blue	36	118
Sand, fine, and shells	34	152
Well Som-Dd 27 (Altitude: 8 feet)		
Pleistocene and Pliocene (?) series:		
Sand, black	2	2
Sand, red	8	10

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	18	28
Pocomoke aquifer:		
Sand, gray	22	50
Gravel	10	60
Sand, coarse, gray	40	100
Well Som-Dd 28 (Altitude: 2 feet)		
Recent series:		
Shells (oyster)	3	3
Pleistocene and Pliocene (?) series:		
Sand, gray	7	10
Sand, brown	12	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, soft	3	25
Pocomoke aquifer:		
Sand, greenish, and shells	30	55
Sand and gravel	12	67
Sand, green, and water	17	84
Well Som-Dd 29 (Altitude: 5 feet)		
Pliocene (?) series:		
Sand, red	14	14
Gravel	2	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	40	56
Sand, white	14	70
Sand, gray	25	95
Lower aquiclude:		
Clay, blue	20	115
Sand, black	7	122
Clay, blue	13	135
Sand, gray, and shells	30	165
Well Som-Dd 30 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	7	7
Sand, red	2	9
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	10	19
Clay, blue	13	32
Sand, gray	50	82

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Lower aquiclude:		
Clay, blue	16	98
Sand, gray, and shells	8	106
Clay, blue	4	110
Sand, black	5	115
Clay, blue	10	125
Sand, gray, and shells	38	163
Well Som-Dd 31 (Altitude: 9 feet)		
Pleistocene and Pliocene (?) series:		
Clay, gray	5	5
Sand, red	5	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	5	15
Gravel	1	16
Clay, blue	22	38
Sand, gray	52	90
Gravel	3	93
Lower aquiclude:		
Clay, blue	7	100
Sand, gray	6	106
Clay, blue	10	116
Sand, black	4	120
Sand, gray	20	140
Well Som-Dd 32 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Missing	10	10
Sand	40	50
Sand and gravel	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay and sand	30	130
Clay, soft, and water	20	150
Missing	15	165
Well Som-Dd 33 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	19	19
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	19	38
Pocomoke aquifer:		
Sand, coarse, gray	46	84

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Lower aquiclude:		
Clay, blue	10	94
Sand, green	11	105
Clay, blue	5	110
Sand, black, and shells	10	120
Clay, blue	2	122
Sand, green, and shells	25	147
Well Som-Dd 34 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Clay, brown	4	4
Sand, red	5	9
Clay, brown	14	23
Gravel	2	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	45	70
Pocomoke aquifer:		
Sand, coarse, gray	12	82
Lower aquiclude:		
Clay, blue	36	118
Shells and sand, fine	34	152
Well Som-Dd 35 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, white	2	2
Sand, red	8	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	10	20
Clay, blue	18	38
Pocomoke aquifer:		
Sand, coarse (?)	30	68
Sand, brown	19	87
Lower aquiclude:		
Clay, blue	8	95
Sand, black	15	110
Clay, blue	4	114
Sand, fine, gray	36	150
Well Som-Dd 36 (Altitude: 4 feet)		
Missing:	10	10
Pleistocene and Pliocene (?) series:		
Sand	40	50
Sand and gravel	50	100

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, and clay	25	125
Sand, black	25	150
Sand; water	5	155
Well Som-Dd 37 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Surface soils	2	2
Sand, white	8	10
Sand, red	10	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	14	34
Pocomoke aquifer:		
Sand, coarse, gray, and gravel	51	85
Lower aquiclude:		
Clay, blue	5	90
Sand, gray–black	15	105
Clay, blue	25	130
Sand; water	36.5	166.5
Well Som-Dd 38 (Altitude: 5 feet)		
Missing:	10	10
Pleistocene and Pliocene (?) series:		
Sand	40	50
Sand and gravel; much water, irony	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, and clay	25	125
Sand, black	5	130
Sand; water	22	152
Well Som-Dd 40 (Altitude: 5 feet)		
Pleistocene series:		
Surface soils, black	6	6
Sand, gray	10	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, brown	23	39
Pocomoke aquifer:		
Sand, gray	31	70
Lower aquiclude:		
Clay, blue	45	115
Sand, black	13	128
Sand, gray, and shells	24	152

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Dd 41 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, brown	5	15
Pocomoke aquifer:		
Sand, coarse, gray	45	60
Lower aquiclude:		
Clay, blue	50	110
Sand, fine, gray	39	149
Well Som-Dd 42 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	3	3
Sand, red	7	10
Sand, gray	8	18
Gravel	2	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	15	35
Pocomoke aquifer:		
Gravel	5	40
Sand, brown	55	95
Lower aquiclude:		
Clay, blue	15	110
Sand, black (?)	4	114
Clay, blue	4	118
Sand, gray	32	150
Well Som-Dd 43 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	9	19
Clay, blue	14	33
Sand, coarse, gray	25	58
Clay, blue	4	62
Sand, coarse, gray	19	81
Lower aquiclude:		
Clay, blue	5	86
Sand, gray, and shells	9	95
Clay, blue	15	110

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, black, and shells	5	115
Clay, blue	33	148
Sand, fine, gray, and shells	1	149
Well Som-Dd 44 (Altitude: 6 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	19	19
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	19	38
Pocomoke aquifer:		
Sand, coarse, gray	46	84
Lower aquiclude:		
Clay, blue	10	94
Sand, green	11	105
Clay, blue	5	110
Sand, black, and shells	10	120
Clay, blue	2	122
Sand, gray, and shells	25	147
Well Som-Dd 45 (Altitude: 6 feet)		
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	6	6
Clay, blue	24	30
Pocomoke aquifer:		
Sand, gray	44	74
Gravel	2	76
Lower aquiclude:		
Clay, blue	19	95
Sand, black, and shells	8	103
Clay, blue	22	125
Sand, gray, and shells	38	163
Well Som-De 1 (Altitude: 12 feet)		
Recent series:		
Surface soils	6	6
Pleistocene series:		
Sand; water	4	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Silt; clay and sand (mud)	60	70
Pocomoke aquifer:		
Sand; water, poor quality	20	90
Sand; very little water	20	110
Lower aquiclude:		
Clay, blue, sticky	79	189
Rock	1	190

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand; no water	10	200
Sand, fine; silt and clay (mud)	120	320
St. Marys (?) formation: (subdivision arbitrary)		
Silt; clay and sand, fine (mud)	100	420
Well Som-De 2 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	8	8
Sand; water	2	10
Miocene (?) series:		
Yorktown and Cohansey formations (?):		
Silt; sand and clay (mud)	55	65
Pocomoke aquifer:		
Sand; water	16	81
Well Som-De 3 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	12	12
Sand; water	3	15
Miocene (?) series:		
Yorktown and Cohansey formations (?):		
Silt; sand and clay (mud)	50	65
Pocomoke aquifer:		
Sand; water	19	84
Silt; sand and clay (mud)	20	104
Sand, green; water	16	120
Well Som-De 4 (Altitude: 8 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	12	12
Gravel	9	21
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	23	44
Sand and gravel	49	93
Well Som-De 6 (Altitude: 9 feet)		
Recent and Pleistocene series:		
Surface soils	16	16
Silt; clay and sand (mud)	14	30
Gravel	25	55
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	35	90
Pocomoke aquifer:		
Sand, green; water	26	116

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-De 7 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	18	18
Sand; silt and clay (mud)	32	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay and gravel (mud)	35	86
Pocomoke aquifer:		
Sand; water	33	118
Well Som-De 8 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	8	8
Sand; water	4	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand; silt and clay (mud)	48	60
Pocomoke aquifer (?):		
Sand; water	10	70
Clay	30	100
Sand, green; water	17	117
Well Som-De 9 (Altitude: 4 feet)		
Recent and Pleistocene series:		
Surface soils	18	18
Sand; water	2	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay; silt and sand (mud)	57	77
Pocomoke aquifer:		
Sand; water	14	91
Well Som-De 10 (Altitude: 3 feet)		
Recent and Pleistocene series:		
Surface soils	9	9
Sand; water	2	11
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Silt; sand; clay; some gravel (mud)	61	72
Pocomoke aquifer:		
Sand; water	14	86
Well Som-De 11 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	12	12
Sand; water	6	18

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, silt and sand (mud)	37	55
Pocomoke aquifer:		
Sand; water	10	65
Clay, silt and sand (mud)	30	95
Sand, green; water; some shells and mud balls	17	112
Well Som-De 12 (Altitude: 9 feet)		
Pleistocene series:		
Clay, yellow	4	4
Sand, white	8	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray, and shells	6	18
Clay, blue	19	37
Pocomoke aquifer:		
Sand, coarse, gray	49	86
Clay, blue	4	90
Sand, brown	8	98
Sand, fine, gray	52	150
Well Som-De 14 (Altitude: 5 feet)		
Pleistocene series:		
Sand, white	18	18
Clay, blue	24	42
Gravel, heavy	2	44
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, light gray	31	75
Well Som-De 15 (Altitude: 8 feet)		
Pleistocene series:		
Clay	7	7
Sand and gravel; water, irony	53	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	10	70
Pocomoke aquifer:		
Sand; water	30	100
Well Som-De 16 (Altitude: 8 feet)		
Recent and Pleistocene series:		
Surface soils	10	10
Sand; water	4	14

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; sand and clay (mud)	47	61
Pocomoke aquifer:		
Sand, fine, and gravel	26	87
Well Som-De 26 (Altitude: 12 feet)		
Pleistocene and Pliocene (?) series:		
Clay, yellow	6	6
Sand, red, and gravel	24	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer (?):		
Sand, coarse, gray	22	52
Sand; white	8	60
Sand, coarse, gray	33	93
Clay, blue	12	105
Sand, white; water	15	120
Well Som-Df 1 (Altitude: 7 feet)		
Recent and Pleistocene series:		
Surface soils	12	12
Sand; water	4	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt; sand and clay (mud)	44	60
Pocomoke aquifer:		
Sand; water	22	82
Well Som-Df 2 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	18	18
Boulder	1	19
Gravel	4	23
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	16	39
Clay, blue	22	61
Pocomoke aquifer:		
Sand, gray	38	99
Gravel	4	103
Sand, white	14	117
Sand, gray	16	133
Gravel	3	136
Lower aquiclude:		
Clay, blue	13	149
Sand, black	11	160

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue	100	260
Rock, hard (.25 foot)	—	260
Clay, blue	47	307
Manokin aquifer (?):		
Sand, coarse, gray	43	350
St. Marys (?) formation:		
Clay, white	50	400
Choptank (?) formation:		
Sand, coarse, gray	40	440
Well Som-Ea 1 (Altitude: 2 feet)		
Pleistocene series:		
Gravel, heavy	60	60
Miocene series:		
Clay, blue	200	260
Hard pan (.75 foot)		260
Sand; water	10	270
Calvert (?) formation:		
Sand; water; hard pan and clay, blue	270	540
Eocene series:		
Piney Point formation:		
Sand; little water	27	567
Rock, sand, hard (19 layers), and clay	58	625
Paleocene series:		
Sand, black, and clay at intervals	75	700
Clay	95	795
Upper Cretaceous series:		
Magothy (?) formation:		
Sand; water	46	841
Well Som-Ea 2 (Altitude: 2 feet)		
Pleistocene series:		
Sand, fine, light yellow; few shell fragments	10	10
Sand, medium, light yellow-orange, some quartz grains, iron-stained	10	20
Sand, medium; a little clay, light brown; shell fragments; bone; wood	10	30
Sand, coarse to medium, light brown	10	40
Sand, medium to fine, light yellow	20	60
Miocene subdivided on lithology and regional interpretation:		
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, light yellowish-brown; shell fragments; glauconite most abundant	20	80
Clay and sand, light brown; shell fragments; much glauconite	10	90
Sand, clay, light brown; shell fragments; glauconite	10	100
Marl, clayey and sandy, light brown	20	120

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
St. Marys (?) formation:		
Clay, sandy, light brown	10	130
Clay, sandy, light olive-brown; shell fragments; glauconite; pyrite	10	140
Marl; clay, sandy, light olive-brown; shell fragments; glauconite	10	150
Marl; clay, sandy, light olive-brown; shell fragments; glauconite, pyrite	10	160
Marl; clay, sandy, light olive-brown; mother of pearl; Foraminifera	10	170
Clay, sandy, light brown; shell fragments; glauconite; pyrite; a little wood	20	190
Sand, clayey, light yellowish-brown; shell fragments	10	200
Clay, somewhat sandy, light brown	10	210
Clay, sandy, light brown; glauconite	10	220
Clay, somewhat sandy, light brown	10	230
Choptank (?) formation:		
Sand, medium, clayey; shell fragments; little glauconite	10	240
Sand, clayey, light brown; shell fragments; glauconite; pyrite	10	250
Sand, medium, somewhat clayey, light brown; glauconite	10	260
Sand, medium, light brown; very little glauconite	10	270
Sand, somewhat clayey, light brown; shell fragments; glauconite; pyrite	10	280
Clay, sandy, light brown; glauconite	10	290
Calvert (?) formation:		
Sand, fine, light yellow; glauconite	10	300
Sand, fine, light yellow; little or no glauconite	10	310
Sand, fine, yellowish-gray	20	330
Sand, fine, light yellow; glauconite	30	360
Sand, fine, light olive; glauconite	60	420
Sand, clayey, light brown	10	430
Sand, clayey, light brown; glauconite; diatoms	30	460
Sand, clayey, light brown	20	480
Clay, sandy, light brown	10	490
Clay, sandy, fine, light brown	10	500
Clay, sandy, fine, light brown	20	520
Clay, sandy, fine, light brown; mica; glauconite	70	590
Eocene series:		
Piney Point formation:		
Sand, light olive-gray	20	610
Sand, clayey, light brown; shell fragments	30	640
Sand, clayey, green to olive-gray; shell fragments; glauconite	30	670
Sand, clayey, green to light olive; shell fragments; glauconite	10	680
Paleocene series:		
Sand, green to olive-gray; shell fragments; glauconite	10	690
Sand, green; some clay, light olive; glauconite	20	710
Clay and sand, green to light olive	10	720
Sand, green to olive-black; glauconite	10	730

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, green; some clay, light olive; few shell fragments; glauconite	10	740
Sand, green; some clay, olive-gray; glauconite; little pyrite	20	760
Sand, green; considerable clay, light olive; few shell fragments; glauconite	10	770
Sand, green, and clay, light olive	10	780
Clay and sand, green to light olive; shell fragments and glauconite	10	790
Upper Cretaceous series:		
Magothy (?) formation:		
Sample missing	20	810
Sand, medium to fine, micaceous, light yellow	10	820
Well Som-Ea 4 (Altitude: 2 feet)		
Pleistocene series:		
Sand	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	30	40
Sand and gravel	20	60
St. Marys (?) formation:		
Clay, blue	190	250
Detail lost below this depth. See logs of Ea 1 and Ea 2.		
Total depth		852
Well Som-Ea 7 (Altitude: 2 feet)		
Recent, Pleistocene and Pliocene (?) series:		
Sand, red	18	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	12	30
Sand, gray, and shells	5	35
Clay, blue	10	45
Sand, coarse, gray	10	55
Clay, blue	10	65
Sand, coarse, white, and gravel	19	84
Clay, blue	20	104
St. Marys (?) formation:		
Clay, blue	137	241
Choptank (?) formation:		
Sand, gray, and shells	24	265
Sand rock, hard (see Ea 9)	35	300
Calvert (?) formation:		
Sand rock, hard	212	512
Sand, dark gray	16	528
Clay, blue	12	540

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Eocene (?) series:		
Piney Point formation:		
Sand, gray	18	558
Sand rock, hard	4	562
Sand, hard	5	567
Sand rock, hard	42	609
Clay, light blue	11	620
Paleocene (?) series:		
Sand rock, hard	31	651
Sand, black	16	667
Clay, blue	100	767
Upper Cretaceous (?) series:		
Magothy (?) formation:		
Sand, white and clay	81	848
Well Som-Ea 8 (Altitude: 2 feet)		
Recent, Pleistocene and Pliocene (?) series:		
Clay, brown	8	8
Sand, red	10	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	20	38
Clay and gravel, blue	12	50
Clay, blue	10	60
Sand, gray	10	70
Sand and gravel	4	74
Clay, blue	26	100
St. Marys formation:		
Clay, dark blue	131	231
Choptank (?) formation:		
Sand, fine, gray	31	262
Rock, hard	1.5	263.5
Sand, fine, gray	30.5	294
Calvert (?) formation:		
Rock, sand, hard	1.5	295.5
Clay, dark blue	216.5	512
Rock, sand, hard	3	515
Sand, crusty	15	530
Eocene (?) series:		
Piney Point formation:		
Sand, crusty	85	615
Clay, blue	15	630
Paleocene (?) series:		
Clay, blue	10	640
Sand, black	58	698
Clay, blue	100	798
Upper Cretaceous (?) series:		
Sand, gray	42	840
Sand	31	871

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ea 9 (Altitude: 2 feet)		
Recent, Pleistocene and Pliocene (?) series:		
Surface soils, black	8	8
Sand, red	11	19
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	5	24
Sand, fine, brown	38	62
Clay, blue	12	74
Sand, coarse, gray	19	93
Clay, blue	10	103
St. Marys (?) formation:		
Clay, blue	29	132
Sand, gray	26	158
Clay, blue	77	235
Choptank (?) formation:		
Sand, gray, and shells	43	278
Sand rock, hard	—	278
Sand, gray	14	292
Calvert (?) formation:		
Clay, blue	233	525
Sand, gray	42	567
Clay, blue	8	575
Eocene (?) series:		
Piney Point formation:		
Rock, hard	—	575
Sand, gray, hard	5	580
Clay, brown	29	609
Sand, gray-black	21	630
Paleocene (?) series:		
Sand, gray, hard	42	672
Sand, black	63	735
Clay, blue	33	768
Upper Cretaceous (?) series:		
Magothy (?) formation:		
Clay, brown	9	777
Clay, yellow	21	798
Raritan (?) formation:		
Clay, blue	12	810
Clay, pink	52	862
Clay, blue	8	870
Sand, white	45	915
Well Som-Ec 2 (Altitude: 5 feet)		
Missing:	935	935
Paleocene (?) series:		
Clay	15	950
Rock	1.5	951.5
Clay	17	968.5

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand; water	17.5	986
Crust	—	986
Sand; water	6	992
Clay, sandy, blue	5	997
Well Som-Ec 4 (Altitude: 5 feet)		
Pleistocene series:		
Sand, medium, light tan; some granule-size gravel	5	5
Sand, medium to very coarse, gray-buff	23	28
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, silty, fine to medium, some very coarse grain size, red and gray	12	40
Sand, silty, fine to medium, some fine and very coarse grain size, red and gray	27	67
Lower aquiclude:		
Silt and fine sand, red and gray; some granule-size gravel; large shell fragments	32	99
Silt and fine sand, red and gray; no shells	75	174
Manokin aquifer:		
Sand, silty, fine, reddish gray; shell fragments	2	176
Sand, medium, light gray; abundant shell fragments	14	190
Sand, silty, fine, gray; shell fragments	55	245
Sand, silty, fine, light gray; abundant shell fragments	3	248
St. Marys (?) formation:		
Clay and silt, gray; shell fragments	39	287
Silt and clay, gray; no shell fragments	33	320
Choptank (?) formation:		
Sand, fine, light gray, calcareous cemented; some shell fragments	30	350
Clay and fine sand, silty, dove-gray	38	388
Gray shell bed	4	392
Calvert formation:		
Sand, silty, fine, gray, tends to ball	139	531
Clay and silt, sandy, reddish-gray, tends to ball	20	551
Clay and silt, gray, tends to ball	29	580
Clay with more silt, tends to ball	90	670
Silt, whitish (diatomaceous)	47	717
Sand, coarse-grained, 10 per cent glauconite	4	721
Sand, clayey, fine, 85 per cent glauconite, 15 per cent quartz	39	760
Eocene series:		
Piney Point formation:		
Sand, fine to very fine, green, almost 100 per cent glauconite	26	786
Sand, clayey, fine, glauconitic, green	47	833
Shale, gray; some glauconitic sand	12	845
Sand, fine, glauconitic, gray	15	860

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Paleocene series:		
Sand, glauconitic; clay, gray	25	885
Clay, glauconitic, gray	155	1040
Sand, fine to medium, 60 per cent glauconite, 40 per cent quartz	17	1057
Sand, silty, fine, gray, slightly glauconitic	10	1067
Upper Cretaceous series:		
Monmouth or Magothy (?) formation:		
Clay aggregates, coarse rounded granular	58	1125
Sand, fine to medium, 10 per cent glauconite	17	1142
Clay aggregates, coarse rounded granular, gray	37	1179
Raritan (?) formation:		
Clay aggregates, silty, gray and red	18	1197
Sand, fine, brown, slightly glauconitic	15	1212
Clay aggregates, silty, gray and red; charcoal	13	1225
Clay aggregates, silty, with fine sand, gray and red; charcoal	21	1246
Clay, silty, gray and varicolored	4	1250
Sand, very fine to fine, buff, with red and green grains	22	1272
Clay aggregates, sandy, gray	31	1303
Well Som-Ec 5 (Altitude: 2 feet)		
Recent series:		
Shells	10	10
Pleistocene series:		
Silt; sand, soft (mud)	5	15
Sand, yellow, soft	20	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, slate, soft	17	52
Sand, coarse, gray	23	75
Clay gray, soft	13	88
Clay, gray, hard, and shells	3	91
Clay, gray, softer	17	108
Sand, green, hard, shelly; some flowing water	6	114
Clay, sandy, brown, soft	5	119
Hard streak (.5 foot)		119
Clay, sandy, brown, soft	38	157
Hard streak (.5 foot)		157
Clay, light green, soft	20	177
Sand, green, free; some water	3	180
Clay, green, solid	42	222
Clay, green, sandy streaks	27	249
St. Marys (?) formation:		
Clay, gray, tough	70	319
Clay, gray, very hard	1	320
Clay, gray, tough	32	352

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Choptank (?) formation:		
Rock, hard (.5 foot)	—	352
Sand	8	360
Clay, sandy, soft	23	383
Rock, soft	2	385
Hard layer	2	387
Calvert (?) formation:		
Clay, green, soft	133	520
Clay, dark green, tough	185	705
Sand, gray, soft	3	708
Clay, sandy, green and black, soft	4	712
Rock, hard	4	716
Clay, sandy, green and black, soft	56	772
Eocene (?) series:		
Clay, green and black; shells; some gravel, hard	68	840
Clay, green and gray, soft; some sand, black	70	910
Paleocene (?) series:		
Clay, light, tough	10	920
Sand, gray, soft; some flowing water	2	922
Clay, green, soft	13	935
Sand, gray, soft (boulder at 942 feet)	7	942
Clay, brown, tough	23	965
Clay, very sandy, gray, soft; water; wood fragments	20	985
Clay, sandy, gray	15	1000
Sand, gray, free; water	11	1011
Well Som-Ec 6 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Clay, brown	6	6
Sand, red	6	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	5	17
Sand, gray	8	25
Clay, blue	15	40
Pocomoke aquifer:		
Sand, brown and gray; some gravel	41	81
Well Som-Ec 7 (Altitude: 2 feet)		
Recent series (fill):		
Shells	13	13
Pleistocene series:		
Silt; sand; clay (mud)	7	20
Hard layer	1	21
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand	9	30
Clay, soft	50	80

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, free	7	87
Clay and shells	177	264
St. Marys (?) formation: (See Ec 4)		
Shells with clay	69	333
Choptank (?) formation:		
Rock	1	334
Clay	41	375
Rock	2	377
Clay	21	398
Rock	2	400
Calvert (?) formation:		
Clay, crusty	20	420
Clay, hard	64	484
Clay, soft	229	713
Crusty layers, hard	15	728
Eocene (?) and Paleocene (?) series:		
Clay	192	920
Sand	2	922
Clay, tough	8	930
Clay	5	935
Sand	7	942
Clay	23	965
Clay, sandy	31	996
Sand	32	1028
Clay	14	1042
Well Som-Ec 11 (Altitude: 3 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	7	7
Sand, red	9	16
Gravel and sand, gray	3	19
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	13	32
Pocomoke aquifer:		
Sand, gray	38	70
Lower aquiclude:		
Clay, blue	30	100
Sand, black, and shells	10	110
Clay, blue	10	120
Gravel, light	14	134
Clay, blue	126	260
St. Marys (?) formation: (See Ec 4)		
Clay, blue	80	340
Choptank (?) formation:		
Sand, coarse, gray, and shells	44	384

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ec 12 (Altitude: 4 feet)		
Pleistocene series:		
Silt; clay; sand and water (mud)	50	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand; water	20	70
Silt; clay; sand; shells and water (mud)	30	100
Sand, very fine, with clay balls	50	150
Well Som-Ec 13 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, brown	8	8
Sand, coarse, gray, and gravel	9	17
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, black	25	42
Clay, blue	8	50
Sand, coarse, gray, and gravel	55	105
Lower aquiclude:		
Clay, blue	25	130
Sand, black	10	140
Clay, blue	25	165
Manokin aquifer:		
Sand, gray, and shells	31	196
Well Som-Ec 22 (Altitude: 2 feet)		
Missing	10	10
Pleistocene series:		
Sand	40	50
Sand and gravel	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, and clay	25	125
Sand, black	46	171
Manokin aquifer:		
Sand, water	18	189
Well Som-Ec 23 (Altitude: 5 feet)		
Missing	10	10
Pleistocene series:		
Sand	40	50
Sand and gravel	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, and clay	20	120
Sand, black, and shells	10	130
Clay, soft, and sand, water	49	179

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ec 24 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	6	6
Sand, red	4	10
Sand, gray	4	14
Gravel	4	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Sand, gray	4	22
Clay, blue	19	41
Pocomoke aquifer:		
Sand, gray	47	88
Lower aquiclude:		
Clay, blue	27	115
Sand, black	7	122
Clay, blue	38	160
Manokin aquifer:		
Sand, gray, and shells	35	195
Well Som-Ec 25 (Altitude: 5 feet)		
Pleistocene series:		
Clay, brown	3	3
Sand, white	7	10
Sand, fine, gray	6	16
Gravel, heavy	6	22
Sand, coarse	17	39
Gravel	14	53
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	17	70
Sand, gray	10	80
Clay, blue	44	124
Sand, black	22	146
Clay, light brown	18	164
Manokin aquifer:		
Sand; water	47	211
Well Som-Ec 26 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Sand, white	3	3
Sand, red	15	18
Sand, coarse, gray, and gravel	30	48
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, white	26	74
Sand, gray, and shells	16	90
Clay, blue	25	115

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, black, and shells, brown	15	130
Clay, blue	45	175
Manokin aquifer:		
Sand, gray, and shells	39	214
Well Som-Ec 27 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Sand, white	10	10
Sand, red, and gravel	10	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray, and gravel	22	42
Sand, coarse, gray; water, irony	33	75
Lower aquiclude:		
Clay, blue	95	170
Manokin aquifer:		
Sand, gray, and shells	28	198
Well Som-Ec 28 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	6	6
Sand, white	10	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, coarse, gray	26	42
Sand, white	6	48
Sand, gray	10	58
Clay, blue	6	64
Sand; shells, and gravel	16	80
Lower aquiclude:		
Clay, brown	10	90
Sand, coarse, and shells	20	110
Clay, blue	5	115
Sand, black	11	126
Sand, coarse, gray	16	142
Sand, gray	36	178
Manokin aquifer:		
Sand, gray, and shells	32	210
Well Som-Ec 29 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, yellow	2	2
Sand, red	8	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	10	20
Gravel	3	23

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, gray	13	36
Gravel	8	44
Lower aquiclude:		
Clay, blue	21	65
Sand, gray	35	100
Clay, blue	18	118
Sand, black, and shells	22	140
Clay, blue	28	168
Manokin aquifer:		
Sand, gray, and shells	37	205
Well Som-Ec 30 (Altitude, 3 feet)		
Pleistocene and Pliocene (?) series:		
Clay, blue	7	7
Sand, red	7	14
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Sand, gray	5	19
Clay, blue	13	32
Pocomoke aquifer:		
Sand, gray; shells and gravel	38	70
Lower aquiclude:		
Clay, blue	30	100
Sand, black	5	105
Clay, blue	134	239
St. Marys (?) formation (division arbitrary):		
Clay, blue	90	329
Choptank (?) formation:		
Sand, coarse, gray, and shells	33	362
Well Som-Ec 31 (Altitude: 4 feet)		
Recent and Pleistocene series:		
Surface soils; marsh debris (mud)	10	10
Sand, light; water	18	28
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, green; water	12	40
Sand, light; water	45	85
Well Som-Ec 32 (Altitude: 4 feet)		
Pleistocene series:		
Clay, dark brown	6	6
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Sand, dark gray	15	21
Clay, blue	15	36

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand, coarse, gray	4	40
Gravel	4	44
Sand, coarse, gray	28	72
Lower aquiclude:		
Clay, blue	33	105
Sand, black	5	110
Clay, blue	10	120
Sand, fine, gray	15	135
Clay, blue	72	207
Shell rock, hard (.5 foot)		207
Clay, blue	33	240
St. Marys (?) formation: (See Ec 4)		
Clay, blue	22	262
Sand rock, hard	2	264
Clay, blue	56	320
Choptank (?) formation:		
Sand, gray, hard	40	360
Well Som-Ec 33 (Altitude: 3 feet)		
Pleistocene and Pliocene (?) series:		
Clay, brown	5	5
Sand, red	6	11
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Sand, gray	7	18
Clay, blue	18	36
Pocomoke aquifer:		
Gravel	7	43
Sand, coarse, gray	25	68
Lower aquiclude:		
Clay, blue	37	105
Sand, black	5	110
Sand, fine, gray	20	130
Rock, hard		130
Clay, blue (See Ec 4)	110	240
St. Marys (?) formation:		
Clay, blue	80	320
Choptank (?) formation:		
Sand, coarse, blue	42	362
Well Som-Ec 34 (Altitude: 4 feet)		
Recent series:		
Surface soils, dark	3	3
Pliocene (?) series:		
Sand, red	7	10

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine	5	15
Clay, blue	17	32
Sand, gray, and gravel	10	42
Clay, blue	23	65
Sand, coarse, gray	11	76
Clay, blue	8	84
Sand, black, and shells	8	92
Sand, black, and shells, hard	16	108
Sand, fine, gray; some shells and clay layers	43	151
Well Som-Ec 35 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	10	10
Miocene series (?):		
Yorktown and Cohansey formations (?):		
Sand, fine, gray	10	20
Clay, white	15	35
Shells	13	48
Clay, brown	7	55
Sand, coarse, brown, and shells	25	80
Clay, blue	25	105
Sand, fine, and shells	47	152
Well Som-Ec 36 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark brown	6	6
Sand, gray, and gravel	4	10
Clay, blue	8	18
Sand, coarse, gray, and gravel	12	30
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, pink	16	46
Sand, fine, gray	12	58
Sand, black	17	75
Clay, blue	23	98
Sand, black, and shells	7	105
Clay, blue	7	112
Sand, fine, gray, and clay	40	152
Well Som-Ec 41 (Altitude: 3 feet)		
Pliocene (?) series:		
Sand, red	6	6
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, gray	10	16
Clay, blue	8	24

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Gravel	2	26
Clay, blue	16	42
Pocomoke aquifer (?):		
Sand, gray	28	70
Gravel	2	72
Lower aquiclude:		
Clay, blue	46	118
Sand, black	12	130
Clay, blue	30	160
Manokin aquifer:		
Sand, gray	29	189
Well Som-Ed 1 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay and sand, red	15	15
Sand; water	7	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt and clay (mud)	53	75
Marl and sand, with small clay balls	25	100
Clay, gray and white	30	130
Sand, very fine; water, and a few shells	14	144
Well Som-Ed 3 (Altitude: 4 feet)		
Pleistocene series:		
Soil; sand, and clay	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	11	21
Clay, sandy	11	32
Pocomoke aquifer:		
Sand; clay streaks	4	36
Shell rock, hard	1	37
Sand, clayey	5	42
Sand; gravel	10	52
Sand; shells	5	57
Sand; gravel (producing zone)	13	70
Sand; clay, and shells	11	81
Lower aquiclude:		
Clay, tight	9	90
Clay; shells	5	95
Clay	14	109
Sand, fine; shells	5	114
Clay; shells	4	118
Sand	4	122
Clay; shells	14	136
Clay	60	196

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer (?):		
Clay; sand, and shells	4	200
Sand, tight (meager yield, 5 gpm test)	10	210
Sand; clay, and shells	7	217
Clay; shells	13	230
Well Som-Ed 4 (Altitude: 5 feet)		
Recent, Pleistocene and Pliocene (?) series:		
Surface soils, dark	3	3
Sand, red	7	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	6	16
Sand, gray	10	26
Clay, blue	34	60
Sand, gray	13	73
Gravel	3	76
Sand, gray	44	120
Clay, blue	18	138
Sand, gray	2	140
Clay, blue	49	189
Sand, gray	4	193
Clay, blue	76	269
St. Marys (?) formation:		
Rock	1	270
Clay, blue	90	360
Choptank (?) formation:		
Sand, gray	38	398
Well Som-Ed 5 (Altitude: 5 feet)		
Recent series:		
Surface soils, black	1	1
Pliocene series:		
Sand, red	16	17
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray, and gravel	59	76
Lower aquiclude:		
Clay, blue	16	92
Sand, black	20	112
Clay, blue	58	170
Manokin aquifer:		
Sand, fine, gray	32	202
Well Som-Ed 7 (Altitude: 5 feet)		
Pleistocene series:		
Sand, white	23	23

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	37	60
Pocomoke aquifer:		
Gravel	2	62
Clay, blue	4	66
Sand, gray	25	91
Gravel	2	93
Lower aquiclude:		
Clay, blue	77	170
Manokin aquifer:		
Sand, brown	10	180
Sand, gray	30	210
Well Som-Ed 8 (Altitude: 5 feet)		
Recent and Pliocene (?) series:		
Surface soils, black	3	3
Sand, red	5	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	17	25
Pocomoke aquifer:		
Sand, gray	25	50
Gravel	8	58
Lower aquiclude:		
Clay, blue	54	112
Sand, black	13	125
Clay, blue	35	160
Manokin aquifer:		
Sand, gray	38	198
Well Som-Ed 9 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	8	8
Sand, red	4	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	8	20
Clay, blue	10	30
Sand, gray	10	40
Gravel	2	42
Sand, gray	18	60
Lower aquiclude:		
Clay, blue	120	180
Manokin aquifer:		
Sand, gray	31	211

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ed 10 (Altitude: 5 feet)		
Pliocene (?) series:		
Sand, red	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	18	28
Pocomoke aquifer:		
Sand, white	22	50
Sand, brown	39	89
Gravel	7	96
Lower aquiclude:		
Clay, blue	76	172
Manokin aquifer		
Sand, gray	40	212
Well-Som-Ed 11 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark	5	5
Clay, blue	5	10
Sand, red	10	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	10	30
Pocomoke aquifer:		
Sand, gray	30	60
Sand, fine, gray	24	84
Lower aquiclude:		
Clay, blue	91	175
Manokin aquifer:		
Sand, gray, hard	40	215
Well-Som-Ed 12 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	14	14
Clay, blue	12	26
Gravel	6	32
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, coarse, gray	18	50
Clay, blue	15	65
Sand, brown	25	90
Lower aquiclude:		
Clay, blue	35	125
Sand, black, and shells	10	135
Clay, blue	29	164
Manokin aquifer:		
Sand, gray, and shells	34	198

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Well Som-Ed 13 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, brown	5	5
Sand, red	5	10
Clay, brown	30	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray, and gravel	14	54
Lower aquiclude:		
Clay, blue	106	160
Manokin aquifer:		
Sand, coarse, gray	40	200
Well Som-Ed 14 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, white	3	3
Sand, white	5	8
Sand, red	6	14
Clay, blue	8	22
Sand, gray, and gravel	20	42
Sand, red	8	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	12	62
Pocomoke aquifer:		
Sand, gray	32	94
Lower aquiclude:		
Clay, blue	26	120
Sand, black, and shells	14	134
Clay, blue	31	165
Manokin aquifer:		
Sand, gray, and shells	30	195
Well Som-Ed 15 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Sand, medium, light buff	10	10
Sand, coarse-medium, light gray to tan	30	40
Sand, coarse-medium, some small gravel, light brown	40	80
Sand, medium, light brown; few shell fragments	10	90
Sand, very coarse to medium, light brown; small gravel; much water, irony	10	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, fine-very fine, brown, and silt	20	120
Sand, medium, dark green; shell fragments	10	130
Sand, fine-very fine; dark gray, with about 10 percent glauconite; shell fragments	40	170

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, medium, light gray and brown; shell fragments	19	189
Well Som-Ed 16 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	8	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	10	18
Clay, blue	12	30
Sand, gray	10	40
Gravel	4	44
Lower aquiclude:		
Clay, blue	76	120
Sand, black, and shells	12	132
Clay, blue	34	166
Manokin aquifer:		
Sand, gray, hard	27	193
Well Som-Ed 18 (Altitude: 3 feet)		
Missing	10	10
Pleistocene and Pliocene (?) series:		
Sand	40	50
Sand and gravel; much water	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, fine, and clay	20	120
Sand, black, and shells	10	130
Clay, soft	40	170
Manokin aquifer:		
Sand; water	20	190
Well Som-Ed 19 (Altitude: 4 feet)		
Recent:		
Missing	1	1
Pliocene (?) series:		
Sand, red	7	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, brown	9	17
Gravel	3	20
Clay, blue	15	35
Pocomoke aquifer:		
Sand, gray	4	39
Clay, blue	7	46
Sand, gray	7	53

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue	12	65
Sand, gray	33	98
Lower aquiclude:		
Clay, blue	22	120
Sand, black	11	131
Clay, blue	29	160
Manokin aquifer:		
Sand, gray, and shells	36	196
Well Som-Ed 20 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	10	10
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	8	18
Pocomoke aquifer:		
Sand, gray	25	43
Clay, blue	5	48
Sand, gray	10	58
Clay, blue	4	62
Sand, gray	19	81
Lower aquiclude:		
Clay, blue	43	124
Sand, black	36	160
Manokin aquifer:		
Sand, gray, and shells	31	191
Well Som-Ed 22 (Altitude: 4 feet)		
Pleistocene and Pliocene (?) series:		
Clay, dark brown	2	2
Sand, red	7	9
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	7	16
Clay, blue	14	30
Sand, dark brown	38	68
Lower aquiclude:		
Clay, white	22	90
Sand, gray, and shells	6	96
Clay, blue	26	122
Sand, black, and shells	11	133
Clay, blue	27	160
Manokin aquifer:		
Sand, gray	44	204
Well Som-Ed 23 (Altitude: 2 feet)		
Recent series:		
Marsh	1	1

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Pleistocene and Pliocene (?) series:		
Clay, dark	11	12
Gravel	4	16
Sand, red	5	21
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	7	28
Gravel	4	32
Sand, gray	8	40
Clay, blue	10	50
Sand, coarse, gray	12	62
Clay, blue	7	69
Sand, fine, gray	34	103
Lower aquiclude:		
Clay, blue	22	125
Sand, black, and shells (salt water)	11	136
Clay, blue	20	156
Sand rock, hard	1	157
Manokin aquifer:		
Sand; gravel and shells, hard; water	31	188
Missing (reported salt water)	20	208
Well Som-Ed 25 (Altitude: 3 feet)		
Pleistocene series:		
Sand, white	10	10
Clay, brown	6	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Gravel, coarse, and sand, green	23	39
Clay, brown	19	58
Sand, fine, gray; water, irony	38	96
Lower aquiclude:		
Clay, blue	24	120
Sand, black, and shells	22	142
Clay, blue	33	175
Manokin aquifer:		
Sand, coarse, gray; water	23	198
Well Som-Ed 26 (Altitude: 3 feet)		
Missing	10	10
Pleistocene series:		
Sand	40	50
Sand and gravel; much water, irony	50	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, fine, and clay	20	120

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Sand, black, and shells	10	130
Clay, soft	40	170
Manokin aquifer:		
Sand; water	15	185
Well Som-Ed 27 (Altitude: 4 feet)		
Pleistocene series:		
Clay, white	3	3
Sand, white	7	10
Clay, brown	3	13
Gravel, heavy	4	17
Sand, white	3	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, coarse, gray, and gravel	21	41
Sand, gray	53	94
Lower aquiclude:		
Sand, gray, and shells	12	106
Clay, blue	9	115
Sand, gray	5	120
Clay, blue	45	165
Manokin aquifer:		
Sand, coarse, gray, and shells; water	30	195
Well Som-Ed 28 (Altitude: 3 feet)		
Recent series:		
Surface soils, black	1	1
Pliocene (?) series:		
Sand, red	9	10
Clay, blue	4	14
Gravel	2	16
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	24	40
Pocomoke aquifer:		
Gravel	3	43
Sand, coarse, gray	17	60
Lower aquiclude:		
Clay, blue	63	123
Sand, black, and shells	20	143
Clay, blue	32	175
Manokin aquifer:		
Sand, coarse, gray; water	33	208
Well-Som-Ed 29 (Altitude: 3 feet)		
Pliocene (?) series:		
Sand, red	10	10

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	20	30
Pocomoke aquifer:		
Gravel, heavy	10	40
Sand, coarse	44	84
Sand, fine, gray	8	92
Lower aquiclude:		
Clay, blue	31	123
Sand, black	11	134
Clay, blue	34	168
Manokin aquifer:		
Sand, gray, and shells; water	32	200
Well Som-Ed 30 (Altitude: 3 feet)		
Pliocene (?) series:		
Sand, red	8	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	25	33
Gravel	17	50
Clay, blue	12	62
Sand, gray	4	66
Lower aquiclude:		
Clay, blue	26	92
Sand, gray	13	105
Clay, blue	15	120
Sand, black, and shells	7	127
Clay, blue	35	162
Manokin aquifer:		
Sand, gray, and shells; water	38	200
Well Som-Ed 31 (Altitude: 4 feet)		
Pliocene (?) series:		
Sand, red	8	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	7	15
Pocomoke aquifer:		
Sand, gray	3	18
Gravel	3	21
Sand, gray	9	30
Gravel	15	45
Sand, gray	20	65
Clay, blue	7	72
Sand, gray	10	82

TABLE 41—*Continued*

	Thickness (feet)	Depth (feet)
Lower aquiclude:		
Clay, blue	38	120
Sand, black	15	135
Clay, blue	33	168
Manokin aquifer:		
Sand, gray, and shells; water	42	210
Well Som-Ed 32 (Altitude: 4 feet)		
Recent and Pleistocene series:		
Surface soils; silt and clay	18	18
Miocene (?) series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer (?):		
Sand	36	54
Well Som-Ed 41 (Altitude: 6 feet)		
Pliocene (?) series:		
Sand, red	8	8
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	12	20
Clay, blue	8	28
Sand, gray	31	59
Clay, blue	4	63
Sand, gray	9	72
Gravel	3	75
Lower aquiclude:		
Clay, blue	63	138
Sand, black	8	146
Clay, blue	34	180
Manokin aquifer:		
Sand, gray	21	201
Well Som-Ef 1 (Altitude: 5 feet)		
Recent and Pleistocene series:		
Parsonsburg (?) sand:		
Surface soils	20	20
Sand	4	24
Pamlico (?) formation:		
Clay; silt and sand (mud)	32	56
Beaverdam, sand (?):		
Sand; water; some gravel	17	73

TABLE 42

Logs of Wells in Wicomico County

	Thickness (feet)	Depth (feet)
Test Hole Wi-Ad 9 (Altitude: 28 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, very coarse to medium, yellowish brown	11	11
Gravel	.5	11.5
Pamlico formation:		
Clay, dark grayish-blue to light	4	15.5
Sand, medium, light gray	5	20.5
Clay, sandy, light gray	4	24.5
Clay, variegated; some sand and wood	4	28.5
Beaverdam sand:		
Sand, coarse to fine, light gray	7	35.5
Sand, light gray, and silt, blue	5	40.5
Pliocene (?) series:		
Sand, very coarse, to medium, yellowish brown, and some clay, blue	6	46.5
Well Wi-Ad 1 (Altitude: 20 feet)		
Pleistocene and Pliocene (?) series:		
Parsonsburg sand:		
Sand	10	10
Sand and gravel	9.7	19.7
Pamlico formation:		
Clay	.5	20.2
Sand, fine, clayey	19.8	40
Clay	17	57
Sand	2	59
Pliocene (?) series:		
Gravel, hard	12.5	71.5
Sand	.5	72
Miocene series:		
St. Marys (?) formation:		
Clay, sandy	70	142
Choptank (?) formation:		
Sand	2	144
Clay	51	195
Hard layer	.3	195.3
Clay	34	229.3
Marl	9.3	238.6
Hard layer	.7	239.3
Sand	.5	239.8
Hard layer	1.9	241.7
Sand, very fine, free	2.3	244
Sand streaks	11.8	255.8
Hard layer	.5	256.3

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Calvert (?) formation:		
Nanticoke aquifer:		
Sand, hard; water	39	295.3
Clay	5.7	301
Obs. Well Wi-Bc 38 (Altitude: 19.2 feet)		
Pleistocene series:		
Sand, medium, brown and gray	4	4
Clay, silty, loose, buff-gray	3	7
Clay, silty, chocolate-brown, with 1½ inch pebbles	1.5	8.5
Sand, medium, chocolate-brown, with gravel, granule size	1.5	10
Well Wi-Bc 39 (Altitude: 25 feet)		
Pleistocene and Pliocene (?) series:		
Sandy	15	15
Sand and gravel	24	39
Sandy	7	46
Sand and gravel; water	44	90
Well Wi-Bd 2 (Altitude: 45 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, brown	20	20
Beaverdam sand:		
Sand, coarse, light	25	45
Pliocene (?) series:		
Sand, coarse, and ¾-inch gravel, gray-tan	23	68
Well Bi-Bd 11 (Altitude: 25 feet)		
Based on partial paleontology. Compare with Bd 45, 100 feet to west.		
Pleistocene series:		
Parsonsburg sand:		
Sandy	11	11
Beaverdam sand:		
Sand, coarse, light	79	90
Pliocene (?) series:		
Sand, coarse, light, with clay streaks	27	117
Miocene series:		
St. Marys (?) formation:		
Clay, blue	.5	117.5
Sand, coarse, light	22.5	140
Clay, soft, sandy, gray	10	150
Choptank (?) formation:		
Sand and shell	10	160
Sand and shell and wood	18	178
Clay, firm, gray	11	189
Sand, fine	2	191

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Clay, gray	63	254
Hard and crusty	2	256
Sand, shell, crusty	13	269
Calvert (?) formation:		
Nanticoke aquifer:		
Hard and crusty	2.6	271.6
Sand, free, gray; shells	26.4	298
Crusty hard	7	305
Obs. Well Wi-Bd 27 (Altitude: 43.9 feet)		
Pleistocene series:		
Topsoil, sandy, medium, dark brown	.7	.7
Sand, medium, brown	1.3	2
Sand, clayey, iron-stained brown	3	5
Clay and sand, medium, iron-stained brown	1.5	6.5
Sand, medium, iron-stained brown	.5	7
Clay, sandy, medium, fine, buff	1.5	8.5
Sand, medium, slightly clayey, iron-stained red	1.5	10
Sand, coarse, red-brown	1.5	11.5
Gravel, 0.5-inch, to coarse sand	—	11.5
Obs. well Wi-Bd 28 (Altitude: 40.3 feet)		
Pleistocene series:		
Sand, medium, brown	4	4
Sand, clayey, medium, gray, brown	.5	4.5
Sand, medium with few ½-inch pebbles, slightly clayey, buff	2.5	7
Sand, pebbly ¼-inch size, coarse, buff to brown	1	8
Sand, coarse, brown to gray	1	9
Sand, granule, coarse, buff	1.5	10.5
Sand, very coarse with some granule-size and few thin clay layers, brown and buff	1.5	12
Obs. well Wi-Bd 29 (Altitude: 35 feet)		
Pleistocene series:		
Sand, medium, brown	3	3
Sand, medium, buff	2	5
Sand, medium with thin gray clay layers, red, brown	1.5	6.5
Sand, medium coarse, brown	.5	7
Sand, medium, light buff and brown	1.5	8.5
Sand, medium, buff	1.5	10
Obs. well Wi-Bd 30 (Altitude: 35 feet)		
Pleistocene series:		
Sand, medium, some granule, brown	5	5
Sand, medium, some granule, buff, brown	2	7
Sand, medium to coarse granule, buff	1.5	8.5
Sand, clayey, pebbly, fine to medium granule, buff	4.5	13

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. well Wi-Bd 31 (Altitude: 30.3 feet)		
Pleistocene series:		
Sand, medium, gray-black	3	3
Sand, clayey, medium, light gray	2	5
Sand, medium coarse, light brown	2	7
Sand, medium, brown-buff	.5	7.5
Sand, medium, chocolate-brown	.5	8
Sand, very coarse, buff-brown	.5	8.5
Obs. well Wi-Bd 32 (Altitude: 27.5 feet)		
Pleistocene series:		
Sand, medium, dark brown	3	3
Clay, sandy, medium, gray	1	4
Sand, medium, gray to light brown	3	7
Obs. Well Wi-Bd 33 (Altitude: 21.6 feet)		
Pleistocene series:		
Sand, medium, brown	3	3
Sand, medium, slightly clayey, brown-buff	2.5	5.5
Sand with gravel size, coarse to medium, buff	1	6.5
Clay, gray	1.5	8
Sand with some pebble and granule-size, very coarse to coarse, Gray-buff	2	10
Obs. Well Wi-Bd 34 (Altitude: 27.6 feet)		
Pleistocene series:		
Sand, medium, brown	3	3
Sand, medium, buff brown	2	5
Sand, coarse, with gravel 1 inch to 1¼ inch size, buff brown	1.5	6.5
Sand, very coarse with some gravel, pebble and granule size, buff brown	1.5	8
Obs. Well Wi-Bd 35 (Altitude: 29.9 feet)		
Pleistocene series:		
Sand, medium, brown	1	1
Clay, gray	.5	1.5
Sand, gravelly, very coarse to coarse, buff	2.5	4
Obs. Well Wi-Bd 36 (Altitude: 35.1 feet)		
Pleistocene series:		
Clay, sandy, fine, brown and gray	4	4
Sand, medium, iron stained, buff-brown and gray	5	9
Sand, coarse to medium, with some granule-size, red-brown	1	10
Obs. Well Wi-Bd 37 (Altitude: 35.1 feet)		
Pleistocene series:		
Sand, medium with some granule-size, brown	3	3
Sand, medium, slightly clayey, light buff	5	8
Sand, medium, slightly clayey, light brown to buff	2	10

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Bd 38 (Altitude: 40.5 feet)		
Pleistocene series:		
Sand, fine, clayey, light brown	4	4
Sand, fine, clayey, iron-stained gray-brown	4	8
Sand, medium, light brown-buff	2	10
Test Hole Wi-Bd 42 (Altitude: 24 feet)		
Pleistocene and Pliocene (?) series:		
Parsonsburg sand:		
Silt and sand, fine to very fine, light tan	.5	.5
Silt and sand, fine, light brown	1.5	2
Sand, silty, medium to fine, light brown	1.5	3.5
Silt and sand, medium to fine, light tan to buff	.5	4
Sand, silty, medium, tan	2	6
Sand, little silt, medium, reddish brown	.5	6.5
Pamlico (?) formation:		
Silt and sand, fine, gray and tan, hard	.5	7
Silt and sand, fine, gray and tan to clay, silty, gray	1	8
Clay, silty, tough, gray	1	9
Silt and sand, medium to fine, light tan and gray	2	11
Beaverdam sand:		
Sand, silty, coarse to medium, buff	1.5	12.5
Sand, silty, very coarse to coarse, light tan; pebbles ¾-inch	3.5	16
Sand, silty, very coarse to coarse, buff to gray; pebbles 1-inch	3	19
Sand, silty, very coarse to coarse, gray	10	29
Sand, granule to medium, gray; pebbles ¾-inch	8	37
Sand, silty, fine to very fine, gray	2	39
Sand, granule to medium, gray; pebbles ¾-inch	15	54
Obs. Well Wi-Bd 43 (Altitude: 44.2 feet)		
Pleistocene series:		
Topsoil, sandy, medium, dark brown	.6	.6
Sand, medium, brown	1.4	2
Sand, clayey, brown, iron-stained	4.5	6.5
Sand, medium, brown, iron-stained	.5	7
Clay and sand, medium to fine, buff	1.5	8.5
Sand, slightly clayey, medium, red, iron-stained	1.5	10
Sand, coarse, reddish brown	1.5	11.5
Obs. Well Wi-Bd 44 (Altitude: 39.8 feet)		
Pleistocene series:		
Topsoil, sandy, medium, dark brown	.7	.7
Sand, medium, light brown	3.3	4
Sand, medium, buff and brown, some clay	.5	4.5
Sand, medium, brown	1	5.5
Sand, medium, buff	1	6.5
Sand, clayey, coarse to medium, iron-stained buff	.5	7
Clay and sand, coarse, 0.5-inch gravel, buff	2	9

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand with some clay, medium, buff	2.5	11.5
Sand, granule to coarse, brown	.5	12
Test Well Wi-Bd 45 (Altitude: 25 feet)		
Compare Bd 11, 100 feet to east.		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, brown and top soil	2	2
Sand, medium, light tan	3	5
Sand, medium, buff	5	10
Pamlico (?) formation:		
Sand, medium, brown and gray	2	12
Sand, medium, gray	32	44
Beaverdam sand:		
Sand, very coarse to coarse, light tan	3	47
Sand, medium to fine, light olive-tan	11	58
Sand, medium, tan	5	63
Sand, very coarse to medium, buff	7	70
Pliocene (?) series:		
Sand, medium, some very coarse from 83–84 feet, tan	14	84
Sand, coarse to medium, buff	11	95
Sand, coarse to medium, red-tan	5	100
Sand, coarse, hard cemented sandstone, iron-stained	3	103
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, medium, gray	12	115
St. Marys (?) formation:		
Sand, fine, gray	40	155
Choptank (?) formation:		
Sand, medium to fine, shells, gray	13	168
Sand, medium to fine, few shell fragments, dark gray	21	189
Sand, medium to fine, clayey, olive-drab	21	210
Sand, coarse to medium, brown, some clay, gray	10	220
Sand, coarse to medium, brown to black, some clay, gray	11	231
Obs. Well Wi-Be 12 (Altitude: 44.9)		
Pleistocene series:		
Sand, pebbly and granule, medium coarse, clayey, brown	5	5
Sand, coarse, light buff-brown	3	8
Sand, very coarse, buff	2	10
Obs. Well Wi-Be 13 (Altitude: 43 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, light brown	9	9
Sand, medium coarse, buff to light brown	3	12

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Be 14 (Altitude: 48 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, light coffee-brown	8	8
Clay, gray and brown	.5	8.5
Sand, medium coarse, light brown	.5	9
Sand, medium coarse, iron-stained buff	3	12
Clay, gray	.5	12.5
Sand, medium coarse, iron-stained buff	.5	13
Obs. Well Wi-Be 15 (Altitude: 46.7 feet)		
Pleistocene series:		
Sand, medium coarse, gravelly and pebbly, tan	5	5
Gravel and sand, coarse with some granule-size, gray, buff and brown	2.5	7.5
Sand, granule and very coarse, light buff	2.5	10
Obs. Well Wi-Be 16 (Altitude: 45 feet)		
Pleistocene series:		
Sand, clayey, medium to fine, brownish gray	6	6
Sand, medium, brownish gray, iron-stained	1	7
Sand, pebbly to coarse, grayish brown	1.5	8.5
Obs. Well Wi-Be 17 (Altitude: 41.7 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, light brown	6	6
Sand, medium, light brown to buff	2	8
Sand, coarse, red, brown	.5	8.5
Test Hole Wi-Be 20 (Altitude: 65 feet)		
Recent series:		
Top soil, clay, hard, yellow	2	2
Clay, light gray	3	5
Pleistocene series:		
Walston silt:		
Clay, sandy, light gray; some granule-size gravel	7	12
Clay, sandy, light gray with streaks of orange	2	14
Sand, clayey and silty, medium to fine, light gray and tan	6	20
Sand, clayey and silty, very coarse to coarse, varicolored with some granule-size gravel	5	25
Beaverdam sand:		
Sand, very coarse to medium, tan; some gravel up to ½-inch	5	30
Sand, clayey, very coarse to medium, tan, gray; some gravel up to ½-inch	5	35
Sand, silty, very coarse to medium, tan; some fine gravel	5	40
Sand, coarse, light tan; some small gravel	11	51
Pliocene (?) series:		
Sand, clayey, very coarse to medium, yellowish brown; some small gravel	4	55

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, clayey, very coarse to medium, yellowish tan; little gravel	10	65
Sand, very coarse to medium, yellowish tan; some gravel, water bearing	38	103
Sand, coarse to medium, grayish tan, water bearing	2	105
Sand, very coarse to coarse, grayish tan	15	120
Test Hole Wi-Be 21 (Altitude: 45 feet)		
Pleistocene series:		
Walston silt:		
Sand, slightly silty, medium, light gray	1	1
Sand and silt, fine, light gray-tan	5.5	6.5
Sand, silty, medium to fine, light gray, becoming coarser near 20 feet	13.5	20
Silt and clay, sandy, fine, light brown and gray	4	24
Sand, medium to fine, silty, light tan-brown	15	39
Beaverdam sand:		
Sand, coarse to medium, light tan to buff; some granule and pebble-size gravel up to 1 inch	10	49
Well Wi-Bf 8 (Altitude: 50 feet)		
Pleistocene series:		
Walston silt:		
Sand, fine	40	40
Missing	8	48
Beaverdam sand:		
Sand; water at 80 feet	82	130
Sand, white, and soft sand (rock?)	27	157
Pliocene (?) series:		
Clay, sandy, black	11	168
Sand, reddish at top and bottom, and gravel	39	207
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, very hard, light blue	13	220
Sand, fine	44	264
St. Marys (?) formation:		
Clay, light gray, fine white shells at 300 to 304 feet	42	306
Sand, hard	35	341
Choptank (?) formation:		
Marl or clay with fine shells	33	374
Sand	12	386
Clay	16	402
Test Hole Wi-Bf 13 (Altitude: 40 feet)		
Pleistocene series:		
Walston silt:		
Sand, coarse to medium, buff to light brown, with silt	5	5
Sand, slightly silty, medium, tan	15	20

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Beaverdam sand:		
Sand, granule to coarse, brown-gray, with some hard white clay	5	25
Sand, very coarse to coarse, brown-gray, with some hard white clay	5	30
Sand, medium to fine, tan-gray	10	40
Sand, medium, light tan, with some white clay	7	47
Sand, coarse, light tan	5	52
Sand, medium, gray-tan	5	57
Pliocene (?) series:		
Sand, coarse to medium, light brown, with little clay	6	63
Sand, coarse, light brown, with gravel up to 0.5-inch	2	65
Sand, coarse, brown	5	70
Sand, coarse to medium, brown	5	75
Sand, medium, brown	5	80
Sand, coarse to medium, brown	2	82
Sand, coarse, brown with gravel	2	84
Sand, very coarse to medium, brown	10	94
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Sand, medium, gray; some blue-gray clay	11	105
Well Wi-Bf 14 (Altitude: 35 feet)		
Pleistocene series:		
Sand	10	10
Clay	12	22
Sand and clay	16	38
Pliocene (?) series:		
Sand and gravel	14	52
Well Wi-Bf 15 (Altitude: 35 feet)		
Pleistocene series:		
Sand	12	12
Clay	11	23
Sand and clay	16	39
Pliocene (?) series:		
Sand and gravel	14	53
Obs. Well Wi-Bg 10 (Altitude: 73.4 feet)		
Pleistocene series:		
Sand, coarse, brown	5	5
Sand, coarse, brown-gray	2	7
Test Hole Wi-Bg 11 (Altitude: 65 feet)		
Pleistocene series:		
Parsonsburg sand:		
Silt, sandy, medium to fine, light brown	8	8
Sand, medium to coarse, light brown	7	15

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium to fine, some silt, light tan	5	20
Sand, coarse to medium, light tan-brown	5	25
Walston silt:		
Clay, sandy, medium, buff	10	35
Beaverdam sand:		
Sand, coarse to medium, clayey, buff	5	40
Sand, coarse, brown; some granule gravel	10	50
Sand, very coarse to coarse, buff; some granule gravel; water bearing	5	55
Sand, very coarse to coarse, buff; some granule gravel	10	65
Sand, coarse to medium, buff	20	85
Sand, medium, buff	5	90
Sand, medium coarse, buff	10	100
Sand, medium, tan	29	129
Sand, medium, tan, some clay	5	134
Sand, coarse, tan	8	142
Well Wi-Bg 12 (Altitude: 67 feet)		
Miocene series:		
Yorktown and Cohansey formations (?):		
No log available	315	315
Sand, fine, gray, argillaceous; some flakes of mica	—	315
Missing	45	360
St. Mary's (?) formation:		
Clay, tough, gray, with shell fragments	5	365
Clay, blue-gray	15	380
Clay, fine-textured, tough, light colored	10	390
Clay, purplish and greenish-blue	—	390
Missing	60	450
Choptank (?) formation:		
Sand, clayey, gray	25	475
Sand, quartz, small, rounded, with black grains responding to phosphate test	—	— 475
Sand, quartz, fine, with sandstone fragments	5	480
Missing	30	510
Sand, quartz, fine, few black grains	40	550
Sand, quartz, clayey, fine, gray	10	560
Sand, quartz, fine, diatomaceous, light gray	5	565
Missing	35	600
Sand, argillaceous, gray, with shell fragments	10	610
Calvert (?) formation:		
Shell fragments in fine gray sand	8	618
Clay, sandy, fine, light gray	52	670
Clay, light gray	5	675
Clay, light gray, somewhat more earthy	—	700
Sand, clayey, coarse to medium, gray	—	750
Sand, quartz, light gray	—	755
Sand, quartz, coarse, gray	—	760

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Diatomaceous earth, gray, impure	—	800
Missing	24	824
Sandstone, gray	8	832
Clay, gray, arenaceous	—	840
Sand, quartz, fine, gray, shell fragments and large piece of calcite	—	960
Missing	22	982
Sand, quartz, fine, gray, with numerous large shell fragments	13	995
Sand, iron-stained, with shell fragments	7	1002
Sand, fine, gray	5	1007
Diatomaceous earth, gray	83	1090
Sand, quartz, fine, green, with fine black specks	5	1095
Sand, fine, gray	5	1100
Earth (?)	7	1107
Missing	4	1111
Sand, very fine, gray	19	1130
Eocene series (?) (structure map suggests it):		
Missing	46	1186
Test Hole Wi-Bh 14 (Altitude: 45 feet)		
Pleistocene series:		
Walston silt:		
Sand, fine, tan to gray	5	5
Sand, medium, tan to gray; some black clay	5	10
Sand, medium, organic material	5	15
Beaverdam sand:		
Sand, medium, gray	5	20
Sand, coarse to medium, gray; with blue clay	5	25
Clay, sandy, light blue	12	37
Clay, sandy, buff	3	40
Sand, coarse to medium, light gray; some bluish green clay	2	42
Gravel, granule to coarse, light gray, some green and blue clay	3	45
Sand, coarse to medium, buff; some light green clay	5	50
Sand, medium, slightly clayey, buff	10	60
Sand, coarse, buff; some light clay	5	65
Sand, medium, buff-gray; some clay	5	70
Sand, medium, light buff	5	75
Sand, medium, clayey, light tan	5	80
Pliocene (?) series:		
Sand, medium, tan; some clay	5	85
Sand, medium to fine, tan; some clay	19	104
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, medium, blue-gray; some clay	1	105
Clay, sandy, fine, blue-gray	4	109
Sand, medium, gray-buff; some clay	3	112

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, buff; some clay	3	115
Sand, coarse to medium, gray and red; some clay	1	116
Sand, medium, gray-buff; some clay	4	120
Sand, medium, red-tan; some clay	2	122
Well Wi-Cc 1 (Altitude: 20 feet)		
Pleistocene series:		
Sand and clay	25	25
Sand	8	33
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	43	76
Manokin aquifer:		
Sand, gray; water and gravel	23	99
Well Wi-Cc 2 (Altitude: 10 feet)		
Pleistocene series:		
Sand	5	5
Clay	15	20
Sand	15	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	20	65
Manokin aquifer:		
Sand, gray; water	18	83
Obs. Well Wi-Cc 21 (Altitude: 15 feet)		
Pleistocene series:		
Sand, medium, brown	4	4
Clay, sandy, fine, buff-brown	1.5	5.5
Sand, coarse with some granule-size, clayey, buff-brown	.5	6
Sand, very coarse to coarse, with some gravel and granule-size, red-brown	1	7
Obs. Well Wi-Cc 22 (Altitude: 14.6 feet)		
Pleistocene series:		
Clay, sandy, brown	3.5	3.5
Clay, sandy, buff-brown	1	4.5
Sand, clayey, medium, buff-brown	1	5.5
Sand, clayey, medium with some small pebbles and granule-size, brown	1	6.5
Sand, medium, red-brown	2	8.5
Sand, very coarse, medium, brown	.5	9
Sand, very coarse, medium, gray-brown	1	10
Sand, fine to medium, gray	2	12

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Hole Wi-Cc 25 (Altitude: 15 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand and clay, orange to gray	5	5
Sand, coarse and granule gravel, orange to light gray	14	19
Sand, hard	1	20
Gravel	1	21
Pamlico formation:		
Silt and clay, blue	9	30
Clay, blue-gray	8.5	38.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, medium to fine, gray, and gravel, granule size, thin layer	3.5	42
Sand, medium to fine, gray	13	55
Sand, coarse to medium, gray	5	60
Sand, granule to coarse, gray	5	65
Sand, medium, gray	19	84
Obs. Well Wi-Cc 24 (Altitude: 18 feet)		
Pleistocene series:		
Sand, clayey, fine to medium, light brown	3	3
Sand, medium, light brown to buff	2	5
Sand, medium coarse, iron-stained brown to buff	.5	5.5
Clay, sandy, medium, gray buff-brown	1.5	7
Obs. Well Wi-Cd 25 (Altitude: 22 feet)		
Pleistocene series:		
Sand, clayey, medium, brown	2.5	2.5
Clay, buff	.5	3
Sand, medium, loose, buff	3	6
Obs. Well Wi-Cd 26 (Altitude: 28 feet)		
Pleistocene series:		
Sand, gravelly, very coarse, gray-buff	4	4
Sand, coarse, gravel, granule, gray	.5	4.5
Sand, fine and very coarse mixed with some pebble and granule-size, gray	2.5	7
Obs. Well Wi-Cd 27 (Altitude: 40 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, tan-brown	5	5
Sand, medium, buff-brown	1	6
Sand, coarse, buff-brown	1	7
Sand, granule and very coarse, buff-brown	1	8

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Cd 28 (Altitude: 38.2 feet)		
Pleistocene series:		
Sand, medium, brown to light brown	3	3
Sand, medium, light brown	2.5	5.5
Sand, coarse to very coarse, buff	1.5	7
Obs. Well Wi-Cd 29 (Altitude: 34.1)		
Pleistocene series:		
Sand, clayey, medium, gray-brown	2	2
Sand, medium, gray-brown	1	3
Sand, medium, red-brown to gray	.5	3.5
Clay, sandy, medium, gray	1	4.5
Clay, sandy, medium, red and gray	.5	5
Sand, granule, medium to coarse, red and gray	1	6
Sand, gravelly, medium, light brown	1	7
Sand, gravelly, medium, buff-brown	1.5	8.5
Sand, coarse, granule, brown	.5	9
Obs. Well Wi-Cd 30 (Altitude: 29.8 feet)		
Pleistocene series:		
Clay, sandy	3	3
Sand	2.5	5.5
Clay	.5	6
Gravel and sand	1	7
Obs. Well Wi-Cd 31 (Altitude: 25 feet)		
Pleistocene series:		
Sand, medium, brown	3.5	3.5
Clay, sandy, medium, buff-brown	1	4.5
Sand, coarse, buff-brown	.5	5
Sand, medium, clean, buff-brown	1	6
Obs. Well Wi-Cd 32 (Altitude: 45 feet)		
Pleistocene series:		
Sand, medium, brown	4.5	4.5
Sand, clayey, coarse to medium, gray-brown	.5	5
Sand, very coarse to coarse, gray-brown	2.5	7.5
Sand, coarse to medium, buff	1.5	9
Test Hole Wi-Cd 33 (Altitude: 45 feet)		
Pleistocene series:		
Walston silt:		
Sand, clayey, yellow	5	5
Silt, sandy, white	4	9
Beaverdam sand:		
Sand, coarse and gravel, yellow	1	10
Sand, coarse, light	19	29

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Pliocene (?) series:		
Sand and fine gravel, rust-brown	6	35
Sand and fine gravel, rust-brown, and clay balls	7	42
Sand, coarse, red-brown	6	48
Sand, clayey, medium to fine, rust	3	51
Sand, coarse, medium, rust-brown	12	63
Sand, coarse to medium, light tan	4	67
Sand, very coarse to medium, brown	6	73
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	4	77
Manokin aquifer:		
Sand, medium, gray to white	8	85
Sand, fine, light tan	5	90
Sand, coarse to medium, light tan	6	96
Sand, medium to fine, dark gray	9	105
Clay, sandy, light gray and gray-blue	2	107
Sand, gray	6	113
Sand, tan	8	121
Sand, clayey, medium, white turning rusty iron color	15	136
Sand, medium, white	16	152
Sand, light yellow-gray	3	155
Sand, medium to fine, dark yellow-gray	2	157
Sand, medium, gray	3	160
Sand, clayey, fine, gray	8	168
Clay, sandy, blue	7	175
Sand, medium to fine, light yellow	5	180
St. Marys (?) formation:		
Sand, yellowish gray; fossils	5	185
Sand, light gray; fossils	5	190
Clay, sandy, blue; fossils	20	210
Test Hole Wi-Cd 34 (Altitude: 15 feet)		
Pleistocene series:		
Parsonsburg sand:		
Silt, sandy, brown to black	6	6
Silt, sandy, and gravel, gray	2	8
Sand and granule and pebbles to ½-inch, light gray; water	12	20
Gravel, coarse	1	21
Sand and granule-size gravel, light gray	5	26
Beaverdam sand:		
Sand, medium, gray; streaks of carbonaceous material	4	30
Sand, coarse, gray, with some light gray clay	7	37
Gravel, granule	1	38
Clay, white-gray	1	39
Sand, coarse to fine, light gray	3	42
Sand, medium, light gray; water	10	52

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, light gray	32	84
Manokin aquifer:		
Sand, medium to fine, gray	21	105
Well Wi-Cd 35 (Altitude: 20 feet)		
Pleistocene series:		
Top soils	16	16
Sand	3	19
Pliocene (?) series:		
Sand and clay, red	31	50
Sand, red	18	68
Test Hole Wi-Cd 45 (Altitude: 30.8 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, light brown	3.5	3.5
Sand, medium, light brown, iron-stained	1	4.5
Sand, medium, brown, and gravel	2	6.5
Sand, medium, buff, brown, and gravel		6.5
Well Wi-Ce 1 (Altitude: 6 feet)		
Pleistocene series:		
Mud	2	2
Sand, white	4	6
Pliocene (?) series:		
Sand, fine, red, and clay	14	20
Sand, coarse, and clay	5	25
Sand, fine, and clay	7	32
Sand, coarse and clay	13	45
Sand and clay	7	52
Sand, hard	4	56
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	2	58
Well Wi-Ce 2 (Altitude: 6 feet)		
Pleistocene series:		
Mud	3	3
Sand, white	2	5
Pliocene (?) series:		
Sand, fine, red	13	18
Sand, fine and gravel	10	28
Clay	3	31
Sand	6	37
Sand, coarse and clay	13	50
Sand, coarse	7	57
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue		57

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 3 (Altitude: 6 feet)		
Pleistocene series:		
Mud	3	3
Sand, quick	7	10
Sand, coarse	7	17
Sand and clay	2	19
Pliocene (?) series:		
Sand, coarse and clay	14	33
Sand, coarse	8	41
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	2	43
Well Wi-Ce 4 (Altitude: 5 feet)		
Pleistocene series:		
Mud	3	3
Pliocene (?) series:		
Sand, white	4	7
Sand, fine, red	8	15
Sand and clay	4	19
Sand, hard, and gravel, coarse	6	25
Sand and clay	7	32
Sand, coarse	16	48
Well Wi-Ce 5 (Altitude: 6 feet)		
Pleistocene series:		
Mud	3	3
Sand, white	4	7
Pliocene (?) series:		
Sand, coarse, and gravel	6	13
Sand, red, and clay	6	19
Sand and clay	5	24
Sand, fine, and gravel	8	32
Sand, red	13	45
Sand and gravel	7	52
Sand, fine	9	61
Clay		61
Well Wi-Ce 6 (Altitude: 9 feet)		
Pleistocene and Pliocene (?) series:		
Mud, meadow	2	2
Sand and gravel	9.5	11.5
Sand, coarse	10.5	22
Gravel and sand	8	30
Gravel	5	35
Sand	9	44
Gravel	6	50
Gravel and sand	6	56
Sand and gravel	9	65
Clay		65

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 7 (Altitude: 9 feet)		
Pleistocene series:		
Mud	2	2
Sand, gray	5	7
Gravel	1	8
Sand, gray, and gravel	3	11
Sand, yellow	7	18
Gravel, large	3	21
Pliocene (?) series:		
Sand, coarse, brown, and gravel, large	24	45
Sand, fine, brown, and gravel	7	52
Sand, coarse, brown, and gravel	10	62
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, bluish gray	2	64
Well Wi-Ce 8 (Altitude: 10 feet)		
Pleistocene series:		
Soil, sandy	4	4
Mud, sand and gravel	6	10
Pliocene (?) series:		
Sand, coarse	22	32
Sand, coarse, and some gravel	30	62
Sand, coarse, medium, some gravel	3	65
Clay, sandy		65
Test Well Wi-Ce 9 (Altitude: 10 feet)		
Pleistocene series:		
Sand, coarse to medium, buff, gray, iron-stained, and gravel.	7	7
Sand, coarse, gravel, fine, buff, magnetite, chert	18	25
Pliocene (?) series:		
Sand, coarse, rusty brown, gravel	15	40
Sand, medium, rusty brown, some mica	8	48
Sand, coarse, rusty brown, and gravel	2	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, gray, sand not mixed with clay	2	52
Test Well Wi-Ce 10 (Altitude: 30 feet)		
Pleistocene series:		
Sand, light, and clay	15	15
Pliocene (?) series:		
Sand, red, and clay	65	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	2	82
Sand, white	7	89
Clay, blue	21	110

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer-		
Sand, white	19	129
Sand, white; plant fragments	6	135
Test Well Wi-Ce 11 (Altitude: 6 feet)		
Pleistocene series:		
Muck	3	3
Sand, white, and gravel	9	12
Pliocene (?) series:		
Sand, and clay, red	13	25
Clay and sand, red	4	29
Gravel	1	30
Sand, coarse, red, and clay	27	57
Sand, coarse, red, and clay, blue	5	62
Test Well Wi-Ce 12 (Altitude: 3 feet)		
Pleistocene and Pliocene (?) series:		
Mud	6	6
Sand, fine	4	10
Gravel and clay	3	13
Sand and clay	7	20
Sand, coarse	20	40
Sand and clay	25	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	5	70
Obs. Well Wi-Ce 13 (Altitude: 7 feet)		
Recent and Pleistocene series:		
Sand and fill	5	5
Pliocene (?) series:		
Sand, red, and gravel	2	7
Sand, red, free, and gravel	22	29
Gravel, hard, ¾-inch	1	30
Sand, free, coarse, and gravel, ¾-inch	6	36
Sand, fine, light brown, and gravel, ¾-inch	4	40
Sand, coarse, free, red, and gravel, ¾-inch	10	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, tough, white	.3	50.3
Clay, blue	.1	50.4
Sand, free, light gray	9.6	60
Clay, blue	5	65
Test Well Wi-Ce 14 (Altitude: 25 feet)		
Pleistocene series:		
Clay and sand	14	14
Sand, white, and clay	12	26

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, clay and gravel	8	34
Sand, clayey, coarse, white	16	50
Pliocene (?) series:		
Sand, clayey, coarse, red	22	72
Rock or cemented formation	.5	72.5
Sand, red	6.5	79
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower Aquiclude:		
Clay, blue	15	94
Sand, fine, white, and clay, blue	49	143
Clay, blue	3	146
Test Well Wi-Ce 15 (Altitude: 29 feet)		
Pleistocene and Pliocene (?) series:		
Sand and clay	30	30
Sand, coarse, and clay	30	60
Sand and clay	10	70
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	3	73
Test Well Wi-Ce 16 (Altitude: 7 feet)		
Pliocene (?) series:		
Not reported	2	2
Sand, coarse to medium, iron-cemented and stained, some gravel, chert	8	10
Sand, coarse to medium, rusty brown, gravel, chert	20	30
Gravel, large, sand, coarse, rusty brown, some magnetite	2	32
Sand, coarse to medium, rusty brown, gravel, some mica, and magnetite	10	42
Sand, coarse, rusty brown, iron-cemented, clay, gray to brown, gravel	10	52
Sand, coarse, rusty brown, clay, sandy, gray to brown, gravel, mica	6	58
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, gray, sand, medium to fine, buff	2	60
Test Well Wi-Ce 17 (Altitude: 8 feet)		
Pliocene (?) series:		
Not reported	6	6
Sand, coarse, buff, iron-stained, and gravel	9	15
Sand, coarse, to medium, rusty brown, and gravel	43	58
Sand, coarse, to medium, rusty brown, iron cemented, and gravel	3	61
Clay, sandy, gray	.5	61.5
Sand, fine, buff, iron-stained	1.5	63

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Ce 18 (Altitude: 7 feet)		
Pliocene (?) series:		
Sand, medium, brown, iron-stained	3.9	3.9
Sand, coarse to medium, rusty brown, and gravel	1.3	5.2
Sand, coarse, rusty brown, gravel, clay, sandy, brown	.5	5.7
Sand, coarse to medium, rusty brown	2.2	7.9
Sand and gravel, rusty brown	.3	8.2
Sand, coarse, rusty brown	2.6	10.8
Well Wi-Ce 42 (Altitude: 30 feet)		
Pleistocene series:		
Soil and sand	6	6
Clay, dark	19	25
Sand, white	10	35
Sand, fine	8	43
Sand, coarse, with pebbles; water	22	65
Crust, irony	2	67
Clay, white	1	68
Pliocene (?) series:		
Sand, iron-colored; water	25	93
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, clayey, with lignite	9	102
Sand, fine, green; water	14	116
Clay, sticky, blue, with sand	19	135
Manokin aquifer:		
Sand, fine, gray, coarse below	50	185
Gravel, coarse, with fine sand; water	72	257
St. Marys formation:		
Clay, with fine sand and shells	6	263
Clay, blue, with shell bed at 274 feet	87	350
Choptank (?) formation:		
Gravel and sand	—	350
Sand, clayey, fine, blue	5	355
Marl, blue, with cobblestones at 376 feet	21	376
Marl, grading to sand, gritty, with shell	12	388
Sand, gray	36	424
Well Wi-Ce 61 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Sand	21	21
Clay, white	12	33
Sand, white	27	60
Sand, yellow	21	81
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	82

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 69 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Sand and gravel, interbedded	65	65
Sand, yellow	15	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	—	80
Obs. Well Wi-Ce 88 (Altitude: 47 feet)		
Pleistocene series:		
Sand, medium, gravelly, pebbly, slightly clayey, buff, brown and gray	6	6
Sand, fine, medium, slightly clayey, buff	4	10
Sand, medium, light buff	2	12
Obs. Well Wi-Ce 89 (Altitude: 45 feet)		
Pleistocene series:		
Top soil, sandy, slightly clayey, medium brown	1	1
Sand, clayey, tan-brown	2	3
Sand, medium, clayey, iron streaked, tan	.5	3.5
Clay, sandy, iron streaked, buff-tan	1	4.5
Clay and sand, medium, iron streaked, buff	2	6.5
Sand, medium, slightly clayey, buff	1.5	8
Sand, coarse to medium, slightly clayey, tan and buff	2.5	10.5
Clay and sand, medium, light tan	.25	10.75
Sand, medium, slightly clayey, tan	2.75	13.5
Well Wi-Ce 91 (Altitude: 35 feet)		
Pliocene (?) series:		
Missing	30	30
Sand, very coarse, dark orange	9	39
Sand, coarse to medium, yellowish orange	10	49
Sand, granule to coarse, yellowish orange	5	54
Sand, medium to fine, yellowish orange	5	59
Sand, granule to coarse, yellowish orange, with pebbles to .5 inch	5	64
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, fine, light gray	5	69
Clay, silty to very fine, weak olive	5	74
Well Wi-Ce 92 (Altitude: 35 feet)		
Pleistocene:		
Earth	5	5
Gravel	5	10
Sand	95	105

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 93 and 94 (Altitude: 15 feet)		
Pleistocene and Pliocene (?) series:		
Sand	14	14
Sand and gravel	6	20
Iron ore	1.3	21.3
Gravel, large	10.7	32
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Clay, gray, sticky	13	45
Sand, coarse, white; some wood	15	60
Well Wi-Ce 95 (Altitude: 8 feet)		
Pleistocene series:		
Soil and sand	6	6
Clay, sandy	10	16
Sand	8	24
Sand and clay	21	45
Pliocene (?) series:		
Sand, red; small amount of water	18	63
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sticky, blue	35	98
Manokin aquifer:		
Sand, fine, gray	27	125
Well Wi-Ce 97 (Altitude: 30 feet)		
Pleistocene series:		
Clay, sandy, brown	17	17
Clay, sandy, white with sand streaks	9	26
Pliocene (?) series:		
Sand, brown with clay streaks	7	33
Sand, brown, some gravel	26	59
Sand and clay streaks	12	71
Well Wi-Ce 98 (Altitude: 40 feet)		
Pleistocene and Pliocene (?) series:		
Clay and sand, yellow	25	25
Clay and sand, fine, white	47	72
Sand, coarse, white	10	82
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	1	83
Well Wi-Ce 99 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Soil and sand	3	3
Sand, fine	49	52

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 100 (Altitude: 5 feet)		
Pleistocene and Pliocene (?) series:		
Top soil and fill	5	5
Sand, fine	10	15
Sand, coarse to fine, some gravel	5	20
Sand, coarse to fine	10	30
Sand, some coarse, fine	5	35
Sand, fine	22	57
Sand, coarse to fine	7	64
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, blue	6	70
Well Wi-Ce 101 (Altitude: 25 feet)		
Pleistocene series:		
Surface sands	18	18
Mud	5	23
Pliocene (?) series:		
Clay and sand mixed, red	32	55
Sand and gravel, red	13	68
Well Wi-Ce 102 (Altitude: 40 feet)		
Pleistocene and Pliocene (?) series:		
Sand, gravel and clay, white and yellow	65	65
Sand, medium, yellow	10	75
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	5	80
Well Wi-Ce 103 (Altitude: 20 feet)		
Pleistocene and Pliocene (?) series:		
Sand, fine, and clay, soft, white	53	53
Sand, coarse, yellow and white	15	68
Well Wi-Ce 104 (Altitude: 35 feet)		
Pleistocene series:		
Soil	2	2
Clay, sandy	3	5
Sand, light	10	15
Pliocene (?) series:		
Sand, red	11	26
Sand, fine gravel, red	38	64
Clay	3	67
Sand, red	3	70
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	8	78
Sand, and gravel	17	95

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Ce 106 (Altitude: 20 feet)		
Pleistocene series:		
Sand, medium, white	10	10
Sand, medium, buff	12	22
Pliocene (?) series:		
Sand, coarse, red	18	40
Sand, medium, red	5	45
Sand, coarse, red to brown	20	65
Sand, coarse to medium, some clay, gray and yellow; some pebbles up to ½-inch	3	68
Obs. Well Wi-Ce 107 (Altitude: 48 feet)		
Pleistocene series:		
Soil	1	1
Sand, clayey, tan	2.5	3.5
Clay, sandy, tan to buff	1	4.5
Sand and clay, buff	2	6.5
Sand, clayey, tan to buff	4	10.5
Sand, and clay, tan	1.3	11.8
Sand, slightly clayey, tan	1.7	13.5
Well Wi-Cf 1 (Altitude: 6 feet)		
Pleistocene series:		
Not reported	2	2
Sand and gravel, fine to medium, buff; some magnetite	18	20
Pliocene (?) series:		
Sand, coarse, rusty brown	10	30
Sand and gravel, coarse, rusty brown	20	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, gray	2	52
Sand, medium to fine, gray, mixed with some clay, gray	8	60
Well Wi-Cf 2 (Altitude: 8 feet)		
Pleistocene series:		
Not reported	10	10
Sand, medium, buff, some magnetite	22	32
Sand, medium, rusty brown	5	37
Pliocene (?) series:		
Sand and gravel, coarse to medium, rusty brown, some sand, arkosic	5	42
Sand, medium, rusty brown	10	52
Sand, coarse, rusty brown	5	57
Sand and gravel, coarse, rusty brown	5	62
Sand, medium, rusty brown	3	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, gray	1	66

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Cf 3 (Altitude: 45 feet)		
Pleistocene series:		
Clay	15	15
Sand, medium	10	25
Sand, light	15	40
Sand, coarse	8	48
Sand, very coarse	8	56
Pliocene (?) series:		
Gravel	9	65
Sand, very fine	5	70
Sand, fine, yellow	3	73
Sand and gravel	6	79
Sand and clay	1	80
Sand, fine	5	85
Gravel	2	87
Gravel, very coarse	1	88
Sand and gravel, coarse	2	90
Gravel, medium	2	92
Gravel, medium, white	3	95
Gravel, yellow	5	100
Sand, yellow	5	105
Sand and gravel, coarse	3.5	108.5
Miocene series:		
Shale layer	0.5	109
Test Well Wi-Cf 22 (Altitude: 11 feet)		
Pleistocene series:		
Beaverdam sand:		
Sand, coarse to medium, white	1	1
Sand, coarse, to medium, reddish	1	2
Sand and gravel, yellow	2	4
Sand and gravel, coarse	5	9
Gravel, coarse	2	11
Sand and gravel, medium	3	14
Pliocene (?) series:		
Sand, fine, reddish, some gravel, medium	9	23
Sand, coarse to medium, orange	3	26
Sand, coarse, and pebbles, large, red	3	29
Gravel, very coarse, some sand	2	31
Sand, coarse, some gravel, red	5	36
Sand, medium to fine, red	7	43
Sand, medium, some gravel, medium, red	2	45
Gravel, coarse, maximum 1-inch	0.5	45.5
Sand and gravel, coarse to medium, red	10.5	56
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	2	58

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Well Wi-Cf 23 (Altitude: 7.8 feet)		
Recent series:		
Loam, black	1	1
Clay, gray to white, dry	1	2
Clay, sandy, gray to white	3	5
Pleistocene series:		
Beaverdam sand:		
Sand, gray to yellow, some gravel	5	10
Pliocene (?) series:		
Sand, fine, red to yellow	5	15
Sand and gravel, medium to fine	1	16
Sand, fine, yellow to red	3	19
Sand, medium to fine, some gravel, red	1	20
Sand, medium to fine, red	6	26
Sand, fine and pebbles, red	1	27
Sand, medium, and gravel, coarse to medium	3	30
Sand, coarse to medium, red	3	33
Sand, medium to fine, red	8	41
Sand, medium to fine, some gravel, red	2	43
Gravel, coarse to medium	1	44
Sand and gravel, coarse to medium, red	6	50
Sand and gravel, cemented, red	0.1	50.1
Sand, coarse to medium, some clay, brown	0.9	51
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	1	52
Test Well Wi-Cf 24 (Altitude: 8 feet)		
Recent series:		
Soil, sandy, black	1	1
Muck, black	1	2
Clay, brown to gray	1	3
Pleistocene series:		
Beaverdam sand:		
Sand, medium to fine, gray	5	8
Sand, medium, gray to yellow	1	9
Gravel, coarse	0.5	9.5
Pliocene (?) series:		
Sand, fine, red	5.5	15
Sand, fine, red, some gravel	2	17
Sand, fine, red	2	19
Sand, medium to fine, some gravel, red	1	20
Sand, and gravel, medium, red	2	22
Sand, fine, red	2	24
Sand, medium to fine, red	6	30
Sand, fine and pebbles, large, red	1	31
Sand, fine, some gravel, medium, red	4.5	35.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, and gravel, coarse to medium, red	0.5	36
Sand, coarse, and gravel, medium, red	3	39
Gravel, coarse, red	1	40
Sand, coarse to medium, red	3	43
Gravel, coarse to medium, red	0.5	43.5
Sand and gravel, coarse to medium, red	6.5	50
"Ironstone"	0.1	50.1
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	0.9	51
Test Well Wi-Cf 25 (Altitude: 16 feet)		
Recent series:		
Soil, sandy, black-gray	0.5	0.5
Sand, medium to fine, yellow	6.5	7
Pleistocene series:		
Beaverdam sand:		
Sand, white, and clay, sandy	1	8
Sand and gravel, coarse	2	10
Gravel, coarse to medium	0.5	10.5
Sand, coarse to medium, some gravel, medium	2.5	13
Sand, medium to fine, white, mixed with some clay	3	16
Sand, coarse to medium, yellow	1	17
Pliocene (?) series:		
Sand, coarse to medium, orange	4	21
Sand, medium to fine, orange	4	25
Sand, medium to fine, some gravel, medium, red	2	27
Sand and gravel, coarse to medium, red	3	30
Gravel and sand, coarse	1	31
Sand and gravel, coarse to medium, orange	3	34
Gravel	0.1	34.1
Sand, medium to fine, orange	4.9	39
Sand, medium to fine, some gravel, orange	2	41
Gravel, coarse to medium	0.1	41.1
Sand, coarse to medium, and gravel, medium	1.9	43
Sand, medium, and gravel, coarse, red	1	44
Sand, coarse to medium, and gravel, medium, red	4	48
Sand, coarse, red, and gravel, coarse to medium	3	51
Sand, very coarse, orange	3	54
Sand, coarse, and gravel, medium, red	3	57
Sand, medium, red, some gravel	2	59
Sand, coarse, and gravel, medium, red	2	61
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, white, and "ironstone"	0.5	61.5
Clay, blue	0.5	62

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Well Wi-Cf 28 (Altitude: 41 feet)		
Pleistocene series:		
Walston silt:		
Sand, yellow	6	6
Clay, sandy, yellow to brown	1	7
Sand, yellow to white	3	10
Clay and silt, sandy, gray	0.5	10.5
Sand, white	4.5	15
Beaverdam sand:		
Gravel, coarse to medium	0.5	15.5
Sand, medium to fine, white	1	16.5
Silt, sandy, fine	0.5	17
Sand, silty, coarse to medium, some gravel	12	29
Gravel, coarse to medium	1	30
Sand, silty, medium to fine, yellow to gray	2	32
Gravel, medium	0.5	32.5
Sand, medium to fine, tan, some pebbles	3.5	36
Sand, fine, yellow	6	42
Sand, medium to fine, yellow to gray, some gravel, medium	5	47
Sand, coarse to medium, and gravel, fine	2	49
Gravel, coarse to medium	1	50
Pliocene (?) series:		
Sand, coarse to medium, brown, and gravel, fine to medium, buff	8	58
Gravel, coarse	0.5	58.5
Sand, coarse to medium, red to brown	4.5	63
Sand, medium to fine, brown, and gravel, medium to coarse	2	65
Gravel coarse	1	66
Sand, medium to fine, red to brown	3.5	69.5
Gravel, coarse	0.5	70
Sand, medium to fine, red to brown	2	72
Sand, fine, yellow to brown	2	74
Sand, clayey, fine, brown	3	77
Sand, medium to fine, red to brown	3	80
Sand, medium to fine, gray to brown, and gravel, medium	3	83
Sand, coarse, and gravel, fine, gray-brown	2	85
Sand, coarse to medium, red, and some gravel, fine	2	87
Sand, coarse to medium, red, and gravel, medium	2	89
Sand, coarse to fine, red to brown, and some gravel, fine	2	91
"Ironstone"	0.5	91.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	0.5	92
Test Well Wi-Cf 29 (Altitude: 30 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, buff	6	6
Sand, coarse to medium, and some pebbles, tan	2	8

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Beaverdam sand:		
Sand and gravel, coarse, white	2	10
Sand, coarse to medium, white	2	12
Sand and gravel, coarse, some clay, white	1	13
Sand, medium, white	3	16
Sand, medium to fine, and some pebbles, white	2	18
Sand, coarse to medium, and some pebbles, white	2	20
Sand, coarse to medium, white	6	26
Pliocene (?) series:		
Gravel	1	27
Sand, medium, iron-stained	4	31
Sand, medium to fine, iron-stained	3	34
Sand, coarse to medium, and some gravel, orange	2	36
Sand and gravel, coarse, orange	11	47
Sand, medium to fine, orange	3	50
Sand, fine, and gravel, coarse, red	3	53
Sand, coarse to fine, and some gravel, large	4	57
Sand, coarse, and some gravel, red	5	62
Sand, coarse, red	5	67
Sand and gravel, coarse, red	4	71
Conglomerate, iron cement	0.5	71.5
Sand and gravel, coarse, red	0.5	72
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	2	74
Test Well Wi-Cf 30 (Altitude: 39 feet)		
Pleistocene series:		
Sand, medium, gray	3	3
Sand, coarse to medium, gray	3	6
Clay, sandy	6	12
Clay, sandy, white, and some gravel	4	16
Sand and gravel, coarse, gray	4	20
Sand, coarse to fine, gray, and some gravel	7	27
Sand, coarse to medium, gray	3	30
Sand, coarse to medium, gray to red, and some gravel, coarse to medium	2	32
Sand, medium to fine, gray to red	7.5	39.5
Sand, medium to fine, red to yellow, and some gravel, medium	1.5	41
Sand, fine, yellow	3	44
Sand, medium to fine, red to yellow	4	48
Sand, medium to fine, gray	8	56
Sand, coarse to medium, gray	3	59
Sand, coarse to medium, gray, and gravel, coarse	1	60
Pliocene (?) series:		
Sand, medium, red to brown, and some gravel, medium	4.5	64.5
Gravel, coarse	0.5	65
Sand, fine, yellow to brown	4.5	69.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium to fine, red, and some gravel, fine	1.5	71
Sand, coarse to fine, red	2	73
Sand, coarse to medium, red, and some gravel	8	81
Conglomerate, iron cement	0.1	81.1
Sand, coarse to medium, red, some clay, sandy	0.9	82
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	0.5	82.5
Test Well W-Cf 31 (Altitude: 43 feet)		
Pleistocene series:		
Soil, sandy	1	1
Sand, yellow	3	4
Sand, gray to yellow	2	6
Clay, sandy, yellow to brown	1	7
Clay, sandy, gray to brown	1	8
Clay, sandy, gray	1	9
Clay, gray to white	2	11
Sand, yellow	1	12
Clay, sandy, white	1	13
Sand, white	6	19
Sand, coarse to medium, white to gray, and some gravel, medium	7	26
Sand, coarse to medium, white to gray, and some gravel, fine	4	30
Sand, coarse to medium, white to gray, and some gravel, fine, lignite	1	31
Sand, coarse to medium, gray, and gravel, medium	5	36
Sand, medium to fine, clayey, gray	2	38
Sand, fine, gray	12	50
Gravel, medium	1	51
Sand, medium to fine, gray to yellow	3	54
Sand, medium to fine, yellow and some gravel, fine	2	56
Gravel, coarse to medium	1	57
Sand, coarse to medium, red to brown	1	58
Sand and gravel, coarse to medium, gray to brown	2	60
Sand, coarse to medium, gray, and gravel, fine	2	62
Sand and gravel, coarse	4	66
Sand, coarse, brown	2	68
Pliocene (?) series:		
Sand, coarse, reddish brown	2	70
Sand and gravel, coarse	4	74
Sand, coarse, and some gravel	14	88
Sand, very coarse, red	2	90
Sand, coarse, red, and gravel, small	5	95
Sand, coarse, red	1	96
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	1	97

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Cf 39 (Altitude: 37.3 feet)		
Pleistocene series:		
Sand, granule to fine, buff	18	18
Obs. Well Wi-Cf 40 (Altitude: 41.0 feet)		
Pleistocene series:		
Sand, medium, gray	2	2
Clay, brown	2	4
Sand, medium, tan to brown	9	13
Obs. Well Wi-Cf 41 (Altitude: 45.5 feet)		
Pleistocene series:		
Sand, medium, chocolate-brown to tan	3.3	3.3
Sand, clayey, medium, brown	1.4	4.7
Sand and silty clay, red-brown	.2	4.9
Sand, little silt and clay, red-brown	1.1	6
Sand and silty clay, red-brown	4.2	10.2
Sand, some silty clay, buff	1.2	11.4
Sand, little silt and clay, orange	.3	11.7
Obs. Well Wi-Cf 42 (Altitude 42.5 feet)		
Pleistocene series:		
Sand, silt and clay, red and brown	6	6
Sand, silty, medium, brown	1.2	7.2
Sand, medium, buff to tan, some silt	2.6	9.8
Silt, sandy, coarse to fine, tan	2.2	12
Obs. Well Wi-Cf 43 (Altitude: 37.0 feet)		
Pleistocene series:		
Sand, coarse, light brown	8	8
Sand, clayey, coarse, iron-stained, light brown	1	9
Sand, coarse and clay, gray-brown	1	10
Sand, clean, coarse, very light tan	5	15
Sand, clean, coarse, buff	3	18
Obs. Well Wi-Cf 44 (Altitude: 40.8 feet)		
Pleistocene series:		
Soil, sand, medium, gravel, chocolate-brown	2.5	2.5
Sand, coarse to medium, tan	2	4.5
Sand, coarse to medium, slightly clayey, tan to red-brown	1.3	5.8
Sand, clayey, medium to fine, brown	.2	6
Silt and clay, sandy, buff to brown	4	10
Sand, silty, coarse to medium, buff	1	11
Sand, coarse to medium, red-brown and buff	1	12
Obs. Well Wi-Cf 45 (Altitude: 51.6 feet)		
Pleistocene series:		
Soil and sand, medium, chocolate-brown	1.7	1.7
Sand, medium, slightly clayey, red-brown	2	3.7

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, silt and clay, buff and red	.5	4.2
Silt and clay, sandy, buff to red	1.6	5.8
Sand, silt and clay, tough, red-brown and buff	2.4	8.2
Silt and clay, sandy, buff	1.5	9.7
Sand, medium, some silt and clay, tan to buff	2.5	12.2
Obs. Well Wi-Cf 46 (Altitude: 68.3 feet)		
Pleistocene series:		
Sand, coarse, light buff	5	5
Sand, coarse, reddish brown	1	6
Clay, sandy, gray	1.5	7.5
Sand, clayey, coarse, brown	1	8.5
Clay, sandy, medium, pinkish brown	1.5	10
Clay, sandy, medium, buff	1	11
Clay, iron-stained gray-red	1	12
Clay, sandy, medium, brown-gray	3	15
Sand, clayey, coarse, brownish gray	2	17
Obs. Well Wi-Cf 47 (Altitude: 47.5 feet)		
Pleistocene series:		
Clay, sandy, brown	4	4
Sand, clayey, buff	8	12
Obs. Well Wi-Cf 48 (Altitude: 53.1 feet)		
Pleistocene series:		
Sand, coarse, light brown	4	4
Sand, coarse, red-brown	3	7
Clay, sandy, pink	5.5	12.5
Sand, coarse, slightly clayey, light brown	1	13.5
Obs. Well Wi-Cf 49 (Altitude: 52.6 feet)		
Pleistocene series:		
Sand, medium, light brown	4	4
Sand, clayey, medium, reddish brown and gray	3	7
Sand, clayey, medium to fine, iron-stained gray	3	10
Clay, sandy, reddish gray	1	11
Sand, coarse, reddish gray	1	12
Sand, coarse, gray-brown	1	13
Obs. Well Wi-Cf 50 (Altitude: 45.9 feet)		
Pleistocene series:		
Sand, very coarse, slightly clayey, light brown	9	9
Sand, very coarse to coarse, light gray-brown	3	12
Sand, very coarse, slightly clayey, light tan	3	15
Obs. Well Wi-Cf 51 (Altitude: 42.2 feet)		
Pleistocene series:		
Sand, coarse, light to dark brown	8	8
Sand, coarse, reddish brown	7	15
Sand, coarse, slightly clayey, reddish brown to buff	2	17

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Cf 54 (Altitude: 42 feet)		
Pleistocene series:		
Walston silt:		
Sand, coarse to medium, silty, buff	10	10
Sand, coarse to medium, silty, tan	10	20
Beaverdam sand:		
Sand, very coarse to coarse, light brown	20	40
Pliocene (?) series:		
Sand, granule to medium, red-brown	10	50
Sand, coarse, some granule, red-brown	23	73
Sand, very coarse to coarse, some clay, dark red-brown	21	94
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, medium, some clay, blue-gray	74	168
Manokin aquifer:		
Sand, medium, blue-gray	11	179
Sand, coarse to medium, blue-gray	21	200
Test Hole Wi-Cf 55 (Altitude: 46 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium to fine, brown	10	10
Walston silt:		
Sand, medium to fine, light gray, some clay, white	5	15
Beaverdam sand:		
Sand, medium, gray, and silt, white	27	42
Sand, coarse to medium, brown-gray, and silt, white	6.5	48.5
Pliocene (?) series:		
Sand, coarse, red-brown	4.5	53
Clay, black, and sand, fine, gray	2	55
Sand, coarse, red-brown	10	65
Sand, coarse, red-brown, some white clay	5	70
Sand, coarse, brown	23	93
Sand, coarse, brown, and clay, black	11	104
Sand, coarse, brown; some pebbles	3.5	107.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, medium to fine, gray	31.5	139
Obs. Well Wi-Cf 56 (Altitude: 45.2 feet)		
Pleistocene series:		
Sand, slightly clayey, medium, brown-buff	1	1
Sand, slightly clayey, medium, brown	1	2
Sand, slightly clayey, medium, red-brown	1	3
Clay, tight, red-gray	1.5	4.5
Clay with some fine sand, red to buff	3	7.5
Sand and clay, fine, buff	2	9.5
Water table surged in, could bring up only fine buff sand and white clay	2	11.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Cf 57 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Surface soils	12	12
Sand and gravel	69	81
Well Wi-Cf 58 (Altitude: 50 feet)		
Pleistocene series:		
Walston silt:		
Silt	5	5
Sand	5	10
Silt and sand	3	13
Beaverdam sand:		
Sand	42	55
Pliocene (?) series:		
Sand, fine	17	72
Sand, coarse	12	84
Gravel and sand	16	100
Sand, white	7	107
Well Wi-Cf 59 (Altitude: 45 feet)		
Pleistocene series:		
Surface sand and water	20	20
Sand and clay	15	35
Pliocene (?) series:		
Sand and gravel	20	55
Sand, water	20	75
Well Wi-Cf 60 (Altitude: 30 feet)		
Pleistocene series:		
Soil and sand	5	5
Sand, white	5	10
Gravel, fine	5	15
Clay, gray	7	22
Sand, white	6	28
Sand and gravel	7	35
Pliocene (?) series:		
Sand, fine, red	10	45
Sand, fine, white	10	55
Sand, coarse, red	12	67
Test Hole Wi-Cf 61 (Altitude: 42 feet)		
Pleistocene series:		
Beaverdam sand:		
Sand, coarse to medium, some granule and fine gravel, some silt, gray	60	60
Pliocene (?) series:		
Sand and gravel, medium	42	102

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, coarse to fine, some gravel and silt, gray	10	112
Silt and shale, gray	5	117
Missing	5	122
Sand, fine, and silt, gray	11	133
Silt, gray	10	143
Sand, fine, and silt, gray	31	174
Sand, fine to very fine, and silt, gray	30	204
Manokin aquifer:		
Sand, fine to very fine, gray	21	225
Sand, coarse to fine, gray	82	307
St. Marys formation:		
Silt and clay, gray; many shell fragments	10	317
Sand, fine, and silt, gray; some shell fragments	31	348
Sand, very fine, and silt, gray; some shell fragments, gravel, fine	20	368
Sand, silty, fine to very fine, gray-green, glauconitic	11	379
Sand, very fine, and silt, gray	30	409
Choptank formation:		
Clay, green, glauconitic, calcareous, some fine to very fine sand, silty, some granule and shell fragments	21	430
Limestone, blue-gray, some shell fragments	30	460
Limestone, blue-gray, some sand, coarse to fine, shell fragments	11	471
Sand, silty, fine to very fine, gray; some shell fragments and granule	31	502
Silt and sand, very fine, gray, calcareous	10	512
Calvert formation:		
Sand, fine to very fine, gray; some shell fragments	20	532
Silt and sand, very fine, light gray, some granule	21	553
Sand, fine to very fine, dark gray; some calcareous and shell fragments	20	573
Silt and sand, very fine, light gray	11	584
Sand, silty, fine to very fine, some shell fragments	10	594
Silt, light gray, some sand, fine	61	655
Sand, silty, fine to very fine, gray; some shell fragments	41	696
Sand, medium to very fine, gray; some limestone and dolomitic (?) fragments	10	706
Limestone, shell and sand, fine	10	716
Sand, fine to very fine, gray, some silt	31	747
Silt and sand, very fine, light gray	51	798
Sand, silty, fine to very fine, gray	30	828
Silt and sand, very fine, light gray	41	869
Silt, light gray, some sand, fine	41	910
Silt and sand, very fine, gray	115	1025
Well Wi-Cf 62 (Altitude: 48 feet)		
Pleistocene series:		
Parsonsburg sand:		
Clay, sand and gravel	20	20

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Walston silt:		
Silt and sand and gravel, buff	10	30
Sand, medium to fine, some gravel, silty, buff	20	50
Silt and sand, some gravel and granule, buff	20	70
Silt and sand, very fine, buff	10	80
Beaverdam sand:		
Sand, medium, silty, some gravel and granule, buff	16	96
Pliocene (?) series:		
Silt and clay, sandy, brown	6	102
Sand, silt, gravel and granule, brown to gray	10	112
Sand, very coarse to coarse, gravel and granule, buff, some red silt and clay	10	122
Sand, coarse, gravel and granule	6	128
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt, gray	5	133
Silt and sand, medium to fine, brown	10	143
Silt, gray to orange, and sand, medium, some gravel	41	184
Silt-clay aggregates and sand, coarse, gray, brown	20	204
Manokin aquifer:		
Sand, very coarse to coarse, some gravel, gray-buff	21	225
Conglomerate, quartz and clay pebbles and fine sand, gray	20	245
Sand, coarse to medium, silty, gray	31	276
Silt and sand, fine, gray	21	297
Silt and sand, coarse to medium, gray	10	307
Sand, very coarse to coarse, some granule, silty, gray-buff	20	327
Sand, medium and silt, gray	11	338
St. Marys (?) formation:		
Sand, medium and silt, shells, gray	10	348
Silt and clay, some shell fragments, gray	20	368
Silt and sand, fine, glauconite, green, some silt and sand, red	20	388
Silt and clay, sandy, gray-green and red	21	409
Silt and clay, gray; shell fragments	20	429
Choptank (?) formation:		
Sand, medium, some silt and clay, gray	11	440
Sand, fine to very fine, silty, shell fragments, green	20	460
Sand, medium to fine, silty, chocolate brown	10	470
Sand, medium to fine, silty, shell fragments, light chocolate brown	52	522
Calvert (?) formation:		
Silt and clay, sandy, shell fragments, gray	30	552
Sand, medium, silty, shell fragments, light gray	11	563
Sand, medium, slightly silty, gray to light red	10	573
Silt and clay, sandy, fine, shell fragments, light to dark gray	10	583
Sand, medium, shell fragments, gray to buff	21	604
Sand, silty, medium, gray, shell fragments	51	655
Sand, silty, medium, gray, some clay, gray, shell fragments	20	675
Sand, silty, medium, gray, glauconitic, shell fragments	31	706

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, silty, clayey, medium, gray, glauconitic, shell fragments	21	727
Sand, silty, medium, fine, gray, some yellow, few shell fragments	10	737
Sand, silty, clayey, coarse, medium, gray, few shell fragments	82	819
Clay, light gray	61	880
Sand, silty, medium, gray and clay, gray	21	901
Clay, light gray	120	1021
Test Hole Wi-Cf 63 (Altitude: 38 feet)		
Pleistocene series:		
Walston silt:		
Silt and sand, medium to fine, buff	10	10
Beaverdam sand:		
Sand, coarse to fine, slightly silty, with about 10 percent granules and small pebbles, buff-colored	72	82
Pliocene (?) series:		
Sand, medium, brown, and gravel	10	92
Sand, medium, gravel, and some shale, brown	21	113
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, silty, gray; little gravel	71	184
Manokin aquifer:		
Sand, coarse to fine, gray, some gravel and silt	82	266
Clay, silty, sandy, gray; shell fragments	31	297
St. Marys formation:		
Clay, silty, sandy, gray; shell fragments	62	359
Clay, silty, gray, gravel and shell	20	379
Clay, silty, gray, with a little sand, glauconitic, green	10	389
Choptank formation:		
Clay, silty, gray, and glauconite, green, and some shell fragments	21	410
Silt, sandy, gray	52	462
Silt, sand, clayey, gray, glauconitic, some shell fragments	20	482
Sand, green, glauconitic, small gravel	21	503
Calvert formation:		
Silt and sand, fine, gray; some shell, pea-size gravel 544–564 feet	61	564
Sand and shell, gray, hard cemented; some silt and clay	41	605
Silt, sandy, light gray; some shell fragments	62	667
Sand, silty, light brown to gray, some gravel	30	697
Sand and silt, some shell fragments	41	738
Sand, silty, some glauconite, gravel and shell fragments	41	779
Silt and sand, very fine, gray, diatomaceous	31	810
Clay, silty, some sand, gray and shell fragments	102	912
Silt, gray, some clay, gravel and shell fragments	41	953
Sand, silty, gray, some pea-size gravel and shell fragments	31	984
Silt, sandy, fine, gray, some shell fragments	16	1000

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Cf 64 (Altitude: 7 feet)		
Pleistocene and Pliocene (?) series:		
Sand	61	61
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	—	61
Well Wi-Cf 65 (Altitude: 8 feet)		
Pleistocene and Pliocene (?) series:		
Topsoil	3	3
Sand, fine	47	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	6	56
Well Wi-Cf 66 (Altitude: 10 feet)		
Pleistocene and Pliocene (?) series:		
Top soil	2	2
Sand, fine	13	15
Sand, coarse to fine	30	45
Sand, coarse to fine, and gravel	10	55
Sand, coarse, and gravel	6	61
Sand, coarse to fine	5	66
Sand, fine	2.5	68.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, blue	1.5	70
Well Wi-Cf 67 (Altitude: 39 feet)		
Pleistocene series:		
Sand and clay	12	12
Sand, white, gray	5	17
Sand, fine, gray	8	25
Gravel and sand, gray	10	35
Sand, medium, gray and clay	20	55
Sand, fine, gray	9	64
Pliocene (?) series:		
Sand, coarse, red	—	64
Test Hole Wi-Cf 68 (Altitude: 39.3 feet)		
Pleistocene and Pliocene (?) series:		
Clay, sandy, silty, dark brown	4	4
Sand, silty, medium, brown to buff	24	28
Test Hole Wi-Cf 69 (Altitude: 39 feet)		
Pleistocene series:		
Missing	3.0	3.0

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Parsonsburg sand:		
Silt, clay, sand, fine, dark brown	0.5	3.5
Sand, medium, silty, brown	1.5	5.0
Silt, clay, sand, fine, buff-brown	1.0	6.0
Sand, medium, silty, brown	1.5	7.5
Silt, and sand, medium to fine, buff-brown	0.5	8.0
Walston silt:		
Silt and sand, fine, light tan	5.0	13.0
Sand, medium, silty, light tan	2.0	15.0
Beaverdam sand:		
Sand, medium, tan, some silt	2.0	17.0
Sand, medium, tan and buff, some silt	2.0	19.0
Sand, medium to fine, tan, some silt	9.0	28.0
Pliocene (?) series:		
Sand, coarse, medium, brown, silty	1.0	29.0
Test Well Wi-Cf 70 (Altitude: 50 feet)		
Pleistocene series:		
Missing	11	11
Clay, white	21	32
Sand, fine and silt	18	50
Sand and small gravel	19	69
Pliocene (?) series:		
Sand, coarse	21	90
Sand	6	96
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	9	105
Sand	22	127
Clay, black	25	152
Sand, fine	16	168
Obs. Well Wi-Cg 24 (Altitude: 49.3 feet)		
Pleistocene series:		
Top soil, silty, sandy, black	3	3
Sand, silty, medium, brown	.5	3.5
Sand, medium, buff	.5	4
Clay, sandy, gray	3	7
Clay, sticky, buff	1.5	8.5
Clay, sandy, buff	.5	9
Clay, sticky, buff	4	13
Sand, clayey, medium, buff-gray	1	14
Obs. Well Wi-Cg 25 (Altitude: 49.7 feet)		
Pleistocene series:		
Sand, coarse, brown	4	4
Clay, buff to brown	12	16
Sand, clayey, coarse, light buff	4	20

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Cg 26 (Altitude: 50.7 feet)		
Pleistocene series:		
Sand, clayey, coarse, brown	5	5
Sand, very coarse, light buff	3	8
Sand, clayey, coarse, buff	2	10
Sand, very coarse, loose, buff	1	11
Obs. Well Wi-Cg 27 (Altitude: 68.0 feet)		
Pleistocene series:		
Clay, slightly sandy, brown	3.5	3.5
Clay, sandy, buff-red and brown	6.5	10
Clay, gray and buff	6	16
Obs. Well Wi-Cg 28 (Altitude: 84.1 feet)		
Pleistocene series:		
Sand, coarse, light brown	6	6
Sand, coarse to medium, light buff to brown	3	9
Obs. Well Wi-Cg 29 (Altitude: 54.4 feet)		
Pleistocene series:		
Clay, sandy, medium fine, gray	10	10
Obs. Well Wi-Cg 30 (Altitude: 78.8 feet)		
Pleistocene series:		
Sand, coarse, coffee-brown	6	6
Sand, coarse, tan	4	10
Obs. Well Wi-Cg 31 (Altitude: 77.6 feet)		
Pleistocene series:		
Sand, coarse, light brown	4	4
Sand, coarse, red-brown	2	6
Sand, coarse, gray	4	10
Obs. Well Wi-Cg 32 (Altitude: 58.6 feet)		
Pleistocene series:		
Sand, coarse, brown	5	5
Sand, silty, gray	3	8
Sand, clayey, medium, dark brown	3.5	11.5
Sand, fine, buff	.5	12
Clay, brown	.5	12.5
Sand, clayey, medium, brown to buff	3.5	16
Obs. Well Wi-Cg 33 (Altitude: 66.7 feet)		
Pleistocene series:		
Sand, medium, light dirty-brown	1	1
Sand, medium, light brown	2	3
Sand, coarse to medium, light tan	2	5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Hole Wi-Cg 34 (Altitude: 49 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, fine, dark brown, buff	5	5
Beaverdam sand:		
Sand, medium, light buff	5	10
Sand, medium, light tan, buff	5	15
Sand, medium, tan, buff	5	20
Sand, medium, fine, light tan, gray with some greenish clay	5	25
Sand, coarse, medium, tan, buff	15	40
Sand, pebbly, coarse, light brown	7	47
Sand, coarse, medium, slightly clayey, light olive-brown	2	49
Sand, medium, tan, some granule, and coarse size, little silt	8	57
Pliocene (?) series:		
Sand, medium, red-tan	5	62
Sand, medium to fine, red-tan, some green to brown silt particles	9	71
Sand, medium to fine, tan-red	1	72
Sand, coarse to medium, red	5	77
Sand, medium, red	.5	77.5
Sand, medium, red-tan	5.5	83
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, medium, gray	5	88
Sand, medium to fine, gray	5	93
Sand, fine, gray	5	98
Sand, medium, gray	6	104
Sand, fine, gray, some clay, gray with mica	5	109
Sand, clayey, medium, fine, gray	5	114
Sand, medium, gray; clay, some gray and some green pellets	11	125
Clay, sandy, dark gray	3	128
Sand, coarse, light gray	12	140
Sand, coarse, gray, lignite, mica, clayey	5	145
Lower aquiclude:		
Clay, sandy, lignitic, gray	5	150
Clay, gray	10	160
Clay, gray, some black clay	6	166
Clay, sandy, gray, some black	5	171
Clay, sandy, bluish gray; shells, lignite	5	176
Sand, fine, gray, some clay, bluish gray; shells, lignite	5	181
Clay, sandy, bluish gray; many shells, some lignite	6	187

See Table 11 for list of fossils from the sample 181 to 187 feet. These were identified as a Choptank fauna, by Miss Collins. If the Choptank is in place here it is about 350 feet high on regional structure. The interpretation favored here is that these fossils were redeposited after being reworked, or that the fauna persisted into late Miocene time.

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Cg 35 (Altitude: 75 feet)		
Pleistocene series:		
Clay, brown	5	5
Sand, white	3	8
Clay, blue	14	22
Clay, blue, free streaks	20	42
Sand	14	56
Sand, coarse, white, dirty, some pebbles	29	85
Clay, firm, blue	10	95
Sand, coarse, white, and gravel	5	100
Clay, sandy, blue	2	102
Sand, coarse, white, and gravel	4	106
Gravel, free, and sand, white	51	157
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, green, soft	10.3	167.3
Sandstone, hard	0.7	168
Sand, gray, and hard shells, not free	16	184
Clay, green, with sand streaks	52	236
Manokin aquifer:		
Sand, coarse, light gray, very free	33	269
Clay, green, soft	8	277
Sand, coarse, light gray, very free	54	331
Sand	10	341
St. Marys (?) formation:		
Clay, sandy, gray	2	343
Clay, gray, soft	103	446
Choptank (?) formation:		
Clay, gray, tough	25	471
Rock, soft	.7	471.7
Clay, tough	4.3	476
Rock, hard	2.5	478.5
Sand, tight	1.5	480
Rock, hard	1.5	481.5
Sand, tight	40.0	521.5
Rock, hard	3	524.5
Rock, soft	2	526.5
Sand, tight	4.1	530.6
Rock, hard	21.4	552.0
Sand, green, white, free	8.0	560.0
Clay, green, soft	12.8	572.8
Well deepened to a reported depth of 685 feet. No log available.		
Test Hole Wi-Cg 38 (Altitude: 80 feet)		
Pleistocene series:		
Parsonsburg sand:		
Topsoil, sandy, medium, brown	0.5	0.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, silty, reddish-brown	3.5	4.0
Sand, medium, fine, silty, tan-brown	5.0	9.0
Sand, medium, fine, silty, brown	2.0	11.0
Walston silt:		
Sand, fine, silty, tan to buff	0.5	11.5
Sand, fine, silty, buff	6.5	18.0
Silt and sand, fine, very fine, buff	1.0	19.0
Silt, clay and sand, fine, very fine, gray	2.5	21.5
Silt and clay, gray and brown	6.5	28.0
Silt and clay, sandy, medium, very fine, gray	1.0	29.0
Silt and clay, sandy, fine, very fine, gray-buff	5.0	34.0
Silt, sandy, fine, very fine, buff	5.0	39.0
Silt, sandy, medium, very fine, buff to tan	10.0	49.0
Silt, sandy, fine, very fine, buff to tan	5.0	54.0
Beaverdam sand:		
Sand, medium, fine, silty, buff	25.0	79.0

Well Wi-Cg 39 (Altitude: 54 feet)

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Beaverdam sand:		
Sand, medium, grayish buff	80	80
Clay	4	84
Gravel and sand	6	90
Clay and gravel	13	103
Gravel and sand, coarse	5	108
Sand, coarse to medium, gray buff	39	147
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, brown and blue	10	157
Sand, medium, gray buff	26	183
Sand, fine, gray buff	20	203
Sand, fine, dark gray	10	213
Manokin aquifer:		
Sand, fine, light gray	35	248
Missing	8	256

(The section below 90 feet may be part of the Miocene series. The clay and gravel from 90–103 would be part of the upper aquiclude, and the gravel and coarse sand from 103–147 would be part of the Pocomoke aquifer).

Test Hole Wi-Cg 40 (Altitude: 79 feet)

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, chocolate-brown	3	3
Sand, medium, silty, gray	2	5
Sand, medium, silty, dark brown	2	7
Sand, medium, clean, tan	5	12
Walston silt:		
Sand and clay, silty, brown	1	13

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand and clay, silty, gray	1	14
Sand and clay, silty, brown and gray	1	15
Clay, silty and sandy, brown; peat; much plant material	2	17
Clay, silty and sandy, gray to tan	6	23
Clay, silty and sandy, bluish-gray	1	24
Clay, silty and sandy, gray	1	25
Clay, silty and sandy, gray changing to olive	2	27
Sand, medium, silty, clayey, colored	2	29
Sand, medium, silty, clayey, light green	1	30
Sand, medium, silty, clayey, light green to olive	3	33
Sand, medium, silty, clayey, gray-green	1	34
Sand, medium, silty, red-brown to gray	2	36
Silt and clay, gray, tough	8	44
Silt and clay, sandy, gray and green	5	49
Silt and clay, gray, tough	10	59
Sand, silty and clayey, gray and brown	10	69
Beaverdam sand:		
Sand, coarse to medium, silty, some granule, gray to blue-gray	10	79
Obs. Well Wi-Cg 41 (Altitude: 58 feet)		
Pleistocene series:		
Top soil	1	1
Clay, light gray and brown	8	9
Sand, medium, gray and brown	4	13
Obs. Well Wi-Cg 42 (Altitude: 63 feet)		
Pleistocene series:		
Sand, coarse to medium, light tan	4	4
Clay, sandy, light gray	3	7
Clay, sandy, light brown	3	10
Clay, light gray	4	14
Sand, clayey, medium, light brown	1	15
Sand, coarse, red-brown	1	16
Obs. Well Wi-Cg 43 (Altitude: 56 feet)		
Pleistocene series:		
Sand, coarse, brown	3	3
Sand, clayey, medium, iron-stained	2	5
Clay, sandy, gray to red, iron-stained	5	10
Sand, clayey, coarse, buff, iron-stained	1	11
Sand, slightly clayey, medium, buff-red	1.5	12.5
Sand, medium, clayey, brown	1	13.5
Well Wi-Cg 44 (Altitude: 75 feet)		
Pleistocene series:		
Sand, free	8	8
Clay, tough	17	25
Clay, sandy, white	2	27

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, white, free, clay streaks	15	42
Sand, coarse, white, free	44.4	86.4
Clay, dark, tough	8.6	95
Rock	1	96
Sand, free, and clay streaks	25	121
Sand and gravel, ¾-inch, white	14.8	135.8
Sand, white, free, and gravel	23.2	159
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay and sand, free	62	221
Manokin aquifer:		
Sand and shell	39	260
Sand, coarse, free, and gravel, white	20	280
Well Wi-Ch 4 (Altitude: 38 feet)		
Pleistocene and Pliocene (?) series:		
Sand and clay	6	6
Mud	9	15
Water, very bad odor	45	60
Gravel and clay	5	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, water	34	99
Test Hole Wi-Ch 33 (Altitude: 35 feet)		
Pleistocene series:		
Walston silt:		
Sand, medium, light brown	5	5
Sand, medium to fine, buff	5	10
Sand, clayey, medium, buff to gray	2	12
Beaverdam sand:		
Sand, medium, buff	3	15
Sand, medium, light gray	6	21
Sand, coarse to medium, tan to gray	5	26
Sand, coarse, gray, some green clay	10	36
Sand, clayey, medium, green and gray	19	55
Pliocene (?) series:		
Sand, clayey, coarse, tan to green-gray	5	60
Sand, clayey, medium, gray-green	15	75
Sand, clayey, coarse, tan to green	5	80
Sand, clayey, coarse to medium, tan to green	15	95
Sand, coarse to medium, light tan	5	100
Sand, clayey, medium, tan	5	105
Sand, clayey, medium to fine, buff to green	5	110
Sand, clayey, medium to fine, olive-tan	5	115
Sand, medium, light tan	5	120

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Clay and sand, medium, gray-blue	4	124
Sand, coarse to medium, light gray	7	131
Test Hole Wi-Ch 34 (Altitude: 45 feet)		
Pleistocene series:		
Walston silt:		
Clay, gray and yellow	5	5
Sand, medium, to fine, yellow	5	10
Sand, fine, gray	11	21
Beaverdam sand:		
Sand, coarse to fine, gray	14	35
Sand, granule to coarse, gray, some clay particles, light green	18	53
Sand, medium to fine, gray, some clay particles, green	3	56
Sand, granule to very coarse, green-gray, some clay particles, green and blue	4	60
Sand, medium, buff-gray	3	63
Sand, coarse, buff-gray, some clay, green	5	68
Sand, coarse to medium, light gray, some clay, green	35	103
Sand, medium to fine, green-gray, some clay	5	108
Sand, medium to fine, green-gray, some clay	14	122
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, granule, gravel up to ½-inch size, buff gray	4	126
(Compare with Cg 39)		
Wells Wi-Db 1 and 2 (Altitude: 5 feet)		
Pleistocene series:		
Sand, white	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt, fine sand, and marsh material	20	40
Manokin aquifer:		
Sand, light	53	93
Well Wi-Db 3 (Altitude: 5 feet)		
Pleistocene series:		
Surface material	15	15
Mud	10	25
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud and sand	25	50
Manokin aquifer:		
Sand, water	36	86

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Db 4 (Altitude: 5 feet)		
Pleistocene series:		
Mud, shell and sand; surface water	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud	40	60
Manokin aquifer:		
Sand, water	20	80
Well Wi-Db 5 (Altitude: 5 feet)		
Pleistocene series:		
Mud and sand	60	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, water	16	76
Well Wi-Db 6 (Altitude: 5 feet)		
Pleistocene series:		
Mud and sand	60	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, water	15	75
Well Wi-Db 7 (Altitude: 8 feet)		
Pleistocene series:		
Sand, medium to fine, yellow-gray	10	10
Missing	8	18
Sand, medium to fine, olive-gray	3	21
Sand, coarse, some pebbles, little silt, yellow-gray	14	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, glauconite, olive-gray	6	41
Manokin aquifer:		
Sand, medium to fine, brownish gray	14	55
Sand, coarse to medium, gray	14	69
Test Hole Wi-Db 24 (Altitude: 10 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, white	5	5
Pamlico formation:		
Sand, clayey, brown	10	15
Sand, coarse, with granule-size pebbles, gray and brown	5	20
Sand, very coarse, gray-brown, with clay stringers and granule-size pebbles	5	25
Sand, coarse, dark brown, with clay and pebbles up to ¼-inch	5	30

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue, with ¼-inch pebbles	5	35
Clay, blue, with some dark brown	5	40
Clay, gray	5	45
Sand, very coarse	2	47
Clay, blue-gray, with some sand	3	50
Clay and sand, gray	5	55
Coarse sand and clay, green, gray and white	5	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, coarse to medium, gray, green, with some gray clay	5	65
Sand, coarse, light gray	5	70
Sand, coarse to medium, light gray to gray	10	80
Sand, coarse, gray	4	84
Well Wi-Db 25 (Altitude: 9 feet)		
Pleistocene series:		
Surface soils	15	15
Sands, surface water	3	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud and clay	22	40
Manokin aquifer:		
Sand	48.5	88.5
Well Wi-Db 26 (Altitude: 8 feet)		
Pleistocene series:		
Soil and sand	12	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, very soft	23	35
Manokin aquifer:		
Sand, water	47	82
Well Wi-Dc 1 (Altitude: 7 feet)		
Pleistocene series:		
Clay and silt (mud), black	65	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, gray	18	83
Well Wi-Dc 2 (Altitude: 8 feet)		
Pleistocene series:		
Sand, light	18	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, black	57	75

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, gray, water	22	97
Well Wi-Dc 3 (Altitude: 7 feet)		
Pleistocene series:		
Sand, light, and mud	20	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, black	55	75
Manokin aquifer:		
Sand, light	15	90
Sand, gray, water	13	103
Well Wi-Dc 4 (Altitude: 5 feet)		
Pleistocene series:		
Mud, surface and sand	15	15
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud and clay	65	80
Manokin aquifer:		
Sand, water	14	94
Test Hole Wi-Dc 9 (Altitude: 5 feet)		
Pleistocene series:		
Parsonsburg sand:		
Clay, light brown, and top soil with some pebbles ½-inch size	5	5
Sand, coarse, light brown	2	7
Pamlico formation:		
Sand and clay, light gray	3	10
Sand and clay, very coarse to coarse, light tan	5	15
Sand, very coarse to coarse, light gray, water bearing	2	17
Clay, sandy, light brown	3	20
Sand, very coarse to medium, gray	5	25
Clay, blue gray	21	46
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Clay, sandy, medium to fine, blue-gray	9	55
Sand, medium to fine, gray, well flowed 1 gal. min	8	63
Well Wi-Dc 18 (Altitude: 2 feet)		
Pleistocene series:		
Surface soils	13	13
Sand, water	6	19
Mud	41	60
Sand, gravel, and clay	5	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	31	96

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, very fine, quick	4	100
Sand, gray, water	11	111
Well Wi-Dc 19 (Altitude: 6 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sands, surface	15	15
Sand, light	5	20
Pamlico formation:		
Sand and clay	5	25
Mud	17	42
Clay, blue	20	62
Sand, very fine and clay	13	75
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, gray, water	10	85
Well Wi-Dc 26 (Altitude: 5 feet)		
Pleistocene series:		
Surface soils	10	10
Sand, water	5	15
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, blue, sticky	77	92
Manokin aquifer:		
Sand, dark gray, water	13	105
Well Wi-Dd 1 (Altitude: 10 feet)		
Pleistocene and Pliocene (?) series:		
Sand	78	78
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	12	90
Manokin aquifer:		
Sand	24	114
Test Hole Wi-Dd 2 (Altitude: 20 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, coarse, light brown	5	5
Sand, coarse, light brown and gray	10	15
Beaverdam sand:		
Sand, coarse to medium, light gray	5	20
Sand, coarse, with granule and small pebbles, light gray	5	25
Sand, coarse to medium, light gray	5	30
Sand, coarse, light brown	5	35

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, coarse to medium, with stringers of gray silt and with granule and pebbles to 1-inch, light	5	40
Sand with some clay, medium to fine, gray	5	45
Sand with some clay, medium, gray	15	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Manokin aquifer:		
Sand, coarse, medium, gray; few small pebbles and clay, blue-gray	15	75
Well Wi-Dd 4 (Altitude: 10 feet)		
Pleistocene series:		
Soil, surface, and sands, water	40	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Gravel, mud and clay	45	85
Manokin aquifer:		
Sand, gray, water	25	110
Well Wi-Dd 15 (Altitude: 10 feet)		
Recent series:		
Silt, sandy, buff	4	4
Pleistocene series:		
Beaverdam sand:		
Sand, coarse and medium, and gravel, white and yellow	41	45
Sand, coarse	10	55
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	—	55
Well Wi-Dd 16 (Altitude: 15 feet)		
Pleistocene series:		
Surface soils	25	25
Sand, water	15	40
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	65	105
Manokin aquifer:		
Sand, gray, water	23	128
Well Wi-Dd 17 (Altitude: 15 feet)		
Pleistocene series:		
Surface soils	20	20
Sand, water	10	30
Clay and gravel	8	38
Sand, water	12	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	62	112

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Manokin aquifer:		
Sand, water	17	129
Well Wi-Dd 18 (Altitude: 25 feet)		
Pleistocene series:		
Surface soils	14	14
Sand, water	4	18
Sand and clay	17	35
Sand, water	10	45
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, blue	80	125
Manokin aquifer:		
Sand, gray, water	13	138
Well Wi-Dd 19 (Altitude: 25 feet)		
Pleistocene series:		
Surface soils	12	12
Sand, water	16	28
Clay, light, gravel	4	32
Sand and clay	28	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud	50	110
Manokin aquifer:		
Sand, very fine, gray, water	36	146
Well Wi-De 2 (Altitude: 39 feet)		
Pleistocene and Pliocene (?) series:		
Top soil	2	2
Sand, yellow	16	18
Sand, and clay, yellow	22	40
Clay, yellow	8	48
Clay and sand, yellow	12	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt and sand, fine, blue	31	91
Sand, brown	9	100
Clay, brown	60	160
Clay and sand, dark	15	175
Manokin aquifer:		
Sand, some clay, gray	25	200
Sand, coarse, gray	14	214
Sand, and clay, gray	11	225
Silt and sand, fine, blue	6	231
Well Wi-De 7 (Altitude: 39 feet)		
Pleistocene series:		
Fill, dirt	2.5	2.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Clay, sand, gray	9.5	12
Sand, medium to fine, some coarse size, gray	3	15
Sand, coarse to medium, some gravel, gray	5	20
Sand, medium to fine, some gravel, gray	7	27
Sand, medium, some small gravel	3	30
Clay, green-gray, and sand, medium, buff	5	35
Pliocene (?) series:		
Sand, medium, brown, iron-stained	5	40
Sand, coarse, rusty brown, iron-stained	5	45
Sand, coarse and fine, and gravel, fine, rusty brown	10	55
Sand and gravel, dark buff	5	60
Clay, gray, and sand, medium, some gravel, brown	2	62
Well Wi-De 13 (Altitude: 42 feet)		
Pleistocene and Pliocene (?) series:		
Sand, yellow to red	76	76
Miocene series:		
Yorktown and Cohansey formations (?):		
Mud, gray to black	12	88
Sand and mud, gray	17	105
Sand, gray, lignite	13	118
Sand and mud, gray	6	124
Mud, gray	2	126
Well Wi-De 14 (Altitude: 42 feet)		
Pleistocene and Pliocene (?) series:		
Sand, coarse to medium, some granule size	76	76
Missing	4	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand, pebble to very fine, bluish gray	25	105
Sand, very coarse to very fine, light olive-gray	13	118
Well Wi-De 18 (Altitude: 40 feet)		
Pleistocene and Pliocene (?) series:		
Missing	10	10
Sand, coarse to fine, light yellow	10	20
Clay, brownish gray, and gravel	15	35
Sand, medium, light yellow	10	45
Sand, gravel, some pebbles, up to ¾-inch and granule	24	69
Well Wi-De 30 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Clay, sandy, tan	10	10
Sand, coarse to very fine, brown	10	20
Sand, coarse to very fine, yellow-orange	10	30
Sand, medium to very fine, pebbly, light yellow-orange	30	60

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, coarse to very fine, pebbly, yellow-orange	10	70
Sand, coarse to very fine, yellow-orange	10	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, silty, olive-gray	10	90
Sand, coarse to very fine, blue-gray	20	110
Sand, coarse to very fine, olive-gray	10	120
Clay, silty, yellow-gray	28	148
Missing	2	150
Sand, coarse to very fine, blue-gray	20	170
Clay, silty, yellow-gray	5	175
Manokin aquifer:		
Sand, coarse to very fine, blue-gray	50	225
Well Wi-De 31 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Fill, dirt	3	3
Sand, red	9.5	12.5
Sand and gravel	11.5	24
Clay	1	25
Sand, white	8	33
Sand and clay streaks	4	37
Sand and gravel, red	20	57
Gravel, large, and clay	5	62
Well Wi-De 32 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	10	10
Sand, gray	10	20
Gravel	2	22
Sand, gray	14	36
Sand, white	24	60
Gravel	3	63
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, brown	7	70
Clay, green	18	88
Sand, gray	27	115
Clay, blue	45	160
Manokin aquifer:		
Sand, gray	59	219
Well Wi-De 33 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Sand and top soil	10	10
Sand	4	14
Sand, gravel and clay	36	50
Sand and gravel	19	69

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-De 35 (Altitude: 30 feet)		
Pleistocene and Pliocene (?) series:		
Sand, red	8	8
Sand, gray	12	20
Clay, blue	10	30
Sand, gray	92	122
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	60	182
Manokin aquifer:		
Sand, gray and shells	29	211
Obs. Well Wi-Df 17 (Altitude: 41.5 feet)		
Pleistocene series:		
Sand, medium to fine, buff	4	4
Clay, silty, gray	8	12
Sand, coarse to medium, buff	2	14
Obs. Well Wi-Df 18 (Altitude: 46.1 feet)		
Pleistocene series:		
Soil, loam, gray	1	1
Sand, buff	1	2
Clay, silty and sandy, mottled red, buff and gray	10	12
Sand, fine, buff	2	14
Obs. Well Wi-Df 19 (Altitude: 47.7 feet)		
Pleistocene series:		
Soil, sandy, loam	1	1
Clay, mottled orange-gray	8	9
Sand, fine, white	3	12
Obs. Well Wi-Df 20 (Altitude: 55.3 feet)		
Pleistocene series:		
Topsoil, sandy, black	2	2
Sand, with some clay, coarse, brown	5	7
Sand, fine, gray	4	11
Clay, light buff, light brown, red streaked	9.5	20.5
Sand, coarse to medium, buff	.5	21
Obs. Well Wi-Df 21 (Altitude: 48.4 feet)		
Pleistocene series:		
Sand with some clay, medium, gray	2	2
Clay, sandy, brown to gray	9	11
Sand, medium, brown to gray	2	13
Obs. Well Wi-Df 22 (Altitude: 47.7 feet)		
Pleistocene series:		
Clay, sandy, black	3	3
Clay and sand, fine, gray to brown	4	7

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Obs. Well Wi-Df 23 (Altitude: 45.4 feet)		
Pleistocene series:		
Sand, with some clay, fine, brown	2	2
Sand, medium to fine, brown to gray	11	13
Obs. Well Wi-Df 24 (Altitude: 46.8 feet)		
Pleistoeene series:		
Sand, elayey, medium, brown and red; thin alternating bands of gray clay	5	5
Sand, clayey, medium, brown; thin bands of red clay	2	7
Clay, red and gray	1	8
Clay, brown and gray	1	9
Sand, clayey, fine, brown	5.5	14.5
Sand, elayey, medium, brown	4.5	19
Test Hole Wi-Df 25 (Altitude: 40 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium to fine, brown	10	10
Walston silt:		
Sand, medium, gray to buff, some elay, white and gray	11	21
Sand, coarse to medium, brown to white	4	25
Sand, coarse to medium, light gray, and some silt, white	25	50
Sand, medium, light brown, and silt, white	5	55
Pliocene (?) series:		
Sand, medium, red-brown, and silt, white	5	60
Sand, coarse, red-brown	5	65
Sand, granule to coarse, red-brown and black	10	75
Sand, coarse to medium, red to dark brown, and silt, white	10	85
Sand, eoarse to medium, red to dark brown	5	90
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue green and black, and sand; few shell fragments	14	104
Well Wi-Df 26 (Altitude: 45 feet)		
Pleistoeene and Plioeene (?) series:		
Sand and top soil	16	16
Sand, gravel and elay	49	65
Mioeene series:		
Yorktown and Cohansey formations (?):		
Silt and sand, fine	4	69
Sand	12	81
Well Wi-Df 27 (Altitude: 45 feet)		
Pleistocene and Plioeene (?) series:		
Surface soils	22	22
Sands, white, water	5	27
Clay, red, and gravel	43	70
Sand, red, water	7	77

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Well Wi-Df 28 (Altitude: 42 feet)		
Pleistocene and Pliocene (?) series:		
Surface, soils	8	8
Clay and sand	10	18
Sand	8	26
Clay and sand	14	40
Sand, gravel, coarse, red	33	73
Obs. Well Wi-Df 29 (Altitude: 48 feet)		
Pleistocene series:		
Clay and sand, gray	2	2
Clay, dark gray, tough	14	16
Sand, medium, gray	2	18
Test Hole Wi-Df 30 (Altitude: 44.7 feet)		
Recent series:		
Soil	1	1
Sand, silty, buff	1	2
Pleistocene series:		
Parsonsburg sand:		
Silt and clay, sandy, medium to fine, red-brown	1	3
Sand, medium to fine, some silt and clay, brown	.5	3.5
Silt and clay, sandy, medium to fine, brown	2	5.5
Sand, some silt and clay, red-brown	.5	6
Silt and clay, sandy, medium to fine, red-brown	2.5	8.5
Walston silt:		
Clay, silty, red-brown to gray, tough, grading to soft	4.5	13
Silt and clay, sandy, medium to fine, brown and buff	.5	13.5
Silt and clay, sandy, fine, brown and buff	.5	14
Silt and clay, sandy, medium to fine, tan	.5	14.5
Silt and clay, sandy, medium, tan	.5	15
Beaverdam sand:		
Sand, medium, and silt, buff	.8	15.8
Sand, medium, and silt, buff to brown	.2	16
Sand, medium, brown and buff, some silt	2	18
Sand, coarse to medium, buff, some silt	.5	18.5
Sand, medium to fine, buff, some silt	10	28.5
Test Hole Wi-Df 31 (Altitude: 46.7 feet)		
Recent series:		
Sand, silt and clay, medium, chocolate-brown	.5	1
Pleistocene series:		
Walston silt:		
Silt and clay, some sand, fine, tan, brown, ropey	1.5	2.5
Silt and clay, some sand, medium to fine, buff, brown, ropey	1	3.5
Silt and clay, sandy, medium to fine, buff, tan, brown	2	5.5
Silt and clay, some sand, fine, tan, buff, brick-red	1.5	7
Silt and clay, sandy, medium to fine, brown, buff	.5	7.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium, silty and clayey, light tan	2	9.5
Sand, medium, silty and clayey, buff, soft	3	12.5
Sand, medium, silty and clayey, buff to brick-red, soft	3.5	16
Beaverdam sand:		
Sand, medium, some silt, buff	5.5	21.5
Sand, coarse to medium, some silt, red, brown	2	23.5
Sand, coarse to medium, some silt, buff	2	25.5
Sand, coarse to medium, some silt, yellow, brown	1.5	27
Sand, medium, silty, tan	6	33
Test Hole Wi-Df 32 (Altitude: 47.7 feet)		
Recent series:		
Silt, sandy, fine, gray to black	1	1
Pleistocene series:		
Walston silt:		
Clay, silty, sand, fine, light buff to buff	1.5	2.5
Sand, silt and clay, gray, rust streaks	1	3.5
Clay, silty, sandy, fine, mottled gray, red, rust	1	4.5
Silt and clay, sandy, fine, tan	.5	5
Clay, some sand, medium, light gray, yellow and orange streaks, tough, ropey	1.5	6.5
Clay, light gray, with pink, red and rusty streaks, tough, ropey	1.5	8
Clay, silty, some sand, fine, gray, pink, tough, ropey	.5	8.5
Clay, silty, white, gray and red, tough, ropey	1.5	10
Clay, some silt and sand, pink, few white streaks, tough, ropey	1	11
Clay, silty, gray, pink, rust streaks, ropey	1	12
Clay, silty, sandy, white, mushy	.5	12.5
Sand, fine, silty, tan	1	13.5
Beaverdam sand:		
Sand, medium to fine, tan, white	1.5	15
Sand, silty, some gravel, medium to fine, tan to dark tan, white, some yellow streaks, no gravel 18–19 feet	4	19
Sand, medium to fine, some grit, tan	4	23
Sand, coarse to fine, some silt, dark tan	5	28
Sand, coarse to fine, light brown	2	30
Test Hole Wi-Df 33 (Altitude: 52.6 feet)		
Recent series:		
Sand, silt and clay, medium to fine, chocolate-brown	1.5	1.5
Pleistocene series:		
Walston silt:		
Silt and clay, some sand, fine, tan, buff	4	5.5
Silt and clay, some sand, pink, tough	2	7.5
Silt and clay, some sand, fine, brown	2	9.5
Sand, medium to fine, silty and clayey, brown	.5	10
Silt and clay, some sand	.5	10.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Silt and clay, some sand, buff, pink, tough	3	13.5
Silt and clay, sandy, fine, brown	.5	14
Clay, brick-red, tough	1.5	15.5
Clay, sandy, pink, brown, tough	2.5	18
Sand, silty and clayey	6	24
Test Hole Wi-Df 34 (Altitude: 56.0 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, medium, some silt, brown, black	1.5	1.5
Sand, medium, silty, tan, brown	3	4.5
Sand, medium to fine, silty, brown, gray streaked	1	5.5
Sand, medium, silty, brown, brick-red streaks	3	8.5
Walston silt:		
Silt and clay, some sand, fine to very fine, brown, tough, ropey	.5	9
Silt and clay, some sand, medium to fine, brown	1	10
Silt and clay, some sand, medium to fine, brown, small gray streaks, tough, ropey	1	11
Sand, medium to fine, silty and clayey, brown and gray streaks	.5	11.5
Silt and clay, some sand, coarse to fine, chocolate-brown to buff, tough, ropey	2	13.5
Silt and clay, sandy, medium to fine, buff, tan, tough, ropey	4.5	18
Silt and clay, sandy, coarse to fine, tan, buff	.5	18.5
Sand, medium, silty and clayey, buff to brown	3	21.5
Beaverdam sand:		
Sand, coarse to medium, some silt, some granules, buff to white	17.5	39
Test Hole Wi-Df 35 (Altitude: 54.5 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, silty, fine, brown	1	1
Sand, medium, fine, brown to tan	2	3
Sand, silty, medium to fine, rust colored, some light brown	3.5	6.5
Sand and silt, clayey, fine, rusty, wet	.5	7
Clay, silt and sand, fine, rust, gray	.5	7.5
Silt and clay, rusty, some gray streaks	1	8.5
Walston silt:		
Silt and sand, clayey, fine, light brown	.5	9
Clay, little silt, some rusty streaks, ropey	1	10
Clay, little silt, gray, rust, ropey	.5	10.5
Sand, clayey and silty, fine, gray, rusty	1	11.5
Clay, gray, rusty streaks, ropey, tough	4	15.5
Sand, clayey and silty, medium to fine, gray	.5	16
Sand and silt, clayey, medium to fine, white, grading into light gray clay	6	22
Sand, clayey, medium to fine, tan	2	24
Clay, some silt, light gray, some rust streaks, ropey	5	29
Sand and silt, clayey, medium to fine, white, few thin layers gray and rusty clay	10	39

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Hole Wi-Df 36 (Altitude: 48.8 feet)		
Recent series:		
Topsoil, black	1.5	1.5
Pleistocene series:		
Parsonsburg (?) sand or Walston silt:		
Sand, medium to fine, silt and clay, dark to light brown	6.5	8
Silt and clay, sandy, medium to fine, red, brown	1	9
Silt and clay, sandy, medium to fine, orange, red, soupy	1	10
Silt and clay, sandy, fine to very fine, variegated red, gray, tough	3.5	13.5
Sand, medium to fine, silt and clay, brown, brick-red and gray	2.5	16
Walston silt:		
Sand, medium to fine, silty and clayey, brown to buff	2	18
Sand, medium, silty and clayey, orange and buff	8	26
Beaverdam sand:		
Sand, medium, some stringers of silty clay, buff	2	28
Sand, coarse to medium, brown	1	29
Test Hole Wi-Df 37 (Altitude: 49.2 feet)		
Pleistocene series:		
Parsonsburg (?) sand or Walston silt:		
Sand, medium to fine, tan	2	2
Clay, silt and sand, medium tan	1	3
Clay, sandy, medium to fine, buff	1.5	4.5
Clay, sandy, white, gray	1	5.5
Clay, sandy, white, yellowish brown, soft	.5	6
Sand and clay, yellowish brown, some white to tan, mushy	3	9
Clay, orange-brown, streaks of gray, tough	1	10
Clay, sandy, purple, variegated slightly, tough	2	12
Clay, sandy, tan, softer	.5	12.5
Clay, sandy, gray, white, brown, soft	1.5	14
Walston silt:		
Sand and clay, medium, fine, light brown, mushy	3	17
Clay and sand, medium to fine, tan, light gray, mushy	2	19
Beaverdam sand:		
Sand and clay, medium to fine, tan, light gray, mushy	10	29
Test Hole Wi-Df 38 (Altitude: 44.6 feet)		
Pleistocene series:		
Walston silt:		
Sand, silt and clay, brown	1.5	1.5
Sand, medium, silty, clayey, brown	1	2.5
Sand, silt and clay, brown	.5	3
Silt, sandy, buff to light brown	3	6
Clay, sandy, silty, medium, variegated, buff to reddish brown, tough	1.5	7.5
Clay, sandy, silty, reddish brown to buff, soft	1.5	9
Silt and clay, sandy, medium, light brown	1	10
Beaverdam sand:		
Sand, medium, and some silt, buff	7.5	17.5
Sand, medium, buff, and some silt	11	28.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Test Hole Wi-Df 39 (Altitude: 43.4 feet)		
Pleistocene series:		
Walston silt:		
Sand, medium, silty and clayey, brown	1	1.5
Silt and clay, sandy, medium, brown, buff	1	2.5
Clay and silt, slightly buff	1.5	4
Silt and clay, sandy, medium, brown, buff	1	5
Silt and clay, slightly sandy, fine, brown, buff, tough, ropey, moist	1	6
Clay and silt, sandy, fine, buff to white, soft	2	8
Silty clay, sandy, medium to fine, brown, buff	.5	8.5
Sand, medium, some silt and clay, brown	4.5	13
Sand, medium, slightly silty and clayey, reddish brown	.5	13.5
Sand, medium, silty and clayey, buff	4.5	18
Beaverdam sand:		
Sand, silty and clayey, medium, tan	10	28
Test Hole Wi-Df 40 (Altitude: 48.2 feet)		
Recent series:		
Top soil	1	1
Silt and clay, sandy, medium to fine, black-brown, ropey	1	2
Pleistocene series:		
Walston silt:		
Silt and clay, sandy, medium to fine, tan, ropey	2	4
Sand, silt and clay, medium, brown	1	5
Sand, silt and clay, medium to fine, brown to buff	.5	5.5
Sand, silty and clayey, medium, buff, soft	1.5	7
Silt and clay, sandy, medium to fine, tan to brown, tough	1	8
Silt and clay, sandy, fine, tan to buff, tough	1	9
Do (stiffer, more tan)	.5	9.5
Silt and clay, some sand, fine to very fine, tan to buff, tough, ropey	2	11.5
Silt and clay, sandy, medium to fine, brown, tough	1.5	13
Sand, medium, silty and clayey, brown, soft	1	14
Beaverdam sand:		
Sand, medium, some silt, buff, loose	5	19
Sand, coarse to medium, some silt, buff	5	24
Test Hole Wi-Df 41 (Altitude: 58.1 feet)		
Pleistocene series:		
Walston silt:		
Sand, silt and clay, medium to fine, brown, hard	2.5	2.5
Clay and silt, sandy, fine, brown	6	8.5
Silt and clay, sandy, coarse to medium, brown to buff, ropey	.5	9
Silt and clay, sandy, fine, brown	4	13
Silt and clay, sandy, medium to fine, light tan	.5	13.5
Sand, silt and clay, medium to fine, some granules, light tan	1.5	15
Sand, silt and clay, medium, tan to reddish brown	2.5	17.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Silt and clay, sandy, medium to fine, tan, pink	1.5	19
Silt and clay, brick-red, tough, ropey	3.5	22.5
Sand, silt and clay, medium to fine, brick-red to buff	1.5	24
Beverdam sand:		
Sand, coarse, fine, some granules, soft, some silt, buff	5	29
Test Hole Wi-Df 42 (Altitude: 52.7 feet)		
Recent series:		
Sand, silty, medium, dark brown	1	1
Silt and clay, sandy, medium to fine, tan to brown	.5	1.5
Pleistocene series:		
Walston Silt:		
Silt and clay, some sand, fine, light brown	1.5	3
Silt and clay, some sand, medium to fine, brown	1	4
Sand, medium, silt and clay, brown	2.5	6.5
Sand, coarse to medium, silt and clay, brown to buff	1.25	7.75
Silt and clay, sand, coarse to medium, brown	1.25	9
Silt and clay, sandy, medium to fine, pink and red, ropey	3	12
Silt and clay, sandy, fine, brown to buff, ropey	1	13
Silt and clay, some sand, fine, brick-red, tough, ropey	2.5	15.5
Silt and clay, sandy, medium to fine, pink, red, buff	.5	16
Beaverdam sand:		
Sand, medium to fine, some silt, buff, soft	5	21
Sand, coarse to medium, some silt, buff, soft	8	29
Test Hole Wi-Df 43 (Altitude: 49.2 feet)		
Pleistocene series:		
Parsonsburg (?) sand and Walston silt:		
Sand, silty and clayey, medium to fine, brown	2	2
Sand, silt and clay, medium, reddish brown	.5	2.5
Silt and clay, sandy, medium, reddish brown	2	4.5
Sand, silty and clayey, medium, reddish brown	.5	5
Silt and clay, sandy, fine, reddish brown, some buff	3	8
Silt and clay, sandy, fine, reddish brown, some buff, streaked, tough, ropey	3	11
Silt and clay, sandy, medium, red-brown and buff	1	12
Walston silt:		
Sand, medium, silty and clayey, buff, soft	1	13
Sand, medium, silty and clayey, pink, buff	5	18
Beaverdam sand (?)		
Sand, coarse to medium, buff	7.5	25.5
Sand, very coarse to medium, silty, tan	2.5	28
Test Hole Wi-Df 44 (Altitude: 44.9 feet)		
Recent series:		
Sand, medium, brown (road fill)	.5	.5
Pleistocene series:		
Walston silt		
Clay, sandy, light brown, orange and white streaks	2	2.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Clay, sandy, buff, more orange and white streaks	2	4.5
Clay, sandy, brown	.5	5
Clay and sand, medium, yellow to brown	.5	5.5
Clay, sandy, medium, yellowish brown	.5	6
Sand and clay, medium, buff	.5	6.5
Clay, sandy, buff	.5	7
Sand and clay, medium, buff, some black grains, damp	2	9
Sand, clayey, medium, tan, wetter	1	10
Sand and clay, yellowish brown, watery	7	17
Beaverdam sand:		
Sand, slightly silty, coarse to medium coarse, buff, streaks of gray and red clay	12	29
Test Hole Wi-Df 45 (Altitude: 44.5 feet)		
Recent series:		
Sand, slightly silty, medium, chocolate to dark chocolate-brown	2.5	2.5
Pleistocene series:		
Walston silt		
Sand, medium, silty and clayey, brown	.5	3
Clay and silt, sandy, medium, brown	2	5
Sand, medium, silty and clayey, reddish brown	2.5	7.5
Sand, medium, silty and clayey, light brown	1	8.5
Sand, medium, silty and clayey, buff to brown	1	9.5
Beaverdam sand:		
Sand, silty and clayey, medium, buff to brown, soupy	19.5	29
Test Hole Wi-Df 46 (Altitude: 44.9 feet)		
Plistocene series:		
Walston silt:		
Sand, slightly silty, medium, dark chocolate-brown	1.5	1.5
Sand, slightly silty, medium, light olive-brown	1	2.5
Silt and clay, sandy, medium, light brown	1	3.5
Clay and silt, sandy, some coarse to medium, reddish brown	1	4.5
Clay, silt and sand, medium, reddish brown	.5	5
Clay, silt and sand, medium, brown	.75	5.75
Sand, silty and clayey, medium, light brown	2.25	8
Beaverdam sand:		
Sand, medium, light brown to buff, some silt	21	29
Test Hole Wi-Df 47 (Altitude: 47.5 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, slightly silty, medium, chocolate-brown	2.5	2.5
Sand, slightly silty, medium, brown	.25	2.75
Walston silt:		
Clay, silty and sand, medium, light buff to brown	1.25	4
Silt and clay, sandy, medium to fine, buff, moist	1.5	5.5

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Silt and clay, sandy, medium to fine, buff	2.5	8
Silt and clay, sandy, slightly fine, orange	.5	8.5
Sand, silt and clayey, medium to fine, red, gray, water table at about 11 feet	2.5	11
Sand, medium to fine, buff to brown, soupy, some silt	44.5	55.5
Test Hole Wi-Df 48 (Altitude: 41.4 feet)		
Pleistocene series:		
Parsonsburg sand:		
Sand, silty, medium, brown	1	1
Sand, silt and clay, medium to fine, brown	1	2
Sand, silty and clayey, medium to fine, reddish brown	1.5	3.5
Sand, silt and clay, medium to fine, brown	.5	4
Walston silt:		
Silt and clay, sandy, fine, tan	2	6
Silt and clay, sandy, fine, buff, moist	1.5	7.5
Sand, silty and clayey, medium, buff to red-brick	1	8.5
Sand, medium, some silt	2.5	11
Beaverdam sand:		
Sand, medium, buff, some silt	2.5	13.5
Sand, coarse to medium, some silt, tan	14	27.5
Sand, very coarse to medium, some granules, some silt, tan	1	28.5
Wells Wi-Dg 11, 12 (Altitude: 45 feet)		
Pleistocene series:		
Walston silt:		
Sand, light	5	5
Silt, sandy	3	8
Sand, white	8	16
Clay, silt and sand streaks	18	34
Beaverdam sand:		
Gravel, free	16	50
Sand, free, white, and gravel	3	53
Pliocene (?) series:		
Sand, free, buff and gravel	4	57
Sand and gravel, free, brown	13	70
Sand, free, red; then iron ore	12	82
Test Hole Wi-Dh 12 (Altitude: 38 feet)		
Pleistocene series:		
Walston silt		
Silt and sand, medium, tan, brown	5	5
Sand, clayey, medium, buff	5	10
Sand, clayey, medium, light tan	5	15
Sand, medium, slightly silty, gray-buff	10	25
Sand, medium, greenish gray	5	30
Beaverdam sand:		
Sand, medium, slightly silty, light tan	5	35

TABLE 42—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine, buff	12	47
Sand, coarse, colorless, mica, salt and pepper	19.5	66.5
Pliocene (?) series:		
Sand, very coarse, brown	.5	67
Sand, coarse, various colors, some mica	10	77
Sand, coarse, reddish brown	6	83
Sand, coarse, brown, and gravel	5	88
Sand, coarse, reddish brown, with gravel	2	90
Sand, coarse, medium, buff-brown	3	93
Sand, coarse, medium, buff-brown, some clay, green	3	96
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue, black, green	8	104
Well Wi-Dh 13 (Altitude: 35 feet)		
Pleistocene and Pliocene (?) series:		
Sand	30	30
Gravel and sand	12	42
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay	7	49
Sand	52	101
Pocomoke aquifer:		
Gravel and sand	27	128
Sand	20	148
Sand and gravel	20	168

TABLE 43

Logs of Wells in Worcester County

Well Wor-Af 4 (Altitude: 27 feet)

Pleistocene series:		
Sand and gravel, yellow	110	110

Well Wor-Af 5 (Altitude: 27 feet)

(Formation boundaries chosen on lithology and structural trend, and subject to considerable latitude in interpretation.)

Pleistocene series:		
Parsonsburg sand:		
Clay, sandy, brown	3	3
Sand, dry	2	5
Pamlico (?) formation:		
Sand, fine, free, white; water	9	14
Mud, marsh, soft, blue	4	18
Mud, marsh, very soft, sandy	2	20
Clay, soft, blue, and mud, marsh	14	34
Sand, free, hard, then streaks	26	60
Clay, soft, blue, very sandy	12	72

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Beaverdam sand:		
Gravel, small	3	75
Sandy	3	78
Pliocene (?) series:		
Sand, free, and gravel	69	147
Clay with streaks of sand and gravel	6	153
Sand, free, and gravel	4	157
Clay, sandy	.3	157.3
Sand, gravel and clay streaks	8.7	166
Miocene series:		
Yorktown and Cohansey formations (?):		
Lower aquiclude:		
Clay, tough, dark	3	169
Clay, sandy, gray	11	180
Sand, clay streaks and wood	7	187
Sand, coarse, free; much wood and pea-size gravel	13	200
Clay, firm, gray	10.7	210.7
Rock	.3	211
Clay, sandy	23	234
Manokin aquifer:		
Sand, coarse to fine, free, gray	98	332
Sand, hard, crusty	14	346
Clay, soft, green	6	352
Sand, free, and gravel up to 3/8-inch; water, soft, irony	88	440
St. Marys (?) formation:		
Clay, tough, gray	82.3	522.3
Rock, soft	.8	523.1
Rock, hard	.5	523.6
Clay, tough, and tight sand	25.9	549.5
Rock, soft	.5	550
Clay, tough, and sand streaks	30	580
Choptank (?) formation:		
Rock, hard and soft	11	591
Rock, very hard	3	594
Sand, soft	5	599
Hard (very)	2	601
Sand, soft	5	606
Hard (very)	1	607
Hard and soft places	23	630
Hard and crusty	11.5	641.5
Test Hole Wor-Be 22 (Altitude: 39 feet)		
Pleistocene series:		
Soil, sand, fine, silty, brown and gray	2	2
Silt and sand, fine; some clay, pinkish tan	6	8
Sand, medium to fine; some silt and clay, pinkish tan	12	20
Sand, coarse to medium; some silt and clay, tan-gray	8	28
Sand, coarse to medium; some silt and clay, gray	14	42

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, coarse to medium; little silt, gray; some white chalky particles	2	44
Sand, coarse, gray; bits of green clay; some white chalky particles	1	45
Sand, medium to fine, gray; bits of green clay, and white chalky particles	2	47
Sand, coarse to medium, gray; fine black and white particles and greenish clay	3	50
Sand, medium, buff gray; black and green clay and some white chalky particles	10	60
Sand, very coarse to medium, gray; with chalky and black particles, green clay and some chert fragments	3	63
Sand, medium to fine, silty, buff-gray; some chalky, black, and green clay particles	10	73
Sand, coarse to medium, silty, buff-gray; some chalky particles and fine black specks	5	78
Sand, medium to fine, silty, gray; fine black specks	6	84
Sand, coarse to fine, gray; some green clay particles	11	95
Sand, coarse to medium, gray; chalky particles	10	105
Sand, medium, gray; few black specks	3	108
Sand, medium to fine, gray; abundant black particles; some green clay particles	4	112
Sand, coarse to medium, gray; mica	5	117
Sand, coarse to medium, gray; some green silt and black particles	4	121
Sand, very coarse to medium, gray to buff; some black mica, and chalky particles	5	126
Well Wor-Bf 1 (Altitude: 30 feet)		
Pleistocene series:		
Sand and gravel, yellow	98	98
Well Wor-Bf 2 (Altitude: 30 feet)		
Pleistocene series:		
Sand, yellow; gravel and clay, white	95	95
Sand, yellow, and gravel	15	110
Well Wor-Bf 3 (Altitude: 35 feet)		
Pleistocene series:		
Sand, coarse, and clay, white, hard	18	18
Clay, very sandy, white	58	76
Sand, white	10	86
Sand, coarse, yellow	19	105
Well Wor-Bf 8 (Altitude: 21 feet)		
Pleistocene series:		
Topsoil	.75	.75
Clay, red	2.25	3

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay, fine, sandy	14	17
Sand, clean, water	6	23
Clay, sandy, white	16	39
Sand, fine, dirty, and silt	10	49
Sand, clean, and gravel	3	52
Sand, clayey, very fine; some gravel	38	90
Sand and gravel, varied sized	15	105
Well Wor-Bf 10 (Altitude: 24 feet)		
Pleistocene series:		
Topsoil	.5	.5
Clay, sandy, yellow	1.5	2
Clay, red	2	4
Sand, clayey, white	4	8
Clay, white	6	14
Sand, clayey, white, dirty	21	35
Sand, very fine, white; scattered gravel	12	47
Sand, light yellow, and gravel, small	3	50
Sand, very fine, dirty grayish-white	30	80
Sand, varied sized, light cream, and gravel, very dirty	10	90
Clay, sandy, light gray	4	94
Sand, varied sized, clean, and gravel, varied sized	6	100
Clay, light gray	—	100
Well Wor-Bf 28 (Altitude: 35 feet)		
Pleistocene series:		
Sand, coarse, yellow	16	16
Silt, sandy, white	37	53
Sand, coarse to medium, light tan	15	68
Pliocene (?) series:		
Clay, purplish gray, and sand, fine, brown	28	96
Sand and gravel, orange	21	117
Wells Wor-Bg 6, 7 (Altitude: 12 feet)		
Pleistocene series:		
Sand and gravel	80	80
Well Wor-Bg 10 (Altitude: 5 feet)		
(Because of the nature of the log it is not subdivided into formational units. The producing level is perhaps the Piney Point formation.)		
Clay	10	10
Sand and gravel	240	250
Rock	.5	250.5
Sand, with very little change	256.5	507
Clay, tough	80	587
Rock	.3	587.3
Clay, tough	24.2	611.5
Rock	.5	612

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay, tough	75.3	687.3
Rock	1.7	689
Clay, tough	10	699
Rock	5.5	704.5
Missing	1001.5	1706
Well Wor-Bg 14 (Altitude: 10 feet)		
Pleistocene series:		
Soil, sand	24	24
Clay, black	13	37
Sand, white	27	64
Clay, sandy, blue	21	85
Sand, coarse	17	102
Well Wor-Bh 1 (Altitude: 5 feet)		
Recent series:		
Sand	17	17
Marsh material	8	25
Pleistocene series:		
Sand, free, and marsh material	48	73
Sand, free, and gravel	43	116
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, soft, blue, and shells	32	148
Pocomoke aquifer:		
Sand, free	32	180
Marsh, black	3	183
Sand, free	12	195
Lower aquiclude:		
Clay, blue, and shells	43	238
Manokin aquifer:		
Sand, free, gray	7.6	245.6
Clay	.5	246.1
Sand, fine, free, white	21	267.1
Clay	4.9	272
Well Wor-Bh 6 (Altitude: 5 feet)		
Recent series:		
Sand and marsh material	16	16
Pleistocene series:		
Muck, soft	14	30
Clay, blue	24	54
Sand and gravel	62	116
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	27	143

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay, sandy	13	156
Clay	6	162
Pocomoke aquifer:		
Sand, free, and gravel; some clay streaks	32	194
Well Wor-Bh 7 (Altitude: 5 feet)		
Recent series:		
Sand and marsh materials	18	18
Pelistocene series:		
Muck, soft	17	35
Clay	15	50
Clay and sand streaks	18	68
Sand, coarse, and gravel	37	105
Clay	7	112
Sand and gravel	6	118
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay	18	136
Pocomoke aquifer:		
Sandy	3	139
Sand, coarse, and shell	2	141
Hard	1	142
Clay	4	146
Sand, coarse	3	149
Sand and gravel	34	183
Sand, gravel and wood	5	188
Well Wor-Bh 8 (Altitude: 5 feet)		
Recent series:		
Sand and mud	18	18
Pleistocene series:		
Muck, soft	17	35
Clay	15	50
Clay, sand streaks	18	68
Sand, coarse	17	85
Gravel, large	20	105
Clay	8	113
Sand and gravel	5	118
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay	22	140
Clay and sand streaks	9	149
Pocomoke aquifer:		
Sand, free, gravel	36	185
Well Wor-Bh 9 (Altitude: 5 feet)		
Recent series:		
Sand, shore	25	25

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Clay, soft marsh	15	40
Sand, white	15	55
Clay, soft, blue	42	97
Sand	7	104
Well Wor-Bh 10 (Altitude: 14 feet)		
Recent series:		
Sand, white, yellow	32	32
Pleistocene series:		
Pamlico (?) formation:		
Clay, blue, gray, soft	55	87
Sand and shells	11	98
Well Wor-Bh 13 (Altitude: 5 feet)		
Recent series:		
Sand and marsh material	16	16
Pleistocene series:		
Muck	18	34
Clay, blue	22	56
Sand and gravel	53	109
Clay, blue	2	111
Sand and gravel	5	116
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	27	143
Pocomoke aquifer (?):		
Clay, sandy, and sand streaks	43	186
Lower aquiclude:		
Clay, blue	48	234
Sand, tight	11	245
Manokin aquifer:		
Sand, free	8	253
Clay	6	259
Sand	4	263
Clay	6	269
Sand	3	272
Clay	9	281
Sand	1	282
Clay	2	284
Sand	40	324
Well Wor-Bh 14 (Altitude: 13 feet)		
Recent series:		
Sand, shore	25	25
Pleistocene series:		
Clay, soft marsh	15	40

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, white	15	55
Clay, blue, soft	42	97
Sand	7	104
Well Wor-Bh 17 (Altitude: 4 feet)		
Recent series:		
Sand, surface	20	20
Pleistocene series:		
Mud and sand	20	40
Mud and sand; water, salt	20	60
Sand; water, fresh	33	93
Well Wor-Bh 18 (Altitude: 5 feet)		
Recent series:		
Sand, light	25	25
Pleistocene series:		
Mud, black	40	65
Sand, light; water	30	95
Well Wor-Bh 19 (Altitude: 5 feet)		
Recent series:		
Sand, decayed vegetation	20	20
Pleistocene series:		
Sand, fine, white, clean	10	30
Sand, fine, dirty; mud, brown; shells	10	40
Clay, gray	10	50
Clay, sandy, gray; shells	10	60
Sand, clayey, and gravel	5	65
Sand, coarse to fine, light gray	3	68
Sand, silty, fine, gray; some gravel	4	72
Sand, varied sized, light gray	8	80
Well Wor-Bh 20 (Altitude: 2 feet)		
Recent series:		
Fill	1.5	1.5
Sand	16.5	18
Pleistocene series:		
Mud, sandy, marshy	17	35
Clay, dark gray; shells	22	57
Clay, gray; sand; gravel	7	64
Sand, medium to fine, gray	12	76
Sand, very coarse to fine, and gravel, varied colors	7	83
Well Wor-Bh 21 (Altitude: 7 feet)		
Recent series:		
Sand, white	22	22
Pleistocene series:		
Clay	13	35

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay and sand	43	78
Gravel	1	79
Clay and sand	10	89
Sand and gravel	5	94
Well Wor-Bh 22 (Altitude: 5 feet)		
Recent series:		
Sand	8	8
Pleistocene (?) series:		
Sand and mud	32	40
Sand; water, salt	20	60
Sand and mud	45	105
Sand, water	23	128
Well Wor-Bh 23 (Altitude: 4 feet)		
Recent series:		
Sand	7	7
Pleistocene series:		
Sand and mud	33	40
Sand, water, salt	20	60
Sand and mud	30	90
Pliocene (?) series:		
Sand, water, salt	20	110
Sand, hard, cemented	5	115
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Silt, clay (mud)	60	175
Pocomoke aquifer:		
Sand, water	16	191
Well Wor-Bh 24 (Altitude: 2 feet)		
Recent series:		
Surface soils	8	8
Pleistocene series:		
Sand	4	12
Mud	18	30
Sand and mud	35	65
Pliocene (?) series:		
Sand, water, salt	55	120
Rock	1	121
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Mud, gray, stiff	39	160
Pocomoke aquifer:		
Sand, water	20	180

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Well Wor-Bh 25 (Altitude: 5 feet)		
Recent series:		
Mud; sand, white	30	30
Pleistocene series:		
Sand, coarse	45	75
Clay and sand	35	110
Pliocene (?) series:		
Sand, red	16	126
Well Wor-Ce 2 (Altitude: 38 feet)		
Pleistocene series:		
Sand, free	140	140
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	8	148
Sand and gravel	9	157
Sand, coarse, clay streaks	7	164
Clay, tough	2	166
Clay, sandy	11	177
Clay, tough	7	184
Pocomoke aquifer:		
Sand, tight	7	191
Sand, coarse, and gravel	19	210
Well Wor-Ce 16 (Altitude: 36 feet)		
Pleistocene series:		
Sand and clay	10	10
Sand, fine, white	15	25
Clay, gray	15	40
Pliocene (?) series:		
Sand, fine, red	10	50
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	15	65
Pocomoke aquifer:		
Sand, coarse, gray	13	78
Well Wor-Cf 1 (Altitude: 42 feet)		
Pleistocene series:		
Soil fill	1	1
Soil, sandy	2	3
Sand, hard	6	9
Clay, sandy, white	5	14
Sand, fine	2	16
Sand and clay	8	24
Clay and sand, fine	19	43
Sand, hard	2	45
Clay streaks, and sand, fine	25	70

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine, and gravel	5	75
Sand, medium to fine	12	87
Sand, fine	14	101
Well Wor-Cf 2 (Altitude: 42 feet)		
Pleistocene series:		
Sand, white	105	105
Well Wor-Cf 3 (Altitude: 40 feet)		
Pleistocene series:		
Clay, sandy	5	5
Sand, fine, white	30	35
Clay, gray, plastic	1	36
Sand, coarse, medium, gray	9	45
Sand, gray; some gravel	10	55
Sand and gravel	10	65
Sand and gravel; clay streaks	9	74
Clay, gray	1	75
Sand, gray, and clay	5	80
Sand, coarse	11	91
Gravel, ¾-inch, sand, fine	4	95
Gravel, ¾-inch, and sand	8	103
Gravel, small, and sand	4	107
Clay, sandy, dark gray	8	115
Well Wor-Cg 5 (Altitude: 5 feet)		
Pleistocene series:		
Sand and marsh material	18	18
Clay	24	42
Sand and gravel	63	105
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	43	148
Clay and sand streaks	10	158
Pocomoke aquifer:		
Sand and gravel	25	183
Well Wor-Cg 8 (Altitude: 5 feet)		
Pleistocene series:		
Sand	4	4
Clay, sandy, and marsh material	12	16
Clay, blue	4	20
Sandy, soft	4	24
Sandy	9	33
Clay, brown	4	37
Clay, blue	2	39
Sand	5	44
Clay	6	50

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand	4	54
Clay	3	57
Sand	2	59
Clay	4	63
Sand and gravel	44	107
Rock, soft	.25	107.25
Sand, free	10.75	118
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, tough	15	133
Hard layer	.5	133.5
Clay, sandy	4.5	138
Pocomoke aquifer:		
Sand, tight, and shell	13	151
Sand, free	2	153
Clay, soft	5.5	158.5
Sand, free, and gravel	29.5	188
Clay, blue	.75	188.75
Well Wor-Cg 9 (Altitude: 7 feet)		
Pleistocene series:		
Fill	1	1
Sand, white, dry	2	3
Sand, fine, white	13	16
Sand and gravel	12	28
Sand, silty, very fine, dirty gray	12	40
Clay, gray	15	55
Clay, sandy, gray	9	64
Sand, coarse, gray; gravel, dirty	3	67
Sand, light gray, clean, and gravel	9	76
Sand, coarse to medium; some gravel		76
Well Wor-Cg 14 (Altitude: 9 feet)		
Pleistocene series:		
Sand, light, and clay balls	75	75
Sand, light; water	19	94
Well Wor-Cg 20 (Altitude: 5 feet)		
Recent series:		
Fill	3	3
Marsh and sand, thin	7	10
Pleistocene series:		
Pamlico formation:		
Clay, sandy, gray; shells	10	20
Clay, gray	12	32
Walston silt (?):		
Sand, brown-stained, and decayed vegetation	6	38

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, fine, greenish	2	40
Clay, sandy, gray	22	62
Beaverdam sand:		
Sand, very fine, gray, and large gravel	6	68
Sand, coarse to fine, white, and gravel	13	81
Well Wor-Cg 21 (Altitude: 11 feet)		
Pleistocene series:		
Sand, yellow	70	70
Clay, blue, and sandy clay	18	88
Sand; shells	12	100
Test Hole Wor-Cg 30 (Altitude: 2 feet)		
Recent series:		
Sand, medium, light tan to brown	10	10
Pleistocene series:		
Sand, medium, silty, dark gray	4	14
Sand, medium to fine, silty, clayey, dark greenish-gray, shell fragments	25	39
Sand, medium to fine, silty, clayey, chocolate-brown, peaty H_2S odor	5	44
Silt and clay, tough, sandy, very fine, dark greenish-gray	5	49
Sand, medium to fine, silty, clayey, dark greenish-gray; some coarse sand, 88–98 feet	49	98
Well Wor-Dc 14 (Altitude: 20 feet)		
Pleistocene series:		
Clay	2	2
Sand	57	59
Well Wor-Dc 16 (Altitude: 25 feet)		
Pleistocene series:		
Sand	10	10
Clay	5	15
Sand, red	10	25
Sand, white	25	50
Clay, blue	10	60
Sand and shell	8	68
Gravel	3	71
Clay and sand	9	80
Sand, very coarse, coarse, buff	20	100
Sand, medium	15	115
Well Wor-Dd 10 (Altitude: 20 feet)		
Pleistocene series:		
Sand	8	8
Clay, sandy, brown	8	16
Sand, white	4	20

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, brown	6	26
Sand, white, gray	14	40
Sand, brown	2	42
Sand, white, gray	30	72
Gravel and sand	4	76
Sand, white, gray	27	103
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, gray to green	29	132
Pocomoke aquifer:		
Sand, white, gray; some gravel	11	143
Clay, gray and green	2	145
Sand, brown, and gravel	15	160
Lower aquiclude:		
Clay, gray, green; some marl	50	210
Clay, gray	70	280
Rock, gray	.7	280.7
Clay, sandy	12	292.7
Rock	1.6	294.3
Clay, sandy	11.7	306
Manokin aquifer:		
Sand, fine	66	372
Clay, gray, green	33	405
Well Wor-Dd 23 (Altitude: 17 feet)		
Pleistocene series:		
Sand, yellow, and soil	20	20
Sand, fine, white, and clay	45	65
Sand, yellow, coarse	15	80
Well Wor-Dd 25 (Altitude: 20 feet)		
Pleistocene series:		
Clay	12	12
Sand, gray (separated on basis of Dd 26)	60	72
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	70	142
Lower aquiclude:		
Clay, blue	48	190
Clay, brown	42	232
Sand, fine, gray	8	240
Sand; clay and shells	21	261
Hard pan layer	4.5	265.5
Manokin aquifer:		
Sand, fine, and shells	42.5	308
Sand, coarse, white and yellow	22	330

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Well Wor-Dd 26 (Altitude: 5 feet)		
Pleistocene series:		
Clay	4	4
Sand, white	63	67
Miocene series:		
Yorktown and Cohansey formations (?):		
Pocomoke aquifer:		
Sand, gray	73	140
Lower aquiclude:		
Clay, blue, and shells	88	228
Clay and sand, blue	30	258
Hard pan layer	10	268
Manokin aquifer:		
Sand, fine; shells and wood	34	302
Sand and clay, gray	34	336
Well Wor-Dd 27 (Altitude: 5 feet)		
Pleistocene series:		
Sand and gravel, yellow	77	77
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	43	120
Pocomoke aquifer:		
Sand, coarse, white	20	140
Lower aquiclude:		
Clay, blue	120	260
Manokin aquifer:		
Sand, fine, white	26	286
Test Hole Wor-Dg 1 (Altitude: 3 feet)		
Recent series:		
Sand, medium, tan to buff	9	9
Pleistocene series:		
Pamlico(?) formation and earlier Pleistocene deposits possibly including uppermost Yorktown-Cohansey (?) or a later Miocene formation:		
Sand, medium, light gray; shell fragments	5	14
Sand, medium, some coarse size, light gray; shell fragments	10	24
Sand, medium, some granule and coarse size; shell fragments	5	29
Silt and clay, sandy, fine, dark greenish-gray	5	34
Silt and clay, sandy, medium to fine, dark greenish-gray; shell fragments	14	48
Silt and clay, sandy, medium, dark greenish-gray	1	49
Silt and clay, sandy, fine to very fine, dark greenish-gray; shell fragments	10	59
Sand, medium, silty, clayey, dark greenish-gray; shell fragments	10	69

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Sand, medium to very fine, silty, clayey, dark greenish-gray; shell fragments	5	74
Sand, coarse to medium, silty, clayey, dark greenish-gray; shell fragments	5	79
Test Hole Wor-Dg 2 (Altitude: 3 feet)		
Recent series:		
Sand, medium, brown to gray	9	9
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, coarse to medium, gray	5	14
Sand, coarse to medium, gray; shells	5	19
Pamlico (?) formation (see remarks Wor-Dg 1):		
Sand, silty, clayey, medium to fine, dark greenish-gray	10	29
Sand, fine, silty, woody, brown	5	34
Silt, sandy, fine to very fine, and clay, greenish gray, tough	4	38
Sand, medium to fine; silt and clay, greenish gray; shells	1	39
Silt, sandy, fine to very fine; clay, tough, dark greenish-gray; shells; some pebbles	20	59
Sand, coarse to medium, brown, gray; some gravel; shells	5	64
Silt, sandy, fine to very fine, and clay, dark greenish-gray; some gravel	25	89
Well Wor-Dg 4 (Altitude: 8 feet)		
Recent series:		
Sand, fine	10	10
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, gray, blue	5	15
Sand, gray	10	25
Sand, coarse to medium, gray	18	43
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay, blue	13	56
Sand, fine and clay, blue; some shale	7	63
Sand, fine, gray	5	68
Sand, coarse to medium, gray; some shale	9	77
Sand, coarse to medium, gray; water, salt	6	83
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	15	98
Sand, green, and gravel	19	117
Sand, green	4	121
Clay, gray	17	138
Clay and sand, coarse	3	141
Sand, coarse to fine, gray	10	151
Well Wor-Dg 5 (Altitude: 8 feet)		
Recent series:		
Sand, fine, gray	8	8
Marsh vegetation	2	10

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, medium, grayish brown	10	20
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay, blue; some vegetation	65	85
Miocene series: (compare Dg 4)		
Yorktown and Cohansey formations (?):		
Clay, blue	35	120
Sand, medium to fine, gray	20	140
Sand, coarse, gray	10	150
Well Wor-Ec 26 (Altitude: 10 feet)		
Pleistocene series:		
Sand, fine	15	15
Clay and sand, fine	5	20
Sand, coarse to fine	15	35
Sand, coarse	20	55
Sand, coarse to fine	20	75
Sand, fine	5	80
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	6	86
Pocomoke aquifer:		
Sand, fine; some shell fragments	10	96
Sand, coarse to fine; some gravel	21	117
Well Wor-Ed 7 (Altitude: 36 feet)		
Pleistocene series:		
Sand, yellow, and gravel	30	30
Clay	18	48
Gravel and sand	2	50
Clay	25	75
Sand	2	77
Clay	13	90
Sand	10	100
Well Wor-Ed 8 (Altitude: 38 feet)		
Pleistocene series:		
Clay	10	10
Sand, yellow	10	20
Sand and clay	30	50
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay, black	10	60
Clay, blue	7	67
Sand and gravel, gray	38	105
Sand and shells	47	152
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, gray	13	165

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand, coarse, yellow, white, and green	16	181
Well Wor-Ed 10 (Altitude: 35 feet)		
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand	12	12
Clay	12	24
Sand and gravel	39	63
Pamlico (?) formation (see remark Wor-Dg 1):		
Mud	17	80
Sand and shell	32	112
Well Wor-Ed 16 (Altitude: 40 feet)		
Pleistocene series:		
Sand	30	30
Sand and gravel	33	63
Sand, blue	34	97
Miocene series:		
Yorktown and Cohansey formations (?):		
Sand and mud	23	120
Pocomoke aquifer:		
Sand	31	151
Well Wor-Ef 1 (Altitude: 4 feet)		
Recent series:		
Sand, fine, gray	3	3
Marsh vegetation	17	20
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, medium to fine, gray	20	40
Sand, fine, gray; water, salt	10	50
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay, soft	10	60
Sand, fine, gray; clay	10	70
Sand, fine, gray; shells	10	80
Sand, coarse, gray	10	90
Sand; shells, gravel; clay	10	100
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	60	160
Sand, clayey, green	5	165
Sand, coarse, gray, brown	11	176
Well Wor-Ef 2 (Altitude: 4 feet)		
Recent series:		
Sand, gray, muddy	5	5
Marsh vegetation	3	8

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, fine, gray, muddy	7	15
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay and shells	10	25
Clay, blue (see Wor-Ef 1, 3)	70	95
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, blue	100	195
Pocomoke aquifer:		
Sand, fine, gray	15	210
Sand, coarse, gray; some shells	18	228
Well Wor-Ef 3 (Altitude: 4 feet)		
Recent series:		
Sand, medium, fine	5	5
Marsh vegetation	5	10
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, medium, fine, gray	5	15
Pamlico (?) formation (see remarks Wor-Dg 1):		
Clay and shell	10	25
Clay, blue	68	93
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue; some shell	22	115
Clay, blue; some fine sand and shell	27	142
Sand, fine, gray; some shell	14	156
Sand, coarse to fine, gray	13	169
Well Wor-Fb 1 (Altitude: 20 feet)		
Pleistocene series:		
Sand, yellow	22	22
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue, and sand, fine, gray	61	83
Pocomoke aquifer:		
Sand, fine, hard	19	102
Sand	6	108
Clay	10	118
Sand	10	128
Well Wor-Fb 2 (Altitude: 20 feet)		
Pleistocene series:		
Clay, sandy	10	10
Missing	15	25
Sand and large gravel	19	44

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay and sand, fine, gray	36	80
Pocomoke aquifer:		
Sand, gravel and clay	10	90
Sand and gravel; clay streaks	20	110
Sand, small gravel, and clay	15	125
Lower aquiclude:		
Clay, hard	1	126
Clay and sand, coarse to fine	4	130
Well Wor-Fb 3 (Altitude: 20 feet)		
Pleistocene series:		
Clay and sand	10	10
Clay, sand, and gravel	6	16
Sand, fine, and gravel	9	25
Sand, coarse	6	31
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	32
Well Wor-Fb 4 (Altitude: 20 feet)		
Pleistocene series:		
Clay, hard	5	5
Sand and clay	11	16
Sand, fine	9	25
Sand, coarse, and gravel	11.2	36.2
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	37.2
Well Wor-Fb 5 (Altitude: 20 feet)		
Pleistocene series:		
Clay	7	7
Clay and sand	3	10
Sand, fine	10	20
Sand	10	30
Sand, coarse, and gravel	5	35
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	36
Well Wor-Fb 6 (Altitude: 20 feet)		
Pleistocene series:		
Clay	5	5
Clay and sand	15	20
Sand and large gravel	10	30
Sand, coarse; small boulders	9	39

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	40
Well Wor-Fb 7 (Altitude: 20 feet)		
Pleistocene series:		
Clay and sand	20	20
Sand and gravel	3	23
Sand, fine, and gravel	9	32
Sand, hard	3	35
Sand, coarse	6	41
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay	1	42
Well Wor-Fb 8 (Altitude: 20 feet)		
Pleistocene series:		
Topsoil	5	5
Clay, sandy	11	16
Clay, blue	8	24
Clay, blue; gravel	22	46
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	7	53
Clay, blue; shells	15	68
Clay, blue, sandy	21	89
Pocomoke aquifer:		
Shell, hard	1	90
Sand, gray	10	100
Sand, brown	23	123
Sand, fine; shells	10	133
Clay, blue	3	136
Well Wor-Fb 9 (Altitude: 12 feet)		
Pleistocene series:		
Topsoil; clay	5	5
Sand, medium; gravel	11	16
Clay, blue, hard	6	22
Clay, blue; sand; gravel	32	54
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, blue; shells	9	63
Clay, sandy, blue, with more shells	20	83
Pocomoke aquifer:		
Shells and gravel cemented, hard	1	84
Sand, coarse, and gravel	8	92
Sand, coarse, and gravel; thin layers green clay	12	104
Sand, coarse; shell; gravel and clay, blue	12	116

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay, blue; sand; gravel	8	124
Mud, blue, soft, and sand	11	135
Clay, sandy, blue, and shells	10	145
Well Wor-Fb 10 (Altitude: 6 feet)		
Pleistocene series:		
Soil, sandy	14	14
Clay, dark	4	18
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	29	47
Shell, hard; clay; sand	24	71
Pocomoke aquifer:		
Sand, gray, and shell	24	95
Clay and sand	10	105
Sand	3.5	108.5
Sand, free	9.5	118
Gravel, tight	4	122
Sand, free, and gravel	5.5	127.5
Clay	1.5	129
Well Wor-Fb 11 (Altitude: 3 feet)		
Pleistocene series:		
Fill	5	5
Sand, brown	10	15
Clay, sandy, blue	5	20
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	19	39
Clay, blue; shells	14	53
Sand, fine, muddy; shells	16	69
Pocomoke aquifer:		
Sand, coarse, muddy; shells	11	80
Sand, coarse; gravel; clay	11	91
Sand, coarse, medium, brown	5	96
Sand, coarse; gravel, small; shells	10	106
Sand, coarse, brown	26	132
Clay, sandy; shells	25	157
Well Wor-Fb 12 (Altitude: 4 feet)		
Pleistocene series:		
Sand	10	10
Shell; boulders	2	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, green	35	47
Shale and clay	5	52
Clay, sandy, gray	8	60

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand, gray, free	10	70
Sand, very free	30	100
Clay, sandy	8	108
Sand, coarse, free	26	134
Clay, sandy, soft; shells	7	141
Well Wor-Fb 13 (Altitude: 6 feet)		
Pleistocene series:		
Sandy (very)	4	4
Sand, white; water	2	6
Sandy	2	8
Sand, and gravel, brown	2	10
Boulders (10 inches diameter)	2	12
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, tough, blue	32	44
Clay, shells, and sand streaks	18	62
Pocomoke aquifer:		
Sand, coarse to fine; shells	7	69
Sand, fine; shells	10	79
Sand, fine; shells	6	85
Sand, coarse, with green specks	15	100
Well Wor-Fb 14 (Altitude: 20 feet)		
Pleistocene series:		
Topsoil	2	2
Clay, sandy, yellow	6	8
Sand, coarse to fine	38	46
Miocene series:		
Yorktown and Cohansey formations (?):		
Upper aquiclude:		
Clay, sandy, black; shells	39	85
Pocomoke aquifer:		
Sand, coarse; gravel, fine; shells	10	95
Sand, coarse, black, white	31	126
Sand, fine, black	4	130
Lower aquiclude:		
Clay, sandy, gray, yellow	18	148
Well Wor-Fb 17 (Altitude: 26 feet)		
Pleistocene series:		
Topsoil and sandy clay	5.7	5.7
Sand, coarse to fine; some gravel; little white clay	16.3	22
Clay, white	8.5	30.5
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, sandy, blue, some gravel	12	42.5

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay; little sand, blue	32.5	75
Clay, blue, and shell	8.5	83.5
Clay, blue, and shell; little gravel	23.5	107
Pocomoke aquifer:		
Sand, coarse, and gravel; shell	17.5	124.5
Sand, medium to fine, silty	14.5	139
Sand, coarse, and shell	10.5	149.5
Clay, sandy, blue, and shell	15	164.5
Well Wor-Fb 18 (Altitude: 28 feet)		
Pleistocene series:		
Topsoil	5	5
Sand and clay	10	15
Sand, coarse	10	25
Sand and clay, blue	10	35
Sand, coarse, and gravel	10	45
Gravel	20	65
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, blue	65	130
Pocomoke aquifer:		
Sand, coarse to fine	40	170
Well Wor-Fb 19 (Altitude: −1 foot)		
(Formation boundaries on lithology and structural trend and subject to considerable latitude.)		
Pleistocene series:		
Clay, streak	12	12
Clay, sandy, blue	12	24
Missing	168	192
Miocene series:		
Yorktown and Cohansey formations (?):		
Rock, soft	4	196
Sand	24	220
Clay, shelly, soft, blue	27	247
Rock, hard	2	249
Sand	—	—
St. Marys formation:		
Clay	28	320
Boulder	—	320
Clay	80	400
Clay and boulders	73	473
Choptank formation:		
Shell rock	—	473
Shell rock, boulders	28	501
Rock	.5	501.5
Sandy, soft	18.5	520
Rock	7	527

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Clay, sandy, green	73	600
Sand and shell	7.5	607.5
Calvert formation:		
Sandstone	.8	608.3
Clay, green, with shell	101.7	710
Clay, very soft, light green	120	830
Clay, green, with black sand, a little tougher	20	850
Sand, green and black	40	890
Clay, green, some boulders	20	910
Clay, green	36	946
Clay, green, tougher	110	1056
Missing	5	1061
Eocene series:		
Piney Point and Chickahominy formations:		
Hard, like rock, then softer	4	1065
Clay, soft, gray, with black sand, not sharp sand, last of it hard	90	1155
Clay, tough, green and black sand	20	1175
Paleocene series:		
Clay, tough, black, specks of mud or sand	37	1212
Boulder	7	1219
Clay, light green, with black material like sand but not sharp	59	1278
Hard	.8	1278.8
Clay, gray, with black marl or greenish sand	15.2	1294
Boulders (and sand), water 1320–1340 feet, not good	46	1340
Rock or boulders	80	1420
Upper Cretaceous series:		
Monmouth (?) formation:		
Clay, dark gray, soft, fine, sandy	5	1425
Clay, brown	25	1450
Sand, gray; water, salty, flows	15	1465
Clay	27	1492
Sand	13	1505
Clay	6	1511
Rock	3	1514
Matawan (?) formation:		
Clay, streaks, white, blue, and gray	16	1530
Clay; some sand	4	1534
Clay	6	1540
Well Wor-Fb 32 (Altitude: 30 feet)		
Pleistocene series:		
Clay	5	5
Sand, fine	10	15
Sand, fine, blue-black	30	45
Sand, coarse, and gravel	15	60
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay and mud, black	65	125

TABLE 43—*Continued*

	Thickness (feet)	Depth (feet)
Pocomoke aquifer:		
Sand and fine shell	10	135
Test Hole Wor-Fb 43 (Altitude: 20 feet)		
Pleistocene series:		
Clay and sand	6	6
Sand; gravel and hard pan	14	20
Sand, coarse, and gravel	10	30
Clay, blue, and gravel	2	32
Miocene series:		
Yorktown and Cohansey formations (?):		
Clay, marsh mud, blue	18	50
Clay, blue; large gravel	15	65
Clay, blue, and shells	35	100
Pocomoke aquifer:		
Sand and shells	15	115
Sand, coarse, and large gravel	19	134
Test Hole Wor-Ff 1 (Altitude: 3 feet)		
Recent series:		
Sand, medium, light brown to tan	9	9
Pleistocene series:		
Parsonsburg sand (?) and other members of the Wisconsin stage:		
Sand, coarse to medium, light gray; shells	15	24
Pamlico (?) formation (see remark Wor-Dg 1):		
Silt, sandy, fine, and clay, dark greenish-gray; shells	5	29
Sand, silty, clayey, medium to fine, dark greenish-gray; shells	10	39
Silt, sandy, fine to very fine, and clay, dark greenish-gray; shells	10	49
Silt, sandy, very fine, and clay, gray	10	59
Sand, silty, clayey, medium to fine, dark greenish-gray; shells	30	89
Miocene series:		
Yorktown and Cohansey formations (?):		
Silt and clay, gray	1	90
Sand, fine, silt and clay, greenish gray	14	104

The Surface-Water Resources

BY

ARTHUR E. HULME

Introduction

The principal streams within the tri-county area flow southward or southwestward and drain into lower Chesapeake Bay, the only exceptions being the small streams draining the eastern part of Worcester county into bays adjacent to the Atlantic Ocean.

The primary streams are tidal in their lower reaches and many are affected by tide throughout a greater part of their length. Many of the tributary streams are also affected by tide.

Owing to the flat terrain there are many swampy areas having either brackish or fresh water. Several of the streams either originate in or flow through swamps. The streams are rather sluggish and much less flashy than those draining areas having more topographic relief.

Long-term U. S. Weather Bureau records for southern Eastern Shore of Maryland and Delaware indicate an average annual rainfall of nearly 45 inches, based on a 54-year average period of record for 6 rain gages. Rainfall is generally adequate for farming, and irrigation is not widely practiced.

Hydroelectric power is not feasible owing to the flatness of the terrain. Many small grist mills were operated in the past, as evidenced by the mill ponds scattered throughout the area, but most of these mills are no longer in operation. Many of the ponds are now used for recreational purposes.

The important streams and their drainage areas at selected points are listed in Table 44, based chiefly on data in the "Report to the General Assembly of Maryland by the Water Resources Commission of Maryland, January 1933." The principal streams are shown in figure 52.

Streamflow Measurement Stations

Gaging stations in Somerset, Wicomico, and Worcester Counties are operated by the U. S. Geological Survey in cooperation with the Maryland Department of Geology, Mines and Water Resources. They are complete-record and partial-record gaging stations. Five complete-record stations are operated and seven partial-record stations were operated from January or February 1950 to September 1951.

Discharge measurements, or measurements of flow (Pl. 16), are made periodically and at various stages of the stream in order to derive a stage-discharge relation for the station. After establishing a stage-discharge relation, the discharge for any stage can be determined provided the channel conditions remain stable. A typical discharge rating curve is illustrated in figure 50.

The selection of a gaging-station site requires careful appraisal of various conditions. The stability of the stream channel is investigated; height of banks, their relative freedom from overflow, and suitability of conditions for installation and maintenance of gage structures are taken into account; and the range in stage within which current-meter measurements can be obtained by wading, and the availability and accessibility of existing structures suitable for use in making measurements at higher stages are considered. The site selected may not meet all requirements and an artificial control, or modified type of weir, may be necessary in order to stabilize the stage-discharge relation, especially for low flows. For a channel subject to shifting, where a control is not practical, more frequent measurements may be required to define the stage-discharge relation. A cableway or an auxiliary foot bridge may be required in order to make current-meter measurements at stages higher than can be waded.

There are two principal types of gaging stations, recording and nonrecording. A recording station, as its name implies, is equipped with an instrument called a water-stage recorder that records a continuous graph of the stage. Graphs of river stages from automatic water-stage recorders are illustrated in figure 51. A nonrecording station usually is equipped with a vertical staff-gage, a wire-weight gage, or a reference point from which readings are made by engineers or by an observer. All of the complete-record gaging stations in Maryland are recording but the partial-record stations are non-recording.

Two types of recorder structures are in use in the tri-county area, the permanent and the temporary. The permanent-type structures (Pl. 17, fig. 1) at the newer stations are of concrete-block construction, inside dimensions 4 feet square, connected to the stream by one or more horizontal pipes, so that the water level in the well can fluctuate simultaneously with the stream. Most of the gage wells are equipped with a flushing device for cleaning silt out of the intake pipes. Other equipment includes steel well and house doors, ventilators, built-in instrument shelf, and the recording instrument. The height of the structure is determined by the height of anticipated floods.

The temporary-type structure is a smaller structure composed of corrugated iron culvert pipe placed in a vertical position to act as the stilling well, with a small box-like wooden shelter fastened thereon in which the recorder is placed. This structure is designed for use where short-term records are anticipated, as most of the materials can be salvaged and reused. With either type of recording station, a continuous graphical record of stage can be obtained by means of a water-stage recorder. Monthly inspection in order to remove the chart (Pl. 17, fig. 2) wind the clock, and flush the intakes is all the attention usually re-

TABLE 44

Drainage Areas of Streams in Tri-County Area

Drainage Basin and Name of Stream	Tributary to:	Drainage areas in square miles			
		Total	In Maryland	[a] In Delaware	At USGS gage
Atlantic Coast Drainage in Maryland	Atlantic Ocean	299	299		
POCOMOKE RIVER BASIN					
Pocomoke River					
at Del.-Md. State Line	Pocomoke Sound	26.8		26.8	
South Fork Green Run near Willards at Del.-Md. State Line	Pocomoke River	8.1	7.1	1.0	
Green Run at mouth	Pocomoke River	14.7	10.1	4.6	
near Willards	Pocomoke Sound	60.5	22.3	38.2	60.5
Burnt Mill Branch at Willards	Pocomoke River*	18.1	18.1		
Timmonston Branch at mouth	Pocomoke River	14.5	14.5		
Adkins Race at Powellville (Pond Outlet)	Pocomoke River*	18.7	18.7		
near Wesly (7 mi. above Nassawango Creek)	Pocomoke Sound	183	145	38.2	
Nassawango Creek near Snow Hill	Pocomoke River	44.9	44.9		44.9
Nassawango Creek at mouth	Pocomoke River	73.1	73.1		
Dividing Creek at mouth	Pocomoke River	62.2	62.2		
Pusey Branch at mouth	Dividing Creek	11.5	11.5		
at Pocomoke City	Pocomoke Sound	413	375	38.2	
Pitts Creek at mouth	Pocomoke River	33.3	21.2	(Va.)12.1	
Wagram Creek at Wagram Mill Pond Outlet, Va., 0.2 mi. below Md.-Va. State line	Pitts Creek	18.4	13.0	(Va.) 5.4	
at mouth	Pocomoke Sound	488	437	38.2 (Va.)13.1	

MANOKIN RIVER BASIN					
Manokin Branch (head of Manokin River)					
near Princess Anne	Tangier Sound	5.8	5.8		5.8
at Princess Anne	Tangier Sound	10.3	10.3		
King's Creek at mouth	Manokin River	18.6	18.6		
Back Creek at mouth	Manokin River	18.4	18.4		
Manokin River at mouth (Hazard Point)	Tangier Sound	125	125		
WICOMICO RIVER BASIN					
Leonard Pond Run at Leonard Pond outlet near Delmar	Wicomico River*	16.2	14.1	2.1	
Wicomico River above Beaverdam Creek	Tangier Sound	42.1	38.5	3.6	
Beaverdam Creek near Salisbury	Wicomico River	19.5	19.5		19.5
Beaverdam Creek at mouth	Wicomico River	25.1	25.1		
Tonytank Creek at Fruitland (Fook's Pond outlet)	Wicomico River*	5.0	5.0		
Tonytank Creek near Salisbury (Camden Ave.)	Wicomico River	11.8	11.8		
Passerdyke Creek at mouth	Wicomico Creek	11.7	11.7		
Wicomico Creek at mouth	Wicomico River	32.1	32.1		
at mouth	Tangier Sound	238	235	3.6	
NANTICOKE RIVER BASIN					
Nanticoke River at Del.-Md. State line	Tangier Sound	393	7.5	386	
Baron Creek near Mockingbird Pond at Del.-Md. corner	Nanticoke River*	8.9			
Baron Creek at Mardela Springs (RR crossing)	Nanticoke River	23.4	13.7	9.7	
Baron Creek at mouth	Nanticoke River	30.0	20.3	9.7	
Rewastico Creek above Rewastico Pond near Hebron	Nanticoke River*	8.4	8.4		
Rewastico Creek near Hebron	Nanticoke River	12.2	12.2		12.2
Quantico Creek at Quantico (at bridge on St. Hwy. 347)	Nanticoke River*	10.1	10.1		
Quantico Creek at Quantico (0.2 mi. below hwy. bridge)	Nanticoke River	11.6	11.6		
at mouth	Tangier Sound	815	325	490	

* Sites of partial-record gaging stations where intermittent gage heights were recorded and current-meter measurements were made (all non-tidal except Quantico).

[a] Drainage areas in Delaware except those in Virginia which are noted.

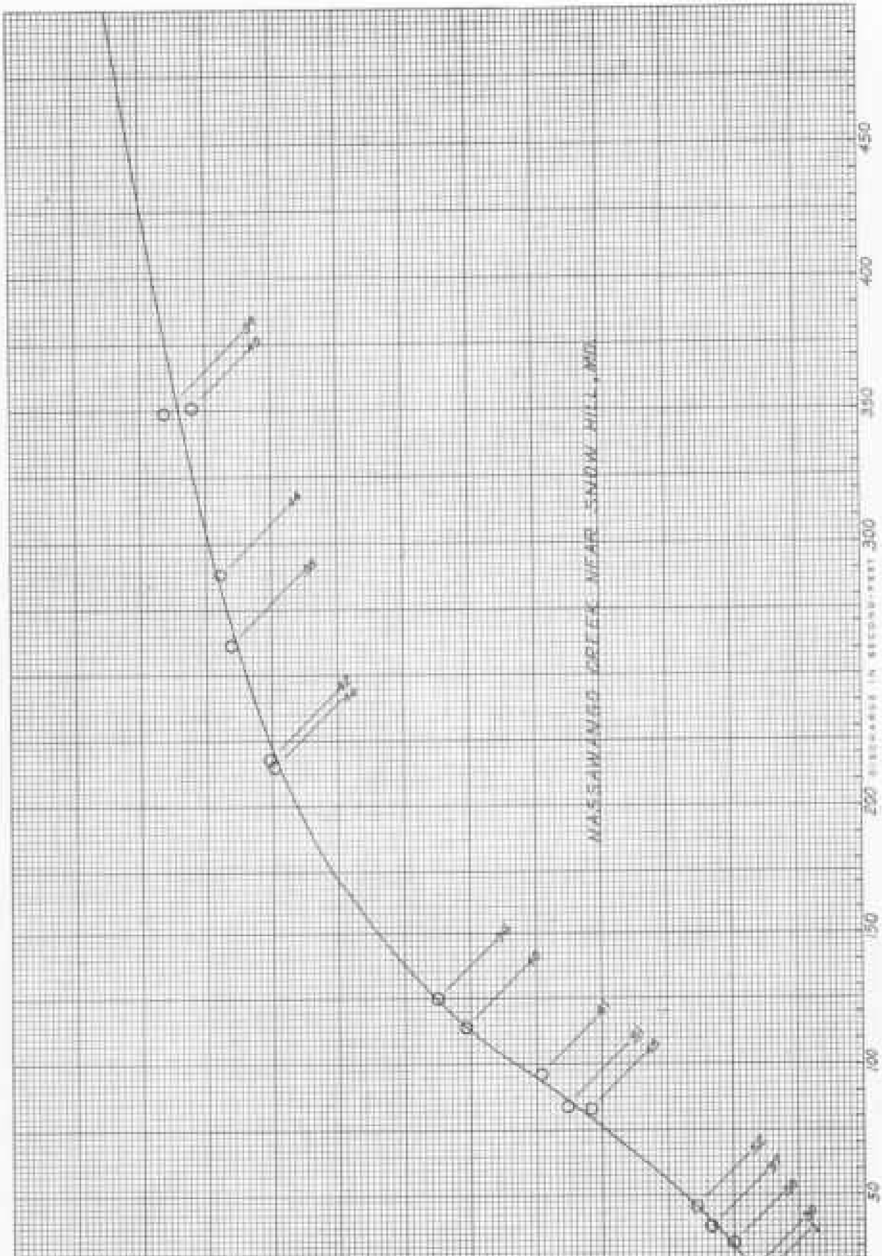

FIGURE 50. Typical Rating Curve showing Relation between Stage and Discharge at a Stream-Gaging Station

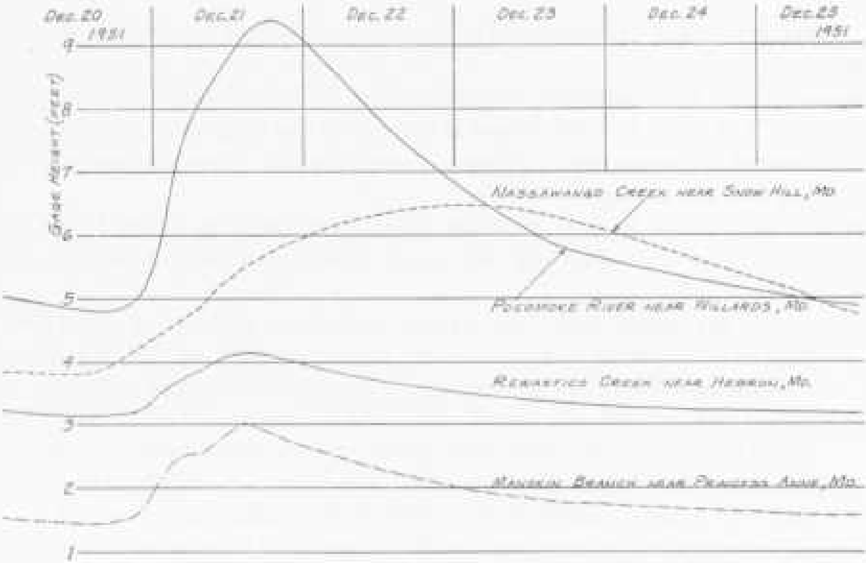

FIGURE 51. Graphs of River Stages from Automatic Water-Stage Recorders

quired except for a yearly maintenance trip to remove silt from the well and make general repairs.

The collection of a satisfactory gage-height record is only one phase of gaging station operation; obtaining an adequate number of reliable discharge measurements to define the stage-discharge relation is an equally important phase of the work.

Discharge measurements at the stations in the tri-county area generally are made by wading, except at high stages when the depth and velocity observations are taken by suspending the current meter and sounding weight from a bridge at the station. Measurements usually are made periodically, the frequency at a given station depending upon the stability of the rating. At a station equipped with an effective artificial control the rating may need to be checked only bi-monthly or even less frequently. On the other hand, a station with an unstable stream bed subject to shifting, or affected by backwater from weeds or other sources, may require measuring bi-weekly or more often. Special stream-gaging trips usually are required to secure measurements with which to define the extreme low water and high water portions of the station rating curves.

Daily-discharge records for gaging stations on the Eastern Shore of Maryland are published in annual water-supply papers of the U. S. Geological Survey called "Surface-Water Supply of the United States," Part 1, or in Part 1B subsequent to 1950.

DEFINITION OF TERMS

Several technical terms are used in streamflow records. Explanations of some of these terms are:

Second-feet.—An abbreviation for cubic feet per second (commonly abbreviated "cfs"). A cubic foot per second is the rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average velocity is 1 foot per second.

Discharge.—A rate of flow of water, usually expressed in second-feet. One second-foot flowing for one day equals 86,400 cubic feet, or 646,317 gallons.

Second-feet per square mile.—An average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the runoff is distributed uniformly as regards both time and area.

Million gallons per day per square mile.—An average number of gallons of water flowing per day from each square mile of area drained, on the assumption that the runoff is distributed uniformly as regards both time and area. One million gallons per day equals 1.5472 cubic feet per second.

Runoff in inches.—The depth to which an area would be covered if all the water draining from it in a given period were uniformly distributed on its surface.

Drainage basin.—The area drained by a stream or stream system, usually expressed in square miles.

TABLE 45

Stream-Gaging Stations in Tri-County Area

No. on Map	Stream-gaging stations	Drainage area (square miles)	Records available*
1	Pocomoke River near Willards	60.5	Dec. 1949–
2	Burnt Mill Branch at Willards†	18.1	Jan. 1950–Sept. 1951
3	Adkins Race at Powellville†	18.7	Jan. 1950–Sept. 1951
4	Nassawango Creek near Snow Hill	44.9	Dec. 1949–
5	Manokin Branch near Princes Anne	5.8	Apr. 1951–
6	Leonard Pond Run near Delmar†	16.2	Feb. 1950–Sept. 1951
7	Beaverdam Creek near Salisbury	19.5	Oct. 1929–
8	Tonytank Creek at Fruitland†	5.0	Jan. 1950–Sept. 1951
9	Baron Creek at Del.-Md. State corner†	8.9	Jan. 1950–Sept. 1951
10	Rewastico Creek above Rewastico Pond near Hebron†	8.4	Jan. 1950–Sept. 1951
11	Rewastico Creek near Hebron	12.2	Dec. 1949–
12	Quantico Creek at Quantico†	10.1	Jan. 1950–Sept. 1951

* Stations without closing date are still in operation.

† Partial-record gaging station: intermittent gage heights and discharge measurements only.

FIGURE 52. Map of Tri-County Area showing Principal Streams and Locations of Gaging Stations

Water year.—A special annual period selected to facilitate water studies, commencing October 1 and ending September 30.

GAGING STATIONS IN THE TRI-COUNTY AREA

COMPLETE-RECORD GAGING STATIONS

In the tri-county area all the gaged streams are tributary to the lower Chesapeake Bay (Table 45). The only long-term streamflow record is that for Beaverdam Creek near Salisbury (formerly published as East Branch Wicomico River) which began in October 1929. Short-term records are available for three gaging stations established in December 1949 and for one established in April 1951.

Drainage areas and the years of record available for all gaging stations, both complete-record and partial-record, are given in Table 45, and the locations of the stations are shown in figure 52.

Records for gaging stations, in either Delaware or Maryland, on other streams which flow into the Nanticoke River Basin will be included in a tri-county report for Caroline, Dorchester, and Talbot Counties.

PARTIAL-RECORD GAGING STATIONS

In order to extend the gaging coverage to provide at least a limited amount of information on as many streams as practicable, seven gaging sites in Wicomico County were selected for operation as partial-record stations (Table 45). At each site either a staff gage or a reference point was established. The period of operation of these partial-record stations was about 21 months extending through September 1951. Basic data collected at these sites consisted of current-meter discharge measurements made once or twice a month (depending upon the stability of the stage-discharge relationship) supplemented by intermittent gage readings. Results of 237 of these discharge measurements (average of 34 measurements per station) are published under "Miscellaneous Discharge Measurements" in the annual water-supply papers of the U. S. Geological Survey, Part 1 for 1950, and Part 1B for 1951.

COMPUTATIONS FOR PARTIAL-RECORDS

The monthly mean discharges for the partial-record gaging stations were derived through correlation with records for complete-record gaging stations. The discharge measurements at a partial-record gaging station were plotted against concurrent discharges at an adjacent complete-record station, a mean curve of relation drawn, and the standard error of estimate determined. Using this curve of relation, daily discharges for the partial-record station were estimated from those on concurrent days at the complete-record station. The estimated daily discharges were then adjusted by amounts indicated by individual measurements, the adjustments being graduated between measurements on basis of time and discharge. Estimated monthly mean discharges were then computed from these adjusted mean daily discharges.

Tests of the accuracy of this method were made by selecting two daily discharges per month from a complete-record gaging station and assuming them to be results of discharge measurements. These were then correlated with concurrent discharges for another complete-record station and monthly mean discharges for the first station were estimated in the manner described above. These estimates were then compared with the monthly mean discharges computed from actual records. Results of these tests showed that the use of this method reduced the original standard errors of estimate—those indicated by the plotting of discharge measurements and concurrent discharges—by one-quarter to one-half. The standard error of estimate of the monthly discharge as given in this report was obtained by reducing the standard error of estimate of the discharge measurements by 30 percent.

The standard error of estimate is a statistical measure of the variation or scatter, about the line of relation, of the points used in the correlation. One standard error measured plus and minus about the line will normally include about two-thirds of the points. It can also be inferred that two-thirds of the estimates made through the use of the line would normally be within one standard error of being correct. About 95 percent of the estimates should be within two standard errors and practically all should be within three. Thus, about two-thirds of the monthly mean discharges estimated for partial-record sites should be correct within the standard error indicated on the station record.

RUNOFF IN THE TRI-COUNTY AREA

MAXIMUM FLOOD RUNOFF

The maximum flood of record at the gaging station on Beaverdam Creek near Salisbury occurred on August 23, 1933, at which time the dam at the gage site was partially washed out. Records for August 1933 collected by the United States Weather Bureau show the recorded 24-hour rainfall to be 6.34 inches at Bridgeville, Delaware, and 7.40 inches at Pocomoke City. As further indication of the extent and severity of this storm, Baltimore recorded 7.62 inches, which was the city's highest 24-hour rainfall since 1871 when statistical tabulations began. Storm damage for August 23, 1933, was very heavy with fields and roads flooded or badly washed, bridges dislodged, and erosion from high tide and waves that cut a channel south of Ocean City between Sinepuxent Bay and the Atlantic Ocean. Worcester County suffered a $300,000 loss to its corn crop; Crisfield suffered a $100,000 industrial loss; and the loss by the fisheries industry was estimated at $3 million. Many boats and waterfront structures were destroyed, and a loss by wave action of about 2 square miles of shore land was estimated by the State Conservation Commissioner.

MINIMUM DROUGHT RUNOFF

Extreme drought conditions prevailed throughout Maryland from 1930 to 1934. The drought commenced in 1930 when the State annual precipitation averaged only 24 inches as compared with a 54-year average of 42 inches. For details on drought studies see U. S. Geological Survey Water-Supply Paper 680, "Droughts of 1930-34." The 1930 precipitation for Maryland and Delaware in terms of percentage of normal (approximately 57 percent) was lower than that recorded by any other of the 30 humid States, not only for 1930 but also for their most severe drought year. Streamflow records are not available for this tri-county area prior to October 1929 but the 1930 drought was undoubtedly the most severe known.

TABLE 46

Average Discharge from Tri-County Area (in cfs per sq. mi.)

Period of record			Drainage area (sq. mi.)											
From	To	Water Years	5.0	5.8	8.4	8.9	10.1	12.2	16.2	18.1	18.7	19.5	44.9	60.5
1930	1932	3										0.564		
1939	1950	12	—		—	—	—	—	—	—	—	1.26	—	—
1951	—	1	*1.00	—	*0.42	*0.64	*0.39	0.42	*0.45	*0.62	*0.72	.83	0.65	0.61
1952	—	1	—	0.70	—	—	—	1.15	—	—	—	1.58	1.37	1.34
1953	—	1		.65				.93				1.53	1.35	1.22
1951	1953	3		—				*.83				1.31	*1.12	*1.06
1952	1953	2		*.68				1.04				1.56	1.36	1.28
1930	1932	18		—				—				*1.16	—	—
1939	1953													
			a		a	a	a		a	a	a			
Station No. on map			8	5	10	9	12	11	6	2	3	7	4	1
Gaging Station			Tonytank Creek at Fruitland	Manokin Branch near Princess Anne	Rewastico Creek (above pond) near Hebron	Baron Creek at Del.-Md. State Corner	Quantico Creek at Quantico	Rewastico Creek near Hebron	Leonard Pond Run near Delmar	Burnt Mill Branch at Willards	Adkins Race at Powellville	Beaverdam Creek near Salisbury	Nassawango Creek near Snow Hill	Pocomoke River near Willards

* = longest period of record.

a = Partial-record gaging station.

AVERAGE RUNOFF

Streamflow records for this report span a period of 24 years, but as some of these records are incomplete there are only 18 complete water years of record for the longest operated gaging station, Beaverdam Creek near Salisbury. The average discharge for these 18 water years (1930–32, 1939–53) was 1.16 cfs per square mile but this can not be assumed to be representative of the general runoff from the tri-county area. On the basis of short-term records of 3 water years (1951–53) for most of the newer stations, it appears that runoff in general from the tri-county area would be somewhat less than that indicated by the Beaverdam Creek record. Table 46 summarizes the average discharge in cubic feet per second per square mile for various periods of records for all the gaging stations. The more recent, shorter-length records do not reflect the unique minimum streamflow conditions of the early 1930's.

QUALITY OF SURFACE WATER

Chemical analyses of water samples collected at the gaging stations and at other places on some of the streams in the tri-county area are given in Table 47. The analyses were supplied by the Quality of Water Branch of the U. S. Geological Survey and were obtained mostly in connection with salinity studies made by the Branch in the summer of 1952, in cooperation with the Department of Geology, Mines and Water Resources. The results of the salinity studies will be published in the tri-county report for Talbot, Caroline, and Dorchester Counties.

FLOW-DURATION STUDIES OF BEAVERDAM CREEK

The study of duration of flow when plotted as a flow-duration curve presents a generalized picture of the relation of flows of various magnitude to the duration of time. To be truly representative, the flow-duration curve should be derived from long-term and essentially continuous records of complete years of mean daily discharge. The flow duration curve shows the percentage of time that the flow was equal to or greater than any given discharge. To be representative of conditions for natural-flow streams the curve should be based on records that are not affected by artificial storage and regulation.

Data for the gaging station on Beaverdam Creek near Salisbury were used as the basis for flow-duration studies of the tri-county area (Table 48 and figure 53). With respect to length the Beaverdam Creek records, dating back to October 1929, meet the requirement. On basis of continuity and natural conditions, however, the data must be qualified. This gaging station, located at the dam on Schumaker Pond, is affected by intermittent operation of the gates, particularly during and after floods. The records are incomplete for the 6 water years 1933 through 1938 as a result of gate operations or damage to the dam structures by floods. Accordingly, those years were eliminated from consideration, leaving 18 complete water years of record through 1953. Furthermore, the

TABLE 47

Chemical and Physical Characteristics of Surface Waters in Somerset, Wicomico and Worcester Counties

Analyses by Geological Survey, United States Department of the Interior
(parts per million)

Sample Number	1	2	3	4	5	6
Date of collection 1952	August 11	August 11	August 27	July 1	August 27	August 27
Silica (SiO_2)	3.9	3.4	17	19	16	13
Iron (Fe),[1]	.04	.07	.23	.39	.07	—
Iron (Fe), total	.90	.69	—	—	—	1.2
Manganese (Mn), dissolved[1]						
Manganese (Mn), total						
Calcium (Ca)	3.7	4.2	2.9	4.0	3.5	6.9
Magnesium (Mg)	.9	1.6	1.6	1.0	.8	8.2
Sodium (Na)	5.7	9.6	6.6	7.5		80
Potassium (K)	1.8	2.0	.7	1.3	5.0	5.9
Bicarbonate $(HCO)_3$	16	14	14	20	10	15
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	7.0	11	7.0	3.8	4.0	31
Chloride (Cl)	7.5	15	7.0	7.5	6.6	134
Fluoride (F)	.0	.1	.2	.3	—	.1
Nitrate (NO_3)	.6	.7	1.1	1.0	1.8	1.5
Dissolved solids						
Sum						
Residue on evaporation at 180°C	47	67	—	66	—	337
Hardness as $CaCO_3$	13	17	14	14	12	51
Non-carbonate	0	6	2	0	3	39
Specific conductance (micromhos at 25°C)	64.0	90.2	61.9	65.6	49.5	519
pH	6.8	6.7	6.2	6.9	6.8	6.3
Color	45	70	35	50	280	130
Temperature (°F)	78	80	74	80	75	74

[1] In solution at time of analysis.

Sample No. 1—Nanticoke River near Sharptown, Dorchester Co.; 3:00 p.m.; low tide; at State Highway No. 313 bridge.

Sample No. 2—Nanticoke River near Sharptown, Dorchester Co.; 9:45 p.m.; high tide; at State Highway No. 313 bridge.

Sample No. 3—Baron Creek near Mardela Springs, Wicomico Co.; 10:15 a.m.; approx. 1 hour after high tide.

Sample No. 4—Rewastico Creek near Hebron, Wicomico Co.; 4:10 p.m.; at outlet of Rewastico Pond—4.7 cfs.

Sample No. 5—Quantico Creek at Quantico, Wicomico Co.; 10:00 a.m.

Sample No. 6—Quantico Creek 2 miles below Quantico, Wicomico Co.; 9:20 a.m.; one hour after high tide.

TABLE 47—*Continued*

Sample Number	7	8	9	10	11	12
Date of collection 1952	August 25	August 25	August 12	August 12	July 1	August 26
Silica (SiO_2)	16	15	14	15	9.9	—
Iron (Fe)[1]	.40	—	.03	.03	.58	—
Iron (Fe), total	—	—	.81	.30	—	—
Manganese (Mn), dissolved[1]						
Manganese (Mn), total						
Calcium (Ca)	7.6	8.5	4.6	4.2	3.1	—
Magnesium (Mg)	3.1	7.1	1.1	1.1	.8	—
Sodium (Na)	5.8	42 (Na + K)	7.2	7.0	7.0	
Potassium (K)	2.3		2.8	3.0	1.4	—
Bicarbonate (HCO_3)	28	28	18	19	21	20
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	11	19	5.5	5.5	4.0	5.0
Chloride (Cl)	9.5	69	7.5	7.2	5.0	6.0
Fluoride (F)	.3	—	.2	.0	.0	—
Nitrate (NO_3)	.6	1.1	.7	.5	.8	1.1
Dissolved solids						
Sum						
Residue on evaporation at 180°C	85	—	75	76	51	—
Hardness as $CaCO_3$	32	50	16	15	11	15
Non-carbonate	10	—	1	0	0	—
Specific conductance (micromhos at 25°C)	102	317	84.7	76.0	55.8	68.8
pH	6.6	6.9	6.9	6.7	7.0	6.7
Color	40	—	75	55	40	—
Temperature (°F)	74	81	81	81		64
Phosphate (PO_4)	—	—	.7	.02	—	—

[1] In solution at time of analysis.

Sample No. 7—Wicomico Creek at Allen, Wicomico Co.; at State Highway No. 529 bridge; 12:30 p.m.; low tide.

Sample No. 8—Wicomico Creek at Allen, Wicomico Co.; at State Highway No. 529 bridge; 6:50 p.m.; high tide.

Sample No. 9—Wicomico River at Salisbury, Wicomico Co.; Main Street bridge; 10:40 p.m.; high tide.

Sample No. 10—Wicomico River at Salisbury, Wicomico Co.; Main Street bridge; 4:10 p.m.; low tide.

Sample No. 11—Beaverdam Creek near Salisbury, Wicomico Co.; 5:45 p.m.; collected at the stream gaging station—16 cfs.

Sample No. 12—Tonytank Creek near Salisbury, Wicomico Co.; 7:15 a.m.; high tide.

TABLE 47—*Continued*

Sample Number	13	14	15	16	17	18
Date of collection 1952	August 25	August 25	July 2	August 26	August 26	July 2
Silica (SiO_2)	2.9	—	20	—	—	23
Iron (Fe)[1]	.43	—	—	—	—	.10
Iron (Fe), total	—	—	1.1	—	—	3.6
Manganese (Mn), dissolved[1]						
Manganese (Mn), total						
Calcium (Ca)	8.5	—	4.2	—	—	5.3
Magnesium (Mg)	18	—	1.6	—	—	1.9
Sodium (Na)	153	—	9.2	—	—	7.4
Potassium (K)	8.0	—	1.4	—	—	1.0
Bicarbonate (HCO_3)	41	60	16	67	54	24
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	27	685	14	22	25	7.8
Chloride (Cl)	268	3480	8.3	108	232	7.2
Fluoride (F)	.3	—	.2	—	—	.4
Nitrate (NO_3)	1.5	1.8	.6	.8	1.0	.9
Dissolved solids						
Sum						
Residue on evaporation at 180°C	562	—	83	—	—	90
Hardness as $CaCO_3$	95	1190	17	69	103	21
Non-carbonate	62	—	4	14	9	1
Specific conductance (micromhos at 25°C)	965	10,700	84.0	520	948	72.6
pH	6.8	7.3	7.0	6.5	6.5	6.9
Color	50	—	45	—		160
Temperature (°F)	78	—	69	68	68	64

[1] In solution at time of analysis.

Sample No. 13—Green Creek near Whitehaven, Wicomico Co.; at State Highway No. 352 bridge; 6:05 p.m.; high tide.

Sample No. 14—Wicomico River near Whitehaven, Wicomico Co.; 6:20 p.m.; high tide.

Sample No. 15—Manokin Branch near Princess Anne, Somerset Co.; 12:45 p.m.; collected at stream gaging station—0.4 cfs.

Sample No. 16—Manokin River at Princes Anne, Somerset Co.; at State Highway No. 363 bridge; 8:30; tide going out.

Sample No. 17—Taylor Branch near Princes Anne, Somerset Co.; 8:35 a.m.; tide going out.

Sample No. 18—Pocomoke River near Willards, Wicomico Co.; 9:00 a.m.; collected at stream gaging station—15 cfs.

TABLE 47—*Continued*

Sample Number	19	20	21	22	23	24
Date of collection 1952	August 25	July 22	July 2	August 26	July 23	July 23
Silica (SiO_2)	—	17	22	20	16	12
Iron (Fe)[1]	—	.95	1.6	—	.10	1.2
Iron (Fe), total	5.5	—	—	2.0	1.2	1.4
Manganese (Mn), dissolved[1]						
Manganese (Mn), total						
Calcium (Ca)	—	4.8	2.2	3.6	5.7	4.6
Magnesium (Mg)	—	1.7	.6	1.9	.4	2.3
Sodium (Na)	—	9.0	7.2	7.3	8.7	15
Potassium (K)	—	2.2	1.4	1.1	1.7	2.4
Bicarbonate (HCO_3)	14	23	12	3	14	18
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	14	9.8	7.0	17	9.8	15
Chloride (Cl)	12	9.2	7.7	8.8	10	19
Fluoride (F)	—	.3	.0	.1	.2	.3
Nitrate (NO_3)	1.9	1.3	2.0	.8	1.9	2.1
Dissolved solids						
Sum						
Residue on evaporation at 180°C	—	88	92	91	95	113
Hardness as $CaCO_3$	20	19	8	17	16	21
Non-carbonate	9	0	0	14	4	6
Specific conductance (micromhos at 25°C)	84.7	89.0	55.9	82.4	77.9	121
pH	5.9	6.6	6.0	5.4	6.3	6.4
Color	—	120	300	80	200	200
Temperature (°F)	68	87	—	71	—	—

[1] In solution at time of analysis.

Sample No. 19—Burnt Mill Branch near Willards, Wicomico Co.; 5:15 p.m.; at U. S. Highway No. 50 bridge.

Sample No. 20—Pocomoke River at Snow Hill, Worcester Co.; 4:30 p.m.; mid channel; high tide.

Sample No. 21—Nassawango Creek near Snow Hill, Worcester Co.; 9:50 a.m.; collected at the stream gaging station—4.2 cfs.

Sample No. 22—Dividing Creek near Pocomoke City, Worcester Co.; 10:00 a.m.; between high and low tide (high tide about 7:00 a.m.); at State Highway No. 384 bridge.

Sample No. 23—Dividing Creek near Pocomoke City, Worcester Co.; 4:35 a.m.; high tide; at State Highway No. 384 bridge.

Sample No. 24—Pocomoke River at Pocomoke City, Worcester Co.; 4:00 a.m.; high tide; mid channel.

TABLE 48

Days of Duration in Discharge of Beaverdam Creek near Salisbury for the Years Ending March 31 during 1931–33 and 1940–53

(Drainage area 19.5 square miles)

Discharge		Number of Days when Discharge was Equal to or Greater than shown					
cfs per sq mi	cfs	1931		1949		1931–33, 40–53	
		Sum	Percent	Sum	Percent	Sum	Percent
		Minimum year		Maximum year		17 year period	
.03	0.6			365	100.0	6,210	100.0
.10	2	365	100.0	364	99.7	6,203	99.9
.15	3	319	87.4	363	99.4	6,152	99.1
.21	4	225	61.6	361	98.9	6,042	97.3
.31	6	138	37.8	361	98.9	5,788	93.2
.41	8	57	15.6	361	98.9	5,099	82.1
.51	10	30	8.2	361	98.9	4,497	72.4
.62	12	15	4.1	360	98.6	4,091	65.9
.72	14	8	2.2	359	98.4	3,642	58.6
.82	16	3	.82	359	98.4	3,202	51.6
.92	18	2	.55	353	96.7	2,800	45.1
1.03	20	1	.27	350	95.9	3,456	39.6
1.13	22	0	0	344	94.2	2,140	34.5
1.23	24			332	91.0	1,870	30.1
1.33	26			320	87.7	1,666	26.8
1.49	29			286	78.4	1,387	22.3
1.64	32			261	71.5	1,174	18.9
1.79	35			241	66.0	994	16.0
1.95	38			212	58.1	838	13.5
2.15	42			182	49.9	657	10.6
2.41	47			154	42.2	518	8.3
2.72	53			127	34.8	407	6.6
3.08	60			99	27.1	301	4.8
3.49	68			71	19.4	220	3.5
3.95	77			59	16.2	167	2.7
4.46	87			45	12.3	127	2.0
5.33	104			27	7.4	71	1.1
6.67	130			19	5.2	38	.61
8.87	173			10	2.7	19	.31
14.00	273			3	.82	5	.081
22.00	429			2	.55	2	.032
36.26	707			1	.27	1	.016

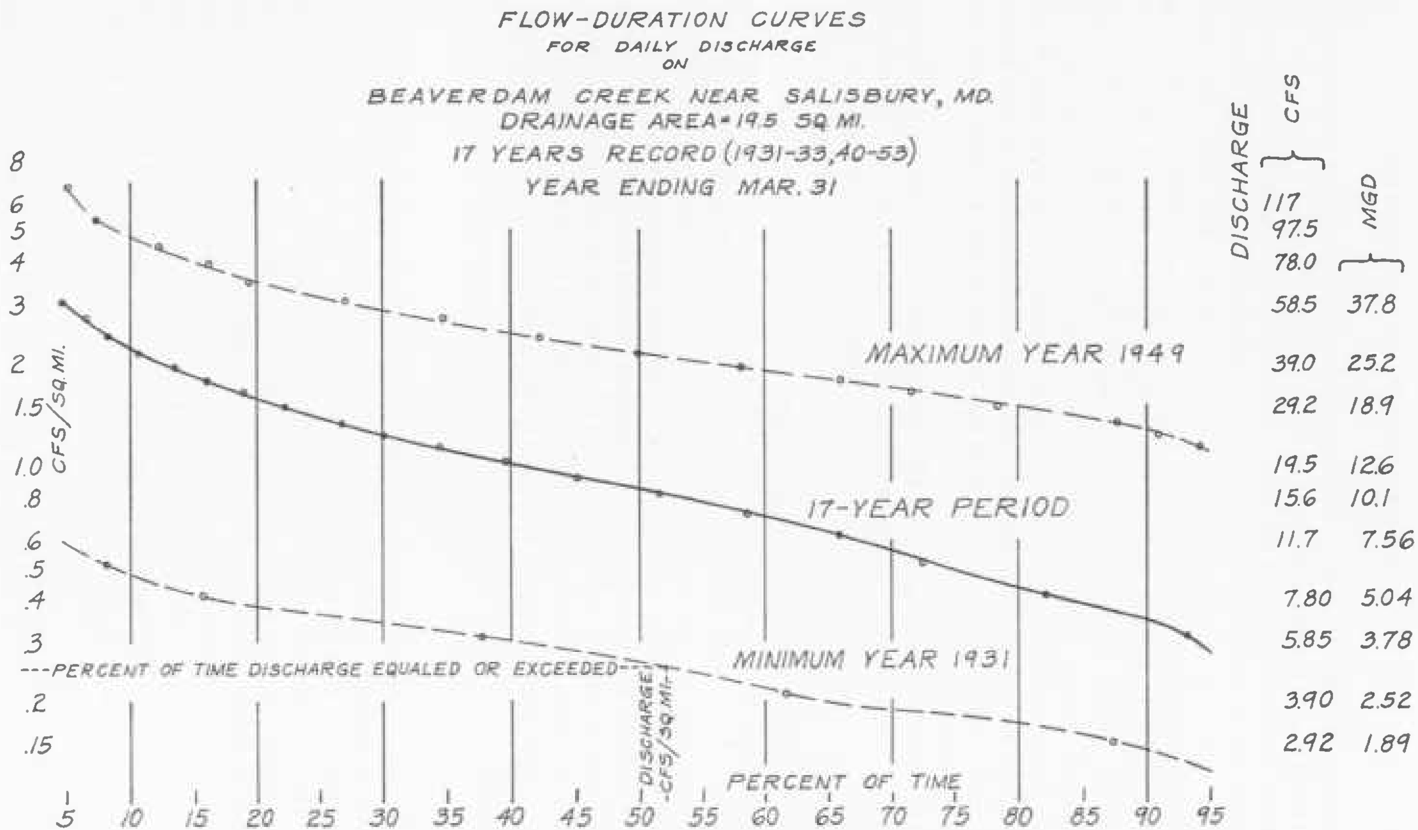

FIGURE 53. Streamflow-Duration Curve for Beaverdam Creek

records used reflect the effects of storage not only in Schumaker Pond but also in Parker Pond, farther upstream.

Flow-duration studies of the daily discharge were made for each complete year of record, but as the chief purpose of duration studies is to ascertain the sustained flow of a stream, especially during periods of low water, the yearly period beginning April 1 and ending March 31 was used rather than the water year (ending September 30). By this selection the duration of the seasonal low-water period occurring in the fall months remains unbroken so that any prolonged drought is entirely contained within a single year's record. Such an instance occurred in the 1930 drought, which did not end on September 30 but continued for several more months. The flow-duration studies in this report, therefore, commence on April 1, 1930 and end on March 31, 1953, except for the six years of missing record.

The flow-duration data for the 17 years of these records show that the maximum and minimum years were 1949 and 1931, respectively. For purposes of comparison, the 17-year period, the maximum year and the minimum year were analyzed separately and the results presented in Table 48. The discharge per square mile was based on the revised drainage area of 19.5 square miles (formerly published as 17.3 square miles). Flow-duration curves of these data were plotted in figure 53 for durations of 5 to 95 percent of the time. The extremes in flow for this gaging station which occurred from 0 to 5 percent and from 95 to 100 percent of the time were purposely omitted from the study because of artificial regulation by the operation of flood gates at the dam during these critical periods. Within 5 to 95 percent of the time, however, it is believed that such regulation had very little effect on the shape of the duration curve; nevertheless, slight adjustments were made on the curve for the maximum year.

DISCHARGE RECORDS

Monthly discharge records for Beaverdam Creek near Salisbury are published in Bulletin 1, Maryland Department of Geology, Mines, and Water Resources, as East Branch Wicomico River for the period from October 4, 1929 to September 30, 1943. On basis of later maps as well as field verifications the drainage area of Beaverdam Creek has since been revised to 19.5 square miles (formerly 17.3 square miles). The monthly figures of discharge for the period October 1, 1929 to September 30, 1943, have been republished in this report together with revised runoff tabulations for discharge in second-feet per square mile, runoff in inches, and discharge in million gallons per day per square mile. Daily discharge for October 1–3, 1929, was estimated in order to complete the month.

Monthly discharge records for all gaging stations in the tri-county area through September 30, 1953, follow. Pertinent details are given in the descriptions for each station.

POCOMOKE RIVER BASIN

1. Pocomoke River near Willards

Location.—Lat. 38°23′30″, long. 75°19′30″, on left bank 30 feet downstream from bridge on U. S. Highway 50, at Wicomico-Worcester County line, 0.6 mile upstream from Burnt Mill Branch, 1.3 miles east of Willards, Wicomico County, and 1.3 miles west of Whaleysville.

Drainage area.—60.5 square miles.

Records available.—December 1949 to September 1953.

Gage.—Water-Stage recorder.

Extremes.—Maximum discharge, 830 second-feet June 1, 1952; maximum gage height 11.20 feet Aug. 15, 1953; minimum discharge, 3.8 second-feet Sept. 5–9, 1950 (gage height, 2.46 feet).

Monthly discharge of Pocomoke River near Willards

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1949–50						
December 22–31	41	30	33.4	0.552	0.21	0.357
January	59	25	31.2	.516	.59	.333
February	143	50	73.9	1.22	1.27	.789
March	403	37	91.9	1.52	1.75	.982
April	86	30	48.4	.800	.89	.517
May	92	35	58.2	.962	1.11	.622
June	49	16	26.3	.435	.48	.281
July	33	13	16.3	.269	.31	.174
August	15	6.1	10.6	.175	.20	.113
September	60	3.8	14.0	.231	.26	.149
1950–51						
October	18	10	12.6	.208	.24	.134
November	92	9.5	19.9	.329	.37	.213
December	129	27	52.2	.863	1.00	.558
January	71	31	43.2	.714	.82	.461
February	101	39	57.5	.950	.99	.614
March	136	30	54.2	.896	1.03	.579
April	132	31	55.8	.922	1.03	.596
May	85	22	34.6	.572	.66	.370
June	334	22	61.6	1.02	1.14	.659
July	73	13	26.5	.438	.50	.283
August	33	10	16.3	.269	.31	.174
September	15	7.0	10.0	.165	.18	.107
The year	334	7.0	36.9	.610	8.27	.394

POCOMOKE RIVER BASIN—*Continued*

Monthly discharge of Pocomoke River near Willards—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	16	9.2	12.1	.200	.23	.129
November	180	14	57.7	.954	1.06	.617
December	495	33	103	1.70	1.95	1.10
January	672	64	149	2.46	2.84	1.59
February	404	51	117	1.93	2.09	1.25
March	658	85	198	3.27	3.78	2.11
April	410	36	92.3	1.53	1.70	.989
May	234	32	63.0	1.04	1.20	.672
June	746	16	86.0	1.42	1.59	.918
July	164	11	26.1	.431	.50	.279
August	148	19	51.7	.855	.99	.553
September	20	9.5	13.6	.225	.25	.145
The year	746	9.2	80.8	1.34	18.18	.866
1952–53						
October	11	7.3	8.75	.145	.17	.094
November	346	7.0	45.5	.752	.84	.486
December	165	46	79.3	1.31	1.51	.847
January	430	80	146	2.41	2.78	1.56
February	457	54	128	2.12	2.20	1.37
March	651	65	166	2.74	3.16	1.77
April	302	45	128	2.12	2.36	1.37
May	66	21	37.1	.613	.71	.396
June	52	12	19.3	.319	.36	.206
July	14	7.7	9.91	.164	.19	.106
August	617	7.6	107	1.77	2.04	1.14
September	26	11	15.4	.255	.28	.165
The year	651	7.0	73.9	1.22	16.60	.789

Pocomoke River Basin

2. Burnt Mills Branch at Willards

Location.—Lat. 38°23′20″, long. 75°20′15″, on upstream side of highway bridge on U. S. Highway 50, 0.5 mile upstream from Gordys Branch, ¾ mile east of Willards, Wicomico County, and 0.8 mile upstream from mouth.

Drainage area.—18.1 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Tape-down point; read intermittently.

Remarks.—Partial-record station with monthly discharge records only; records based on 33 discharge measurements made from Jan. 5, 1950 to Oct. 1, 1951. Standard error of estimate of monthly discharge, about 34%.

Monthly discharge of Burnt Mill Branch at Willards

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			8.35	0.461	0.53	0.298
February			35.3	1.95	2.03	1.26
March			31.9	1.76	2.03	1.14
April			11.8	.652	.73	.421
May			15.2	.840	.97	.543
June			2.58	.143	.16	.092
July			.90	.050	.06	.032
August			.18	.0099	.01	.0064
September			1.10	.061	.07	.039
1950–51						
October			.72	.040	.05	.026
November			2.48	.137	.15	.089
December			13.2	.729	.84	.471
January			16.1	.890	1.03	.575
February			37.3	2.06	2.15	1.33
March			20.6	1.14	1.31	.737
April			14.5	.801	.90	.518
May			5.39	.298	.34	.193
June			17.0	.939	1.05	.607
July			7.78	.430	.50	.278
August			1.92	.106	.12	.069
September			.16	.0088	.01	.0057
The year			11.2	.619	8.45	.400

Pocomoke River Basin

3. Adkins Race at Powellville

Location.—Lat. 38°19′53″, long. 75°22′25″, on upstream side of highway bridge on State Highway 354 at Powellville, Wicomico County, and at upstream side of spillway at Adkins Pond outlet.

Drainage area.—18.7 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Staff gage and concrete control. Auxiliary staff gage at upstream side of highway bridge below wooden dam at same site different datum. Gages read intermittently.

Remarks.—Partial-record station with monthly discharge records only; records based on 41 discharge measurements made from Jan. 4, 1950 to Oct. 1, 1951. Standard error of estimate of monthly discharge, about 23%.

Monthly discharge of Adkins Race at Powellville

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			7.97	0.426	0.49	0.275
February			23.9	1.28	1.33	.827
March			23.0	1.23	1.42	.795
April			13.6	.727	.81	.470
May			15.0	.802	.93	.518
June			3.12	.167	.19	.108
July			3.28	.175	.20	.113
August			5.20	.278	.32	.180
September			3.66	.196	.22	.127
1950–51						
October			3.24	.173	.20	.112
November			11.5	.615	.68	.397
December			36.5	1.95	2.25	1.26
January			19.3	1.03	1.19	.666
February			19.9	1.06	1.11	.685
March			22.9	1.22	1.41	.789
April			20.3	1.09	1.21	.704
May			7.36	.394	.45	.255
June			15.8	.845	.94	.546
July			2.42	.129	.15	.083
August			2.73	.146	.17	.094
September			.94	.050	.06	.032
The year			13.5	.722	9.82	.467

POCOMOKE RIVER BASIN

4. Nassawango Creek near Snow Hill

Location.—Lat. 38°13′45″, long. 75°28′20″, on right bank 10 feet downstream from bridge on State Highway 12, 0.5 mile upstream from Furnace Branch, 0.6 mile downstream from Millville Creek, and 5.5 miles northwest of Snow Hill, Worcester County.

Drainage area.—44.9 square miles.

Records available.—December 1949 to September 1953.

Gage.—Water-stage recorder and concrete control.

Extremes.—Maximum discharge, 988 second-feet Aug. 16, 1953 (gage height, 7.82 feet); minimum recorded, 1.6 second-feet July 19, 20, 1953 (gage height, 130 feet).

Monthly discharge of Nassawango Creek near Snow Hill

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1949–50						
December 21–31	23	20	21.1	0.470	0.19	0.304
January	26	14	17.9	.399	.46	.258
February	50	25	36.3	.808	.84	.522
March	210	22	63.7	1.42	1.64	.918
April	82	18	33.2	.739	.83	.478
May	52	25	35.9	.800	.92	.517
June	23	3.8	10.6	.236	.26	.153
July	153	3.8	34.4	.766	.88	.495
August	72	3.2	11.8	.263	.30	.170
September	27	3.0	9.31	.207	.23	.134
1950–51						
October	19	4.7	7.46	.166	.19	.107
November	56	6.6	16.8	.374	.42	.242
December	117	22	46.5	1.04	1.19	.672
January	50	25	35.9	.800	.92	.517
February	60	26	44.2	.984	1.02	.636
March	146	21	48.8	1.09	1.25	.704
April	80	21	37.4	.833	.93	.538
May	64	13	26.5	.590	.68	.381
June	244	8.5	53.1	1.18	1.32	.763
July	49	4.2	14.1	.314	.36	.203
August	23	4.2	10.6	.236	.27	.153
September	22	3.3	7.67	.171	.19	.111
The year	244	3.3	29.0	.646	8.74	.418

POCOMOKE RIVER BASIN—*Continued*

Monthly discharge of Nassawango Creek near Snow Hill—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	22	4.0	9.44	.210	.24	.136
November	134	10	49.6	1.10	1.23	.711
December	383	26	94.3	2.10	2.42	1.36
January	450	55	118	2.63	3.03	1.70
February	265	45	104	2.32	2.50	1.50
March	460	79	173	3.85	4.44	2.49
April	216	21	54.6	1.22	1.36	.789
May	137	16	34.5	.768	.89	.496
June	440	5	62.5	1.39	1.55	.898
July	10	2.9	4.56	.102	.12	.066
August	91	6.3	32.3	.719	.83	.465
September	7.5	2.3	4.12	.092	.10	.059
The year	460	2.3	61.7	1.37	18.71	.885
1952–53						
October	9.5	2.4	4.40	0.098	0.11	.063
November	180	3.3	35.3	.786	.88	.508
December	101	28	56.1	1.25	1.44	.808
January	268	60	100	2.23	2.58	1.44
February	330	35	98.1	2.18	2.27	1.41
March	450	46	140	3.12	3.59	2.02
April	246	31	115	2.56	2.87	1.65
May	53	7.2	21.5	.479	.55	.310
June	18	3.3	7.29	.162	.18	.105
July	29	1.8	9.02	.201	.23	.130
August	913	2.4	134	2.98	3.45	1.93
September	13	4.6	6.89	.153	.17	.099
The year	913	1.8	60.6	1.35	18.32	.873

5. Manokin Branch near Princess Anne

Location.—Lat. 38°12′50″, long. 75°40′18″, on right bank 5 feet downstream from wooden farm bridge, 1.4 miles northeast of Princess Anne, Somerset County, and 1.6 miles upstream from confluence with Loretto Branch.

Drainage area.—5.8 square miles.

Records available.—April 1951 to September 1953.

Gage.—Water-stage recorder.

Extremes.—Maximum discharge, 210 second-feet Aug. 14, 1953 (gage height, 5.96 feet), from rating curve extended above 42 second-feet by logarithmic plotting; minimum, 0.1 second-foot on many days each year; minimum gage height, 0.845 foot Oct. 2, 1952.

Monthly discharge of Manokin Branch near Princes Anne

Month	Discharge in second feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951						
April 9–30	10	1.7	2.63	0.453	0.37	0.293
May	32	1.1	3.94	.679	.78	.439
June	57	.8	7.37	1.27	1.42	.821
July	1.0	.3	.55	.095	.11	.061
August	.5	.2	.29	.050	.06	.032
September	.9	.1	.24	.041	.05	.026
1951–52						
October	.4	.2	.23	.040	.05	.026
November	8.0	.3	1.54	.266	.30	.172
December	39	1.0	5.78	.997	1.15	.644
January	46	3.2	9.44	1.63	1.88	1.05
February	38	3.1	8.37	1.44	1.56	.931
March	48	4.0	13.1	2.26	2.61	1.46
April	30	2.3	5.64	.972	1.08	.628
May	6.7	.7	2.07	.357	.41	.231
June	28	.4	2.28	.393	.44	.254
July	.4	.2	.30	.052	.06	.034
August	.6	.1	.21	.036	.04	.023
September	.1	.1	.10	.017	.02	.011
The year	48	.1	4.09	.705	9.60	.456
1952–53						
October	.2	.1	.10	.017	.02	.011
November	7.7	.1	.92	.159	.18	.103
December	8.3	.8	2.89	.498	.58	.322
January	21	4.0	7.04	1.21	1.40	.782
February	26	2.3	6.66	1.15	1.20	.743
March	39	3.0	10.2	1.76	2.03	1.14
April	25	2.5	8.78	1.51	1.69	.976
May	4.0	.6	1.43	.247	.28	.160
June	1.1	.3	.48	.083	.09	.054
July	.4	.1	.16	.028	.03	.018
August	86	.1	6.29	1.08	1.25	.698
September	.8	.3	.49	.084	.09	.054
The year	86	.1	3.78	.652	8.84	.421

6. Leonard Pond Run near Delmar

Location.—Lat. 38°25′24″, long. 75°33′53″, on left bank at upstream side of bridge at upstream side of Mill, 0.6 mile upstream from Woods Creek and 2 miles south of Delmar, Wicomico County.

Drainage area.—16.2 square miles.

Records available.—February 1950 to Septemher 1951 (discontinued).

Gage.—Tape-down point; read intermittently.

Remarks.—Partial-record station with monthly discharge records only; records based on 29 discharge measurements made from Feb. 1, 1950 to Aug. 15, 1951. Standard error of estimate of monthly discharge, about 27%.

Monthly discharge of Leonard Pond Run near Delmar

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
February			12.5	0.772	0.81	0.499
March			22.5	1.39	1.60	.898
April			12.8	.790	.88	.511
May			12.7	.784	.90	.507
June			5.76	.356	.40	.230
July			6.25	.386	.44	.249
August			4.38	.270	.31	.175
September			3.24	.200	.22	.129
1950–51						
Octoher			1.27	.078	.09	.050
November			2.49	.154	.17	.100
December			3.99	.246	.28	.159
January			7.09	.438	.50	.283
February			12.8	.790	.82	.511
March			12.6	.778	.90	.503
April			11.5	.710	.79	.459
May			7.56	.467	.54	.302
June			17.8	1.10	1.23	.711
July			5.54	.342	.39	.221
August			3.01	.186	.21	.120
September			1.83	.113	.13	.073
The year			7.24	.447	6.05	.289

Wicomico River Basin

7. Beaverdam Creek near Salisbury

(Formerly published as East Branch Wicomico River near Salisbury)

Location.—Lat. 38°21′05″, long. 75°34′11″, on upstream side of Schumaker Dam between spillway and emergency floodgates, three-quarters of a mile upstream from Beaglin Branch and 2 miles southeast of Salisbury, Wicomico County.

Drainage area.—19.5 square miles (revised).

Records available.—October 1929 to September 1953.

Gage.—Water-stage recorder and concrete spillway of dam for control. Datum of gage is 8.93 feet above mean sea level (city of Salisbury bench mark). Prior to Sept. 28, 1938 at site on left bank at dam at datum 9.02 feet higher.

Average discharge.—18 years (1929–32, 1938–53) 22.5 second-feet.

Extremes.—Maximum discharge not determined, occurred Aug. 23, 1933, when dam was partially washed out; maximum gage height, 14.31 feet Aug. 4, 1948, from highwater mark in well; minimum daily discharge recorded, 0.6 second-foot during several periods in 1938 and 1939 (leakage under dam and through floodgates following closing of floodgates).

Remarks.—Records include flow over spillway plus leakage through floodgates.

Monthly discharge of Beaverdam Creek near Salisbury

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1929–30						
October	20.0	6.6	9.05	0.464	0.53	0.300
November	19.0	7.2	11.8	.605	.68	.391
December	28.3	7.8	14.5	.744	.85	.481
January	24.0	8.4	15.3	.785	.91	.507
February	34.1	12.8	20.2	1.04	1.08	.672
March	58.4	8.4	21.1	1.08	1.25	.698
April	20.0	8.4	11.7	.600	.67	.388
May	15.3	6.6	9.08	.466	.54	.301
June	14.4	5.4	7.62	.391	.44	.253
July	9.1	3.8	5.67	.291	.34	.188
August	7.2	3.3	4.92	.252	.29	.163
September	6.6	2.0	3.75	.192	.21	.124
The year	58.4	2.0	11.2	.574	7.79	.371

WICOMICO RIVER BASIN—*Continued*

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1930–31						
October	6.6	2.0	3.52	.181	.21	.117
November	7.2	2.4	4.02	.206	.23	.133
December	6.5	2.8	3.78	.194	.22	.125
January	7.2	2.8	4.17	.214	.25	.138
February	6.6	2.8	3.96	.203	.21	.131
March	7.2	2.4	4.60	.236	.27	.153
April	20.0	7.2	11.5	.590	.66	.381
May	27.1	6.6	13.3	.682	.78	.441
June	14.4	5.4	8.23	.422	.47	.273
July	8.4	3.3	5.05	.259	.30	.167
August	22.0	3.3	8.41	.431	.50	.279
September	24.0	4.3	8.26	.424	.47	.274
The year	27.1	2.0	6.57	.337	4.57	.218
1931–32						
October	12.8	5.4	7.93	.407	.47	.263
November	11.2	4.8	6.86	.352	.39	.228
December	12.0	4.3	7.05	.362	.42	.234
January	76.1	4.8	21.7	1.11	1.28	.717
February	45.4	16.2	22.6	1.16	1.25	.750
March	98.2	12.0	31.0	1.59	1.83	1.03
April	57.8	16.2	26.8	1.37	1.54	.885
May	86.0	9.1	23.5	1.21	1.39	.782
June	24.0	9.8	14.3	.733	.82	.474
July	12.0	6.6	8.00	.410	.47	.265
August	11.2	4.3	7.01	.359	.41	.232
September	16.2	3.3	6.39	.328	.37	.212
The year	98.2	3.3	15.2	.779	10.64	.503
1932–33						
October	18.0	4.8	8.56	.439	.51	.284
November	31.8	8.4	17.0	.872	.97	.564
December	59.3	9.8	23.5	1.21	1.39	.782
January	68.2	18.0	31.9	1.64	1.89	1.06
February	111	23.0	48.1	2.47	2.57	1.60
March	31.8	17.1	23.3	1.19	1.38	.769
April	120	22.0	42.2	2.16	2.41	1.40
May	35.3	14.4	22.5	1.15	1.33	.743
June	20	7.2	11.0	.564	.63	.365
July	63.7	7.1	17.3	.887	1.02	.573
August 1–21	44.4	9.2	13.2	.677	.53	.438

WICOMICO RIVER BASIN—*Continued*

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1934						
May 8–31	140	26.1	61.6	3.16	2.82	2.04
June	42.5	12.3	21.5	1.10	1.23	.711
July 1–29, 31	65.4	8.9	15.1	.774	.86	.500
August	50.2	9.1	18.7	.959	1.11	.620
September 1–7, 12–30	72.7	10.7	28.8	1.48	1.43	.957
1934–35						
October	58.5	13.2	26.7	1.37	1.58	.885
November	41.0	16.1	22.1	1.13	1.26	.730
December	45.5	18.1	32.4	1.66	1.91	1.07
January 1–22	74.6	19.2	34.3	1.76	1.44	1.14
February 4–28	77.3	24.2	40.8	2.09	1.95	1.35
March 1–8, 22–31	35.8	18.8	27.2	1.39	.94	.898
April	197	19.8	47.0	2.41	2.69	1.56
May	44.2	14.9	22.9	1.17	1.35	.756
June	65.2	10.6	20.1	1.03	1.15	.666
July	67.1	10.6	26.2	1.34	1.55	.866
August	29.0	9.0	13.8	.708	.81	.458
1936						
May 8–31	21.3	11.8	14.5	.744	.66	.481
June	28.2	8.7	14.0	.718	.80	.464
July	20.2	8.5	11.8	.605	.70	.391
August	218	7.1	22.8	1.17	1.35	.756
September 1–15, 23–30	67.0	11.6	21.4	1.10	.94	.711
1936–37						
October	127	15.1	30.4	1.56	1.80	1.01
November	24.4	10.8	15.8	.810	.90	.524
December	124	14.2	39.4	2.02	2.33	1.31
January 1–17	200	38.8	78.7	4.04	2.55	2.61
February 17–28	79.2	38.8	56.4	2.89	1.29	1.87
March	150	20.0	44.7	2.29	2.64	1.48
April 1–26, 28–30	167	19.0	43.7	2.24	2.42	1.45
May	41.6	15.1	24.9	1.28	1.47	.827
June	120	10.8	20.6	1.06	1.18	.685
July	278	13.3	34.0	1.74	2.01	1.12
August 1–22, 30, 31	23.3	10.0	13.5	.692	.62	.447
September	28.3	8.0	12.5	.641	.71	.414

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mlie
	Maximum	Minimum	Mean	Per square mile		
1937–38						
October	23.4	9.0	13.2	.677	.78	.438
November	68	10.5	26.6	1.36	1.52	.879
December	45	16.4	25.4	1.30	1.50	.840
January	76	20.3	32.2	1.65	1.90	1.07
February	79	15.5	29.8	1.53	1.59	.989
March 20–31	37	19.1	26.8	1.37	.61	.885
April 1–17	55	20.2	30.0	1.54	.97	.995
May 5–18	17.3	11.2	13.0	.667	.35	.431
June 10–30	36	.6	19.0	.974	.76	.630
July	230	10.4	43.4	2.23	2.57	1.44
August	34	12.0	20.4	1.05	1.21	.679
September	210	.8	42.3	2.17	2.42	1.40
1938–39						
October	100	.6	28.4	1.46	1.68	.944
November	75	17.3	30.9	1.58	1.77	1.02
December	40.0	16.4	27.6	1.42	1.63	.918
January	80	22.3	43.6	2.24	2.58	1.45
February	84	34.6	54.5	2.79	2.91	1.80
March	219	30.6	52.4	2.69	3.10	1.74
April	198	29.3	57.7	2.96	3.30	1.91
May	41.3	13.6	21.4	1.10	1.27	.711
June	39.0	.6	14.3	.733	.82	.474
July	46	9.6	13.6	.697	.80	.450
August	31.8	5.6	13.1	.672	.77	.434
September	67	12	21.0	1.08	1.20	.698
The year	219	.6	31.4	1.61	21.83	1.04
1939–40						
October	200	17.5	37.4	1.92	2.21	1.24
November	60	16.5	26.4	1.35	1.51	.873
December	17.0	12.5	14.7	.754	.87	.487
January	29	12.5	16.9	.867	1.00	.560
February	80	16.0	40.1	2.06	2.22	1.33
March	72	25	39.6	2.03	2.34	1.31
April	89	22	37.5	1.92	2.15	1.24
May	68	12.0	21.6	1.11	1.28	.717
June	70	.7	17.5	.897	1.00	.580
July	47	7.9	12.4	.636	.73	.411
August	20	8.0	10.7	.549	.63	.355
September	11.5	6.6	8.13	.417	.47	.270
The year	200	.7	23.5	1.21	16.41	.782

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1940–41						
October	12	6.5	7.98	.409	.47	.264
November	35	6.4	14.6	.749	.84	.484
December	29	9.4	15.2	.779	.90	.503
January	55	11	26.3	1.35	1.56	.873
February	44	20	27.1	1.39	1.45	.898
March	92	20	32.0	1.64	1.89	1.06
April	106	19	36.0	1.85	2.06	1.20
May	18	10	13.6	.697	.80	.450
June	32	8.7	13.0	.667	.74	.431
July	20	8.7	12.1	.621	.71	.401
August	18	6.5	8.38	.430	.50	.278
September	11	5.3	6.67	.342	.38	.221
The year	106	5.3	17.7	.908	12.30	.587
1941–42						
October	9.6	4.7	6.00	.308	.35	.199
November	7.3	5.4	6.12	.314	.35	.203
December	15	5.5	7.25	.372	.43	.240
January	13	5.5	6.87	.352	.41	.228
February	15	6.2	8.95	.459	.48	.297
March	357	6.2	43.0	2.21	2.54	1.43
April	126	18	32.8	1.68	1.87	1.09
May	20	11	15.0	.769	.89	.497
June	35	8.5	15.0	.769	.86	.497
July	26	7.7	12.4	.636	.73	.411
August	32	9.3	15.5	.795	.92	.514
September	20	7.9	10.4	.533	.60	.344
The year	357	4.7	15.0	.769	10.43	.497
1942–43						
October	25	7.9	12.6	.646	.75	.418
November	19	11	13.5	.692	.77	.447
December	30	14	18.8	.964	1.11	.623
January	53	15	21.9	1.12	1.29	.724
February	79	24	36.0	1.85	1.92	1.20
March	35	21	28.0	1.44	1.66	.931
April	59	18	26.3	1.35	1.50	.873
May	29	16	20.7	1.06	1.23	.685
June	17	8.6	11.8	.605	.67	.391
July	16	5.6	8.93	.458	.53	.296
August	60	6.2	9.59	.492	.57	.318
September	17	5.6	8.08	.414	.46	.268
The year	79	5.6	17.9	.918	12.46	.593

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	67	6.9	17.3	.887	1.02	.573
November	30	14	20.0	1.03	1.15	.666
December	23	12	14.5	.744	.86	.481
January	91	14	33.8	1.73	2.00	1.12
February	41	17	24.8	1.27	1.37	.821
March	135	32	60.9	3.12	3.60	2.02
April	57	28	37.0	1.90	2.12	1.23
May	30	14	19.0	.974	1.13	.630
June	30	9.5	13.2	.677	.76	.438
July	26	6.9	9.86	.506	.58	.327
August	16	5.7	7.57	.388	.45	.251
September	167	2.2	17.2	.882	.98	.570
The year	167	2.2	22.9	1.17	16.02	.756
1944–45						
October	44	11	15.5	0.795	0.91	0.514
November	49	13	17.2	.882	.98	.570
December	45	19	25.6	1.31	1.52	.847
January	57	24	35.4	1.82	2.09	1.18
February	79	20	35.1	1.80	1.87	1.16
March	46	21	29.2	1.50	1.73	.969
April	27	15	17.8	.913	1.02	.590
May	20	10	13.6	.697	.81	.450
June	44	8.3	13.1	.672	.75	.434
July	104	5.5	32.4	1.66	1.91	1.07
August	97	14	31.7	1.63	1.88	1.05
September	92	14	25.9	1.33	1.48	.860
The year	104	5.5	24.3	1.25	16.95	.808
1945–46						
October	102	13	28.0	1.44	1.66	.931
November	36	18	24.4	1.25	1.39	.808
December	240	27	75.2	3.86	4.45	2.49
January	138	29	44.3	2.27	2.62	1.47
February	52	28	37.5	1.92	2.00	1.24
March	40	22	28.7	1.47	1.70	.950
April	45	15	23.5	1.21	1.34	.782
May	66	22	37.4	1.92	2.21	1.24
June	28	10	16.7	.856	.96	.553
July	42	12	16.6	.851	.98	.550
August	34	10	15.5	.795	.91	.514
September	15	8.8	10.3	.528	.59	.341
The year	240	8.8	29.9	1.53	20.81	.989

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1946–47						
October	16	7.0	9.66	.495	.57	.320
November	19	8.5	11.4	.585	.65	.378
December	30	7.9	11.1	.569	.66	.368
January	47	14	32.8	1.68	1.94	1.09
February	28	15	20.6	1.06	1.10	.685
March	27	16	20.7	1.06	1.23	.685
April	66	16	28.4	1.46	1.62	.944
May	20	13	15.8	.810	.93	.524
June	19	7.6	10.6	.544	.60	.352
July	14	6.7	8.51	.436	.50	.282
August	34	5.2	8.76	.449	.52	.290
September	30	6.7	10.3	.528	.59	.341
The year	66	5.2	15.7	.805	10.91	.520
1947–48						
October	24	8.1	10.5	.538	.62	.348
November	39	8.8	19.3	.990	1.10	.640
December	43	14	19.9	1.02	1.18	.659
January	154	21	52.9	2.71	3.13	1.75
February	68	26	40.0	2.05	2.21	1.32
March	97	31	45.1	2.31	2.67	1.49
April	61	21	34.0	1.74	1.94	1.12
May	245	20	55.0	2.82	3.25	1.82
June	246	26	76.1	3.90	4.35	2.52
July	46	23	31.2	1.60	1.84	1.03
August	707	29	104	5.33	6.15	3.44
September	64	1	23.7	1.22	1.35	.789
The year	707	1	42.7	2.19	29.79	1.42
1948–49						
October	172	3.7	44.3	2.27	2.62	1.47
November	167	24	58.5	3.00	3.35	1.94
December	196	35	75.8	3.89	4.48	2.51
January	140	20	60.4	3.10	3.57	2.00
February	68	38	53.5	2.74	2.86	1.77
March	96	30	52.5	2.69	3.10	1.74
April	67	21	39.5	2.03	2.26	1.31
May	24	13	18.4	.944	1.09	.610
June	18	7.2	10.9	.559	.62	.361
July	12	6.7	8.28	.425	.49	.275
August	21	6.2	9.65	.495	.57	.320
September	63	7.3	12.7	.651	.72	.421
The year	196	3.7	37.0	1.90	25.73	1.23

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1949-50						
October	52	9.0	12.5	0.641	0.74	0.414
November	59	20	26.4	1.35	1.51	.873
December	19	14	15.6	.800	.92	.517
January	20	12	13.8	.708	.81	.458
February	29	17	21.7	1.11	1.16	.717
March	85	15	28.6	1.47	1.69	.950
April	28	17	21.1	1.08	1.21	.698
May	47	18	24.2	1.24	1.43	.801
June	20	8.9	14.5	.744	.83	.481
July	27	7.1	13.8	.708	.82	.458
August	46	1	10.9	.559	.64	.361
September	27	1.5	9.31	.477	.53	.308
The year	85	1	17.7	.908	12.29	.587
1950–1951						
October	10	5.0	6.38	.327	.38	.211
November	40	5.8	9.92	.509	.57	.329
December	30	10	15.1	.774	.89	.500
January	21	6.8	13.6	.697	.81	.450
February	38	6.7	17.8	.913	.95	.590
March	75	14	21.2	1.09	1.25	.704
April	31	14	18.4	.944	1.05	.610
May	90	8.1	19.4	.995	1.14	.643
June	111	8.5	28.3	1.45	1.62	.937
July	67	9.1	18.4	.944	1.09	.610
August	28	8.3	14.2	.728	.84	.471
September	26	6.2	10.6	.544	.61	.352
The year	111	5.0	16.1	.826	11.16	.534
1951–52						
October	15	5.8	8.96	.459	.53	.297
November	54	14	25.0	1.28	1.43	.827
December	121	18	34.9	1.79	2.06	1.16
January	172	27	47.6	2.44	2.81	1.58
February	112	31	46.2	2.37	2.55	1.53
March	193	38	69.2	3.55	4.09	2.29
April	101	23	36.4	1.87	2.08	1.21
May	36	12	21.8	1.12	1.29	.724
June	82	9	21.4	1.10	1.22	.711
July	19	4.9	10.2	.523	.60	.338
August	89	10	36.5	1.87	2.16	1.21
September	17	9.7	12.6	.646	.72	.418
The year	193	4.9	30.9	1.58	21.54	1.02

Monthly discharge of Beaverdam Creek near Salisbury—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1952–53						
October	16	8.4	10.4	.533	.61	.344
November	111	7.2	22.1	1.13	1.26	.730
December	61	16	29.4	1.51	1.74	.976
January	108	31	45.2	2.32	2.67	1.50
February	109	23	41.9	2.15	2.24	1.39
March	145	26	50.6	2.59	2.99	1.67
April	112	21	50.9	2.61	2.91	1.69
May	31	11	19.9	1.02	1.18	.659
June	23	10	13.3	.682	.76	.441
July	26	4.8	9.91	.508	.59	.328
August	369	7.1	54.1	2.77	3.20	1.79
September	16	8.0	11.8	.605	.68	.391
The year	369	4.8	29.9	1.53	20.83	.989

Yearly discharge of Beaverdam Creek near Salisbury

Year	Year ending Sept. 30				Calendar Year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in millien gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1930	11.2	0.574	7.79	0.371	9.16	0.470	6.39	0.304
1931	6.57	.337	4.57	.218	7.45	.382	5.19	.247
1932	15.2	.779	10.64	.503	17.5	.897	12.23	.580
1939	31.4	1.61	21.83	1.04	30.7	1.57	21.34	1.01
1940	23.5	1.21	16.41	.782	20.1	1.03	14.03	.666
1941	17.7	.908	12.30	.587	16.1	.826	11.22	.534
1942	15.0	.769	10.43	.497	17.1	.877	11.93	.567
1943	17.9	.918	12.46	.593	18.5	.949	12.86	.613
1944	22.9	1.17	16.02	.756	23.5	1.21	16.40	.782
1945	24.3	1.25	16.95	.808	30.2	1.55	21.04	1.00
1946	29.9	1.53	20.81	.989	21.8	1.12	15.19	.724
1947	15.7	.805	10.91	.520	17.2	.882	11.93	.570
1948	42.7	2.19	29.79	1.42	53.5	2.74	37.34	1.77
1949	37.0	1.90	25.73	1.23	26.5	1.36	18.45	.879
1950	17.7	.908	12.29	.587	15.8	.810	10.96	.524
1951	16.1	.826	11.16	.534	19.2	.985	13.38	.637
1952	30.9	1.58	21.54	1.02	30.3	1.55	21.13	1.00
1953	29.9	1.53	20.83	.989				
Highest	42.7	2.19	29.79	1.42	53.5	2.74	37.34	1.77
Average	22.5	1.16	15.69	.747	22.0	1.13	15.35	.730
Lowest	6.57	.337	4.57	.218	7.45	.382	5.19	.247

8. Tonytank Creek at Fruitland

Location.—Lat. 38°19′52″ long. 75°35′54″, on upstream side of dam 5 ft right of right overflow culvert, at Fooks Pond outlet, 1 mile northeast of Fruitland, Wicomico County and 1.1 miles south of Salisbury.

Drainage area.—5.0 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge records only; records based on 35 discharge measurements made from Jan. 4, 1950 to Sept. 4, 1951. Standard error of estimate of monthly discharge, about 16%.

Monthly discharge of Tonytank Creek at Fruitland

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			3.91	0.777	0.90	0.502
February			5.16	1.03	1.07	.666
March			9.86	1.96	2.26	1.27
April			6.94	1.38	1.54	.892
May			7.70	1.53	1.77	.989
June			4.74	.942	1.05	.609
July			4.77	.948	1.09	.613
August			3.64	.724	.83	.468
September			3.17	.630	.70	.407
1950–51						
October			2.71	.539	.62	.348
November			3.37	.670	.75	.433
December			4.72	.938	1.08	.606
January			4.66	.926	1.07	.598
February			4.89	.972	1.01	.628
March			5.52	1.10	1.26	.711
April			5.88	1.17	1.30	.756
May			5.83	1.16	1.34	.750
June			10.1	2.00	2.24	1.29
July			4.24	.843	.97	.545
August			4.50	.895	1.03	.578
September			4.31	.857	.96	.554
The year			5.05	1.00	13.63	.646

NANTICOKE RIVER BASIN

9. Baron Creek at Delaware-Maryland State Corner

Location.—Lat. 38°27′30″, long. 75°42′00″ at tree 5 feet upstream from county road and 5 feet right of culvert, 300 feet south of Maryland State Highway 467, 1,800 feet from Delaware-Maryland State Corner, 1 mile upstream from Mockingbird Pond, and 3 miles east of Mardela Springs, Wicomico County.

Drainage area.—8.9 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge records only; 31 discharge measurements made from Jan. 3, 1950 to Oct. 2, 1951. Standard error of estimate of monthly discharge, about 13%.

Monthly discharge of Baron Creek at Delaware-Maryland State Corner

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			6.24	0.699	0.81	0.452
February			10.1	1.13	1.18	.730
March			14.0	1.57	1.81	1.01
April			10.5	1.18	1.31	.763
May			12.1	1.35	1.56	.873
June			6.92	.775	.86	.501
July			4.63	.518	.60	.335
August			3.87	.443	.50	.280
September			3.90	.437	.49	.282
1950–51						
October			3.68	.412	.47	.266
November			3.66	.410	.46	.265
December			4.82	.540	.62	.349
January			5.93	.664	.77	.429
February			7.48	.838	.87	.542
March			9.44	1.06	1.22	.685
April			9.53	1.07	1.19	.692
May			5.56	.623	.72	.403
June			6.97	.781	.87	.505
July			4.37	.489	.56	.316
August			3.99	.447	.52	.289
September			3.45	.386	.43	.249
The year			5.72	.641	8.70	.414

Nanticoke River Basin

10. Rewastico Creek above Rewastico Pond near Hebron

Location.—Lat. 38°25′05″, long. 75°44′06″, on left bank at tree 20 feet upstream from culvert on county road, 1.3 miles upstream from Rewastico Pond outlet, and 2.1 miles west of Hebron, Wicomico County.

Drainage area.—8.4 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Staff gage; read intermittently.

Remarks.—Partial-record station with monthly discharge records only; records based on 33 discharge measurements made from Jan. 3, 1950 to Oct. 2, 1951. Standard error of estimate of monthly discharge, about 18%.

Rewastico Creek above Rewastico Pond near Hebron

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			4.40	0.524	0.60	0.339
February			6.78	.807	.84	.522
March			9.54	1.14	1.31	.737
April			7.78	.926	1.03	.598
May			7.75	.923	1.06	.597
June			4.74	.564	.63	.365
July			3.59	.427	.49	.276
August			2.12	.252	.29	.163
September			2.59	.308	.34	.199
1950–51						
October			1.50	.179	.21	.116
November			2.15	.256	.29	.165
December			3.37	.401	.46	.259
January			3.26	.388	.45	.251
February			3.76	.448	.47	.290
March			5.08	.605	.70	.391
April			5.21	.620	.69	.401
May			3.55	.423	.49	.273
June			6.12	.729	.81	.471
July			2.88	.343	.40	.222
August			3.16	.376	.43	.243
September			2.66	.317	.35	.205
The year			3.55	.423	5.75	.273

Nanticoke River Basin

11. Rewastico Creek near Hebron

Location.—Lat. 38°24′40″, long. 75°45′15″, on left wingwall of old mill sluiceway, 10 feet upstream from bank of stop logs, on right bank of Rewastico Pond at outlet, 1.5 miles upstream from Little Creek, 2.8 miles north of Quantico, and 3.5 miles southwest of Hebron, Wicomico County.

Drainage area.—12.2 square miles.

Records available.—December 1949 to September 1953.

Gage.—Water-staff recorder. Datum of gage is 1.8 feet above mean sea level, datum of 1929. Prior to May 16, 1950 staff gage at same site and datum.

Extremes.—Maximum discharge, 98 second-feet Jan. 28, 1952 (gage height, 4.78 feet); minimum, 1.0 second-foot Oct. 21–23, 1950 (gage height, 2.25 feet).

Remarks.—Records comprised of flow through sluiceway and through 42-inch culvert near left bank.

Monthly discharge of Rewastico Creek near Hebron

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1949–50						
December 20–31	6.8	5.2	5.97	0.489	0.22	0.316
January	11	5.2	5.83	.478	.55	.309
February	22	7.8	11.0	.902	.94	.583
March	49	7.5	15.7	1.29	1.48	.834
April	13	7.5	10.2	.836	.93	.540
May	28	8.0	12.8	1.05	1.21	.679
June	9.2	3.0	5.56	.456	.51	.295
July	6.7	2.2	3.68	.302	.35	.195
August	5.3	1.4	2.46	.202	.23	.131
September	8.3	1.3	2.77	.227	.25	.147
1950–51						
October	5.3	1.0	2.15	.176	.20	.114
November	10	1.8	3.02	.248	.28	.160
December	7.2	2.8	4.19	.343	.40	.222
January	7.8	4.1	4.98	.408	.47	.264
February	11	3.8	6.36	.521	.54	.337
March	37	5.4	8.87	.727	.84	.470
April	15	5.6	7.57	.620	.69	.401
May	15	3.6	5.36	.439	.51	.284
June	26	3.4	6.71	.550	.61	.355
July	7.1	1.8	3.28	.269	.31	.174
August	13	2.0	4.34	.356	.41	.230
September	13	2.3	4.07	.334	.37	.216
The year	37	1.0	5.06	.415	5.63	.268

NANTICOKE RIVER BASIN—*Continued*

Monthly discharge of Rewastico Creek near Hebron—*Continued*

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951-52						
October	6.2	2.4	3.50	.287	.33	.185
November	22	5.0	8.67	.711	.79	.460
December	51	5.5	13.7	1.12	1.29	.724
January	79	12	23.9	1.96	2.26	1.27
February	65	16	25.9	2.12	2.29	1.37
March	80	17	30.6	2.51	2.90	1.62
April	64	11	22.1	1.81	2.02	1.17
May	24	7.1	11.8	.967	1.12	.625
June	54	4.4	10.2	.836	.93	.540
July	8.5	1.2	3.12	.256	.29	.165
August	24	2.7	10.2	.836	.97	.540
September	8.0	3.3	4.79	.393	.44	.254
The year	80	1.2	14.0	1.15	15.63	.743
1952-53						
October	4.9	2.1	3.04	.249	.29	.161
November	43	2.2	7.66	.628	.70	.406
December	29	7.3	12.6	1.03	1.19	.666
January	49	13	20.6	1.69	1.95	1.09
February	56	11	18.4	1.51	1.57	.976
March	66	13	23.7	1.94	2.24	1.25
April	48	12	21.4	1.75	1.96	1.13
May	16	5.5	9.17	.752	.87	.486
June	9.8	3.0	5.54	.454	.51	.293
July	7.1	1.3	2.41	.198	.23	.128
August	50	1.6	8.64	.708	.82	.458
September	8.0	1.5	3.33	.273	.30	.176
The year	66	1.3	11.3	.926	12.63	.598

Nanticoke River Basin

12. Quantico Creek at Quantico

Location.—Lat. 38°22′12″, long 75°44′23″, on downstream side of highway bridge on State Highway 347, at south limits of Quantico, Wicomico County, and 700 feet upstream from unnamed tributary.

Drainage area.—10.1 square miles.

Records available.—January 1950 to September 1951 (discontinued).

Gage.—Tape-down point; read intermittently.

Remarks.—Partial-record station with monthly records only; records based on 35 discharge measurements made from Jan. 4, 1950 to Oct. 2, 1951. Standard error of estimate of monthly discharge, about 18%.

Monthly discharges of Quantico Creek at Quantico

Month	Discharge in second-feet				Runoff in Inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950						
January			4.87	0.482	0.56	0.312
February			12.4	1.23	1.28	.795
March			17.7	1.75	2.02	1.13
April			10.1	1.00	1.12	.646
May			12.7	1.26	1.45	.814
June			3.38	.335	.37	.217
July			2.02	.200	.23	.129
August			.72	.071	.08	.046
September			1.13	.112	.12	.072
1950–51						
October			1.29	.128	.15	.083
November			2.24	.222	.25	.143
December			3.03	.300	.35	.194
January			3.94	.390	.45	.252
February			5.94	.588	.61	.380
March			8.62	.853	.98	.551
April			6.95	.688	.77	.445
May			3.98	.394	.45	.255
June			5.83	.577	.64	.373
July			1.16	.115	.13	.074
August			2.33	.231	.27	.149
September			2.29	.227	.25	.147
The year			3.95	.391	5.30	.253

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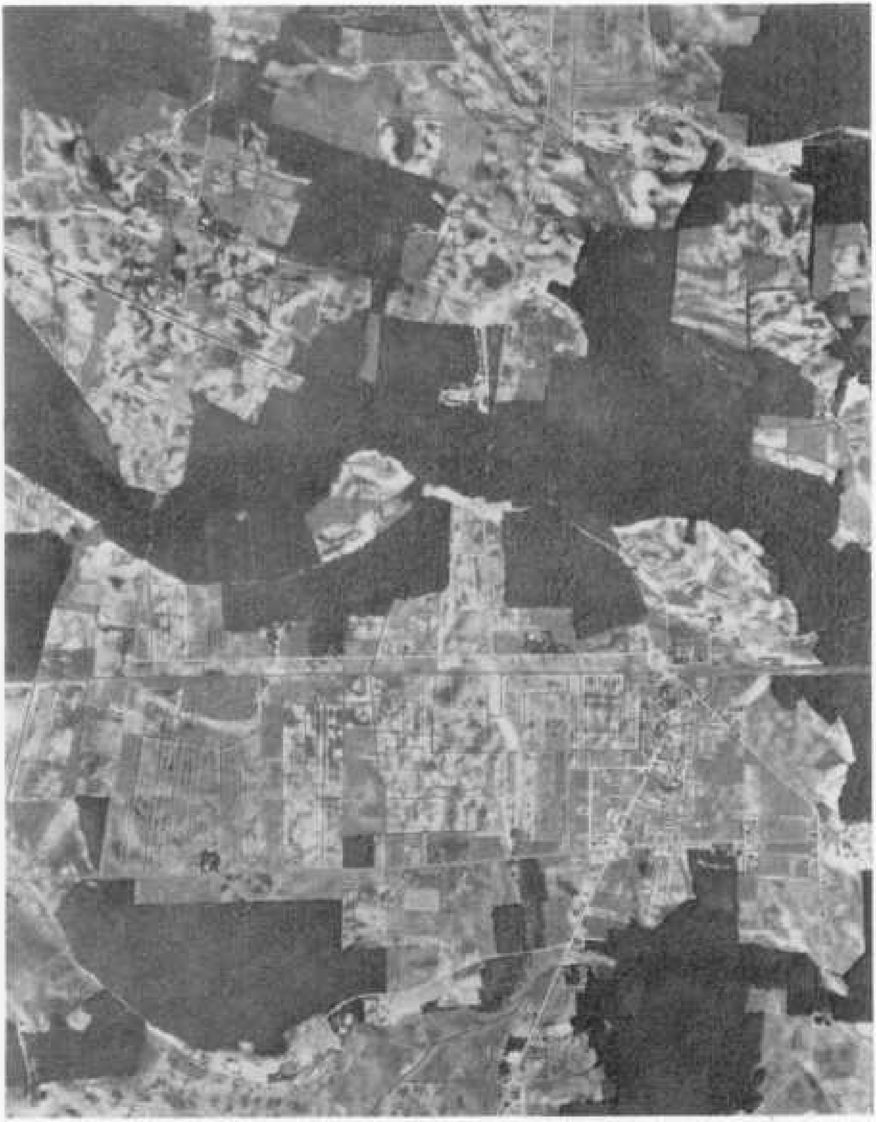
Aerial View of Cypress Swamp Basin, Worcester County (1 inch = 3000 feet)

PLATE XIV



Aerial View of Willards Area, Wicomico County, showing Mottled Soil Pattern
(1 inch = 2400 feet)

FIGURE 1. Roadcut 2 miles West of Powellville, Route 350, showing Involutions of Silt and Clay

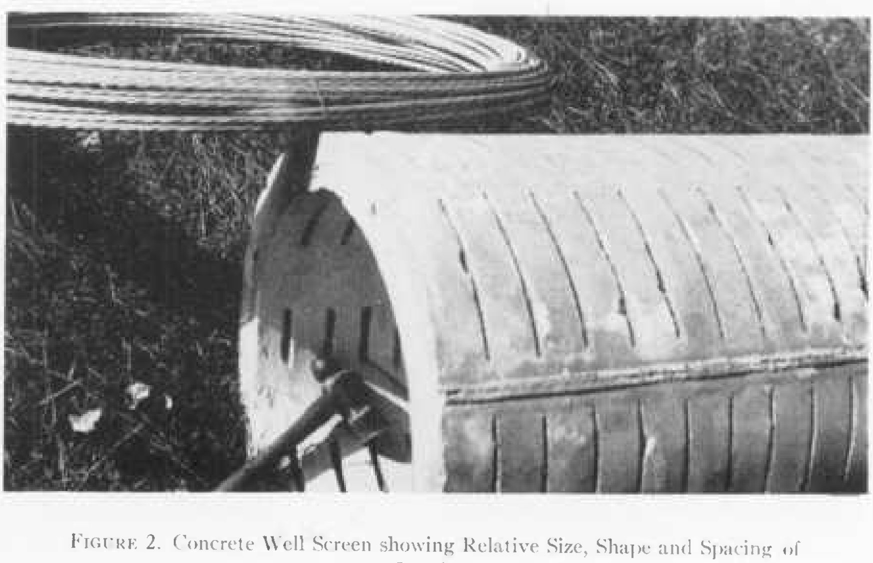


FIGURE 2. Concrete Well Screen showing Relative Size, Shape and Spacing of Openings

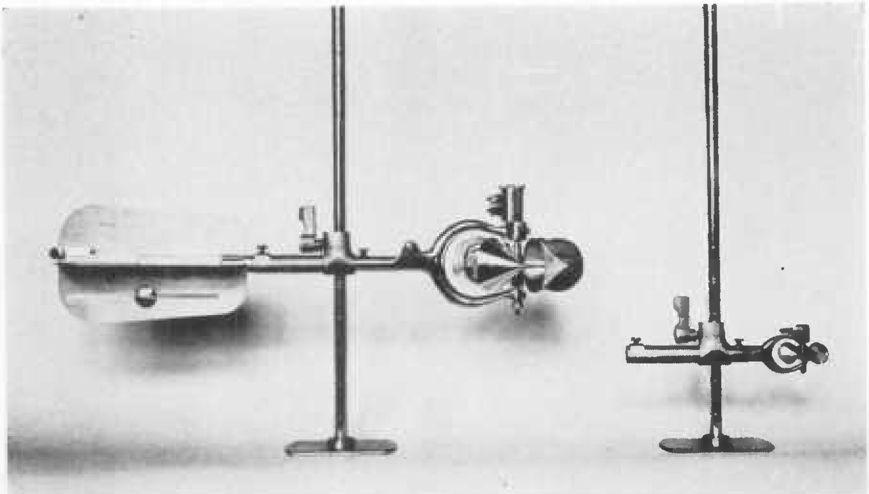


FIGURE 1. Price Standard Current Meter and Pygmy Meter Suspended on Wading Rods, used to Measure Discharge

FIGURE 2. Engineer making Discharge Measurements by Wading

FIGURE 1. Gage House on Nassawango Creek near Snow Hill

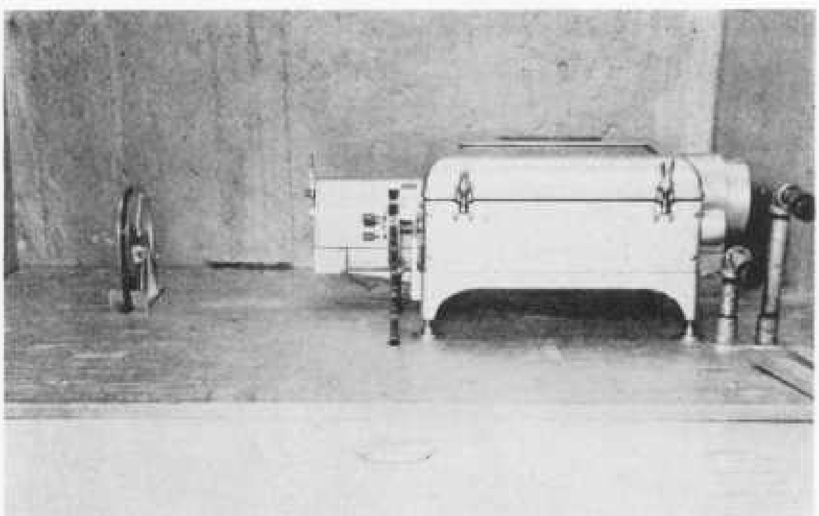
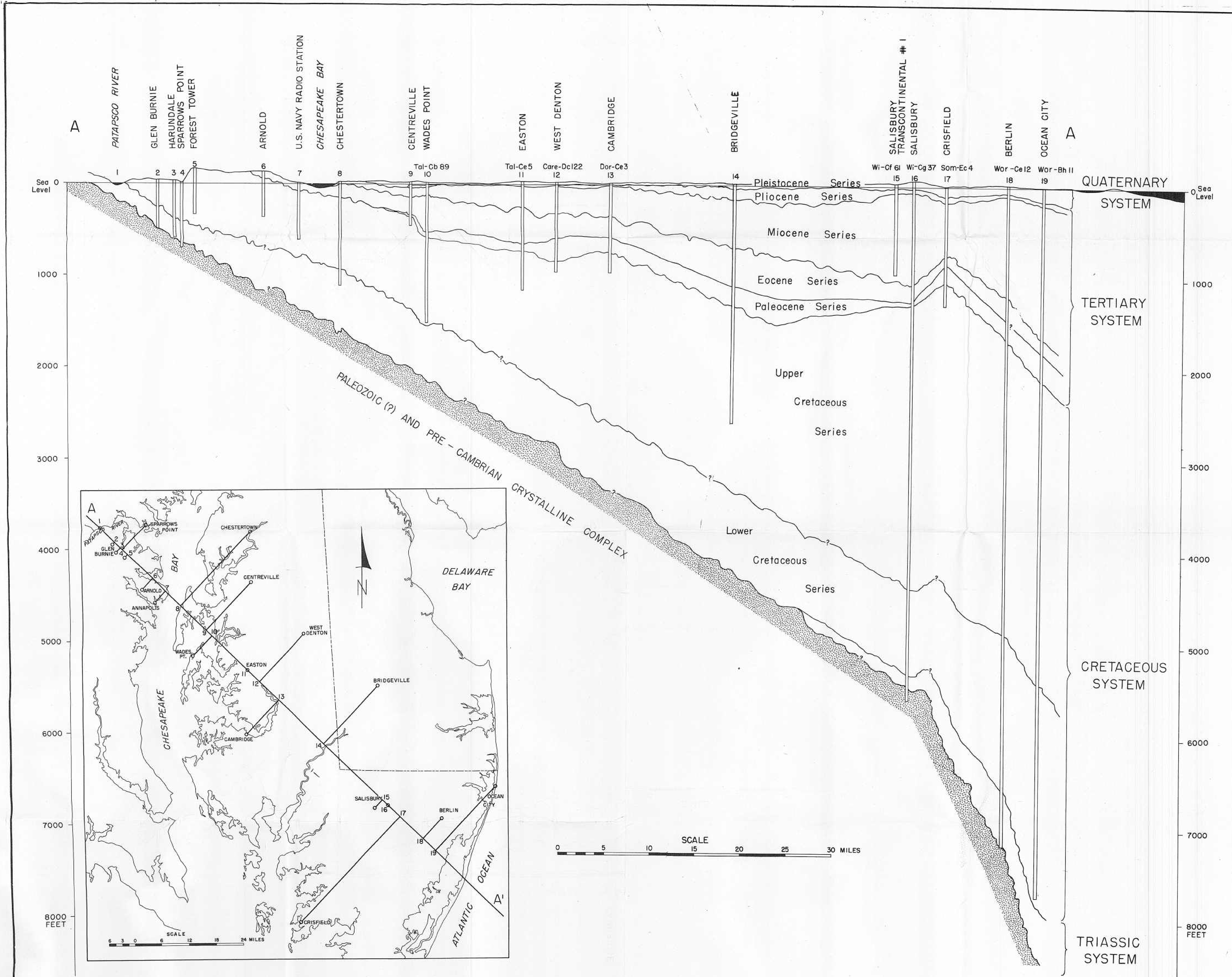


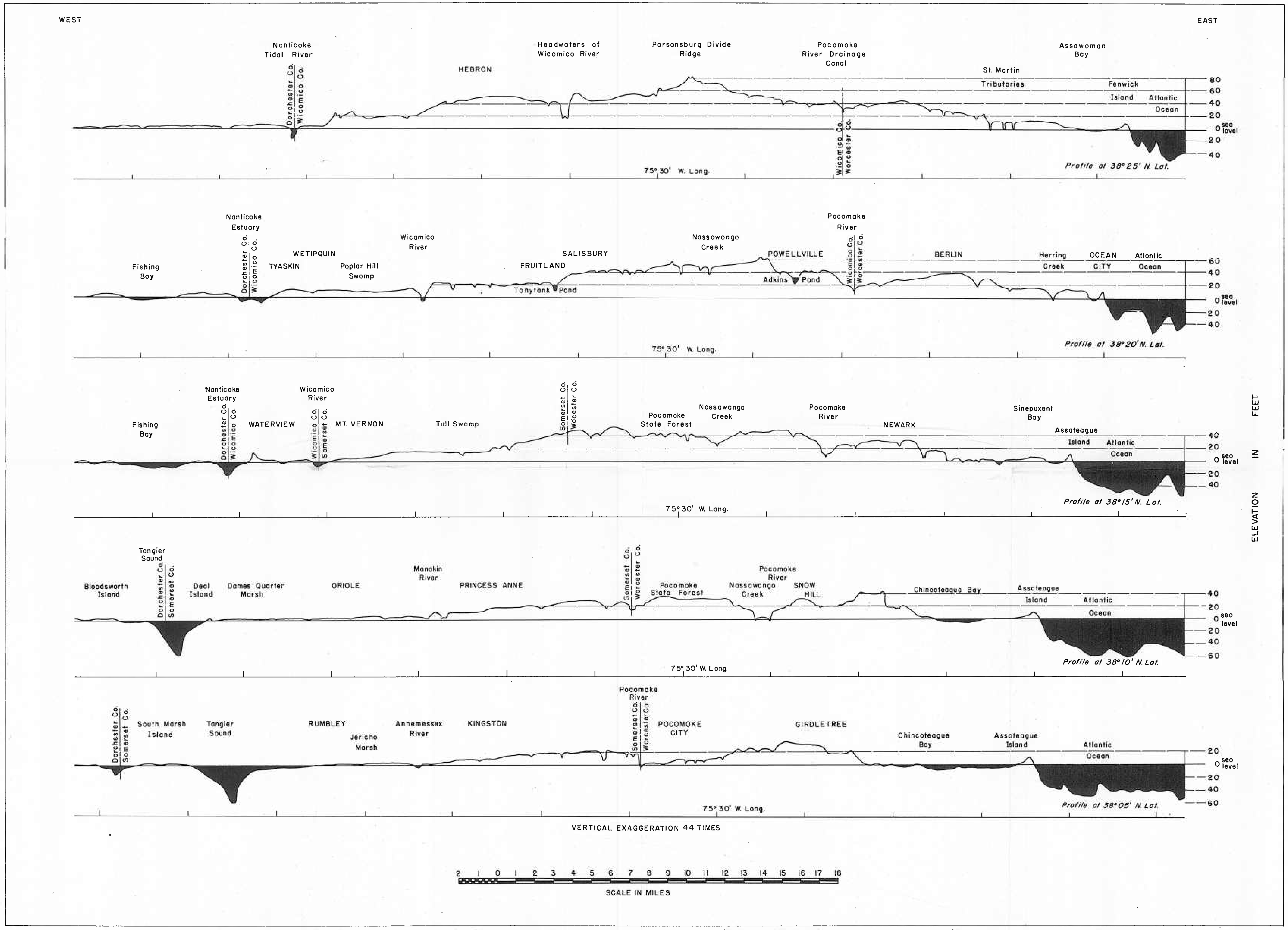
FIGURE 2. Automatic Water-Stage Recorder with Reference Tape Gage and Intake-Flushing Valve Handles in Gage House

AUTHOR INDEX

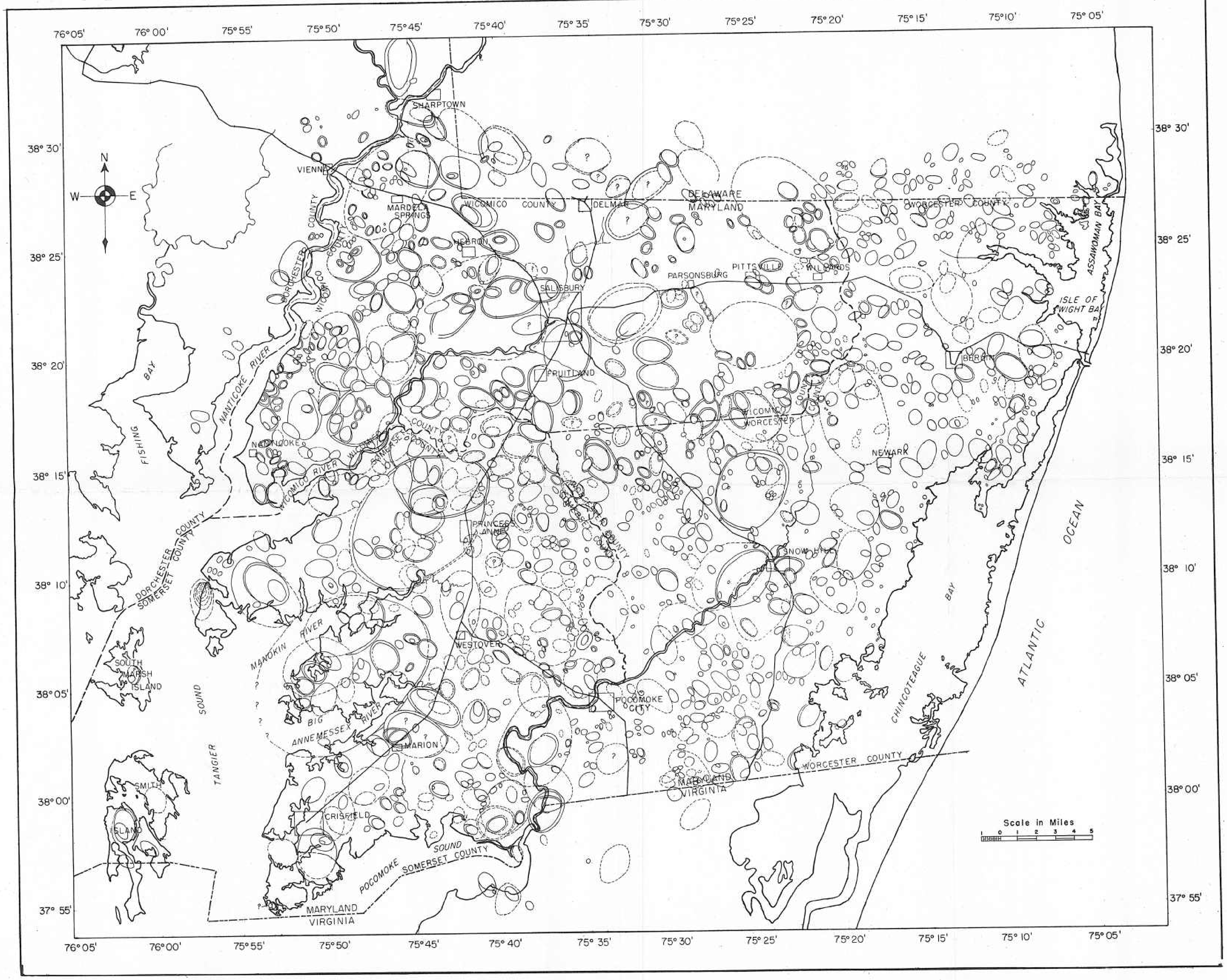
SUBJECT INDEX



GEOLOGIC SECTION OF TERTIARY AND CRETACEOUS SEDIMENTS FROM THE PATAPSCO RIVER, SOUTH OF HALETHORPE, BALTIMORE COUNTY TO THE ATLANTIC OCEAN, WORCESTER COUNTY



PROFILES ACROSS SOMERSET, WICOMICO, AND WORCESTER COUNTIES ON 5-MINUTE LATITUDE LINES SHOWING TERRACES AND STREAM CHANNELS



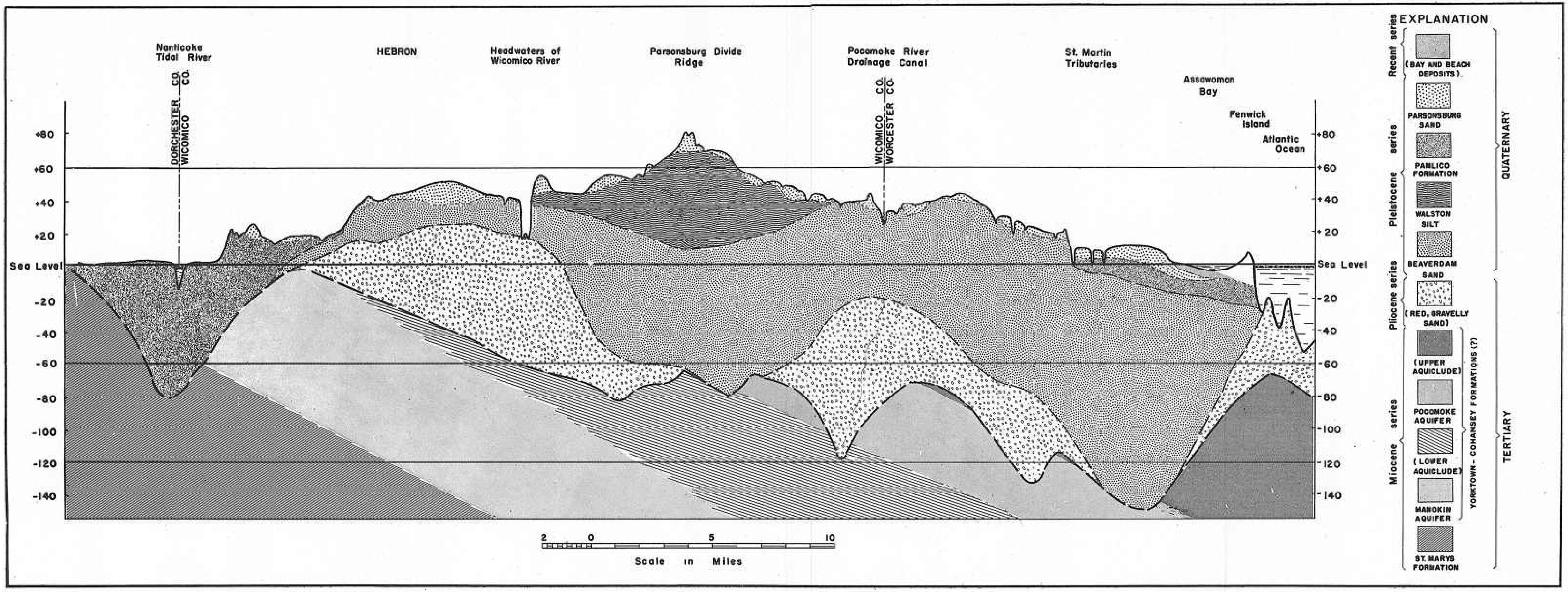
MAP OF SOMERSET, WICOMICO, AND WORCESTER COUNTIES, SHOWING CHLORIDE CONTENT IN THE MANOKIN AQUIFER AND LOCATION OF WELLS FROM WHICH WATER SAMPLES HAVE BEEN ANALYZED

ELECTRIC LOG–MINERAL–FAUNAL CORRELATIONS

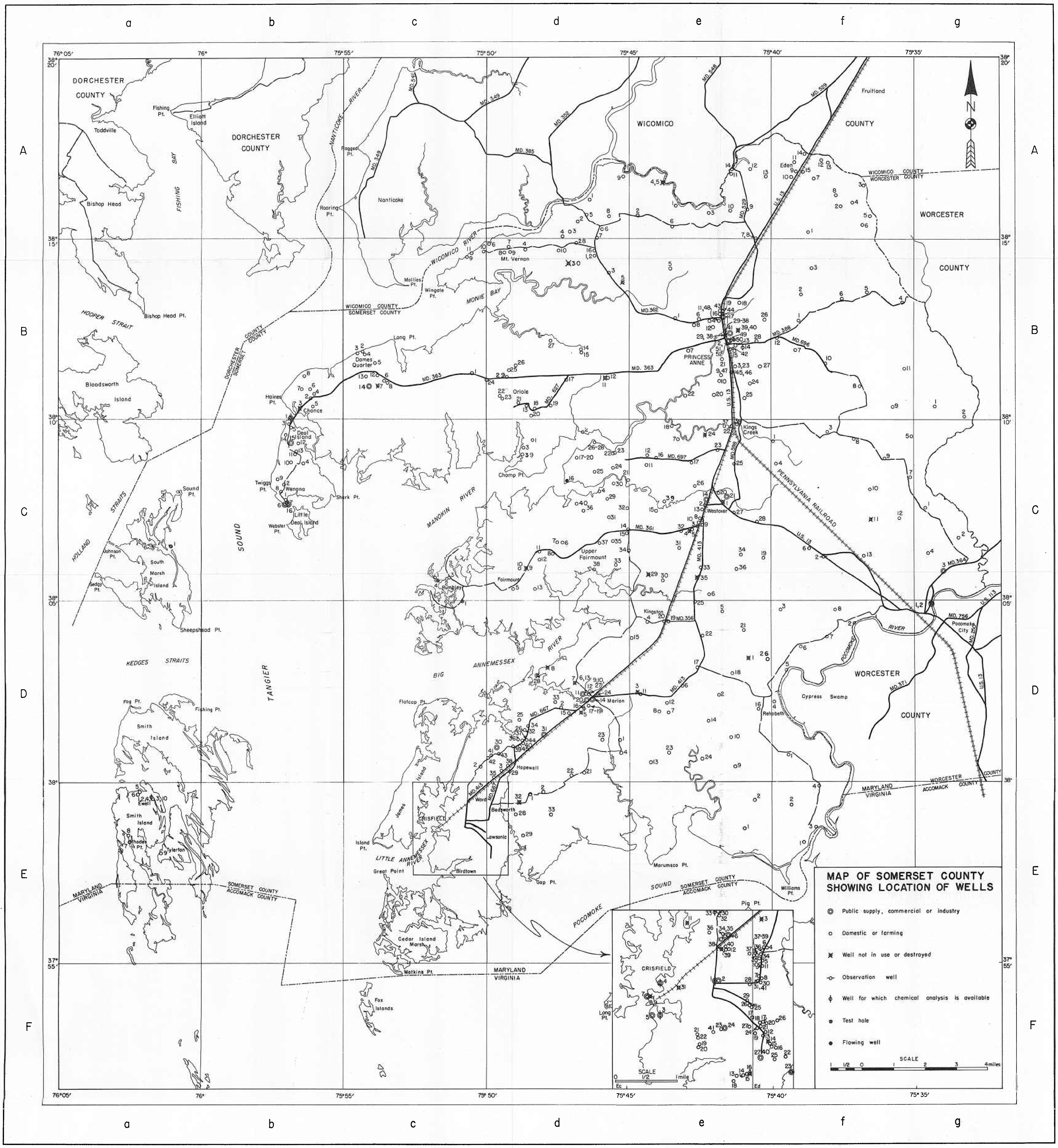
DEEP TESTS–EASTERN SHORE of MARYLAND

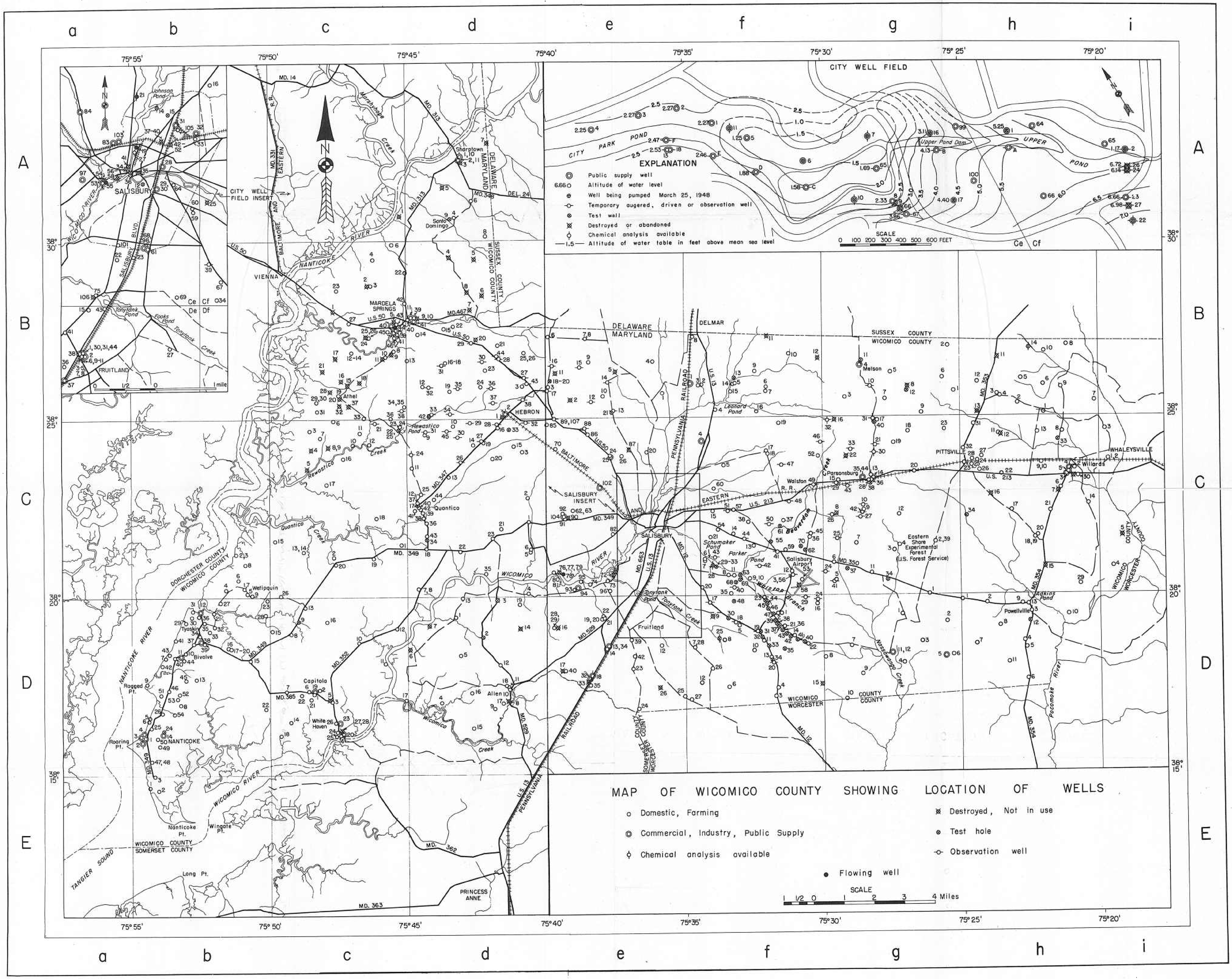
Adapted from
J. L. Anderson (1948, fig. 20)

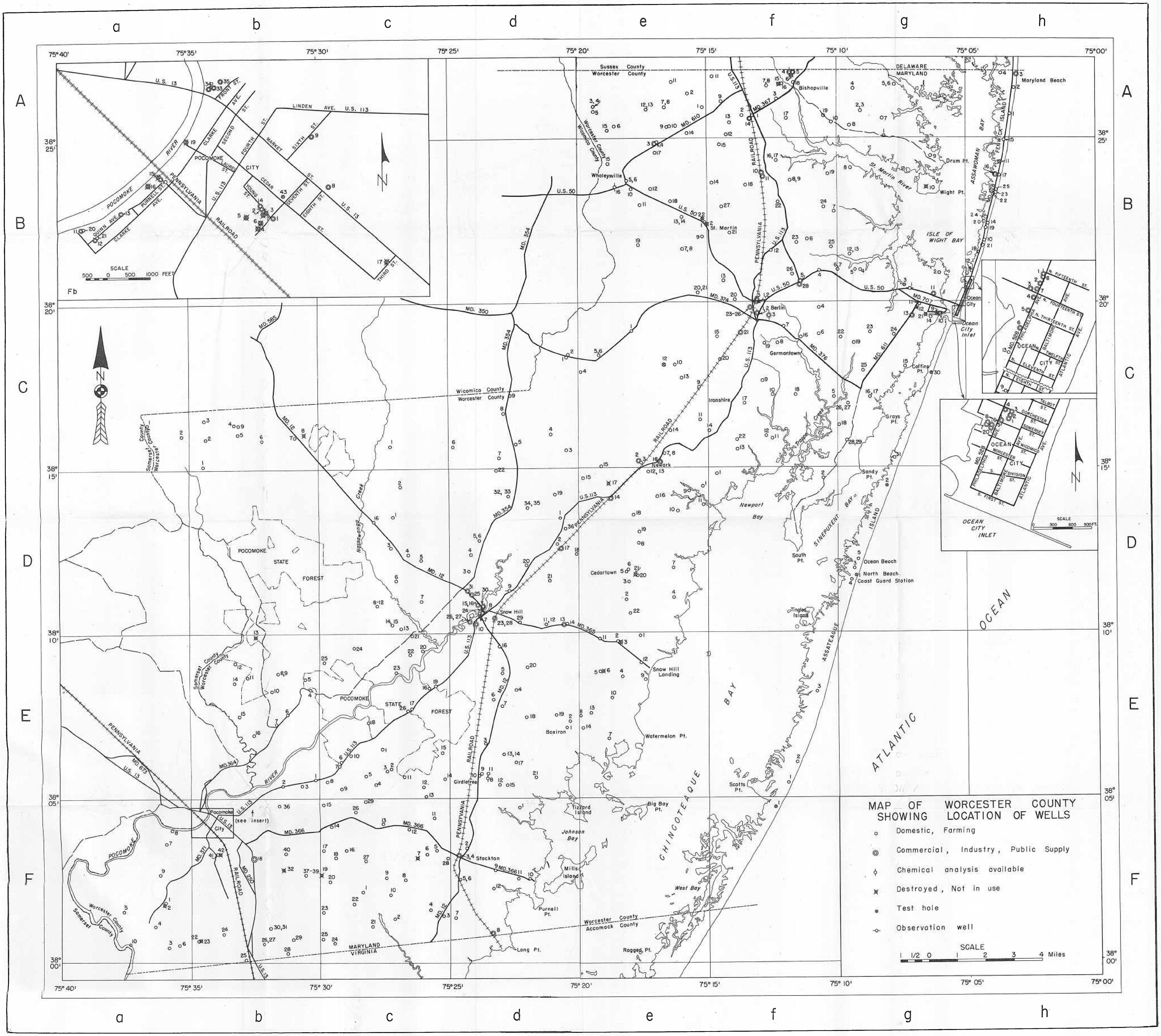
GRAPH SHOWING ELECTRIC LOGS, MINERAL AND FAUNAL CORRELATIONS, DEEP TESTS IN WICOMICO AND WORCESTER COUNTIES

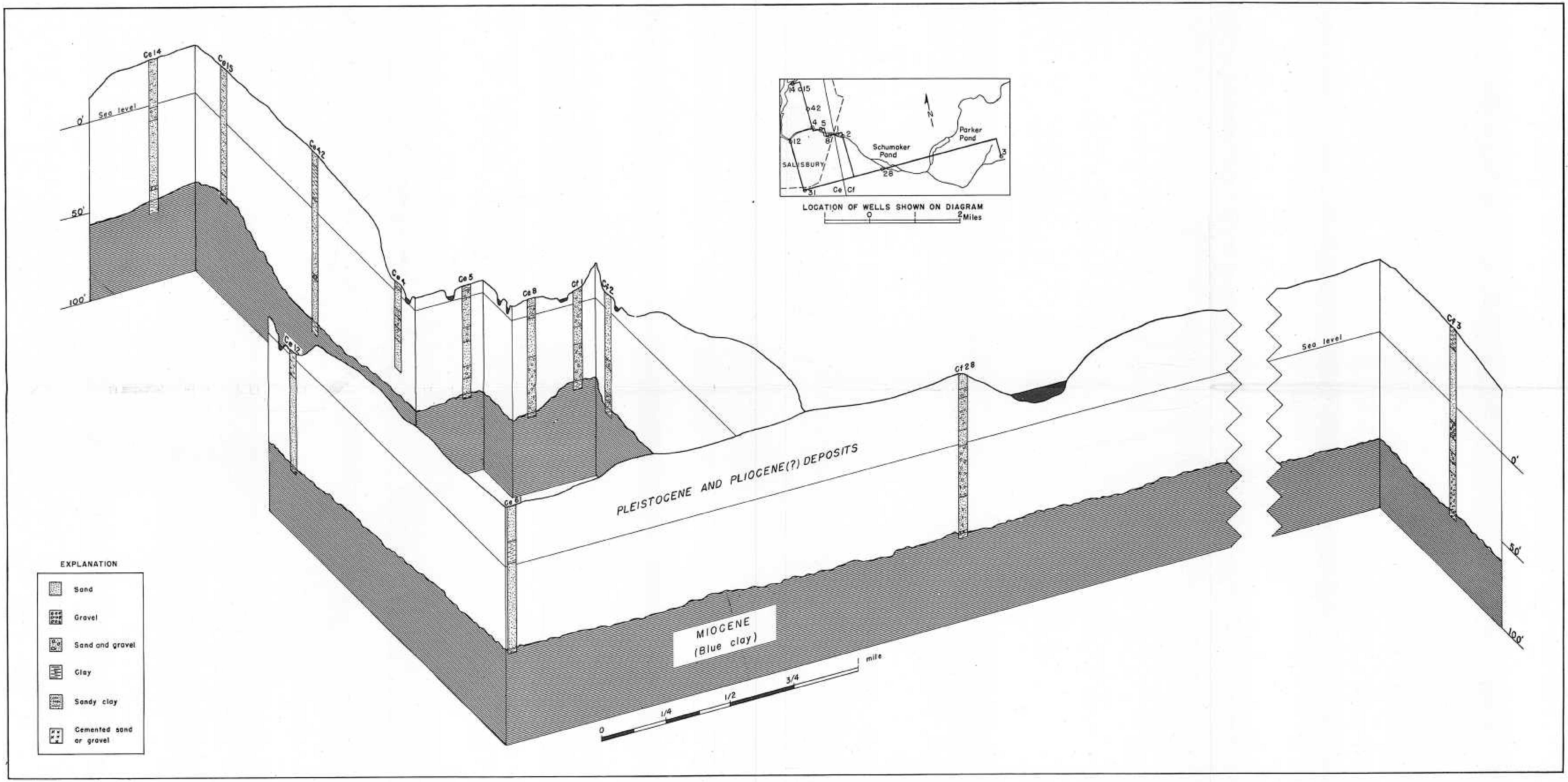


GENERALIZED GEOLOGICAL CROSS SECTION OF THE PLEISTOCENE AND PLIOCENE(?) FORMATIONS AND THE UPPER MIOCENE SERIES IN WICOMICO AND WORCESTER COUNTIES ALONG LATITUDE 38° 25′ N

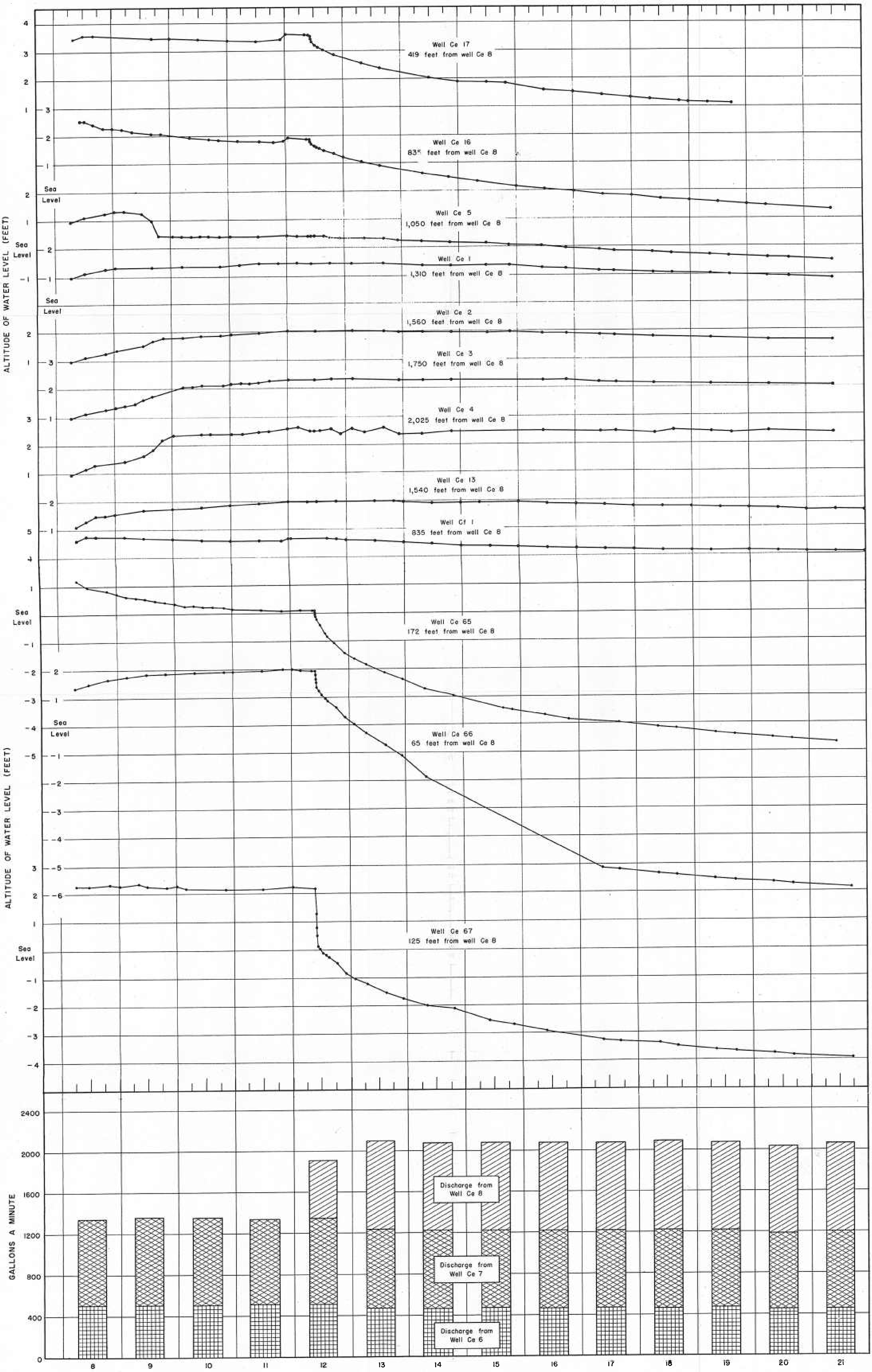

MAP OF SOMERSET COUNTY
SHOWING LOCATION OF WELLS
Public supply, commercial or industry
Domestic or farming
Well not in use or destroyed
Observation well
Well for which chemical analysis is available
Test hole
Flowing well
SCALE
4 miles
DORCHESTER COUNTY
WICOMICO COUNTY
WORCESTER COUNTY
CRISFIELD
PRINCESS ANNE
Fruitland
Eden
Mt. Vernon
Deal Island
Smith Island
Ewell
Tylerton
Kingston
Westover
Marion
Hopewell
Rehobeth
Pocomoke City
TANGIER SOUND
POCOMOKE SOUND
MANOKIN RIVER
BIG ANNEMESSEX RIVER
LITTLE ANNEMESSEX RIVER
WICOMICO RIVER
POCOMOKE RIVER
PENNSYLVANIA RAILROAD
MARYLAND VIRGINIA
SOMERSET COUNTY ACCOMACK COUNTY


MAP OF WICOMICO COUNTY SHOWING LOCATION OF WELLS
Domestic, Farming
Commercial, Industry, Public Supply
Chemical analysis available
Destroyed, Not in use
Test hole
Observation well
Flowing well
SCALE
1 1/2 0 1 2 3 4 Miles
CITY WELL FIELD
EXPLANATION
Public supply well
Altitude of water level
Well being pumped March 25, 1948
Temporary augered, driven or observation well
Test well
Destroyed or abandoned
Chemical analysis available
Altitude of water table in feet above mean sea level
SCALE
0 100 200 300 400 500 600 FEET
CITY PARK POND
UPPER POND
Upper Pond Dam
SALISBURY
FRUITLAND
CITY WELL FIELD INSERT
SALISBURY INSERT
DELAWARE
MARYLAND
SUSSEX COUNTY
WICOMICO COUNTY
DORCHESTER COUNTY
WORCESTER COUNTY
SOMERSET COUNTY
NANTICOKE RIVER
WICOMICO RIVER
TANGIER SOUND
VIENNA
MARDELA SPRINGS
SHARPTOWN
HEBRON
DELMAR
PITTSVILLE
WHALEYSVILLE
WILLARDS
PARSONSBURG
QUANTICO
ALLEN
NANTICOKE
PRINCESS ANNE
75°55' 75°50' 75°45' 75°40' 75°35' 75°30' 75°25' 75°20'
38° 30' 38° 25' 38° 20' 38° 15'
a b c d e f g h i
A B C D E

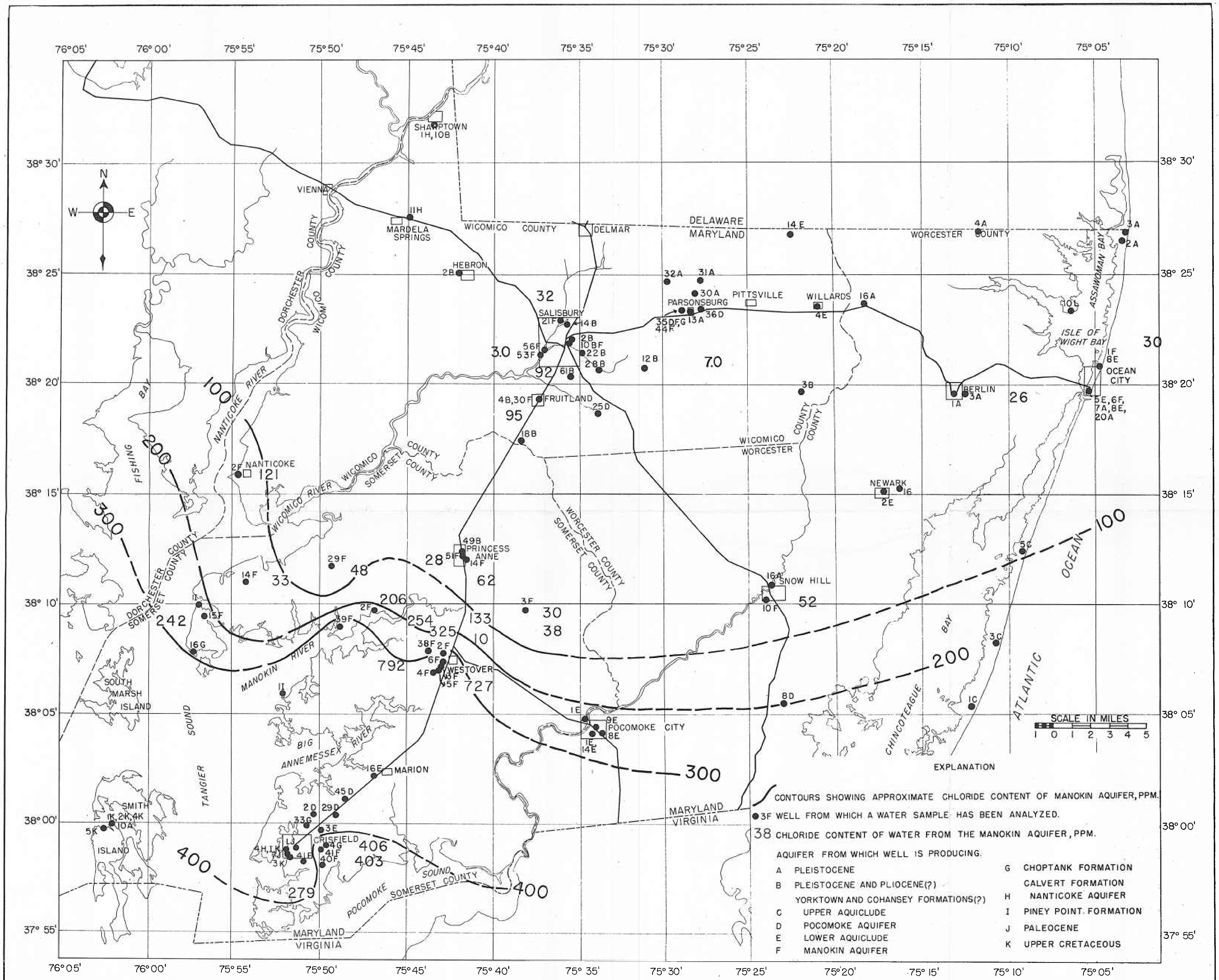

MAP OF WORCESTER COUNTY SHOWING LOCATION OF WELLS
Domestic, Farming
Commercial, Industry, Public Supply
Chemical analysis available
Destroyed, Not in use
Test hole
Observation well
SCALE
1 1/2 0 1 2 3 4 Miles
Sussex County
Worcester County
DELAWARE
MARYLAND
Wicomico County
Worcester County
Somerset County
Worcester Accomack County
MARYLAND
VIRGINIA
Bishopville
Maryland Beach
Wholeysville
St. Martin
Berlin
Germantown
Ocean City
Ocean City Inlet
Newark
Ironshire
Cedartown
Snow Hill
Snow Hill Landing
Girdletree
Stockton
Boxiron
Pocomoke City
Purnell Pt.
Long Pt.
Ragged Pt.
Big Bay Pt.
Scotts Pt.
Watermelon Pt.
Tizzard Island
Johnson Bay
Mills Island
West Bay
Tingles Island
South Pt.
Sandy Pt.
Grays Pt.
Collins Pt.
Drum Pt.
Wight Pt.
Ocean Beach
North Beach Coast Guard Station
ISLE OF WIGHT BAY
ASSAWOMAN BAY
FENWICK ISLAND
Newport Bay
SINEPUXENT BAY
ASSATEAGUE ISLAND
CHINCOTEAGUE BAY
ATLANTIC OCEAN
St. Martin River
Trappe Creek
Nassawango Creek
POCOMOKE RIVER
POCOMOKE STATE FOREST
PENNSYLVANIA RAILROAD
U.S. 13
U.S. 50
U.S. 113
MD. 12
MD. 354
MD. 350
MD. 365
MD. 366
MD. 367
MD. 374
MD. 376
MD. 589
MD. 610
MD. 611
MD. 707
LINDEN AVE.
MARKET ST.
SIXTH ST.
SEVENTH ST.
EIGHTH ST.
FRONT ST.
CLARKE AVE.
SECOND ST.
FOURTH ST.
CEDAR ST.
YOUNG ST.
DUNN AVE.
PURNELL ST.
THIRD ST.
SCALE
500 0 500 1000 FEET
Fb
OCEAN CITY
BALTIMORE AVE.
PHILADELPHIA AVE.
ATLANTIC AVE.
OCEAN CITY INLET
SCALE
0 300 600 900 FT.
75° 40'
75° 35'
75° 30'
75° 25'
75° 20'
75° 15'
75° 10'
75° 05'
75° 00'
38° 25'
38° 20'
38° 15'
38° 10'
38° 05'
38° 00'
a b c d e f g h
A B C D E F



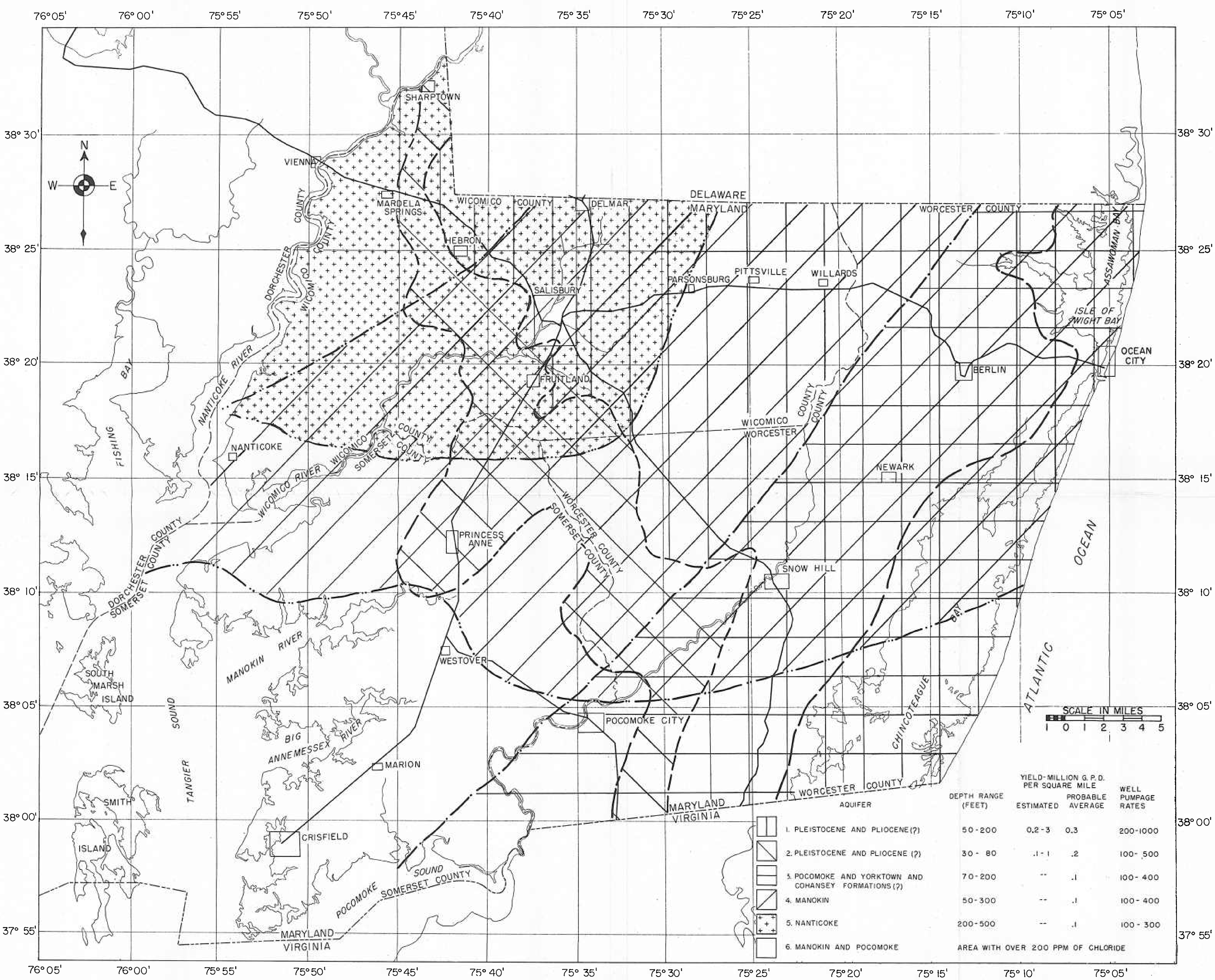
SECTIONAL DIAGRAM SHOWING THICKNESS OF PLEISTOCENE AND PLIOCENE(?) AQUIFER IN THE VICINITY OF SALISBURY



GRAPH OF PUMPAGE OF SALISBURY WELLS WI-CE 6, 7, AND 8, AND DRAWDOWN OF OBSERVATION WELLS, NOVEMBER, 1947



MAP OF SOMERSET, WICOMICO, AND WORCESTER COUNTIES, SHOWING PATTERN OF MARYLAND BASINS



MAP OF GROUND-WATER POTENTIALITIES IN SOMERSET, WICOMICO AND WORCESTER COUNTIES